These are the BibTex references that were manually created from the International Medical Informatics Association (IMIA) Yearbook of Medical Informatics Table of Contents for 1992 to 2005. In total there are 892 references.

The references are in the BibTex format and when possible the abstract was added (from searching PubMed). In the abstract we added "Reprinted from:" and the short reference of the actual paper.

Note:
a) Since this information was derived only from the Table of Contents the page numbers may be off (i.e. blank pages separating articles), so it would be useful if someone would examine the physical IMIA Yearbook of Medical Informatics books and check the page numbers.
b) Since Optical Character Recognition (OCR) was used in converting the scanned pages to text there may be some errors.

For further contact information: Dean Yergens (dyergens@ucalgary.ca)

IMIA 1992 BibTex

@article{IMIA199201,
    author = {Willems JL},
    title = {Preface},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {},
    abstract = {},
    note = {}
}

@article{IMIA199202,
    author = {Anonymous},
    title = {Editorial Advances in an Interdisciplinary Science},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {},
    abstract = {},
    note = {}
}

@article{IMIA19921,
    author = {IMIA},
    title = {IMIA Societies, Working Groups & Conferences},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {},
    abstract = {},
    note = {}
@article{IMIA19924,
  author = {van Bemmel JH, McCray AT},
  title = {Introduction},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {4},
  abstract = {},
  note = {}
}

@article{IMIA199259,
  author = {Rector AL, Nowlan WA, Kay S},
  title = {Foundations for an Electronic Medical Record},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {59-66},
  abstract = {Given the many efforts currently under way to develop standards for electronic medical records, it is important to step back and reexamine the fundamental principles which should underlie a model of the electronic medical record. This paper presents an analysis based on the experience in developing the PEN & PAD prototype clinical workstation. The fundamental contention is that the requirements for a medical record must be grounded in its use for patient care. The basic requirement is that it be a faithful record of what clinicians have heard, seen, thought, and done. The other requirements for a medical record, e.g., that it be attributable and permanent, follow naturally from this view. We use the criteria developed to re-examine Weed's Problem Oriented Medical Record and also relate the criteria to secondary uses of the medical record for population data, communications and decision support. Reprinted from: Methods Inf Med 1991;30:179-86},
  note = {Methods Inf Med 1991;30:179-86}
}

@article{IMIA199267,
  author = {Jick H, Jick SS, Derby LE},
  title = {Validation of information recorded on general practitioner based computerised data resource in the United Kingdom},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {67-69},
  abstract = {OBJECTIVE:To determine the extent of agreement between clinical information recorded on surgery computers of selected general practitioners and similar information in manual records of letters received from hospital consultants and kept in the general practitioners' files.}
DESIGN: Hospital consultants' letters in the manual records of selected general practitioners were photocopied and the consultants' clinical diagnoses were compared with diagnoses recorded on computer. SETTING: General practices in the United Kingdom using computers provided by VAMP Health for recording clinical information. SUBJECTS: 2491 patients who received one of three non-steroidal anti-inflammatory drugs and who attended 58 practices whose computer recorded data were considered after a preliminary review to be of satisfactory quality. RESULTS: Among 1191 patients for whom consultants' letters were forwarded a clinical diagnosis reflecting the diagnosis noted on a consultant letter was present on the computer record for 1038 (87%). CONCLUSION: Clinical information available on the computer records of the general practitioners who participated in this study is satisfactory for many clinical studies. Reprinted from: Br Med J 1991;302:766-8,

note ={Br Med J 1991;302:766-8}

@article{IMIA199270,
author = {Johnson N, Mant D, Jones L, Randall T},
title = {Use of computerised general practice data for population surveillance: Comparative study of influenza data},
journal = {IMIA Yearbook of medical informatics},
volume = {1992},
year = {1992},
pages = {70-72},
abstract = {OBJECTIVE: To assess the potential for using routine computerised general practice data for surveillance of illness. DESIGN: Comparison of the incidence of influenza during the 1989 epidemic derived from a computerised database with that derived from the Royal College of General Practitioners's weekly returns service--a well established predominantly manual surveillance system. SETTING: 433 general practices throughout the United Kingdom that used a commercial computer system linked to a central databank. MAIN OUTCOME MEASURE: Incidence of influenza. RESULTS: The slope of the influenza epidemic curve was essentially the same whether derived from the routine computerised data or royal college's weekly returns service data, and the computerised data were geographically consistent. Throughout the study period, however, the computer derived incidence was between one third and one quarter of that derived from the royal college's system (which is served by practitioners trained in surveillance methods). The peak weekly rates were 164 cases per 100,000 for the computerised system and 583 cases per 100,000 for the royal college's surveillance system. CONCLUSIONS: The apparent underreporting in the routine computerised data probably reflects lack of motivation and experience in disease surveillance and haphazard computer entry (particularly of consultations that took place outside of the surgery and consultations that did not result in a prescription), along with overestimation of the population under surveillance. Nevertheless, routine computerised surveillance allows rapid data collection from a large number of practices over a wide geographical area and would greatly augment existing methods. Reprinted From: Br Med J 1991;302:763-5},

note = {Br Med J 1991;302:763-5}

@article{IMIA1992173,
author = {Ornstein SM, Garr DR, Jenkins RG, Rust PF, Arnon A},
title = {Computer-generated physician and patient reminders. Tools to improve population adherence to selected preventive services},
Despite an emerging consensus on appropriate preventive services, a minority of patients receive them. A study was undertaken to assess the impact of computer-generated reminders to adult patients, their physicians, or both patients and physicians on adherence to five recommended preventive services: cholesterol measurements, fecal occult blood testing, mammography, Papanicolaou smears, and tetanus immunization. During the academic year 1988-1989, all 7397 adult patients and their 49 physicians in a university family medicine clinical practice were randomized by practice group into one of four study groups: control, physician reminders, patient reminders, and both physician and patient reminders. Adherence was defined in community-oriented terms: the percentage of patients within each group who had received the preventive service in the recommended interval. During the study period, adherence to four of the five preventive services increased significantly, with the largest increases in the physician and patient reminder group: cholesterol measurements increased from 19.5% to 38.1%, fecal occult blood testing 9.3% to 27.0%, mammography 11.4% to 27.1%, and tetanus immunization 23.4% to 35.4% (for each increase, P less than .0001, McNemar's chi-square test). In general, increases were greater in blacks and in patients with any form of insurance coverage. Computer-based physician and patient reminder systems have great promise of improving adherence to preventive services in primary care settings. Reprinted From: J Fam Pract 1991;32:82-90.

Software to perform record linkage should have several characteristics: (1) portability in being able to function with researchers' current arrangement of computer systems and languages, (2) flexibility in handling different linkage strategies, and (3) low cost in both computer time and researchers' efforts. A linkage package (LINKS) is described which satisfies these criteria; LINKS provides tools for both deterministic and probabilistic linkage as well as test modules for assessing data quality and structure. Because each linkage project is different, the modular nature of the software allows for better control of the programming process and development of unique strategies. Since the user provides the weights and decision rules, he may modify data between steps and/or develop extra steps to supplement the basic modules. In two information-rich linkage projects involving California AIDS data, LINKS identified mortality using deterministic approaches and permitted comparisons with other software and strategies. Flexible software and a deterministic approach would have eliminated the expensive key entry used to add full names and social security numbers as additional identifiers to one of the California data files. Reprinted From: Methods Inf Med 1991;30:210-4.
The Nursing Minimum Data Set (NMDS) represents the first attempt to standardize the collection of essential nursing data. These minimum core data, used on a regular basis by the majority of nurses in the delivery of care across settings, can provide an accurate description of nursing diagnoses, nursing care, and nursing resources used. Collected on an ongoing basis, a standardized nursing data base will enable nurses to compare data across populations, settings, geographic areas, and time. Public health nurses will be able to evaluate and compare services. The purpose of this article is to discuss briefly the following aspects of the NMDS: background including definition, purposes, and elements; availability and reliability of the data; benefits; implications of the NMDS with emphasis on nursing research; and health policy decision making. Reprinted from: Am J Public Health 1991;81:421-6.

OBJECTIVE: To develop a new method to improve the detection and characterization of adverse drug events (ADEs) in hospital patients. DESIGN: Prospective study of all patients admitted to our hospital over an 18-month period. SETTING: LDS Hospital, Salt Lake City, Utah, a 520-bed tertiary care center affiliated with the University of Utah School of Medicine, Salt Lake City. PATIENTS: We developed a computerized ADE monitor, and computer programs were written using an integrated hospital information system to allow for multiple source detection of potential ADEs occurring in hospital patients. Signals of potential ADEs, both voluntary and automated, included sudden medication stop orders, antidote ordering, and certain abnormal laboratory values. Each day, a list of all potential ADEs from these sources was generated, and a pharmacist reviewed the medical records of all patients with possible ADEs for accuracy and causality. Verified ADEs were characterized as mild, moderate, or severe and as type A (dose-dependent or predictable) or type B (idiosyncratic or allergic) reactions, and causality was further measured using a standardized scoring method. OUTCOME MEASURE: The number and characterization of ADEs detected. RESULTS: Over 18 months, we monitored 36,653 hospitalized patients. There were 731 verified ADEs identified in 648 patients, 701 ADEs were characterized as moderate or severe, and 664 were classified as type A reactions. During this same period, only nine ADEs were identified using traditional detection methods. Physicians, pharmacists, and nurses voluntarily reported 92 of the 731 ADEs detected using this automated system. The other 631 ADEs were detected from automated signals, the most common of which were diphenhydramine hydrochloride and naloxone hydrochloride use, high serum drug levels, leukopenia, and the use of phytonadione and anti-diarrheals. The most common symptoms and signs were pruritus, nausea and/or vomiting, rash, and confusion-lethargy. The most common drug classes involved were analgesics, anti-infectives, and cardiovascular agents. CONCLUSION: We believe that screening for ADEs with a computerized hospital information system offers a potential method for improving the detection and characterization of these events in hospital patients. Reprinted From: JAMA 1991;266:2847-51.
BACKGROUND: Despite much evidence that modifying risk factors for coronary heart disease can decrease morbidity and mortality, little is known about the impact of risk-factor modification on life expectancy. METHODS AND RESULTS: We used the Coronary Heart Disease Policy Model, a state-transition computer simulation of the US population, to forecast potential gains in life expectancy from risk-factor modification for the cohort of Americans turning age 35 in 1990. Among 35-year-old men, we projected that the population-wide increase in life expectancy would be about 1.1 years from strict blood pressure control, 0.8 years from smoking cessation, 0.7 years from reduction of serum cholesterol to 200 mg/dl, and about 0.6 years from weight loss to ideal body weight. For women, reducing cholesterol to 200 mg/dl would have the greatest estimated impact—a gain of 0.8 years—whereas smoking cessation, blood pressure control, or weight loss would yield population-wide gains of 0.7, 0.4, and 0.4 years, respectively. Gains for 35-year-old individuals having a given risk factor are greater. We estimate that, on average, male smokers would gain 2.3 years from quitting smoking; males with hypertension would gain 1.1-5.3 years from reducing their diastolic blood pressure to 88 mm Hg; men with serum cholesterol levels exceeding 200 mg/dl would gain 0.5-4.2 years from lowering their serum cholesterol level to 200 mg/dl; and overweight men would gain an average of 0.7-1.7 years from achieving ideal body weight. Corresponding projected gains for at-risk women are 2.8 years from quitting smoking, 0.9-5.7 years from lowering blood pressure, 0.4-6.3 years from decreasing serum cholesterol, and 0.5-1.1 years from losing weight. Eliminating coronary heart disease mortality is estimated to extend the average life expectancy of a 35-year-old man by 3.1 years and a 35-year-old woman by 3.3 years. CONCLUSIONS: Population-wide gains in life expectancy from single risk-factor modifications are modest, but gains to individuals at risk can be more substantial. Reprinted From: Circulation 1991;83:1194-201.
times through the use of blood pools. Advanced features of the SPSL were used to develop variants of the basic model to simulate feedback-controlled isoflurane administration, nitrous oxide uptake, and the impact of a nonlinearity by incorporating the effect of enflurane on cardiac output. Two variants were concatenated to form a multiple model showing the concentration and second-gas effects. The model was capable of reproducing the anesthetic uptake from previous experimental studies for nitrous oxide. After its validation for other anesthetic agents, the model can be used for clinical, teaching, and research purposes. The SPSL freed the authors from the problems associated with computer programming and allowed them to concentrate on the structure of the model.

Reprinted From: Anesthesiology 1991;75:345-55,

note = {Anesthesiology 1991;75:345-55}

@article{IMIA1992120,
    author = {Popp H-J, Schecke T, Rau G, Kasmacher H, Kalf G},
    title = {An interactive computer simulator of the circulation for knowledge acquisition in cardio-anesthesia},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {120-127},
    abstract = {Knowledge-based decision support systems for use in cardio-anesthesia can provide online support to the anesthesiologist by generating intelligent alarms. However, the acquisition and validation of a consistent knowledge base for this application bears problems related to the transfer of clinical experiences into a rule system. An interactive simulator of the human circulation is presented that supports the process of knowledge acquisition and testing. The simulator can be controlled in realtime by an anesthesiologist during the simulation run thus providing a basis for interdisciplinary discussion of routine as well as critical situations. The output data can be transferred to a knowledge-based system for test purposes. The simulator is currently being used for the development of the Anesthesia Expert Assist System AES-2. With regard to the special application a model of the heart-function was integrated which enables the simulation of heart insufficiency. Simulation runs under various conditions are presented and discussed. The simulator was implemented on an ATARI ST personal computer. Reprinted From: Int J Clin Monit Comput 1991;8:151-8},
    note = {Int J Clin Monit Comput 1991;8:151-8}
}

@article{IMIA1992128,
    author = {Gelsema ES, Leijnse B, Wulkan RW},
    title = {A multi-dimensional analysis of three chemical quantities in the blood},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {128-139},
    abstract = {A three-dimensional model for the analysis of the three quantities pH, pCO2 and base excess (BE), as measured in arterial blood, is presented. Whereas the conventional analysis of these quantities relies on reference regions as established from the univariate distributions, treating the quantities as uncorrelated, the present model estimates the parameters of the three-dimensional reference region from a sample of observations, based on the assumption that the observations inside the reference region follow a multi-dimensional Gaussian distribution. For observations outside the reference region, reference directions are established, corresponding to the conventionally defined specific states of acid-base disturbances. This leads to a new classification
model, the results of which are compared to those of the conventional model. Reprinted From: Med Inf (Lond) 1991;16:43-54,

note = {Med Inf (Lond) 1991;16:43-54}

@article{IMIA1992140,
    author = {Dawes GS, Moulden M, Redman CW},
    title = {The advantages of computerized fetal heart rate analysis},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {140-146},
    abstract = {A brief account is given of the advantages of computerized analysis of human fetal heart rate (FHR) traces antenatally, based on clinical use over 8 years. Accuracy is greater. Results are presented quantitatively and consistently. The numerical measures of the FHR pattern are related to other objective measures of fetal health, e.g. initial compensated hypoxaemia or terminal acidaemia. Computerized analysis has shown that changes in FHR variation are a better guide than the presence or absence of large decelerations. Recording time is used better. Synoptic displays of data over 4 weeks show significant trends in fetal heart rate variation and movements with time. And the problems generated by the limitations of fetal heart rate monitors are identified to exclude spurious information. Reprinted From: J Perinat Med. 1991;19:39-45},
}

@article{IMIA1992147,
    author = {Kudenchuk PJ, Ho MT, Weaver WD, Litwin PE, Martin JS, Eisenberg MS, Hallstrom AP, Cobb LA, Kennedy JW},
    title = {Accuracy of computer-interpreted electrocardiography in selecting patients for thrombolytic therapy},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {147-152},
    abstract = {A prehospital computer-interpreted electrocardiogram (ECG) was obtained in 1,189 patients with chest pain of suspected cardiac origin during an ongoing trial of prehospital thrombolytic therapy in acute myocardial infarction. Electrocardiograms were performed by paramedics 1.5 +/- 1.2 h after the onset of symptoms. Of 391 patients with evidence of acute myocardial infarction, 202 (52%) were identified as having ST segment elevation (acute injury) by the computer-interpreted ECG compared with 259 (66%) by an electrocardiographer (p less than 0.001). Of 798 patients with chest pain but no infarction, 785 (98%) were appropriately excluded by computer compared with 757 (95%) by an electrocardiographer (p less than 0.001). The positive predictive value of the computer- and physician-interpreted ECG was, respectively, 94% and 86% and the negative predictive value was 81% and 85%. Prehospital screening of possible candidates for thrombolytic therapy with the aid of a computerized ECG is feasible, highly specific and with further enhancement can speed the care of all patients with acute myocardial infarction. Reprinted from: J Am Coll Cardiol 1991;17:1486-91},
    note = {J Am Coll Cardiol 1991;17:1486-91}
}
Recognition of the speech of severely dysarthric individuals requires a technique which is robust to extraordinary conditions of high variability and very little training data. A hidden Markov model approach to isolated word recognition is used in an attempt to automatically model the enormous variability of the speech, while signal preprocessing measures and model modifications are employed to make better use of the existing data. Two findings are contrary to general experience with normal speech recognition. The first is that an ergodic model is found to outperform a standard left-to-right (Bakis) model structure. The second is that automated clipping of transitional acoustics in the speech is found to significantly enhance recognition. Experimental results using utterances of cerebral palsied persons with an array of articulatory abilities are presented.

The capability of two enhancement techniques to improve recognition of images by patients with central scotoma or cataracts was evaluated using image-processing simulations and direct patient testing. Enhancements and simulations were based on measurements of contrast sensitivity loss for patients with macular disease. Contrast sensitivity loss was measured using Gabor-type localized stimuli and paradigms that are appropriate for analyzing form perception. The simulations using the contrast sensitivity data suggested that patients with moderate visual loss (20/70-20/200) may have difficulty recognizing faces and may benefit from enhancement by both of the techniques used. Ability to recognize celebrities from enhanced images improved for 39 of the 46 patients tested. The improvement was significant (P less than 0.05) for 16 of the 38 patients with central visual loss and for 3 of 8 patients with anterior segment media opacities tested. The simulations suggest that the benefits of image enhancement may be similar or even greater for recognition of other types of images. Reprinted from: Invest Ophthalmol Vis Sci 1991;32:2337-50.
An objective and quantitative method for the evaluation of the quality of megavoltage portal images was developed by applying receiver operating characteristic analysis. On the basis of therapeutic use of portal images, setup errors were employed as "signals" in this experimental study that compared the original portal films with digitized images. Six readers observed 104 portal images of a chest phantom, half of which were "abnormal" (ie, had setup errors). Digital images (2,048 x 2,048 matrix) were enhanced by means of histogram equalization and then printed with a laser printer for observation. The readers showed a higher discrimination capacity with the digitally enhanced images, although a statistically significant improvement was not demonstrated. The present method of assessment of image quality proved to be both simple and clinically reasonable. Reprinted from: Radiology 1991;181:273-6,

note = {Radiology 1991;181:273-6}

@article{IMIA1992189,
    author = {Garreau M, Coatrieux JL, Collorec R, Chardenon C},
    title = {A knowledge-based approach for 3-D reconstruction and labeling of vascular networks from biplane angiographic projections},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {189-198},
    abstract = {An approach to the three-dimensional reconstruction of coronary arteries is presented. The principal objective is to show how modeling of a vascular network, together with algorithmic procedures, can lead to accurate 3-D structure and feature labeling. The labeling problem is stated directly within the 3-D reconstruction framework. The reconstruction ambiguities inherent to biplane techniques are solved by means of a knowledge base, modeling of the object, and heuristic rules. Feasibility in near-real situations has been demonstrated. The critical importance of the object 3-D reference to achieving the data and modeling matching is emphasized, and a way to deal with it is pointed out. The overall system implies an incremental development in methodologies and experiments. All of them have been elaborated and tested independently, and the most appropriate ones have been selected for integration into a modular system. All the stages of the process (calibration, segmentation, reconstruction, and display) are discussed, with the main focus on modeling. Examples of automatic reconstruction from a phantom are provided. Reprinted from: IEEE T Med Imaging 1991;10:122-31},
}

@article{IMIA1992199,
    author = {Vesely I, Eickmeier B, Campbell G},
    title = {Automated 3-D reconstruction of vascular structures from high definition casts},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {199-205},
    abstract = {Three-dimensional reconstruction and computer modeling is becoming recognized as a powerful tool for studying vascular structures. The computational approach, as well as the computer hardware selected for the task, however, depend upon the information desired. For
the modeling of surface geometry, as in the case of the aortic valve, a surface formation technique is favorable over the more computationally demanding volume rendering approach. Automated surface formation, however, requires good quality, high contrast images. We therefore present a technique for producing high contrast images from high definition casts. We also describe the methodology used for automatic contour tracing, generating a mesh of variable density, and the schemes used to reconstruct bifurcating objects. With this approach, 98 mbytes of imaging data could be reduced to 180 kbytes of polygon vertices, and manipulated at near real-time speed on a medium performance graphics workstation. Such a system is therefore well suited for detailed, quantitative analyses of the reconstructed structures. Overall, this paper outlines the procedures used to create a high definition, three-dimensional computer model of any vascular structure.

Reprinted from: IEEE T Biomed Eng 1991;38:1123-9,
linguistic descriptions and relations. Knowledge of local intensity change can therefore be deduced from the knowledge of global intensity change through fuzzy reasoning. Reprinted from: IEEE T Med Imaging 1991;10:187-99,

}

@article{IMIA1992223,
  author = {Tahoces PG, Correa J, Souto M, Gonzalez C, Gomez L, Vidal IL},
  title = {Enhancement of chest and breast radiographs by automatic spatial filtering},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {223-228},
  abstract = {The authors present a new algorithm to enhance the edges and contrast of chest and breast radiographs while minimally amplifying image noise. The algorithm consists of a linear combination of an original image and two smoothed images obtained from it by using different masks and parameters, followed by the application of nonlinear contrast stretching. The result is an image which retains the high median frequency local variations (edge and contrast-enhancing). Reprinted from: IEEE T Med Imaging 1991;10:330-5},
}

@article{IMIA1992229,
  author = {MacMahon H, Doi K, Sanada S, Montner SM, Giger ML, Metz CE, Nakamori N, Yin FF, Xu XW, Yonekawa H, Takeuchi H},
  title = {Data compression: effect on diagnostic accuracy in digital chest radiography},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {229-233},
  abstract = {High-resolution digital images make up very large data sets that are relatively slow to transmit and expensive to store. Data compression techniques are being developed to address this problem, but significant image deterioration can occur at high compression ratios. In this study, the authors evaluated a form of adaptive block cosine transform coding, a new compression technique that allows considerable compression of digital radiographs with minimal degradation of image quality. To determine the effect of data compression on diagnostic accuracy, observer tests were performed with 60 digitized chest radiographs (2,048 x 2,048 matrix, 1,024 shades of gray) containing subtle examples of pneumothorax, interstitial infiltrate, nodules, and bone lesions. Radiographs with no compression, with 25:1 compression, and with 50:1 compression ratios were presented in randomized order to 12 radiologists. The results suggest that, with this compression scheme, compression ratios as high as 25:1 may be acceptable for primary diagnosis in chest radiology. Reprinted from: Radiology 1991;178:175-9},
  note = {Radiology 1991;178:175-9}
}

@article{IMIA1992234,
  author = {Van der Stelt PF, Geraets WGM},
  title = {Computer-aided interpretation and quantification of angular periodont bone defects on dental radiographs},
  journal = {IMIA Yearbook of medical informatics},
  note = {IMIA Yearbook of medical informatics}
}
Capabilities of human observers to detect and describe small bone defects objectively are limited. Digital image processing can provide a useful contribution to the diagnostic process. This paper describes the evaluation of a computer-aided procedure for the interpretation and quantification of angular periodontal bone defects on dental radiographs. The computer-aided procedure was able to rank series of artificial periodontal bone lesions as accurate as experienced clinicians. Comparison of data from clinical inspection of lesions during surgery and quantitative results of the digitized procedure shows that the latter produced reliable information on the lesions size. Reproducibility is satisfactory. It was concluded that computer-aided detection and description of periodontal bone defects decreases the interobserver variability in general and the time-dependent variability in repeated assessments of a single observer. Reprinted from: IEEE T Biomed Eng 1991;38:334-8,

note = {IEEE T Biomed Eng 1991;38:334-8}

@article{IMIA1992239,
    author = {Fairhurst MC, Smith SL},
    title = {Application of image analysis to neurological screening through figure copying tasks},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {239-257},
    abstract = {Approaches to the detection and monitoring of neurological dysfunction are generally resource-intensive and often difficult to evaluate objectively. This paper describes an approach to neurological screening which is based on the on-line analysis of figure copying tasks, and a variety of features are measured to characterise task execution. It is shown how both qualitative and quantitative measures of individual performance can be obtained in real time. A preliminary experimental study is described to identify appropriate performance indicators for a reference asymptomatic population and for a population with a known abnormal clinical history. The results obtained experimentally demonstrate that the approach proposed, while convenient and efficient in terms of the resources required in implementation, nevertheless offers a high degree of robustness and sensitivity which supports an optimistic view of its clinical viability. Reprinted from: Int J Biomed Comput 1991;28:269-87},
}

@article{IMIA1992258,
    author = {Khadra L, Matalgah M, El-Asir B, Mawagdeh S},
    title = {The wavelet transform and its applications to phonocardiogram signal analysis},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {258-264},
    abstract = {The wavelet transform, which is the decomposition of a signal into a set of independent frequency channels, is shown to be a useful diagnostic tool in the analysis of heartbeat sounds. In particular, the wavelet transform enables the experimentalist to obtain qualitative and quantitative measurements of time-frequency characteristics of phonocardiogram (PCG) signals. Reprinted from: Med Inf (Lond) 1991;16:271-7},
    note = {Med Inf (Lond) 1991;16:271-7}
The occurrence and nature of cough sounds, especially those occurring in asthma in young children, is of considerable interest to workers in paediatrics and general practice. To facilitate our research into the characteristics of such sounds, we have developed a microcomputer-based analysis system, which we call COFF. In this paper we discuss the design and implementation of the system, emphasising its user-friendly, interactive features, and the manner in which it efficiently manages the large amounts of data that research into sounds incurs. We illustrate the operation of the system with examples of spectrograms computed from cough sounds recorded simultaneously at the mouth and through the chest wall. Reprinted from: Comput Methods Programs Biomed 1991;36:33-43.

BACKGROUND: Computer programs for the interpretation of electrocardiograms (ECGs) are now widely used. However, a systematic assessment of various computer programs for the interpretation of ECGs has not been performed. METHODS: We undertook a large international study to compare the performance of nine electrocardiographic computer programs with that of eight cardiologists in interpreting ECGs in 1220 clinically validated cases of various cardiac disorders. ECGs from the following groups were included in the sample: control patients (n = 382); patients with left ventricular hypertrophy (n = 183), right ventricular hypertrophy (n = 55), or biventricular hypertrophy (n = 53); patients with anterior myocardial infarction (n = 170), inferior myocardial infarction (n = 273), or combined myocardial infarction (n = 73); and patients with combined infarction and hypertrophy (n = 31). The interpretations of the computer programs and the cardiologists were compared with the clinical diagnoses made independently of the ECGs, and the computer interpretations were compared with those of the cardiologists. RESULTS: The percentage of ECGs correctly classified by the computer programs (median, 91.3 percent) was lower than that of the cardiologists (median, 96.0 percent; P less than 0.01). The median sensitivity of the computer programs was also significantly lower than that of the cardiologists in diagnosing left ventricular hypertrophy (56.6 percent vs. 63.9 percent, P less than 0.02), right ventricular hypertrophy (31.8 percent vs. 46.6 percent, P less than 0.01), anterior myocardial infarction (77.1 percent vs. 84.9 percent, P less than 0.001), and inferior myocardial infarction (58.8 percent vs. 71.7 percent, P less than 0.0001). The median total accuracy level (the percentage of correct classifications) was 6.6 percent lower for the computer programs (69.7 percent) than for the cardiologists (76.3 percent; P
less than 0.001). However, the performance of the best programs nearly matched that of the most accurate cardiologists. CONCLUSIONS: Our study shows that some but not all computer programs for the interpretation of ECGs perform almost as well as cardiologists in identifying seven major cardiac disorders. Reprinted from: N Engl J Med 1991;325:1767-73,


@article{IMIA1992286,
    author = {De Dombal FT, Dallos V, McAdam WAF},
    title = {Can computer aided teaching packages improve clinical care in patients with acute abdominal pain?},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {286-288},
    abstract = {OBJECTIVE: To compare three methods of support for inexperienced staff in their diagnosis and management of patients with acute abdominal pain--namely, with (a) structured data collection forms, (b) real time computer aided decision support, and (c) computer based teaching packages. DESIGN: Prospective assessment of effects of methods of support on groups of doctors in one urban hospital and one rural hospital. SETTING: Accident and emergency department at Whipps Cross Hospital, London, and surgical wards of Airedale General Hospital, West Yorkshire. PATIENTS: Consecutive prospective series of all patients presenting to each hospital in specified time periods with acute abdominal pain; total patients in the various periods were 12,506. MAIN OUTCOME MEASURES: Diagnostic accuracy of participating doctors, admission rates of patients with non-specific abdominal pain, perforation rates in patients with appendicitis, negative laparotomy rates. RESULTS: Use of any one modality resulted in improved diagnostic accuracy and decision making performance. Use of structured forms plus computer feedback resulted in better performance than use of forms alone. Use of structured forms plus a computer teaching package gave results at least as good as those with direct feedback by computer. CONCLUSIONS: The results confirm earlier studies in suggesting that the use of computer aided decision support improves diagnostic and decision making performance when dealing with patients suffering from acute abdominal pain. That use of the computer for teaching gave results at least as good as with its use for direct feedback may be highly relevant for those who are apprehensive about the real time use of diagnostic computers in a clinical setting. Reprinted from: Br Med J 1991;302:1495-7},
    note = {Br Med J 1991;302:1495-7}
}

@article{IMIA1992289,
    author = {Bernelot Moens HJ, Van der Korst JK},
    title = {Comparison of rheumatological diagnosis by a Bayesian program and by physicians},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {289-295},
    abstract = {A Bayesian decision support system was developed for the diagnosis of rheumatic disorders. Knowledge in this system is represented as evidential weights of findings. Simple weights were calculated as the logarithm of likelihood ratios on the basis of 1,000 consecutive patients from a rheumatological clinic. The effect of various methods to improve performance of the system by modification of the weights was studied. Three methods had a mathematical basis; a fourth
consisted of weights adapted by a human expert, which allowed inclusion of diagnostic rules such as defined in widely accepted criteria sets. The system's performance was measured in a test population of 570 different cases from the same clinic and compared with predictions of diagnostic outcome made by rheumatologists. The weights from a human expert gave optimal results (sensitivity 65% and specificity 96%), that were close to the physicians' predictions (sensitivity 64% and specificity 98%). The methods to measure the performance of the various models used in this study emphasize sensitivity, specificity and the use of receiver operating characteristics. Reprinted from: Methods Inf Med 1991;30:187-93,

note = {Methods Inf Med 1991;30:187-93}

@article{IMIA1992296,
  author = {Franklin RCG, Spiegelhalter DJ, Macartney FJ, Bull K},
  title = {Evaluation of a diagnostic algorithm for heart disease in neonates},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {296-300},
  abstract = {OBJECTIVE: To develop, test, and validate an algorithm for diagnosing disease in neonates during an over the telephone referral to a specialist cardiac centre. DESIGN: A draft algorithm requiring only data available to a referring paediatrician was generated. This was modified in the light of a retrospective review of case records. A questionnaire to elicit all the data required by the algorithm was then generated. There followed a prospective three phase evaluation during consecutive over the telephone referrals. This consisted of (a) a conventional phase with unstructured referral consultations, (b) a phase with referrals structured around the questionnaire but independent of the algorithm, and (c) a validation phase with the algorithm (and its previous errors) available during the referral consultation. SETTING: 59 paediatric centres in south east England and a central specialist paediatric cardiology unit. PATIENTS: Consecutive neonates (aged less than 31 days) referred with suspected heart disease. The retrospective review was of records of 174 neonates from 1979. In the prospective evaluation (1987-90) the conventional phase comprised 71 neonates (over 5.5 months), the structured phase 203 neonates (over 14 months), and the validation phase 195 neonates (over 12 months).MAIN OUTCOME MEASURES: Diagnostic accuracy (assigning patients to the correct diagnostic category (out of 27)), of the referring paediatrician, the specialist after the referral consultation, and the algorithm as compared with the definitive diagnosis by echocardiography at the specialist centre, and score for the appropriateness of management in transit. RESULTS: Simply structuring the consultation by questionnaire (that is, proceeding from the conventional phase to the structured phase) improved the diagnostic accuracy of both paediatricians (from 34% (24/71 cases) to 48% (97/203) correct) and specialists (from 54% (38/71 cases) to 64% (130/203) correct). The algorithm (structured phase) would have been even more accurate (78% (158/203 cases); p less than 0.01). Management scores in the structured phase were also better than in the conventional phase (80%(162/203 cases) v 58% (41/71) appropriate; p less than 0.01). Management scores would have improved to 91% appropriate (185/203; p less than 0.001) had the algorithmic diagnoses dictated management. The superiority of the algorithm was maintained but not bettered in the validation phase. CONCLUSIONS: Applying the algorithm should reduce the morbidity and mortality of neonates with critical heart disease by aiding clinicians in therapeutic decisions for in transit care. Reprinted from: Br Med J 1991;302:935-9},

note = {Br Med J 1991;302:935-9}

@article{IMIA1992301,
  author = {Nykanen P, Chowdhury S, Wigertz O},
Evaluation of decision support systems in medicine

Abstract: Evaluation deals with the measurement or judgement of system characteristics and with comparison of these with the frame of reference. Evaluation of medical decision support systems is important because these systems are planned to support human decision making in tasks where information from different sources is combined to support clinicians' decisions concerning diagnosis, therapy planning and monitoring of the disease and treatment processes. As the field of decision support systems is still relatively unexplored, standards or generally accepted methodologies are not yet available for evaluation. Evaluation of medical decision support systems should be approached from the perspectives of knowledge acquisition, system development lifecycle and user-system integrated environment. Reprinted from: Comput Methods Programs Biomed 1991;34:229-38

Note: Comput Methods Programs Biomed 1991;34:229-38

@article{IMIA1992311,
  author={Middleton B, Shwe MA, Heckerman DE, Hendon M, Horvitz EJ, Lehmann HP, Cooper GF},
  title={Probabilistic diagnosis using a reformulation of the INTERNIST-11 QMR knowledge base. Evaluation of diagnostic performance},
  journal={IMIA Yearbook of medical informatics},
  volume={1992},
  year={1992},
  pages={311-322},
  abstract={We have developed a probabilistic reformulation of the Quick Medical Reference (QMR) system. In Part I of this two-part series, we described a two-level, multiply connected belief-network representation of the QMR knowledge base and a simulation algorithm to perform probabilistic inference on the reformulated knowledge base. In Part II of this series, we report on an evaluation of the probabilistic QMR, in which we compare the performance of QMR to that of our probabilistic system on cases abstracted from continuing medical education materials from Scientific American Medicine. In addition, we analyze empirically several components of the probabilistic model and simulation algorithm. Reprinted from: Methods Inf Med 1991;30:256-67},
  note={Methods Inf Med 1991;30:256-67}
}

@article{IMIA1992323,
  author={Gammerman A, Thatcher AR},
  title={Bayesian diagnostic probabilities without assuming independence of symptoms},
  journal={IMIA Yearbook of medical informatics},
  volume={1992},
  year={1992},
  pages={323-330},
  abstract={The paper describes an application of Bayes' Theorem to the problem of estimating from past data the probabilities that patients have certain diseases, given their symptoms. The data consist of hospital records of patients who suffered acute abdominal pain. For each patient the records showed a large number of symptoms and the final diagnosis to one of nine diseases or diagnostic groups. Most current methods of computer diagnosis use the "Simple Bayes" model in which the symptoms are assumed to be independent, but the present paper does not make this assumption. Those symptoms (or lack of symptoms) which are most relevant to the diagnosis of each disease can be easily obtained by a computer program. Reprinted from: Comput Methods Programs Biomed 1991;34:229-38},
  note={Comput Methods Programs Biomed 1991;34:229-38}
}
disease are identified by a sequence of chi-squared tests. The computer diagnoses obtained as a result of the implementation of this approach are compared with those given by the "Simple Bayes" method, by the method of classification trees (CART), and also with the preliminary and final diagnoses made by physicians. Reprinted from: Methods Inf Med 1991;30:15-22,

note = {Methods Inf Med 1991;30:15-22}

@article{IMIA1992331,
author = {Wu TD},
title = {A problem decomposition method for efficient diagnosis and interpretation of multiple disorders},
journal = {IMIA Yearbook of medical informatics},
volume = {1992},
year = {1992},
pages = {331-344},
abstract = {Diagnosis of multiple disorders can be made more efficient by reasoning explicitly about problem decompositions. A diagnostic problem can be decomposed by hypothesizing about common and disjoint cause relationships among the given symptoms. The resulting structure exploits computational principles of causal intersection, subproblem independence, and minimal factorability to increase efficiency. By assigning structure to a problem, the symptom decomposition approach offers a new type of decision-support task called symptom interpretation. Experimental results indicate that symptom decomposition yields substantial increases in performance compared to existing methods for multidisorder diagnosis. Reprinted from: Comput Methods Programs Biomed 1991;35:239-50},

note = {Comput Methods Programs Biomed 1991;35:239-50}
}

@article{IMIA1992345,
author = {Wyatt J},
title = {Computer-based knowledge systems},
journal = {IMIA Yearbook of medical informatics},
volume = {1992},
year = {1992},
pages = {345-350},
abstract = {Lancet 1991;338:1431-6},

note = {Lancet 1991;338:1431-6}
}

@article{IMIA19921351,
author = {Van der Lei J, Musen MA, Van der Does E, Man in 't Veld AJ, Van Bemmel JH},
title = {Comparison of computer-aided and human review of general practitioners' management of hypertension},
journal = {IMIA Yearbook of medical informatics},
volume = {1992},
year = {1992},
pages = {351-355},
abstract = {Computer programs that automatically review decisions can help physicians provide better patient care. In the Netherlands, the ELIAS computer information system has replaced paper medical records in some general practices. We have written a computer program called 'HyperCritic' that audits general practitioners' management of patients with essential hypertension}
by taking patient-specific data from the ELIAS system. We investigated whether the computer-based medical records contain sufficient information to generate critiques, and compared the limitations of audit by hypercritic with those of review by a panel of eight physicians. Hypercritic and the physicians independently reviewed the medical records of 20 randomly selected patients with hypertension and commented on the decisions made at each of 243 patient visits. Of 468 comments on patient management, 260 were judged correct by six or more of the physicians; hypercritic also made 118 of these 260 comments. The main reasons why the program did not produce the other 142 comments were: insufficient data in the computer-based medical record; absence of sufficient medical consensus; and omissions in the database of hypercritic. Calculation of an "index of merit" ([(sensitivity + specificity) - 1] for individual reviewers showed that hypercritic performed better (index of merit 0.62) in its limited domain than did physician reviewers (0.3-0.56). At least in hypertension management, automated review of computer-based medical records compares favourably with review by physicians. Further development of computer-aided clinical audit requires the introduction of computer-based medical records that capture the reasoning of physicians, and of widely accepted practice guidelines. Reprinted from: Lancet 1991;338:1504-8.

Fieldman MJ, Barnett GO, "An approach to evaluating the accuracy of DXplain," IMIA Yearbook of medical informatics, 1992, 356-361. DXplain is a computer-based decision support system which generates a differential diagnosis (ddx) from a given list of clinical manifestations. An approach was developed to evaluate the accuracy of the ddx's produced by DXplain. The first step involves the collection of 65 benchmark cases drawn from a variety of sources and authors. Despite their diverse origins, the cases share in common that they are all clinical cases upon which a consulting physician might be asked to produce a differential. This helps to ensure that the evaluation of the system will be done in an environment similar to that in which the system is actually used. In the second step, all cases are reviewed by five board-certified physicians (experts) as well as DXplain. For each case, the evaluators (experts and DXplain) produce a rank-ordered ddx list along with an indication of how strongly each disease was felt to be supported by the case findings. A scoring technique was devised which rewards concordance with the gold standard: a consensus of the evaluators’ ddx lists. Each evaluator receives a score which is proportional to the degree of agreement achieved with the consensus on the ddx submitted. Preliminary results on a trial evaluation of 46 cases indicate that DXplain, on average, did well in agreeing with the consensus. Agreement was achieved both in regard to the specific diagnoses listed in the ddx and the degree to which the diseases were felt to be supported by the case findings. A discussion of some important issues in the evaluation of knowledge-based systems is undertaken. Reprinted from: Comput Methods Programs Biomed 1991;35:261-6.

Bayesian belief networks provide an intuitive and concise means of representing probabilistic relationships among the variables in expert systems. A major drawback to this methodology is its computational complexity. We present an introduction to belief networks, and describe methods for precomputing, or caching, part of a belief network based on metrics of probability and expected utility. These algorithms are examples of a general method for decreasing expected running time for probabilistic inference. We first present the necessary background, and then present algorithms for producing caches based on metrics of expected probability and expected utility. We show how these algorithms can be applied to a moderately complex belief network, and present directions for future research.


note = {Methods Inf Med 1991;30:81-9}

@article{IMIA1992371,
  author = {Lehmann HP, Shortliffe EH},
  title = {THOMAS: Building Bayesian statistical expert systems to aid in clinical decision making},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {371-380},
  abstract = {Knowledge-based system for classical statistical analysis must separate the task of analyzing data from that of using the results of the analysis. In contrast, a Bayesian framework for building biostatistical expert system allows for the integration of the data-analytic and decision-making tasks. The architecture of such a framework entails enabling the system (1) to make its recommendations on decision-analytic grounds; (2) to construct statistical models dynamically; (3) to update a statistical model based on the user’s prior beliefs and on data from, the methodological concerns evinced by, the study. This architecture permits the knowledge engineer to represent a variety of types of statistical and domain knowledge. Construction of such systems requires that the knowledge engineer reinterpret traditional statistical concerns, such as by replacing the notion of statistical significance with that of a pragmatic clinical threshold. The clinical user of such a system can interact with the system at a semantic level appropriate to her fund of methodological knowledge, rather than at the level of statistical details. We demonstrate these issues with a prototype system called THOMAS which helps a physician decision maker interpret the results of a published randomized clinical trial. Reprinted from: Comput Methods Programs Biomed 1991;35:251-60},
  note = {Comput Methods Programs Biomed 1991;35:251-60}
}

@article{IMIA1992381,
  author = {Giuse DA, Giuse NB, Bankowitz RA, Miller RA},
  title = {Heuristic determination of quantitative data for knowledge acquisition in medicine},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {381-392},
  abstract = {Knowledge acquisition for medical knowledge bases can be aided by programs that suggest possible values for portions of the data. The paper presents an experiment which was used in designing a heuristic to help the process of knowledge acquisition. The heuristic helps to determine numerical data from stylized literature excerpts in the context of knowledge acquisition


for the QMR medical knowledge base. Quantitative suggestions from the heuristics are shown to agree substantially with the data incorporated in the final version of the knowledge base. The experiment shows the potential of knowledge base specific heuristics in simplifying the task of knowledge base creation. Reprinted from: Comput Biomed Res 1991;24:261-72,

@article{IMIA1992393,
      author = {Heckerling PS, Elstein AS, Terzian CG, Kushner MS},
      title = {The effect of incomplete knowledge on the diagnoses of a computer consultant system},
      journal = {IMIA Yearbook of medical informatics},
      volume = {1992},
      year = {1992},
      pages = {393-400},
      abstract = {The knowledge bases (KBs) of diagnostic decision support systems are often incomplete, and gaps in the KB could potentially lead systems to reach diagnoses that are implausible to physicians. To investigate this possibility we studied Iliad (Version 2.01), a computer consultant system that generates differential diagnosis across the domain of internal medicine. Data from the history, physical examination, and laboratory findings of 50 grand-rounds cases were entered into Iliad by a computer consultant aware of the diagnosis but blinded to its presence or absence in Iliad's KB. Two experienced internists were asked to diagnose these cases before and after seeing the results of the computer consultation, and to assess the plausibility of the computer's diagnoses. Twenty-eight of the 50 cases (56.0%) were diseases contained in Iliad's KB. After seeing Iliad's diagnoses for cases in the KB, physicians assigned to their correct diagnoses a higher mean ranked position (1.5 versus 2.0, p less than 0.008) and a higher mean probability (84.0% versus 77.6%, p less than 0.008) compared with their pre-Iliad values, whereas for cases not in the KB, mean position and probability for correct diagnoses did not change. Physician diagnostic accuracy did not change after consultation on cases included or not included in the KB. After adjusting for case difficulty, mean plausibility of Iliad's diagnoses was judged significantly higher (on a seven-point scale) for cases in the KB than for cases not in the KB (4.2 versus 3.2, p less than 0.02). (ABSTRACT TRUNCATED AT 250 WORDS) Reprinted from: Med Inf (Land) 1991;16:363-370},
      note = {Med Inf (Land) 1991;16:363-370}
}
temporal reasoning problems we encountered in constructing medical expert systems. A key feature of both extensions is that stored data are partitioned into groupings, such as sequential clinical visits, clinical exacerbations, or other abstract events that have clinical decision-making relevance. The temporal network (TNET) is an object-oriented database that extends the temporal reasoning capabilities of ONCOCIN, a medical expert system that provides chemotherapy advice. TNET uses persistent objects to associate observations with intervals of time during which "an event of clinical interest" occurred. A second object-oriented system called the extended temporal network (ETNET), is both an extension and a simplification of TNET. Like TNET, ETNET uses persistent objects to represent relevant intervals; unlike the first system, however, ETNET contains reasoning methods (rules) that can be executed when an event "begins", and that are withdrawn when that event "concludes". TNET and ETNET capture temporal relationships among recorded information that are not represented in TOD-based databases. Although they do not solve all temporal reasoning problems found in medical decision making, these new structures enable patient database systems to encode complex temporal relationships, to store and retrieve patient data based on multiple clinical contexts and, in ETNET, to modify the reasoning methods available to an expert system based on the onset or conclusion of specific clinical events. Reprinted from: Methods Inf Med 1991;30:4-14

@article{IMIA1992412,
  author = {Patrick EA, Moskowitz M, Mansukhani VT, Greenstein EI},
  title = {Knowledge-based Systems Expert learning system network for diagnosis of breast calcifications},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {412-417},
  abstract = {Breast calcification diagnosis was studied by using clinical findings and computerized image processing of a mammogram in a network of trained expert learning systems (Outcome Advisor [OA]). The system was tested with records not used for training and performance was compared with radiologist. The network was 72% accurate in classifying clusters of calcifications as malignant or benign over a set of test cases radiologists had considered "hard-to-diagnose calcifications," and referred for biopsy. The radiologists had decided to conduct biopsy by selecting an equal number of positive and negative cases for the test group; thus the radiologists' performance with respect to categories of benign versus malignant was constrained to be 50/50. Statistical analysis shows only a 2% probability that the observed accuracy of 72% was a chance performance in recognizing whether a cluster is benign or malignant. The feasibility of developing a network of OAs for diagnosing breast cancer integrating digital image processing of mammograms is promising. Reprinted from: Invest Radio! 1991;26:534-9},
  note = {Invest Radio! 1991;26:534-9}
}

@article{IMIA1992418,
  author = {Jones BT},
  title = {Building nursing expert systems using automated rule induction},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {418-428},
}
abstract = {Previous articles in this journal testify that nursing expert systems have become a feature of nursing information technology and nursing theory. Unfortunately, experts' knowledge is not easy to elicit and computer systems are not easy to program. Fortunately, expert system shells bypass most of the problems associated with programming expert systems. Lesser known but with no less impact are shells that bypass the other difficult phase of expert system construction, namely knowledge elicitation. The major aim of this article is to provide a nontechnical description of such a shell and the use to which we have put it within three quite different areas of nursing. In addition, the article introduces expert systems in nursing as a potentially unifying development in a profession rapidly undergoing specialization. Reprinted from: Comput Nurs 1991;9:52-60,

note = {Comput Nurs 1991;9:52-60}

@article{IMIA1992429,
  author = {Baxt WG},
  title = {Use of an artificial neural network for the diagnosis of myocardial infarction},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {429-434},
  abstract = {OBJECTIVE: To validate prospectively the use of an artificial neural network to identify myocardial infarction in patients presenting to an emergency department with anterior chest pain. DESIGN: Prospective, blinded testing. SETTING: Tertiary university teaching center. PATIENTS: A total of 331 consecutive adult patients presenting with anterior chest pain. MEASUREMENTS: Diagnostic sensitivity and specificity with regard to the diagnosis of acute myocardial infarction. MAIN RESULTS: An artificial neural network was trained on clinical pattern sets retrospectively derived from the cases of 351 patients hospitalized with a high likelihood of having myocardial infarction. It was prospectively tested on 331 consecutive patients presenting to an emergency department with anterior chest pain. The ability of the network to distinguish patients with from those without acute myocardial infarction was compared with that of physicians caring for the same patients. The physicians had a diagnostic sensitivity of 77.7% (95% CI, 77.0% to 82.9%) and a diagnostic specificity of 84.7% (CI, 84.0% to 86.4%). The artificial neural network had a sensitivity of 97.2% (CI, 97.2% to 97.5%; P = 0.033) and a specificity of 96.2% (CI, 96.2% to 96.4%; P less than 0.001). CONCLUSION: An artificial neural network trained to identify myocardial infarction in adult patients presenting to an emergency department may be a valuable aid to the clinical diagnosis of myocardial infarction; however, this possibility must be confirmed through prospective testing on a larger patient sample. Reprinted from: Ann Intern Med 1991;115:843-8},

note = {Ann Intern Med 1991;115:843-8}

@article{IMIA1992435,
  author = {Furlong JW, Dupuy ME, Heinsimer JA},
  title = {Neural network analysis of serial cardiac enzyme data. A clinical application of artificial machine intelligence},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {435-442},
  abstract = {There has been a recent resurgence of interest in the study and application of computerized neural networks within the broad field of artificial intelligence. These "intelligent machines" are modeled after biological nervous systems and are fundamentally different from the many computerized expert systems that previously have been introduced as clinical decision-making}
aids. The authors describe a neural network designed and trained to predict the probability of acute myocardial infarction (AMI) based on the analysis of paired sets of cardiac enzymes. The neural network predicted 24 of 24 (100%) AMIs and 27 of 29 (93%) No-AMIs when compared with a pathologist's interpretation of the patient's laboratory data (P less than 0.000001). The authors attempted to validate the network's diagnoses by two independent methods. When compared with echocardiogram and EKG for diagnosis of AMI, the neural network agreed with the cardiologist's interpretation in 12 of 14 (86%) AMIs and 1 of 3 (33%) No-AMIs, but the correlation was not statistically significant. Using autopsy outcome for validation, the neural network agreed with the anatomic evidence in 24 of 26 (92%) AMIs and 4 of 6 (67%) No-AMIs (P = 0.001). The authors conclude that neural networks can be successfully applied to the analysis of cardiac enzyme data and suggest that broader applications exist within the domain of clinical decision support. Reprinted from: Am J Clin Pathol 1991;96:134-41,

\[\text{note = \{Am J Clin Pathol 1991;96:134-41\}}\]

\@article{IMIA1992443,
  title = \{Identification of the 'H-NMR spectra of complex oligosaccharides with artificial neural networks\},
  journal = \{IMIA Yearbook of medical informatics\},
  volume = \{1992\},
  year = \{1992\},
  pages = \{443-445\},
  abstract = \{Artificial networks can be used to identify hydrogen nuclear magnetic resonance (1H-NMR) spectra of complex oligosaccharides. Feed-forward neural networks with back-propagation of errors can distinguish between spectra of oligosaccharides that differ by only one glycosyl residue in twenty. The artificial neural networks use features of the strongly overlapping region of the spectra (hump region) as well as features of the resolved regions of the spectra (structural reporter groups) to recognize spectra and efficiently recognized 1H-NMR spectra even when the spectra were perturbed by minor variations in their chemical shifts. Identification of spectra by neural network-based pattern recognition techniques required less than 0.1 second. It is anticipated that artificial neural networks can be used to identify the structures of any complex carbohydrate that has been previously characterized and for which a 1H-NMR spectrum is available. Reprinted from: Science 1991;251:542-4\},
  note = \{Science 1991;251:542-4\}
}

\@article{IMIA1992446,
  author = \{Demeler B, Zhou GW\},
  title = \{Neural network optimization for E. coil promoter prediction\},
  journal = \{IMIA Yearbook of medical informatics\},
  volume = \{1992\},
  year = \{1992\},
  pages = \{446-452\},
  abstract = \{Methods for optimizing the prediction of Escherichia coli RNA polymerase promoter sequences by neural networks are presented. A neural network was trained on a set of 80 known promoter sequences combined with different numbers of random sequences. The conserved -10 region and -35 region of the promoter sequences and a combination of these regions were used in three independent training sets. The prediction accuracy of the resulting weight matrix was tested against a separate set of 30 known promoter sequences and 1500 random sequences. The effects of
the network's topology, the extent of training, the number of random sequences in the training set and the effects of different data representations were examined and optimized. Accuracies of 100% on the promoter test set and 98.4% on the random test set were achieved with the optimal parameters. Reprinted from: Nucleic Acids Res 1991;19:1593-9.

Note: Nucleic Acids Res 1991;19:1593-9

@article{IMIA1992453,
    author = {Gindi GR, Darken CJ, O'Brien KM, Stetz ML, Deckelbaum LI},
    title = {Neural network and conventional classifiers for fluorescence-guided laser angioplasty},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {453-462},
    abstract = {In laser angioplasty, fluorescence spectra of targeted tissue may be used to classify the tissue as atherosclerotic or normal and guide selective laser ablation of atherosclerotic plaque. Here, the ability of the back-propagation and K-nearest neighbors techniques to classify arterial fluorescence spectra is investigated. Both methods are competitive with other classification schemes. The relative performance of variations on both techniques is used to make inferences about the geometry of the classification task. Reprinted from: IEEE T Blamed Eng 1991;38:246-52},
    note = {IEEE T Blamed Eng 1991;38:246-52}
}

@article{IMIA1992463,
    author = {Safran C},
    title = {Using routinely collected data for clinical research},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {463-468},
    abstract = {Clinical research involving prospective data collection in randomized controlled trials is not always feasible. Increasingly, hospitals are developing large clinical databases that are waiting to be mined. We have developed a computer program, ClinQuery, that facilitates such exploration and analysis. We have also shown in a series of studies that the use of clinical data is a powerful tool in health services research. In some cases, we have shown that coded data are inaccurate and that alternative clinical data are preferable. In other cases, a combination of clinical data and coded discharge diagnoses is preferable. Reprinted from: Stat Med 1991;10:559-64},
    note = {Stat Med 1991;10:559-64}
}

@article{IMIA1992469,
    author = {Lachenbruch PA, Reinsch S, MacRae PG, Tobis JS},
    title = {Adjusting for recall bias with the proportional hazards model},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {469-471},
    abstract = {In studying falling frequency in the elderly, we observed that having subjects keep a diary led to a larger number of falls reported than had been noted in a previous study in the same
population. The previous study asked subjects to report any falls in the previous three months. We considered two related explanations for the observation of lower incidence reports with a 3-month recall survey. First, there may have been under-reporting of falls due to recall bias. Second, the less severe falls (which did not result in injuries) may not be reported. We suggest that the proportional hazards model may be used to adjust studies in which recall is used to determine incidence and time to falls. Reprinted from: Methods Inf Med 1991;30:108-10,

note = {Methods Inf Med 1991;30:108-10}
From a small collection of medical publications in the Surgeon General's Office in 1836, the National Library of Medicine has developed into the leading repository of medical information in the world. Despite strong opposition and impediments from certain quarters, involving considerable machinations and intrigue, the determination of interested medical leaders and sympathetic members of Congress triumphed in having this remarkable institution established on the campus of the National Institutes of Health, Bethesda, Md. As a participant in many of the negotiations preceding that decision, I have happily witnessed the transformation of the Library, long housed in cramped, makeshift quarters, to its present magnificent structures in the heart of our nation's foremost medical research center. Its prodigious collection of print, audiovisual, and electronic information; its imaginative research projects; its excellent outreach program; and its innovative services and products are indispensable to all practicing health professionals, scientists, and medical educators, as well as to journalists, government officials, and others. The ultimate beneficiary, of course, is the patient. Reprinted from: JAMA 1991;266:1252-8,
Given the many efforts currently under way to develop standards for electronic medical records, it is important to step back and reexamine the fundamental principles which should underlie a model of the electronic medical record. This paper presents an analysis based on the experience in developing the PEN & PAD prototype clinical workstation. The fundamental contention is that the requirements for a medical record must be grounded in its use for patient care. The basic requirement is that it be a faithful record of what clinicians have heard, seen, thought, and done. The other requirements for a medical record, e.g., that it be attributable and permanent, follow naturally from this view. We use the criteria developed to re-examine Weed’s Problem Oriented Medical Record and also relate the criteria to secondary uses of the medical record for population data, communications and decision support. Reprinted from: Methods Inf Med 1991;30:179-86,

@article{IMIA199267,
    author = {Jick H, Jick SS, Derby LE},
    title = {Validation of information recorded on general practitioner based computerised data resource in the United Kingdom},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {67-69},
    abstract = {OBJECTIVE:To determine the extent of agreement between clinical information recorded on surgery computers of selected general practitioners and similar information in manual records of letters received from hospital consultants and kept in the general practitioners’ files. DESIGN:Hospital consultants’ letters in the manual records of selected general practitioners were photocopied and the consultants’ clinical diagnoses were compared with diagnoses recorded on computer. SETTING:General practices in the United Kingdom using computers provided by VAMP Health for recording clinical information. SUBJECTS:2491 patients who received one of three non-steroidal anti-inflammatory drugs and who attended 58 practices whose computer recorded data were considered after a preliminary review to be of satisfactory quality. RESULTS:Among 1191 patients for whom consultants’ letters were forwarded a clinical diagnosis reflecting the diagnosis noted on a consultant letter was present on the computer record for 1038 (87%). CONCLUSION:Clinical information available on the computer records of the general practitioners who participated in this study is satisfactory for many clinical studies. Reprinted from: Br Med J 1991;302:766-8},
    note = {Br Med J 1991;302:766-8}
}

@article{IMIA199270,
    author = {Johnson N, Mant D, Jones L, Randall T},
    title = {Use of computerised general practice data for population surveillance: Comparative study of influenza data},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {70-72},
}
abstract = {OBJECTIVE: To assess the potential for using routine computerised general practice data for surveillance of illness. DESIGN: Comparison of the incidence of influenza during the 1989 epidemic derived from a computerised database with that derived from the Royal College of General Practitioner's weekly returns service—a well established predominantly manual surveillance system.

SETTING: 433 general practices throughout the United Kingdom that used a commercial computer system linked to a central databank.

MAIN OUTCOME MEASURE: Incidence of influenza. RESULTS: The slope of the influenza epidemic curve was essentially the same whether derived from the routine computerised data or royal college's weekly returns service data, and the computerised data were geographically consistent. Throughout the study period, however, the computer derived incidence was between one third and one quarter of that derived from the royal college's system (which is served by practitioners trained in surveillance methods). The peak weekly rates were 164 cases per 100,000 for the computerised system and 583 cases per 100,000 for the royal college's surveillance system.

CONCLUSIONS: The apparent underreporting in the routine computerised data probably reflects lack of motivation and experience in disease surveillance and haphazard computer entry (particularly of consultations that took place outside of the surgery and consultations that did not result in a prescription), along with overestimation of the population under surveillance. Nevertheless, routine computerised surveillance allows rapid data collection from a large number of practices over a wide geographical area and would greatly augment existing methods. Reprinted From: Br Med J 1991;302:763-5,

note = {Br Med J 1991;302:763-5}

@article{IMIA1992173,
    author = {Ornstein SM, Garr DR, Jenkins RG, Rust PF, Arnon A},
    title = {Computer-generated physician and patient reminders. Tools to improve population adherence to selected preventive services},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {73-81},
    abstract = {Despite an emerging consensus on appropriate preventive services, a minority of patients receive them. A study was undertaken to assess the impact of computer-generated reminders to adult patients, their physicians, or both patients and physicians on adherence to five recommended preventive services: cholesterol measurements, fecal occult blood testing, mammography, Papanicolaou smears, and tetanus immunization. During the academic year 1988-1989, all 7397 adult patients and their 49 physicians in a university family medicine clinical practice were randomized by practice group into one of four study groups: control, physician reminders, patient reminders, and both physician and patient reminders. Adherence was defined in community-oriented terms: the percentage of patients within each group who had received the preventive service in the recommended interval. During the study period, adherence to four of the five preventive services increased significantly, with the largest increases in the physician and patient reminder group: cholesterol measurements increased from 19.5% to 38.1%, fecal occult blood testing 9.3% to 27.0%, mammography 11.4% to 27.1%, and tetanus immunization 23.4% to 35.4% (for each increase, P less than .0001, McNemar's chi-square test). In general, increases were greater in blacks and in patients with any form of insurance coverage. Computer-based physician and patient reminder systems have great promise of improving adherence to preventive services in primary care settings. Reprinted From: J Fain Pract 1991;32:82-90},
    note = {J Fain Pract 1991;32:82-90}
}
Software to perform record linkage should have several characteristics: (1) portability in being able to function with researchers’ current arrangement of computer systems and languages, (2) flexibility in handling different linkage strategies, and (3) low cost in both computer time and researchers’ efforts. A linkage package (LINKS) is described which satisfies these criteria; LINKS provides tools for both deterministic and probabilistic linkage as well as test modules for assessing data quality and structure. Because each linkage project is different, the modular nature of the software allows for better control of the programming process and development of unique strategies. Since the user provides the weights and decision rules, he may modify data between steps and/or develop extra steps to supplement the basic modules. In two information-rich linkage projects involving California AIDS data, LINKS identified mortality using deterministic approaches and permitted comparisons with other software and strategies. Flexible software and a deterministic approach would have eliminated the expensive key entry used to add full names and social security numbers as additional identifiers to one of the California data files. Reprinted From: Methods Inf Med 1991;30:210-4.

OBJECTIVE: To develop a new method to improve the detection and characterization of adverse drug events (ADEs) in hospital patients. DESIGN: Prospective study of all patients admitted to our hospital over an 18-month period. SETTING: LDS Hospital, Salt Lake City, Utah, a 520-bed tertiary care center affiliated with the University of Utah School of Medicine, Salt Lake City. PATIENTS: We developed a computerized ADE monitor, and computer programs were written using an integrated hospital information system to allow for multiple source detection of potential ADEs occurring in hospital patients. Signals of potential ADEs, both voluntary and automated, included sudden medication stop orders, antidote ordering, and certain abnormal laboratory values. Each day, a list of all potential ADEs from these sources was generated, and a pharmacist reviewed the medical records of all patients with possible ADEs for accuracy and causality. Verified ADEs were characterized as mild, moderate, or severe and as type A (dose-dependent or predictable) or type B (idiosyncratic or allergic) reactions, and causality was further measured using a standardized scoring method. OUTCOME MEASURE: The number and characterization of ADEs detected. RESULTS: Over 18 months, we monitored 36,653 hospitalized patients. There were 731 verified ADEs identified in 648 patients, 701 ADEs were characterized as moderate or severe, and 664 were classified as type A reactions. During this same period, only nine ADEs were identified using traditional detection methods. Physicians, pharmacists, and nurses voluntarily reported 92 of the 731 ADEs detected using this automated system. The other 631 ADEs were detected from automated signals, the most common of which were diphenhydramine hydrochloride and naloxone hydrochloride use, high serum drug levels, leukopenia, and the use of phytonadione and antidiarrheals. The most common symptoms and signs were pruritus, nausea and/or vomiting, rash, and confusion-lethargy. The most common drug classes involved were analgesics, anti-infectives, and cardiovascular agents. CONCLUSION: We believe that screening for ADEs with a computerized hospital information system offers a potential method for improving the detection and characterization of these events in hospital patients. Reprinted From: JAMA 1991;266:2847-51.

BACKGROUND: Despite much evidence that modifying risk factors for coronary heart disease can decrease morbidity and mortality, little is known about the impact of risk-factor modification on life expectancy. METHODS AND RESULTS: We used the Coronary Heart Disease Policy Model, a state-transition computer simulation of the US population, to forecast potential gains in life expectancy from risk-factor modification for the cohort of Americans turning age 35 in 1990. Among 35-year-old men, we projected that the population-wide increase in life expectancy would be about 1.1 years from strict blood pressure control, 0.8 years from smoking cessation, 0.7 years from reduction of serum cholesterol to 200 mg/dl, and about 0.6 years from weight loss to ideal body weight. For women, reducing cholesterol to 200 mg/dl would have the greatest estimated impact—a gain of 0.8 years—whereas smoking cessation, blood pressure control, or weight loss would yield population-wide gains of 0.7, 0.4, and 0.4 years, respectively. Gains for 35-year-old individuals having a given risk factor are greater. We estimate that, on average, male smokers would gain 2.3 years from quitting smoking; males with hypertension would gain 1.1-5.3 years from reducing their
diastolic blood pressure to 88 mm Hg; men with serum cholesterol levels exceeding 200 mg/dl would gain 0.5-4.2 years from lowering their serum cholesterol level to 200 mg/dl; and overweight men would gain an average of 0.7-1.7 years from achieving ideal body weight. Corresponding projected gains for at-risk women are 2.8 years from quitting smoking, 0.9-5.7 years from lowering blood pressure, 0.4-6.3 years from decreasing serum cholesterol, and 0.5-1.1 years from losing weight. Eliminating coronary heart disease mortality is estimated to extend the average life expectancy of a 35-year-old man by 3.1 years and a 35-year-old woman by 3.3 years. CONCLUSIONS: Population-wide gains in life expectancy from single risk-factor modifications are modest, but gains to individuals at risk can be more substantial. Reprinted From: Circulation 1991;83:1194-201.}

note = {Circulation 1991;83:1194-201.}

@article{IMIA1992109,
  author = {Lerou JGC, Dirksen R, Beneken Kolmer HH, Booij LH},
  title = {A system model for closed-circuit inhalation anesthesia. I. Computer study},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {109-119},
  abstract = {Developing a custom computer program to simulate the uptake, distribution, and elimination of inhalational anesthetics allows the anesthesiologist to address specific problems, but extensive skills are required to translate the involved processes first into a set of mathematical equations and then into a satisfactory computer program. The first step is often facilitated by solutions offered in the literature. The second step demands computer proficiency that is often not available, but this problem can be obviated by means of a special-purpose simulation language (SPSL). We therefore constructed a model for closed-circuit inhalation anesthesia with the aid of the block-structured SPSL TUTSIM. Noticeable differences with previous models are that the linear, 14-compartment basic model does not assume a constant alveolar concentration and mimics circulation times through the use of blood pools. Advanced features of the SPSL were used to develop variants of the basic model to simulate feedback-controlled isoflurane administration, nitrous oxide uptake, and the impact of a nonlinearity by incorporating the effect of enflurane on cardiac output. Two variants were concatenated to form a multiple model showing the concentration and second-gas effects. The model was capable of reproducing the anesthetic uptake from previous experimental studies for nitrous oxide. After its validation for other anesthetic agents, the model can be used for clinical, teaching, and research purposes. The SPSL freed the authors from the problems associated with computer programming and allowed them to concentrate on the structure of the model. Reprinted From: Anesthesiology 1991;75:345-55},
  note = {Anesthesiology 1991;75:345-55}
}

@article{IMIA1992120,
  author = {Popp H-J, Schecke T, Rau G, Kasmacher H, Kalff G},
  title = {An interactive computer simulator of the circulation for knowledge acquisition in cardio-anesthesia},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {120-127},
  abstract = {Knowledge-based decision support systems for use in cardio-anesthesia can provide online support to the anesthesiologist by generating intelligent alarms. However, the acquisition and validation of a consistent knowledge base for this application bears problems related
to the transfer of clinical experiences into a rule system. An interactive simulator of the human circulation is presented that supports the process of knowledge acquisition and testing. The simulator can be controlled in real-time by an anesthesiologist during the simulation run thus providing a basis for interdisciplinary discussion of routine as well as critical situations. The output data can be transferred to a knowledge-based system for test purposes. The simulator is currently being used for the development of the Anesthesia Expert Assist System AES-2. With regard to the special application a model of the heart-function was integrated which enables the simulation of heart insufficiency. Simulation runs under various conditions are presented and discussed. The simulator was implemented on an ATARI ST personal computer. Reprinted From: Int J Clin Monit Comput 1991;8:151-8,

\[\text{note} = \{\text{Int J Clin Monit Comput 1991;8:151-8}\}\]

@article{IMIA1992128,
  \author{Gelsema ES, Leijnse B, Wulkan RW},
  \title{A multi-dimensional analysis of three chemical quantities in the blood},
  \journal{IMIA Yearbook of medical informatics},
  \volume{1992},
  \year{1992},
  \pages{128-139},
  \abstract{A three-dimensional model for the analysis of the three quantities pH, pCO2 and base excess (BE), as measured in arterial blood, is presented. Whereas the conventional analysis of these quantities relies on reference regions as established from the univariate distributions, treating the quantities as uncorrelated, the present model estimates the parameters of the three-dimensional reference region from a sample of observations, based on the assumption that the observations inside the reference region follow a multi-dimensional Gaussian distribution. For observations outside the reference region, reference directions are established, corresponding to the conventionally defined specific states of acid-base disturbances. This leads to a new classification model, the results of which are compared to those of the conventional model. Reprinted From: Med Inf (Lond) 1991;16:43-54},
  \note{Med Inf (Lond) 1991;16:43-54}
}

@article{IMIA1992140,
  \author{Dawes GS, Moulden M, Redman CW},
  \title{The advantages of computerized fetal heart rate analysis},
  \journal{IMIA Yearbook of medical informatics},
  \volume{1992},
  \year{1992},
  \pages{140-146},
  \abstract{A brief account is given of the advantages of computerized analysis of human fetal heart rate (FHR) traces antenatally, based on clinical use over 8 years. Accuracy is greater. Results are presented quantitatively and consistently. The numerical measures of the FHR pattern are related to other objective measures of fetal health, e.g. initial compensated hypoxaemia or terminal acidaemia. Computerized analysis has shown that changes in FHR variation are a better guide than the presence or absence of large decelerations. Recording time is used better. Synoptic displays of data over 4 weeks show significant trends in fetal heart rate variation and movements with time. And the problems generated by the limitations of fetal heart rate monitors are identified to exclude spurious information. Reprinted From: J Perinat Med. 1991;19:39-45},
  \note{J Perinat Med. 1991;19:39-45}
}
A prehospital computer-interpreted electrocardiogram (ECG) was obtained in 1,189 patients with chest pain of suspected cardiac origin during an ongoing trial of prehospital thrombolytic therapy in acute myocardial infarction. Electrocardiograms were performed by paramedics 1.5 ± 1.2 h after the onset of symptoms. Of 391 patients with evidence of acute myocardial infarction, 202 (52%) were identified as having ST segment elevation (acute injury) by the computer-interpreted ECG compared with 259 (66%) by an electrocardiographer (p < 0.001). Of 798 patients with chest pain but no infarction, 785 (98%) were appropriately excluded by computer compared with 757 (95%) by an electrocardiographer (p < 0.001). The positive predictive value of the computer- and physician-interpreted ECG was, respectively, 94% and 86% and the negative predictive value was 81% and 85%. Prehospital screening of possible candidates for thrombolytic therapy with the aid of a computerized ECG is feasible, highly specific and with further enhancement can speed the care of all patients with acute myocardial infarction. Reprinted from: J Am Coll Cardiol 1991;17:1486-91, note = {J Am Coll Cardiol 1991;17:1486-91}

Recognition of the speech of severely dysarthric individuals requires a technique which is robust to extraordinary conditions of high variability and very little training data. A hidden Markov model approach to isolated word recognition is used in an attempt to automatically model the enormous variability of the speech, while signal preprocessing measures and model modifications are employed to make better use of the existing data. Two findings are contrary to general experience with normal speech recognition. The first is that an ergodic model is found to outperform a standard left-to-right (Bakis) model structure. The second is that automated clipping of transitional acoustics in the speech is found to significantly enhance recognition. Experimental results using utterances of cerebral palsyed persons with an array of articulatory abilities are presented. Reprinted from: Comput Methods Programs Biomed 1991;35:125-39, note = {Comput Methods Programs Biomed 1991;35:125-39}
Digital image enhancement has been proposed as an aid for the visually impaired. The capability of two enhancement techniques to improve recognition of images by patients with central scotoma or cataracts was evaluated using image-processing simulations and direct patient testing. Enhancements and simulations were based on measurements of contrast sensitivity loss for patients with macular disease. Contrast sensitivity loss was measured using Gabor-type localized stimuli and paradigms that are appropriate for analyzing form perception. The simulations using the contrast sensitivity data suggested that patients with moderate visual loss (20/70-20/200) may have difficulty recognizing faces and may benefit from enhancement by both of the techniques used. Ability to recognize celebrities from enhanced images improved for 39 of the 46 patients tested. The improvement was significant (P less than 0.05) for 16 of the 38 patients with central visual loss and for 3 of 8 patients with anterior segment media opacities tested. The simulations suggest that the benefits of image enhancement may be similar or even greater for recognition of other types of images. Reprinted from: Invest Ophthalmol Vis Sci 1991;32:2337-50.

An objective and quantitative method for the evaluation of the quality of megavoltage portal images was developed by applying receiver operating characteristic analysis to imaging in radiation therapy. On the basis of therapeutic use of portal images, setup errors were employed as "signals" in this experimental study that compared the original portal films with digitized images. Six readers observed 104 portal images of a chest phantom, half of which were "abnormal" (ie, had setup errors). Digital images (2,048 x 2,048 matrix) were enhanced by means of histogram equalization and then printed with a laser printer for observation. The readers showed a higher discrimination capacity with the digitally enhanced images, although a statistically significant improvement was not demonstrated. The present method of assessment of image quality proved to be both simple and clinically reasonable. Reprinted from: Radiology 1991;181:273-6.
An approach to the three-dimensional reconstruction of coronary arteries is presented. The principal objective is to show how modeling of a vascular network, together with algorithmic procedures, can lead to accurate 3-D structure and feature labeling. The labeling problem is stated directly within the 3-D reconstruction framework. The reconstruction ambiguities inherent to biplane techniques are solved by means of a knowledge base, modeling of the object, and heuristic rules. Feasibility in near-real situations has been demonstrated. The critical importance of the object 3-D reference to achieving the data and modeling matching is emphasized, and a way to deal with it is pointed out. The overall system implies an incremental development in methodologies and experiments. All of them have been elaborated and tested independently, and the most appropriate ones have been selected for integration into a modular system. All the stages of the process (calibration, segmentation, reconstruction, and display) are discussed, with the main focus on modeling. Examples of automatic reconstruction from a phantom are provided. Reprinted from: IEEE T Med Imaging 1991;10:122-31.

Abstract
Three-dimensional reconstruction and computer modeling is becoming recognized as a powerful tool for studying vascular structures. The computational approach, as well as the computer hardware selected for the task, however, depend upon the information desired. For the modeling of surface geometry, as in the case of the aortic valve, a surface formation technique is favorable over the more computationally demanding volume rendering approach. Automated surface formation, however, requires good quality, high contrast images. We therefore present a technique for producing high contrast images from high definition casts. We also describe the methodology used for automatic contour tracing, generating a mesh of variable density, and the schemes used to reconstruct bifurcating objects. With this approach, 98 mbytes of imaging data could be reduced to 180 kbytes of polygon vertices, and manipulated at near real-time speed on a medium performance graphics workstation. Such a system is therefore well suited for detailed, quantitative analyses of the reconstructed structures. Overall, this paper outlines the procedures used to create a high definition, three-dimensional computer model of any vascular structure.

abstract = {The three-dimensional Fourier transform fast imaging with steady precession (FISP) technique was used to obtain high-resolution magnetic resonance (MR) images of the temporal bone region and to generate three-dimensional reconstructed images of the inner ear. The three-dimensional reconstructed images of the inner ear were directly synthesized from two-dimensional images of the temporal bone region by means of an external processing computer. With use of three-dimensional reconstructed images and stereoscopic observations, structures inside the temporal bone region and the positional relationship among them were easily recognized. These structures are difficult to demonstrate with two-dimensional images. This three-dimensional method was also shown to be useful for recognition of disease and anatomic malformations in the temporal bone region. Reprinted from: Radiology 1991;178:141-4},
note = {Radiology 1991;178:141-4}

@article{IMIA1992210,
author = {Feng J, Lin W-C, Chen C-T},
title = {Epicardial boundary detection using fuzzy reasoning},
journal = {IMIA Yearbook of medical informatics},
volume = {1992},
year = {1992},
pages = {210-222},
abstract = {A fully automated system for detecting the endocardial and epicardial boundaries in a two-dimensional echocardiography by using fuzzy reasoning techniques is proposed. The image is first enhanced by applying the Laplacian-of-Gaussian edge detector. Second, the center of the left ventricle is determined automatically by analyzing the original image. Next, a search process radiated from the estimated center is performed to locate the endocardial boundary by using the zero-crossing points. After this step, the estimation of the range of radius of a possible epicardial boundary is carried out by comparing the high-level knowledge of intensity changes along all directions with the actual image intensity changes. The high-level knowledge of global intensity change in the image is acquired from experts in advance, and is represented in the form of fuzzy linguistic descriptions and relations. Knowledge of local intensity change can therefore be deduced from the knowledge of global intensity change through fuzzy reasoning. Reprinted from: IEEE T Med Imaging 1991;10:187-99},
}

@article{IMIA1992223,
author = {Tahoces PG, Correa J, Souto M, Gonzalez C, Gomez L, Vidal IL},
title = {Enhancement of chest and breast radiographs by automatic spatial filtering},
journal = {IMIA Yearbook of medical informatics},
volume = {1992},
year = {1992},
pages = {223-228},
abstract = {The authors present a new algorithm to enhance the edges and contrast of chest and breast radiographs while minimally amplifying image noise. The algorithm consists of a linear combination of an original image and two smoothed images obtained from it by using different masks and parameters, followed by the application of nonlinear contrast stretching. The result is an image which retains the high median frequency local variations (edge and contrast-enhancing). Reprinted from: IEEE T Med Imaging 1991;10:330-5},
}
Data compression: effect on diagnostic accuracy in digital chest radiography

High-resolution digital images make up very large data sets that are relatively slow to transmit and expensive to store. Data compression techniques are being developed to address this problem, but significant image deterioration can occur at high compression ratios. In this study, the authors evaluated a form of adaptive block cosine transform coding, a new compression technique that allows considerable compression of digital radiographs with minimal degradation of image quality. To determine the effect of data compression on diagnostic accuracy, observer tests were performed with 60 digitized chest radiographs (2,048 x 2,048 matrix, 1,024 shades of gray) containing subtle examples of pneumothorax, interstitial infiltrate, nodules, and bone lesions. Radiographs with no compression, with 25:1 compression, and with 50:1 compression ratios were presented in randomized order to 12 radiologists. The results suggest that, with this compression scheme, compression ratios as high as 25:1 may be acceptable for primary diagnosis in chest radiology. Reprinted from: Radiology 1991;178:175-9.
Approaches to the detection and monitoring of neurological dysfunction are generally resource-intensive and often difficult to evaluate objectively. This paper describes an approach to neurological screening which is based on the on-line analysis of figure copying tasks, and a variety of features are measured to characterise task execution. It is shown how both qualitative and quantitative measures of individual performance can be obtained in real time. A preliminary experimental study is described to identify appropriate performance indicators for a reference asymptomatic population and for a population with a known abnormal clinical history. The results obtained experimentally demonstrate that the approach proposed, while convenient and efficient in terms of the resources required in implementation, nevertheless offers a high degree of robustness and sensitivity which supports an optimistic view of its clinical viability. Reprinted from: Int J Biomed Comput 1991;28:269-87.

@article{IMIA1992258,
  author = {Khadra L, Matalgah M, El-Asir B, Mawagdeh S},
  title = {The wavelet transform and its applications to phonocardiogram signal analysis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {258-264},
  abstract = {The wavelet transform, which is the decomposition of a signal into a set of independent frequency channels, is shown to be a useful diagnostic tool in the analysis of heartbeat sounds. In particular, the wavelet transform enables the experimentalist to obtain qualitative and quantitative measurements of time-frequency characteristics of phonocardiogram (PCG) signals. Reprinted from: Med Inf (Lond) 1991;16:271-7},
  note = {Med Inf (Lond) 1991;16:271-7}
}

@article{IMIA1992265,
  author = {Thorpe CW, Fright WR, Toop Lir, Dawson KP},
  title = {A microcomputer-based interactive cough sound analysis system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {265-278},
  abstract = {The occurrence and nature of cough sounds, especially those occurring in asthma in young children, is of considerable interest to workers in paediatrics and general practice. To facilitate our research into the characteristics of such sounds, we have developed a microcomputer-based analysis system, which we call COFF. In this paper we discuss the design and implementation of the system, emphasising its user-friendly, interactive features, and the manner in which it efficiently manages the large amounts of data that research into sounds incurs. We illustrate the operation of the system with examples of spectrograms computed from cough sounds recorded simultaneously at the mouth and through the chest wall. Reprinted from: Comput Methods Programs Biomed 1991;36:33-43},
  note = {Comput Methods Programs Biomed 1991;36:33-43}
}
BACKGROUND: Computer programs for the interpretation of electrocardiograms (ECGs) are now widely used. However, a systematic assessment of various computer programs for the interpretation of ECGs has not been performed. METHODS: We undertook a large international study to compare the performance of nine electrocardiographic computer programs with that of eight cardiologists in interpreting ECGs in 1220 clinically validated cases of various cardiac disorders. ECGs from the following groups were included in the sample: control patients (n = 382); patients with left ventricular hypertrophy (n = 183), right ventricular hypertrophy (n = 55), or biventricular hypertrophy (n = 53); patients with anterior myocardial infarction (n = 170), inferior myocardial infarction (n = 273), or combined myocardial infarction (n = 73); and patients with combined infarction and hypertrophy (n = 31). The interpretations of the computer programs and the cardiologists were compared with the clinical diagnoses made independently of the ECGs, and the computer interpretations were compared with those of the cardiologists. RESULTS: The percentage of ECGs correctly classified by the computer programs (median, 91.3 percent) was lower than that of the cardiologists (median, 96.0 percent; P < 0.01). The median sensitivity of the computer programs was also significantly lower than that of the cardiologists in diagnosing left ventricular hypertrophy (56.6 percent vs. 63.9 percent, P < 0.02), right ventricular hypertrophy (31.8 percent vs. 46.6 percent, P < 0.01), anterior myocardial infarction (77.1 percent vs. 84.9 percent, P < 0.001), and inferior myocardial infarction (58.8 percent vs. 71.7 percent, P < 0.0001). The median total accuracy level (the percentage of correct classifications) was 6.6 percent lower for the computer programs (69.7 percent) than for the cardiologists (76.3 percent; P < 0.001). However, the performance of the best programs nearly matched that of the most accurate cardiologists. CONCLUSIONS: Our study shows that some but not all computer programs for the interpretation of ECGs perform almost as well as cardiologists in identifying seven major cardiac disorders. Reprinted from: N Engl J Med 1991;325:1767-73,

presenting to each hospital in specified time periods with acute abdominal pain; total patients in the various periods were 12,506.

MAIN OUTCOME MEASURES: Diagnostic accuracy of participating doctors, admission rates of patients with non-specific abdominal pain, perforation rates in patients with appendicitis, negative laparotomy rates. RESULTS: Use of any one modality resulted in improved diagnostic accuracy and decision making performance. Use of structured forms plus computer feedback resulted in better performance than use of forms alone. Use of structured forms plus a computer teaching package gave results at least as good as those with direct feedback by computer. CONCLUSIONS: The results confirm earlier studies in suggesting that the use of computer aided decision support improves diagnostic and decision making performance when dealing with patients suffering from acute abdominal pain. That use of the computer for teaching gave results at least as good as with its use for direct feedback may be highly relevant for those who are apprehensive about the real time use of diagnostic computers in a clinical setting. Reprinted from: Br Med J 1991;302:1495-7,

note = {Br Med J 1991;302:1495-7}

@article{IMIA1992289,
    author = {Bernelot Moens HJ, Van der Korst JK},
    title = {Comparison of rheumatological diagnosis by a Bayesian program and by physicians},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {289-295},
    abstract = {A Bayesian decision support system was developed for the diagnosis of rheumatic disorders. Knowledge in this system is represented as evidential weights of findings. Simple weights were calculated as the logarithm of likelihood ratios on the basis of 1,000 consecutive patients from a rheumatological clinic. The effect of various methods to improve performance of the system by modification of the weights was studied. Three methods had a mathematical basis; a fourth consisted of weights adapted by a human expert, which allowed inclusion of diagnostic rules such as defined in widely accepted criteria sets. The system's performance was measured in a test population of 570 different cases from the same clinic and compared with predictions of diagnostic outcome made by rheumatologists. The weights from a human expert gave optimal results (sensitivity 65% and specificity 96%), that were close to the physicians' predictions (sensitivity 64% and specificity 98%). The methods to measure the performance of the various models used in this study emphasize sensitivity, specificity and the use of receiver operating characteristics. Reprinted from: Methods Inf Med 1991;30:187-93},
    note = {Methods Inf Med 1991;30:187-93}
}

@article{IMIA1992296,
    author = {Franklin RCG, Spiegelhalter DJ, Macartney FJ, Bull K},
    title = {Evaluation of a diagnostic algorithm for heart disease in neonates},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {296-300},
    abstract = {OBJECTIVE: To develop, test, and validate an algorithm for diagnosing disease in neonates during an over the telephone referral to a specialist cardiac centre. DESIGN: A draft algorithm requiring only data available to a referring paediatrician was generated. This was modified in the light of a retrospective review of case records. A questionnaire to elicit all the data required by
the algorithm was then generated. There followed a prospective three phase evaluation during consecutive over the telephone referrals. This consisted of (a) a conventional phase with unstructured referral consultations, (b) a phase with referrals structured around the questionnaire but independent of the algorithm, and (c) a validation phase with the algorithm (and its previous errors) available during the referral consultation. SETTING: 59 paediatric centres in south east England and a central specialist paediatric cardiology unit. PATIENTS: Consecutive neonates (aged less than 31 days) referred with suspected heart disease. The retrospective review was of records of 174 neonates from 1979. In the prospective evaluation (1987-90) the conventional phase comprised 71 neonates (over 5.5 months), the structured phase 203 neonates (over 14 months), and the validation phase 195 neonates (over 12 months). MAIN OUTCOME MEASURES: Diagnostic accuracy (assigning patients to the correct diagnostic category (out of 27)), of the referring paediatrician, the specialist after the referral consultation, and the algorithm as compared with the definitive diagnosis by echocardiography at the specialist centre, and score for the appropriateness of management in transit. RESULTS: Simply structuring the consultation by questionnaire (that is, proceeding from the conventional phase to the structured phase) improved the diagnostic accuracy of both paediatricians (from 34% (24/71 cases) to 48% (97/203) correct) and specialists (from 54% (38/71 cases) to 64% (130/203) correct). The algorithm (structured phase) would have been even more accurate (78% (158/203 cases); p less than 0.01). Management scores in the structured phase were also better than in the conventional phase (80% (162/203 cases) v 58% (41/71) appropriate; p less than 0.01). Management scores would have improved to 91% appropriate (185/203; p less than 0.001) had the algorithmic diagnoses dictated management. The superiority of the algorithm was maintained but not bettered in the validation phase. CONCLUSIONS: Applying the algorithm should reduce the morbidity and mortality of neonates with critical heart disease by aiding clinicians in therapeutic decisions for in transit care. Reprinted from: Br Med J 1991;302:935-9,

@article{IMIA1992301,
    author = {Nykanen P, Chowdhury S, Wigertz O},
    title = {Evaluation of decision support systems in medicine},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {301-310},
    abstract = {Evaluation deals with the measurement or judgement of system characteristics and with comparison of these with the frame of reference. Evaluation of medical decision support systems is important because these systems are planned to support human decision making in tasks where information from different sources is combined to support clinicians' decisions concerning diagnosis, therapy planning and monitoring of the disease and treatment processes. As the field of decision support systems is still relatively unexplored, standards or generally accepted methodologies are not yet available for evaluation. Evaluation of medical decision support systems should be approached from the perspectives of knowledge acquisition, system development life-cycle and user-system integrated environment. Reprinted from: Comput Methods Programs Biomed 1991;34:229-38},
    note = {Comput Methods Programs Biomed 1991;34:229-38}
}

@article{IMIA1992311,
    author = {Middleton B, Shwe MA, Heckerman DE, Hendon M, Horvitz EJ, Lehmann HP, Cooper GF},
    title = {Probabilistic diagnosis using a reformulation of the INTERNIST-11 QMR knowledge base. Evaluation of diagnostic performance},
}
We have developed a probabilistic reformulation of the Quick Medical Reference (QMR) system. In Part I of this two-part series, we described a two-level, multiply connected belief-network representation of the QMR knowledge base and a simulation algorithm to perform probabilistic inference on the reformulated knowledge base. In Part II of this series, we report on an evaluation of the probabilistic QMR, in which we compare the performance of QMR to that of our probabilistic system on cases abstracted from continuing medical education materials from Scientific American Medicine. In addition, we analyze empirically several components of the probabilistic model and simulation algorithm. Reprinted from: Methods Inf Med 1991;30:256-67.

The paper describes an application of Bayes' Theorem to the problem of estimating from past data the probabilities that patients have certain diseases, given their symptoms. The data consist of hospital records of patients who suffered acute abdominal pain. For each patient the records showed a large number of symptoms and the final diagnosis to one of nine diseases or diagnostic groups. Most current methods of computer diagnosis use the "Simple Bayes" model in which the symptoms are assumed to be independent, but the present paper does not make this assumption. Those symptoms (or lack of symptoms) which are most relevant to the diagnosis of each disease are identified by a sequence of chi-squared tests. The computer diagnoses obtained as a result of the implementation of this approach are compared with those given by the "Simple Bayes" method, by the method of classification trees (CART), and also with the preliminary and final diagnoses made by physicians. Reprinted from: Methods Inf Med 1991;30:15-22.

Diagnosis of multiple disorders can be made more efficient by reasoning explicitly about problem decompositions. A diagnostic problem can be decomposed by hypothesizing about common and disjoint cause relationships among the given symptoms. The resulting structure exploits computational principles of causal intersection, subproblem independence, and minimal factorability to increase efficiency. By assigning structure to a problem, the symptom decomposition approach offers a new type of decision-support task called symptom interpretation. Experimental results indicate that symptom decomposition yields substantial increases in performance compared to
    note = {Comput Methods Programs Biomed 1991;35:239-50}
}
DXplain is a computer-based decision support system which generates a differential diagnosis (ddx) from a given list of clinical manifestations (Barnett et al., J. Am. Med. Assoc. 258 (1987) 67-74). An approach was developed to evaluate the accuracy of the ddx's produced by DXplain. The first step involves the collection of 65 benchmark cases drawn from a variety of sources and authors. Despite their diverse origins, the cases share in common that they are all clinical cases upon which a consulting physician might be asked to produce a differential. This helps to ensure that the evaluation of the system will be done in an environment similar to that in which the system is actually used. In the second step, all cases are reviewed by five board-certified physicians (experts) as well as DXplain. For each case, the evaluators (experts and DXplain) produce a rank-ordered ddx list along with an indication of how strongly each disease was felt to be supported by the case findings. A scoring technique was devised which rewards concordance with the gold standard: a consensus of the evaluators' ddx lists. Each evaluator receives a score which is proportional to the degree of agreement achieved with the consensus on the ddx submitted. Preliminary results on a trial evaluation of 46 cases indicate that DXplain, on average, did well in agreeing with the consensus. Agreement was achieved both in regard to the specific diagnoses listed in the ddx and the degree to which the diseases were felt to be supported by the case findings. A discussion of some important issues in the evaluation of knowledge-based systems is undertaken. Reprinted from: Comput Methods Programs Biomed 1991;35:261-6,

note = {Comput Methods Programs Biomed 1991;35:261-6}
abstract = {Knowledge-based system for classical statistical analysis must separate the task of analyzing data from that of using the results of the analysis. In contrast, a Bayesian framework for building biostatistical expert system allows for the integration of the data-analytic and decision-making tasks. The architecture of such a framework entails enabling the system (1) to make its recommendations on decision-analytic grounds; (2) to construct statistical models dynamically; (3) to update a statistical model based on the user's prior beliefs and on data from, the methodological concerns evinced by, the study. This architecture permits the knowledge engineer to represent a variety of types of statistical and domain knowledge. Construction of such systems requires that the knowledge engineer reinterpret traditional statistical concerns, such as by replacing the notion of statistical significance with that of a pragmatic clinical threshold. The clinical user of such a system can interact with the system at a semantic level appropriate to her fund of methodological knowledge, rather than at the level of statistical details. We demonstrate these issues with a prototype system called THOMAS which helps a physician decision maker interpret the results of a published randomized clinical trial. Reprinted from: Comput Methods Programs Biomed 1991;35:251-60,

note = {Comput Methods Programs Biomed 1991;35:251-60}

@article{IMIA1992381,
  author = {Giuse DA, Giuse NB, Bankowitz RA, Miller RA},
  title = {Heuristic determination of quantitative data for knowledge acquisition in medicine},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {381-392},
  abstract = {Knowledge acquisition for medical knowledge bases can be aided by programs that suggest possible values for portions of the data. The paper presents an experiment which was used in designing a heuristic to help the process of knowledge acquisition. The heuristic helps to determine numerical data from stylized literature excerpts in the context of knowledge acquisition for the QMR medical knowledge base. Quantitative suggestions from the heuristics are shown to agree substantially with the data incorporated in the final version of the knowledge base. The experiment shows the potential of knowledge base specific heuristics in simplifying the task of knowledge base creation. Reprinted from: Comput Biomed Res 1991;24:261-72},
  note = {Comput Biomed Res 1991;24:261-72}
}

@article{IMIA1992393,
  author = {Heckerling PS, Elstein AS, Terzian CG, Kushner MS},
  title = {The effect of incomplete knowledge on the diagnoses of a computer consultant system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {393-400},
  abstract = {The knowledge bases (KBs) of diagnostic decision support systems are often incomplete, and gaps in the KB could potentially lead systems to reach diagnoses that are implausible to physicians. To investigate this possibility we studied Iliad (Version 2.01), a computer consultant system that generates differential diagnosis across the domain of internal medicine. Data from the history, physical examination, and laboratory findings of 50 grand-rounds cases were entered into Iliad by a computer consultant aware of the diagnosis but blinded to its presence or absence in Iliad's KB. Two experienced internists were asked to diagnose these cases before and after seeing the


results of the computer consultation, and to assess the plausibility of the computer’s diagnoses. Twenty-eight of the 50 cases (56.0%) were diseases contained in Iliad’s KB. After seeing Iliad’s diagnoses for cases in the KB, physicians assigned to their correct diagnoses a higher mean ranked position (1.5 versus 2.0, p less than 0.008) and a higher mean probability (84.0% versus 77.6%, p less than 0.008) compared with their pre-Iliad values, whereas for cases not in the KB, mean position and probability for correct diagnoses did not change. Physician diagnostic accuracy did not change after consultation on cases included or not included in the KB. After adjusting for case difficulty, mean plausibility of Iliad’s diagnoses was judged significantly higher (on a seven-point scale) for cases in the KB than for cases not in the KB (4.2 versus 3.2, p less than 0.02). (ABSTRACT TRUNCATED AT 250 WORDS) Reprinted from: Med Inf (Land) 1991;16:363-370, note = {Med Inf (Land) 1991;16:363-370}

@article{IMIA1992401,
  author = {Kahn MG, Fagan LM, Tu S},
  title = {Extensions to the time-oriented database model to support temporal reasoning in medical expert systems},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1992},
  year = {1992},
  pages = {401-411},
  abstract = {Physicians faced with diagnostic and therapeutic decisions must reason about clinical features that change over time. Database-management systems (DBMS) can increase access to patient data, but most systems are limited in their ability to store and retrieve complex temporal information. The Time-Oriented Databank (TOD) model, the most widely used data model for medical database systems, associates a single time stamp with each observation. The proper analysis of most clinical data requires accounting for multiple concurrent clinical events that may alter the interpretation of the raw data. Most medical DBMSs cannot retrieve patient data indexed by multiple clinical events. We describe two logical extensions to TOD-based databases that solve a set of temporal reasoning problems we encountered in constructing medical expert systems. A key feature of both extensions is that stored data are partitioned into groupings, such as sequential clinical visits, clinical exacerbations, or other abstract events that have clinical decision-making relevance. The temporal network (TNET) is an object-oriented database that extends the temporal reasoning capabilities of ONCOCIN, a medical expert system that provides chemotherapy advice. TNET uses persistent objects to associate observations with intervals of time during which "an event of clinical interest" occurred. A second object-oriented system called the extended temporal network (ETNET), is both an extension and a simplification of TNET. Like TNET, ETNET uses persistent objects to represent relevant intervals; unlike the first system, however, ETNET contains reasoning methods (rules) that can be executed when an event "begins", and that are withdrawn when that event "concludes". TNET and ETNET capture temporal relationships among recorded information that are not represented in TOD-based databases. Although they do not solve all temporal reasoning problems found in medical decision making, these new structures enable patient database systems to encode complex temporal relationships, to store and retrieve patient data based on multiple clinical contexts and, in ETNET, to modify the reasoning methods available to an expert system based on the onset or conclusion of specific clinical events. Reprinted from: Methods Inf Med 1991;30:4-14},
  note = {Methods Inf Med 1991;30:4-14}
}

@article{IMIA1992412,
Breast calcification diagnosis was studied by using clinical findings and computerized image processing of a mammogram in a network of trained expert learning systems (Outcome Advisor [OA]). The system was tested with records not used for training and performance was compared with radiologist. The network was 72% accurate in classifying clusters of calcifications as malignant or benign over a set of test cases radiologists had considered "hard-to-diagnose calcifications," and referred for biopsy. The radiologists had decided to conduct biopsy by selecting an equal number of positive and negative cases for the test group; thus the radiologists' performance with respect to categories of benign versus malignant was constrained to be 50/50. Statistical analysis shows only a 2% probability that the observed accuracy of 72% was a chance performance in recognizing whether a cluster is benign or malignant. The feasibility of developing a network of OAs for diagnosing breast cancer integrating digital image processing of mammograms is promising.


Previous articles in this journal testify that nursing expert systems have become a feature of nursing information technology and nursing theory. Regrettably, experts' knowledge is not easy to elicit and computer systems are not easy to program. Fortunately, expert system shells bypass most of the problems associated with programming expert systems. Lesser known but with no less impact are shells that bypass the other difficult phase of expert system construction, namely knowledge elicitation. The major aim of this article is to provide a nontechnical description of such a shell and the use to which we have put it within three quite different areas of nursing. In addition, the article introduces expert systems in nursing as a potentially unifying development in a profession rapidly undergoing specialization. Reprinted from: Comput Nurs 1991;9:52-60.

OBJECTIVE: To validate prospectively the use of an artificial neural network to identify myocardial infarction in patients presenting to an emergency department with anterior chest pain. DESIGN: Prospective, blinded testing. SETTING: Tertiary university teaching center. PATIENTS: A
total of 331 consecutive adult patients presenting with anterior chest pain. MEASUREMENTS: Diagnostic sensitivity and specificity with regard to the diagnosis of acute myocardial infarction. MAIN RESULTS: An artificial neural network was trained on clinical pattern sets retrospectively derived from the cases of 351 patients hospitalized with a high likelihood of having myocardial infarction. It was prospectively tested on 331 consecutive patients presenting to an emergency department with anterior chest pain. The ability of the network to distinguish patients with from those without acute myocardial infarction was compared with that of physicians caring for the same patients. The physicians had a diagnostic sensitivity of 77.7% (95% CI, 77.0% to 82.9%) and a diagnostic specificity of 84.7% (CI, 84.0% to 86.4%). The artificial neural network had a sensitivity of 97.2% (CI, 97.2% to 97.5%; P = 0.033) and a specificity of 96.2% (CI, 96.2% to 96.4%; P less than 0.001). CONCLUSION: An artificial neural network trained to identify myocardial infarction in adult patients presenting to an emergency department may be a valuable aid to the clinical diagnosis of myocardial infarction; however, this possibility must be confirmed through prospective testing on a larger patient sample. Reprinted from: Ann Intern Med 1991;115:843-8,

note = {Ann Intern Med 1991;115:843-8}

@article{IMIA1992435,
    author = {Furlong JW, Dupuy ME, Heinsimer JA},
    title = {Neural network analysis of serial cardiac enzyme data. A clinical application of artificial machine intelligence},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {435-442},
    abstract = {There has been a recent resurgence of interest in the study and application of computerized neural networks within the broad field of artificial intelligence. These "intelligent machines" are modeled after biological nervous systems and are fundamentally different from the many computerized expert systems that previously have been introduced as clinical decision-making aids. The authors describe a neural network designed and trained to predict the probability of acute myocardial infarction (AMI) based on the analysis of paired sets of cardiac enzymes. The neural network predicted 24 of 24 (100%) AMIs and 27 of 29 (93%) No-AMIs when compared with a pathologist's interpretation of the patient's laboratory data (P less than 0.000001). The authors attempted to validate the network's diagnoses by two independent methods. When compared with echocardiogram and EKG for diagnosis of AMI, the neural network agreed with the cardiologist's interpretation in 12 of 14 (86%) AMIs and 1 of 3 (33%) No-AMIs, but the correlation was not statistically significant. Using autopsy outcome for validation, the neural network agreed with the anatomic evidence in 24 of 26 (92%) AMIs and 4 of 6 (67%) No-AMIs (P = 0.001). The authors conclude that neural networks can be successfully applied to the analysis of cardiac enzyme data and suggest that broader applications exist within the domain of clinical decision support. Reprinted from: Am J Clin Pathol 1991;96:134-41},
    note = {Am J Clin Pathol 1991;96:134-41}
}

@article{IMIA1992443,
    title = {Identification of the 'H-NMR spectra of complex oligosaccharides with artificial neural networks},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    abstract = {The authors describe a neural network designed and trained to predict the probability of acute myocardial infarction (AMI) based on the analysis of paired sets of cardiac enzymes. The neural network predicted 24 of 24 (100%) AMIs and 27 of 29 (93%) No-AMIs when compared with a pathologist's interpretation of the patient's laboratory data (P less than 0.000001). The authors attempted to validate the network's diagnoses by two independent methods. When compared with echocardiogram and EKG for diagnosis of AMI, the neural network agreed with the cardiologist's interpretation in 12 of 14 (86%) AMIs and 1 of 3 (33%) No-AMIs, but the correlation was not statistically significant. Using autopsy outcome for validation, the neural network agreed with the anatomic evidence in 24 of 26 (92%) AMIs and 4 of 6 (67%) No-AMIs (P = 0.001). The authors conclude that neural networks can be successfully applied to the analysis of cardiac enzyme data and suggest that broader applications exist within the domain of clinical decision support. Reprinted from: Am J Clin Pathol 1991;96:134-41},
    note = {Am J Clin Pathol 1991;96:134-41}
Artificial networks can be used to identify hydrogen nuclear magnetic resonance (1H-NMR) spectra of complex oligosaccharides. Feed-forward neural networks with back-propagation of errors can distinguish between spectra of oligosaccharides that differ by only one glycosyl residue in twenty. The artificial neural networks use features of the strongly overlapping region of the spectra (hump region) as well as features of the resolved regions of the spectra (structural reporter groups) to recognize spectra and efficiently recognized 1H-NMR spectra even when the spectra were perturbed by minor variations in their chemical shifts. Identification of spectra by neural network-based pattern recognition techniques required less than 0.1 second. It is anticipated that artificial neural networks can be used to identify the structures of any complex carbohydrate that has been previously characterized and for which a 1H-NMR spectrum is available.

Reprinted from: Science 1991;251:542-4

Methods for optimizing the prediction of Escherichia coli RNA polymerase promoter sequences by neural networks are presented. A neural network was trained on a set of 80 known promoter sequences combined with different numbers of random sequences. The conserved -10 region and -35 region of the promoter sequences and a combination of these regions were used in three independent training sets. The prediction accuracy of the resulting weight matrix was tested against a separate set of 30 known promoter sequences and 1500 random sequences. The effects of the network's topology, the extent of training, the number of random sequences in the training set and the effects of different data representations were examined and optimized. Accuracies of 100% on the promoter test set and 98.4% on the random test set were achieved with the optimal parameters. Reprinted from: Nucleic Acids Res 1991;19:1593-9

In laser angioplasty, fluorescence spectra of targeted tissue may be used to classify the tissue as atherosclerotic or normal and guide selective laser ablation of atherosclerotic plaque. Here, the ability of the back-propagation and K-nearest neighbors techniques to classify arterial fluorescence spectra is investigated. Both methods are competitive with other classification schemes. The relative performance of variations on both techniques is used to make inferences about the geometry of the classification task. Reprinted from: IEEE T Blamed Eng 1991;38:246-52
Clinical research involving prospective data collection in randomized controlled trials is not always feasible. Increasingly, hospitals are developing large clinical databases that are waiting to be mined. We have developed a computer program, ClinQuery, that facilitates such exploration and analysis. We have also shown in a series of studies that the use of clinical data is a powerful tool in health services research. In some cases, we have shown that coded data are inaccurate and that alternative clinical data are preferable. In other cases, a combination of clinical data and coded discharge diagnoses is preferable. Reprinted from: Stat Med 1991;10:559-64.

In studying falling frequency in the elderly, we observed that having subjects keep a diary led to a larger number of falls reported than had been noted in a previous study in the same population. The previous study asked subjects to report any falls in the previous three months. We considered two related explanations for the observation of lower incidence reports with a 3-month recall survey. First, there may have been under-reporting of falls due to recall bias. Second, the less severe falls (which did not result in injuries) may not be reported. We suggest that the proportional hazards model may be used to adjust studies in which recall is used to determine incidence and time to falls. Reprinted from: Methods Inf Med 1991;30:108-10.

The algorithm and the program for the prediction of RNA secondary structure with pseudoknot formation have been proposed. The algorithm simulates stepwise folding by generating random structures using Monte Carlo method, followed by the selection of helices to final structure on the basis of both their probabilities of occurrence in a random structure and free energy parameters. The program versions have been tested on ribosomal RNA structures and on RNAs with pseudoknots evidenced by experimental data. It is shown that the simulation of folding during RNA
synthesis improves the results. The introduction of pseudoknot formation permits to predict the pseudoknotted structures and to improve the prediction of long-range interactions. The computer program is rather fast and allows to predict the structures for long RNAs without using large memory volumes in usual personal computer. Reprinted from: Nucleic Acids Res 1991;19:2489-94,


@article{IMIA1992478,
    author = {Miller PL, Nadkarni P, Gelernter JE, Carriero N, Pakstis AI, Kidd ILK},
    title = {Parallelizing genetic linkage analysis: a case study for applying parallel computation in molecular biology},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {478-492},
    abstract = {Parallel computers offer a solution to improve the lengthy computation time of many conventional, sequential programs used in molecular biology. On a parallel computer, different pieces of the computation are performed simultaneously on different processors. LINKMAP is a sequential program widely used by scientists to perform genetic linkage analysis. We have converted LINKMAP to run on a parallel computer, using the machine-independent parallel programming language, Linda. Using the parallelization of LINKMAP as a case study, the paper outlines an approach to converting existing highly iterative programs to a parallel form. The paper describes the steps involved in converting the sequential program to a parallel program. It presents performance benchmarks comparing the sequential version of LINKMAP with the parallel version running on different parallel machines. The paper also discusses alternative approaches to the problem of "load balancing," making sure the computational load is shared as evenly as possible among the available processors. Reprinted from: Comput Biomed Res 1991;24:234-48},
}

@article{IMIA1992493,
    author = {DeBakey ME},
    title = {The National Library of Medicine. Evolution of a premier information center},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1992},
    year = {1992},
    pages = {493-499},
    abstract = {From a small collection of medical publications in the Surgeon General's Office in 1836, the National Library of Medicine has developed into the leading repository of medical information in the world. Despite strong opposition and impediments from certain quarters, involving considerable machinations and intrigue, the determination of interested medical leaders and sympathetic members of Congress triumphed in having this remarkable institution established on the campus of the National Institutes of Health, Bethesda, Md. As a participant in many of the negotiations preceding that decision, I have happily witnessed the transformation of the Library, long housed in cramped, makeshift quarters, to its present magnificent structures in the heart of our nation's foremost medical research center. Its prodigious collection of print, audiovisual, and electronic information; its imaginative research projects; its excellent outreach program; and its innovative services and products are indispensable to all practicing health professionals, scientists, and medical educators, as well as to journalists, government officials, and others. The ultimate beneficiary, of course, is the patient. Reprinted from: JAMA 1991;266:1252-8},
    note = {JAMA 1991;266:1252-8}
}
IMIA 1994 BIBTex

@article{IMIA19941,
  author = {Gremy F},
  title = {Preface},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {1-3},
  abstract = {},
  note = {}
}

@article{IMIA19944,
  author = {Anonymous},
  title = {Editorial - Advanced Communications in Health Care},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {4-6},
  abstract = {},
  note = {}
}

@article{IMIA19947,
  author = {Anonymous},
  title = {Information on IMIA },
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {7-10},
  abstract = {},
  note = {}
}

@article{IMIA199411,
  author = {Anonymous},
  title = {Addresses of IMIA Member Societies},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {11-18},
  abstract = {},
  note = {}
}

@article{IMIA199419,
  author = {Anonymous},
  title = {...}
title = {Use of MEDLINE by physicians for clinical problem solving},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
year = {1994},
pages = {126-131},
abstract = {OBJECTIVE: To understand the ways in which computer-mediated searching of the biomedical literature affects patient care and other professional activities. Undertaken to determine the ways in which on-line access to the biomedical literature via the National Library of Medicine's MEDLINE database "makes a difference" in what physicians do when confronted with a medical problem requiring new or additional information. DESIGN: An adaptation of the Critical Incident Technique used to gather detailed reports of MEDLINE search results that were especially helpful (or not helpful) in carrying out the individual's professional activities. The individual physician was the source of the patient care incident reports. One thousand one hundred fifty-eight reports were systematically analyzed from three different perspectives: (1) why the information was sought; (2) the effect of having (or not having) the needed information on professional decisions and actions; and (3) the outcome of the search. PARTICIPANTS AND SETTING: Telephone interviews were carried out with a purposive sample of 552 physicians, scientists, and other professionals working in a variety of clinical care and other settings. Of these, 65% were direct users of MEDLINE throughout the United States, and 35% had MEDLINE searches conducted for them either at a major health sciences center or in community hospitals. RESULTS: Three comprehensive and detailed inventories that describe the motivation for the searches, how search results affected the actions and decisions of the individual who initiated the search, and how they affected the outcome of the situation that motivated the search. CONCLUSIONS: MEDLINE searches are being carried out by and for physicians to meet a wide diversity of clinical information needs. Physicians report that in situations involving individual patients, rapid access to the biomedical literature via MEDLINE is at times critical to sound patient care and favorably influences patient outcomes. Reprinted from: JAMA 1993;269:3124-9},
note = {JAMA 1993;269:3124-9}
variables to predict patients who would have a prolonged ICU length of stay, defined as a stay
greater than 2 days. In an independent test set of 696 patients, the network was able to stratify
patients into three risk groups for prolonged stay (low, intermediate, and high), corresponding to
frequencies of prolonged stay of 16.3, 35.3, and 60.8%, respectively. The trained network could
potentially be used as a predictive instrument for optimizing the scheduling of cardiac surgery
patients in times of limited ICU resources. Neural networks are a new method for developing
predictive instruments that offer both advantages and disadvantages when compared to other more
widely used statistical techniques. Reprinted from: Comput Biomed Res 1993;26:220-9,

@article{IMIA1994142,
author = {Roa L, Gomez-Cia T},
title = {A burn patient resuscitation therapy designed by computer simulation (BET). Part 1: Simulation studies},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
year = {1994},
pages = {142-149},
abstract = {This study presents an analysis of the fluid, electrolyte and colloid needs of burn patients during the shock phase. A digital simulation technique was used which had previously been validated and published in burned patients (Roa et al., 1988). After analysing the repercussions of both burns and various resuscitation procedures, a fluid therapy method (BET) has been designed using a burn patient simulator, which has been characterized by its effectiveness and minimal side-effects. The characteristics of the BET method are a low volume of infusion resuscitation solution (220 ml/h/m2 burned body surface area (BBSA)) and a rapid and large volume of colloidal substances (with colloid concentrations of 10, 7.5 and 5 g/100 ml during the first three 8 h periods of the first postburn day and 2.5 g/100 ml until the 40th h postburn). Reprinted from: Burns 1993;19:324-31},
note = {Burns 1993;19:324-31}
}

@article{IMIA1994150,
title = {Pain assessment with interactive computer animation},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
year = {1994},
pages = {150-154},
abstract = {A method of assessing pain using interactive computer animation is described. This method provides quantitative measurements of different qualitative aspects of pain experience without reliance on fine verbal distinctions. A clinical comparison of this procedure and the Short-Form McGill Pain Questionnaire (SF-MPQ) is reported. Correlations between paper and animated visual analogue scales (VAS) showed that animated measurements can be reliably compared to traditional paper-based reporting. Measurements using animations designed to assess different qualities of pain experience correlated significantly with SF-MPQ measures, providing good concurrent validity. A difference was found between patients who chose only one quality-of-pain animation and those who chose more than one, possibly indicating a difference in patients' verbal fluency. Patients overwhelmingly preferred the interactive animations to the paper-based method. Reprinted from: Pain 1993;53:347-51},
note = {Pain 1993;53:347-51}
}
OBJECTIVE: To determine the suitability of insurance claims information for use in clinical outcomes research in ischemic heart disease. DESIGN: Concordance study of two databases. SETTING: Tertiary care referral center. PATIENTS: A total of 12,937 consecutive patients hospitalized for cardiac catheterization for suspected ischemic heart disease between July 1985 and May 1990. INTERVENTIONS: Two-by-two tables were used to compute overall and kappa measures of agreement comparing clinical versus claims data for 12 important predictors of prognosis in patients with ischemic heart disease. MEASUREMENTS: Kappa statistics (agreement adjusted for chance agreement) were used to quantify agreement rates. RESULTS: Agreement rates between the clinical and claims databases ranged from 0.83 for the diagnosis of diabetes to 0.09 for the diagnosis of unstable angina (kappa values). Claims data failed to identify more than one half of the patients with prognostically important conditions, including mitral insufficiency, congestive heart failure, peripheral vascular disease, old myocardial infarction, hyperlipidemia, cerebrovascular disease, tobacco use, angina, and unstable angina, when compared with the clinical information system. CONCLUSIONS: Our results suggest that insurance claims data lack important diagnostic and prognostic information when compared with concurrently collected clinical data in the study of ischemic heart disease. Thus, insurance claims data are not as useful as clinical data for identifying clinically relevant patient groups and for adjusting for risk in outcome studies, such as analyses of hospital mortality. Reprinted from: Ann Intern Med 1993;119:844-50,

note = {Ann Intern Med 1993;119:844-50}

The task of determining patients' eligibility for clinical trials is knowledge and data intensive. In this paper, we present a model for the task of eligibility determination, and describe how a computer system can assist clinical researchers in performing that task. Qualitative and probabilistic approaches to computing and summarizing the eligibility status of potentially eligible patients are described. The two approaches are compared, and a synthesis that draws on the strengths of each approach is proposed. The result of applying these techniques to a database of HIV-positive patient cases suggests that computer programs such as the one described can increase the accrual rate of eligible patients into clinical trials. These methods may also be applied to the task of determining from electronic patient records whether practice guidelines apply in particular clinical situations. Reprinted from: Methods Inf Med 1993;32:317-25,

note = {Methods Inf Med 1993;32:317-25}
@article{IMIA1994173,
  author = {Van Ginneken AM},
  title = {Computer-based patient records. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {173-175},
  abstract = {},
  note = {} }

@article{IMIA1994176,
  author = {Rector AL, Nowlan WA, Kay S, Goble CA, Hawkins D},
  title = {A framework for modelling the electronic medical record},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {176-186},
  abstract = {This paper presents a model for an electronic medical record which satisfies the requirements for a faithful and structured record of patient care set out in a previous paper in this series. The model underlies the PEN & PAD clinical workstation, and it provides for a permanent, completely attributable record of patient care and the process of medical decision making. The model separates the record into two levels: direct observations of the patient and meta-statements about the use of observations in decision making and the clinical dialogue. The model is presented in terms of "descriptions" formulated in the Structured Meta Knowledge (SMK) formalism, but many of its features are more general than the specific implementation. The use of electronic medical records based on the model for decision support and the analysis of aggregated data are discussed along with potential use of the model in distributed information systems. Reprinted from: Methods Inf Med 1993;32:109-19},
  note = {Methods Inf Med 1993;32:109-19} }

@article{IMIA1994187,
  author = {Nygren E, Henriksson P},
  title = {Reading the medical record. I. Analysis of physicians' ways of reading the medical record},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {187-198},
  abstract = {Physicians were interviewed about their routines in everyday use of the medical record. From the interviews, we conclude that the medical record is a well functioning working instrument for the experienced physician. Using the medical record as a basis for decision making involves interpretation of format, layout and other textural features of the type-written data. Interpretation of these features provides effective guidance in the process of searching, reading and assessing the relevance of different items of information in the record. It seems that this is a skill which is an integrated part of diagnostic expertise. This skill plays an important role in decision making based on the large amount of information about a patient, which is exhibited to the reader in the medical record. This finding has implications for the design of user interfaces for reading computerized medical records. Reprinted from: Comput Methods Programs Biomed 1992;39:1-12},
  note = {Comput Methods Programs Biomed 1992;39:1-12}}
The introduction of computer-based patient records in The Netherlands. (plus editorial comment)}

Objective: To assess the effects on health care resource utilization of a network of microcomputer workstations for writing all inpatient orders. Design: Randomized controlled clinical trial. Setting: Inpatient internal medicine service of an urban public hospital. Subjects: A total of 5219 internal medicine patients and the 68 teams of house officers, medical students, and faculty interns who cared for them. Intervention: Microcomputer workstations, linked to a comprehensive electronic medical record system, for writing all inpatient orders. Main Outcome Measures: Total inpatient charges for each admission and charges for specific categories of orders. A time-motion study of selected interns assessed the ordering system's time consumption. Results: Intervention teams generated charges that were $887 (12.7%) lower per admission than did control teams (P = .02). Significant reductions (P < .05) were demonstrated separately for bed charges, diagnostic test charges, and drug charges. Reductions of similar proportion and statistical significance were found for hospital costs. The mean length of stay was 0.89 day shorter for intervention resident teams (P = .11). Interns in the intervention group spent an average of 33 minutes longer (5.5 minutes per patient) during a 10-hour observation period writing orders than did interns in the control group (P < .0001). Conclusions: A network of microcomputer workstations for writing all inpatient orders significantly lowered patient charges and hospital costs. This would amount to savings of more than
$3 million in charges annually for this hospital's medicine service and potentially tens of billions of dollars nationwide. However, the system required more physician time than did the paper charts. Research at other sites and system advances to reduce time requirements are warranted. Reprinted from: JAMA 1993;269:379-83,

note = {JAMA 1993;269:379-83}

@article{IMIA1994215,
  author = {Tang PC},
  title = {Information systems. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {215-217},
  abstract = {},
  note = {}}

@article{IMIA1994218,
  author = {Kahn MG},
  title = {The desktop database dilemma},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {218-221},
  abstract = {Acad Med 1993;68:34-7},
  note = {Acad Med 1993;68:34-7}}

@article{IMIA1994222,
  author = {Collura TF, Jacobs EC, Braun DS, Burgess RC},
  title = {EView—a workstation-based viewer for intensive clinical electroencephalography},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {222-230},
  abstract = {We describe a workstation-based EEG viewer that satisfies the requirements for high-volume clinical EEG review. It currently supports two 24-h four-bed epilepsy monitoring units and a network of routine, intraoperative, and intensive care monitors, providing paperless review of over 5000 pages/day by a staff of clinical neurophysiologists. The design takes advantage of the development environment, processing and graphics resources, and networking capabilities of high-performance UNIX workstations. The user interface and operational infrastructure have been tailored to the demands of clinical neurophysiologists requiring rapid access to large volumes of EEG waveform data in a large clinical neurophysiology laboratory. This paper describes the functional requirements, system architecture, and implementation details of the current system. Reprinted from: IEEE Trans Biomed Eng 1993;40:736-44},
The assessment of pollutant effects on health status requires the mergence and analysis of two different databases: pollution measurements and health care information. This paper compares two subsets of these data: Ohio Environmental Protection Agency data on ambient air pollutants and Ohio Medicare data on respiratory diseases. Small area analysis was performed to assess statewide variations in hospital admission rates for respiratory diseases. The ambient air pollutant levels for each small area were compared to the variations in respiratory disease rates. Five groups of diseases correlated with pollutant levels. In addition, pollutant levels were significantly associated with medical complications. This study demonstrates the feasibility and benefit of linking environmental and health care databases and suggests the need for a more comprehensive, automated analysis of more pollutants and diseases. Reprinted from: Int J Biomed Comput 1993;32:279-88.

In this article, the authors report on part one of a three-part investigation studying the impact of bedside terminals at New York University Medical Center, New York, NY. Using a before-after parallel control-group design, the quality of computerized nursing documentation was studied before and after adding computers to patient rooms. The quality of documentation was defined by timeliness and completeness of data. The study hypothesis, which predicted a positive relationship between the presence of bedside terminals and the quality of nursing documentation, was not supported. Study results showed a minimal use of the computer terminals located in patient rooms. A surprising result was the use of terminals located in rooms other than that of the patient for which documentation was made. Reprint from: Comput Nurs 1993;11:176-82.

A digital archive center was implemented for a radiology department. The system was designed to store and retrieve medical images efficiently. This project demonstrates the feasibility and benefit of digital image storage and retrieval systems in healthcare settings.

Note: The abstracts and citations are structured according to the provided format.
abstract = {OBJECTIVE: In this article, we describe the implementation of a digital archive center for a radiology department in a 700-bed teaching hospital. MATERIALS AND METHODS: The archive center consists of two identical archive systems, each comprising five components: an archive server, a data-base server, an optical disk library, a stand-alone optical disk drive, and a communication network. An image management system controls the image traffic from acquisition devices to display stations. A fault-tolerant mechanism was built into the archive center to achieve a 100% uptime. RESULTS: The center has been in operation for over 6 months. We have not experienced a single total system failure during this period. It currently archives all digital images from three MR units and four CT scanners and selected images from three computed radiographic systems and two laser film digitizers. The center archives between 1.5 and 2.0 gigabytes of images per workday. CONCLUSION: With its built-in fault-tolerant mechanism, we believe that the implemented archive center is very reliable and is suitable for a radiology department to archive its digital images. Reprinted from: Am J Roentgenol 1992;159:1101-5},

note = {Am J Roentgenol 1992;159:1101-5}

@article{IMIA1994253,
    author = {Pangalos GJ},
    title = {Medical database security policies},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1994},
    year = {1994},
    pages = {253-262},
    abstract = {OBJECTIVE: In a two-phase study design, the characteristics of an external data set were studied for precision and bias of the number of incident or prevalent cases of a disease obtained from claims databases. METHODS: In the study population (first phase), incident or prevalent cases were counted whereas external data (second phase) provided sensitivity and specificity estimates to count cases in a claims database. Influence of potential differences in sensitivity and specificity between the two phases were evaluated. This was illustrated for 50-90% sensitivity and 99-99.99% specificity ranges. RESULTS AND CONCLUSIONS: The impact of differences in sensitivity and specificity depends on the odds of disease in the study population. We provide advice on the choice of adequate data sets to correct claims database estimates. Reprinted from: Methods Inf Med 1993;32:349-56},
    note = {Methods Inf Med 1993;32:349-56}
}

@article{IMIA1994263,
    author = {Andreassen S, Christensen HI},
    title = {Image and signal processing. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1994},
    year = {1994},
    pages = {263-265},
    abstract = {},
    note = {}}

@article{IMIA1994266,
    author = {Madhukar B, Murthy ISN},
    title = {ECG data compression by modeling},
    }
The paper presents a novel algorithm for data compression of single lead electrocardiogram (ECG) data. The method is based on parametric modeling of the discrete cosine transformed ECG signal. Improved high frequency reconstruction is achieved by separately modeling the low and the high frequency regions of the transformed signal. Differential pulse code modulation is applied on the model parameters to obtain a further increase in the compression. Compression ratios up to 1:40 were achieved without significant distortion. Reprinted from: Comput Biomed Res 1993;26:310-7.

@article{IMIA1994274,
    author = {Akay YM, Akay M, Welkowitz W, Semmlow JL, Kostis JB},
    title = {Noninvasive acoustical detection of coronary artery disease: a comparative study of signal processing methods},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1994},
    year = {1994},
    pages = {274-281},
    abstract = {Previous studies have indicated heart sounds may contain information useful in the detection of occluded coronary arteries. During diastole, coronary blood flow is maximum, and the sounds associated with turbulent blood flow through partially occluded coronary arteries should be detectable. In order to detect such sounds, recordings of diastolic heart sound segments were analyzed by using four signal processing techniques; the Fast Fourier Transform (FFT), the Autoregressive (AR), the Autoregressive Moving Average (ARMA), and the Minimum-Norm (Eigenvector) methods. To further enhance the diastolic heart sounds and reduce background noise, an Adaptive filter was used as a preprocessor. The power ratios of the FFT method and the poles of the AR, ARMA, and Eigenvector methods were used to diagnose patients as diseased or normal arteries using a blind protocol without prior knowledge of the actual disease states of the patients to guard against human bias. Results showed that normal and abnormal records were correctly distinguished in 56 of 80 cases using the Fast Fourier Transform (FFT), in 63 of 80 cases using the AR, in 62 of 80 cases using the ARMA method, and in 67 of 80 cases using the Eigenvector method. Among all four methods, the Eigenvector methods showed the best diagnostic performance when compared with the FFT, AR, and ARMA methods. These results confirm that high frequency acoustic energy between 300 and 800 Hz is associated with coronary stenosis. Reprinted from: IEEE Trans Biomed Eng 1993;40:571-8},
    note = {IEEE Trans Biomed Eng 1993;40:571-8}
}

@article{IMIA1994282,
    author = {Minoshima S, Koeppe RA, Mintun MA, Berger KL, Taylor SF, Frey KA, Kuhl DE},
    title = {Automated detection of the intercommissural line for stereotactic localization of functional brain images},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1994},
    year = {1994},
    pages = {282-289},
}
A technique has been developed for automated detection of the intercommissural (AC-PC) line for positron emission tomography (PET). The AC-PC line is estimated from the location of four internal landmarks; the frontal and occipital poles, the inferior aspect of the anterior corpus callosum, and the subthalamic point. The landmarks are detected automatically in PET mid-sagittal slices by combining edge detection, interpolation and profile curve analysis techniques. The anatomical relationships between the true and estimated AC-PC lines from the landmarks was confirmed by analysis of magnetic resonance (MR) images. Accuracy of the automated estimation technique was assessed in co-registered PET and MR images, which showed minimal angular differences and displacements of the estimated from the true AC-PC lines. The automated detection of the AC-PC line in a PET study enables accurate stereotactic localization of functional signals without the need for additional anatomical imaging and provides a basis for objective and reproducible intersubject comparison. Reprinted from: J Nucl Med 1993;34:322-9.
We present techniques of automatic nonlinear transformation of MR images (2D or 3D). A neural network automatically finds the corresponding parts between the subject’s brain images and the standard images. By iterative operations, the network generates a set of image-shifting vectors to realize a plastic transformation. For precise matching, a set of markers can be placed manually before starting the transformation on landmarks of the images, e.g., on the anterior-posterior commissural line and on the central sulcus. Reprinted from: J Comput Assist Tomogr 1993;17:455-60.

note = {J Comput Assist Tomogr 1993;17:455-60}

@article{IMIA1994302,
author = {Ozkan M, Dawant BM, Maciunas RJ},
title = {Neural-network-based segmentation of multi-modal medical images: a comparative and prospective study},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
year = {1994},
pages = {302-314},
abstract = {This work presents an investigation of the potential of artificial neural networks for classification of registered magnetic resonance and X-ray computer tomography images of the human brain. First, topological and learning parameters are established experimentally. Second, the learning and generalization properties of the neural networks are compared to those of a classical maximum likelihood classifier and the superiority of the neural network approach is demonstrated when small training sets are utilized. Third, the generalization properties of the neural networks are utilized to develop an adaptive learning scheme able to overcome interslice intensity variations typical of MR images. This approach permits the segmentation of image volumes based on training sets selected on a single slice. Finally, the segmentation results obtained both with the artificial neural network and the maximum likelihood classifiers are compared to contours drawn manually. Reprinted from: IEEE Trans Med Imaging 1993;12:534-44},
note = {IEEE Trans Med Imaging 1993;12:534-44}
}

@article{IMIA1994315,
author = {Fieschi M},
title = {Decision-support systems. Synopsis.},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
year = {1994},
pages = {315-317},
abstract = {},
note = {}
}

@article{IMIA1994318,
author = {Shortliffe EH},
title = {The adolescence of AI in medicine: will the field come of age in the '90s?},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
abstract = {},
Artificial intelligence in medicine (AIM) has reached a period of adolescence in which interactions with the outside world are not only natural but mandatory. Although the basic research topics in AIM may be those of artificial intelligence, the applied issues touch more generally on the broad field of medical informatics. To the extent that AIM research is driven by performance goals for biomedicine, AIM is simply one component within a wide range of research and development activities. Furthermore, an adequate appraisal of AIM research requires an understanding of the research motivations, the complexity of the problems, and a suitable definition of the criteria for judging the field's success. Effective fielding of AIM systems will be dependent on the development of integrated environments for communication and computing that allow merging of knowledge-based tools with other patient data-management and information-retrieval applications. The creation of this kind of infrastructure will require vision and resources from leaders who realize that the practice of medicine is inherently an information-management task and that biomedicine must make the same kind of coordinated commitment to computing technologies as have other segments of our society in which the importance of information management is well understood. Reprinted from: Artif Intell Med 1993;5:93-106.

Little significance is attached by medical informatics workers to the many practical issues which affect the development of clinical decision-support systems. We examine the current state of research in clinical decision-support, the characteristics and motivations of developers, and the perceptions of intended end-users. Factors which adversely affect the success of systems are highlighted and pointers to good practice discussed. We then propose a coherent approach to system development, consisting of requirements analysis, software design, implementation, testing, evaluation and maintenance. Reprinted from: Methods Inf Med 1993;32:1-8.

Providing explanations of the conclusions of decision-support systems can be viewed as presenting inference results in a manner that enhances the user's insight into how these results were obtained. The ability to explain inferences has been demonstrated to be an important factor in making medical decision-support systems acceptable for clinical use. Although many researchers in artificial intelligence have explored the automatic generation of explanations for
decision-support systems based on symbolic reasoning, research in automated explanation of probabilistic results has been limited. We present the results of an evaluation study of INSITE, a program that explains the reasoning of decision-support systems based on Bayesian belief networks. In the domain of anesthesia, we compared subjects who had access to a belief network with explanations of the inference results to control subjects who used the same belief network without explanations. We show that, compared to control subjects, the explanation subjects demonstrated greater diagnostic accuracy, were more confident about their conclusions, were more critical of the belief network, and found the presentation of the inference results more clear. Reprinted from: Comput Biomed Res 1993;26:242-54,

note = {Comput Biomed Res 1993;26:242-54}

@article{IMIA1994364,
  author = {Tourassi GD, Floyd CE Jr},
  title = {Artificial neural networks for single photon emission computed tomography. A study of cold lesion detection and localization,},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {364-370},
  abstract = {RATIONALE AND OBJECTIVES: An artificial neural network was developed for cold lesion detection and localization in single photon emission computed tomography (SPECT) images. METHODS: The network was trained for several noise levels and lesion sizes to identify lesions located in the center of small image neighborhoods. When scrolled across an image the trained network was able to identify cold abnormalities. The diagnostic performance of the technique was evaluated at two noise levels (50,000 and 100,000 counts/slice) and for two lesion sizes (radius: 1.0 cm and 1.5 cm) using the free-response operating characteristic (FROC) analysis. Furthermore, the same network was tested on a situation it was not trained on (80,000 counts/slice and a different reconstruction filter). RESULTS: The neural network showed high sensitivity and small false-positive rates per image for all test situations. These results suggest that neural networks are promising tools for computer-aided clinical diagnosis in SPECT: Reprinted from: Invest Radiol 1993;28:671-7},
  note = {Invest Radiol 1993;28:671-7}
}

@article{IMIA1994371,
  author = {Wu Y, Giger ML, Doi K, Vyborny CJ, Schmidt RA, Metz CE},
  title = {Artificial neural networks in mammography: application to decision making in the diagnosis of breast cancer},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {371-380},
  abstract = {The authors investigated the potential utility of artificial neural networks as a decision-making aid to radiologists in the analysis of mammographic data. Three-layer, feed-forward neural networks with a back-propagation algorithm were trained for the interpretation of mammograms on the basis of features extracted from mammograms by experienced radiologists. A network that used 43 image features performed well in distinguishing between benign and malignant lesions, yielding a value of 0.95 for the area under the receiver operating characteristic curve for textbook cases in a test with the round-robin method. With clinical cases, the performance of a neural network in merging 14 radiologist-extracted features of lesions to distinguish between benign and malignant lesions was found to be higher than the average performance of attending and
resident radiologists alone (without the aid of a neural network). The authors conclude that such networks may provide a potentially useful tool in the mammographic decision-making task of distinguishing between benign and malignant lesions. Reprinted from: Radiology 1993;187:81-7,

note = {Radiology 1993;187:81-7}
amongst symptoms and signs, there is little to be gained by taking interactions into account. However, failure to record all possible observations does limit diagnostic accuracy significantly. The results suggest that near-optimal diagnostic accuracy (75-80%) can be obtained with a training set size of 10(5) cases simply by applying Bayes' theorem with the usual assumption of conditional independence. Reprinted from: Med Inf (Lond) 1993;18:255-70.

@article{IMIA1994411,
  title = {Evaluating consensus among physicians in medical knowledge base construction},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {411-419},
  abstract = {This study evaluates inter-author variability in knowledge base construction. Seven board-certified internists independently profiled "acute perinephric abscess", using as reference material a set of 109 peer-reviewed articles. Each participant created a list of findings associated with the disease, estimated the predictive value and sensitivity of each finding, and assessed the pertinence of each article for making each judgment. Agreement in finding selection was significantly different from chance: seven, six, and five participants selected the same finding 78.6, 9.8, and 1.6 times more often than predicted by chance. Findings with the highest sensitivity were most likely to be included by all participants. The selection of supporting evidence from the medical literature was significantly related to each physician's agreement with the majority. The study shows that, with appropriate guidance, physicians can reproducibly extract information from the medical literature, and thus established a foundation for multi-author knowledge base construction. Reprinted from: Methods Inf Med 1993;32:137-45},
  note = {Methods Inf Med 1993;32:137-45}
}

@article{IMIA1994420,
  author = {Korver M, Lucas PJF},
  title = {Knowledge Processing Converting a rule-based expert system into a belief network},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {420-442},
  abstract = {The theory of belief networks offers a relatively new approach for dealing with uncertain information in knowledge-based (expert) systems. In contrast with the heuristic techniques for reasoning with uncertainty employed in many rule-based expert systems, the theory of belief networks is mathematically sound, based on techniques from probability theory. It therefore seems attractive to convert existing rule-based expert systems into belief networks. In this article we discuss the design of a belief network reformulation of the diagnostic rule-based expert system HEPAR. For the purpose of this experiment we have studied several typical pieces of medical knowledge represented in the HEPAR system. It turned out that, due to the differences in the type of knowledge represented and in the formalism used to represent uncertainty, much of the medical knowledge required for building the belief network concerned could not be extracted from HEPAR. As a consequence, significant additional knowledge acquisition was required. However, the objects and attributes defined in the HEPAR system, as well as the conditions in production rules mentioning these objects and attributes, were useful for guiding the selection of the statistical variables for
building the belief network. The mapping of objects and attributes in HEPAR to statistical variables is discussed in detail. Reprinted from: Med Inf (Lond) 1993;18:219-41,

Note = {Med Inf (Lond) 1993;18:219-41}

@article{IMIA1994443,
  author = {Shahar Y, Musen MA},
  title = {RESUME: a temporal-abstraction system for patient monitoring},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {443-464},
  abstract = {RESUME is a system that performs temporal abstraction of time-stamped data. The temporal-abstraction task is crucial for planning treatment, for executing treatment plans, for identifying clinical problems, and for revising treatment plans. The RESUME system is based on a model of three basic temporal-abstraction mechanisms: point temporal abstraction, a mechanism for abstracting the values of several parameters into a value of another parameter; temporal inference, a mechanism for inferring sound logical conclusions over a single interval or two meeting intervals; and temporal interpolation, a mechanism for bridging nonmeeting temporal intervals. Making explicit the knowledge required for temporal abstraction supports the acquisition and the sharing of that knowledge. We have implemented the RESUME system using the CLIPS knowledge-representation shell. The RESUME system emphasizes the need for explicit representation of temporal-abstraction knowledge, and the advantages of modular, task-specific but domain-independent architectures for building medical knowledge-based systems. Reprinted from: Comput Biomed Res 1993;26:255-73},
}

@article{IMIA1994465,
  author = {Brinkley JF},
  title = {Education. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {465-467},
  abstract = {},
  note = {} 
}

@article{IMIA1994468,
  author = {Chew FS, Smirniotopoulos JO},
  title = {Educational efficacy of computer-assisted instruction with interactive videodisc in radiology},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {468-474},
  abstract = {RATIONALE AND OBJECTIVES: To create a robust, functional computer-assisted instruction (CAI)-videodisc program and to demonstrate its educational efficacy. METHODS: After creating a CAI-videodisc program in skeletal radiology for a two-screen Macintosh system, 36 medical
students and 162 radiology residents entered a controlled study with paired pre- and posttests. Subjects also compared CAI-videodisc with other educational media. RESULTS: Medical students using the CAI-videodisc improved their mean pre- and posttest scores from 50.9 to 70.9 (P < .001, control group scores 50.1 and 50.6) and residents (using a different test) improved from 45.4 to 70.9 (P < .001, control group scores 49.6 and 46.1). Medical students and residents favored CAI-videodisc over teaching files, textbooks, videotapes, and slide-audiotapes. CONCLUSIONS: A functional CAI-videodisc program was created and demonstrated to be educationally effective. Reprinted from: Invest Radio' 1993;28:1052-8,

note = {Invest Radio' 1993;28:1052-8}

@article{IMIA19994475,
author = {Lonwe B, Heij1 A},
title = {Computer-assisted instruction in emergency ophthalmological care},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
year = {1994},
pages = {475-481},
abstract = {The use of computer-assisted instruction in medical education has increased steadily in the last decade with the availability of personal computers. Many computer-assisted instruction programs train the user to handle various forms of disease or injury. Our intent was to provide medical students with more experience in managing ophthalmological emergencies, and we therefore designed a computerized teaching system for emergency ophthalmological care. The system makes it possible for inexperienced students to develop these skills, without jeopardizing the patient's health during training. Colour illustrations help teach the student to judge clinical signs. First, two classes of altogether 35 students used the teaching system. The students were shown to have gained significantly better knowledge of conditions which had been presented to them by the computerized teaching, than of conditions which had not been presented in this way. After having used the system, two other classes were asked about their attitudes towards this teaching modality. A majority regarded it as a valuable or very valuable addition to traditional methods of teaching. This type of instruction system may improve the quality of ophthalmic teaching without increasing teaching staff requirements. Reprinted from: Acta Ophthalmol (Copenh) 1993;71:289-95},

note = {Acta Ophthalmol (Copenh) 1993;71:289-95}

@article{IMIA19994482,
author = {Narayan S, Sensharma D, Santori EM, Lee AA, Sabherwal A, Toga AW},
title = {Animated visualization of a high resolution color three dimensional digital computer model of the whole human head},
journal = {IMIA Yearbook of medical informatics},
volume = {1994},
year = {1994},
pages = {482-492},
abstract = {The interactive visualization of animated images through a computerized three dimensional (3D) full color model of an unstained cadaveric human head is presented. Serial full color images were taken of the blockface of a cryomicrotomed frozen human head every 200 microns. From this series of images a three dimensional digital model with a resultant pixel resolution of 200 microns3 was created on a UNIX workstation. Using this database, resampled images were computed along orthogonal axes and written sequentially to a write-once-read-many times (WORM) videodisc
unit. Playback of this customized videodisc dataset provides animations of the digitally reconstructed slices and 3D reconstructed surface models. An interactive interface to the animated sequences is provided through a PC based tutorial package. This tutorial program is able to access videodisc frames to display animations and labeled still images in a software window to illustrate various neuroanatomic topics. The technique of animation as applied to this high resolution 3D model provides insight into complex spatial relationships and has great potential in research and as a teaching tool in the neurosciences. Reprinted from: Int J Biomed Comput 1993;32:7-17,

note = {Int J Biomed Comput 1993;32:7-17}

@article{IMIA1994493,
  author = {Tiede U, Bomans M, Milne KH, Pommert A, Riemer M, Schiemann T, Schubert R, Lierse W},
  title = {A computerized three-dimensional atlas of the human skull and brain},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1994},
  year = {1994},
  pages = {493-501},
  abstract = {PURPOSE: To develop an anatomic atlas of the human head based on a volume model derived from MR and CT. METHODS: Every voxel of this model was labeled by a neuroanatomist concerning its membership to a structural and/or functional region. A computer program was written that, instead of displaying precomputed images, allows the user to choose and compose arbitrary views. RESULTS: The user can subtract parts and ask for annotations just by using the mouse. Conversely, one can compose images by choosing objects from the list of anatomical constituents which is displayed on the screen. A set of dissection tools allows a "look and feel" that comes near to a true dissection. Operations that are not possible in a real dissection, such as reassembly or filling cavities, can be performed. CONCLUSION: The authors have developed a computerized model that can be used for anatomy teaching and also as a reference for radiologists or surgeons. To replace classical atlases, the spatial resolution must be improved and speed must approach real time. Functional imaging data (position emission tomography and single photon emission CT) can be added to the system. The system is mobile and can be situated in classrooms, operating rooms, reading rooms, and libraries. Reprinted from: Am J Neuroradiol 1993;14:551-9},
  note = {Am J Neuroradiol 1993;14:551-9}
}
@article{IMIA1995121,
  author = {Zvarova J},
  title = {Medical informatics, statistics and epidemiology education in the framework of the Tempus-Phare joint European project},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {121-124},
  abstract = {},
  note = {};
}

@article{IMIA1995125,
  author = {Cimino JJ, Allen BA, Clayton PD},
  title = {Medical Informatics training at the Columbia University and the Columbia-Presbyterian Medical Center},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {125-132},
  abstract = {},
  note = {};
}

@article{IMIA1995133,
  author = {Takeda H},
  title = {Health and clinical management. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {133-134},
  abstract = {},
  note = {};
}

@article{IMIA1995135,
  title = {PC-based system for an objective quantification of manual movement disability for clinical and scientific purposes},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {135-142},
  abstract = {In clinical management and research of movement disorders exact knowledge about the extent of motor impairment is essential. This paper presents a computer program which allows for an objective measurement of manual movement disability. The program was developed for standard hardware and can easily be used in a variety of clinical and research environments. The}
program runs on MS-DOS computers and uses a Microsoft computer mouse as the only input device. The temporal resolution is 100 Hz, the spatial resolution 400 dots per inch. The user may choose between standard test sets or he may design sets according to his individual needs from a pool of available protocols which includes tracking tasks, ballistic tasks, complex sequential tasks, and finger tapping. All tasks are implemented in a similar way in order to keep the test environment as consistent as possible for the patient. The patient must usually carry out movements which correspond to the movements of a target symbol on the computer screen. This entails the manipulation of a follower symbol, also visible on the computer screen, via the computer mouse. The program itself and the theoretical background of the protocols are described in the paper. Additionally, preliminary results from pilot experiments are presented. Reprinted from: J Biomed Eng 1993;15:363-70, note = {J Biomed Eng 1993;15:363-70}

@article{IMIA1995143,
  author = {Astion ML, Wener MH, Thomas RG, Hunder GG, Bloch DA},
  title = {Application of neural networks to the classification of giant cell arteritis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {143-153},
  abstract = {OBJECTIVE: Neural networks are a group of computer-based pattern recognition methods that have recently been applied to clinical diagnosis and classification. In this study, we applied one type of neural network, the backpropagation network, to the diagnostic classification of giant cell arteritis (GCA). METHODS: The analysis was performed on the 807 cases in the vasculitis database of the American College of Rheumatology. Classification was based on the 8 clinical criteria previously used for classification of this data set: 1) age ≥ 50 years, 2) new localized headache, 3) temporal artery tenderness or decrease in temporal artery pulse, 4) polymyalgia rheumatica, 5) abnormal result on artery biopsy, 6) erythrocyte sedimentation rate > or = 50 mm/hour, 7) scalp tenderness or nodules, and 8) claudication of the jaw, of the tongue, or on swallowing. To avoid overtraining, network training was terminated when the generalization error reached a minimum. True cross-validation classification rates were obtained. RESULTS: Neural networks correctly classified 94.4% of the GCA cases (n = 214) and 91.9% of the other vasculitis cases (n = 593). In comparison, classification trees correctly classified 91.6% of the GCA cases and 93.4% of the other vasculitis cases. Neural nets and classification trees were compared by receiver operating characteristic (ROC) analysis. The ROC curves for the two methods crossed, indicating that the better classification method depended on the choice of decision threshold. At a decision threshold that gave equal costs to percentage increases in false-positive and false-negative results, the methods were not significantly different in their performance (P = 0.45). CONCLUSION: Neural networks are a potentially useful method for developing diagnostic classification rules from clinical data. Reprinted from: Arthritis Rheum 1994;37:760-70},
  note = {Arthritis Rheum 1994;37:760-70}
}

@article{IMIA1995154,
  author = {Linnarsson R},
  title = {Drug interactions in primary health care. A retrospective database study and its implications for the design of a computerized decision support system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  note = {IMIA Yearbook of medical informatics: 1995; 15:189-95}
}
OBJECTIVE: To investigate the occurrence of potential drug interactions in primary health care from the perspective of the prescribing general practitioner. DESIGN: Retrospective database study of computer-based patient records with a query language. All drug prescriptions during a four year period were compared with concurrent or overlapping prescriptions for the same patient and these drug pairs were compared with a database of drug interactions from the Swedish drug catalogue. SETTING: One health centre in Sweden with six general practitioners and two doctors on vocational training. PARTICIPANTS: All patients who had visited a doctor at the health centre between 1 November 1986 and 31 October 1990. MAIN OUTCOME MEASURES: The rate of potential interactions in relation to all drug prescriptions and the incidence rate of potential interactions for patients at risk (those receiving two or more drugs). RESULTS: Approximately 55,000 drug prescriptions were analysed for potential drug interactions. A total of 1,074 cases of potential drug interactions were found, which corresponds to a rate of 1.9% of all drug prescriptions. The incidence rate of potential interactions was 12% for all patients at risk (those receiving two or more drugs) and 22% for elderly (> = 65 years of age) patients at risk. Major interactions were investigated concerning the extent to which the prescribing doctors were aware of the potential interactions. CONCLUSION: Potential drug interactions occur at a high rate in general practice, in particular for elderly patients. Properly designed computer-based decision-support might increase the prescribing doctor's awareness of clinically significant interactions and improve the quality of drug treatment. Reprinted from: Scand J Prim Health Care 1993;11:181-6,

note = {Scand J Prim Health Care 1993;11:181-6}

@article{IMIA1995160,
  author = {Kahn MG},
  title = {Clinical databases and critical care research},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {160-174},
  abstract = {Clinical investigators who seek to exploit electronic databases for clinical research need to be aware of the strengths and limitations of the data stored in these systems. Generic issues are examined that can arise from the use of any electronic database, as well as more specific and unique issues that need to be resolved before a comprehensive medical-record database can be realized. Specific suggestions are provided that can be employed by the critical care director who seeks to exploit the rich clinical data available in electronic form for clinical research. Reprinted from: Crit Care Clin 1994;10:37-51},
  note = {Crit Care Clin 1994;10:37-51}
}

@article{IMIA1995175,
  author = {Gorman PN, Ash J, Wykoff L},
  title = {Can primary care physicians' questions be answered using the medical journal literature},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {175-181},
  abstract = {Medical librarians and informatics professionals believe the medical journal literature can be useful in clinical practice, but evidence suggests that practicing physicians do not share this belief. The authors designed a study to determine whether a random sample of "native"
questions asked by primary care practitioners could be answered using the journal literature. Participants included forty-nine active, nonacademic primary care physicians providing ambulatory care in rural and nonrural Oregon, and seven medical librarians. The study was conducted in three stages: (1) office interviews with physicians to record clinical questions; (2) online searches to locate answers to selected questions; and (3) clinician feedback regarding the relevance and usefulness of the information retrieved. Of 295 questions recorded during forty-nine interviews, 60 questions were selected at random for searches. The average total time spent searching for and selecting articles for each question was forty-three minutes. The average cost per question searched was $27.37. Clinician feedback was received for 48 of 56 questions (four physicians could not be located, so their questions were not used in tabulating the results). For 28 questions (56%), clinicians judged the material relevant; for 22 questions (46%) the information provided a “clear answer” to their question. They expected the information would have had an impact on their patient in nineteen (40%) cases, and an impact on themselves or their practice in twenty-four (51%) cases. If the results can be generalized, and if the time and cost of performing searches can be reduced, increased use of the journal literature could significantly improve the extent to which primary care physicians' information needs are met. Reprinted from: Bull Med Libr Assoc 1994;82:140-6, note = {Bull Med Libr Assoc 1994;82:140-6}

@article{IMIA1995182,
    author = {Klein MS, Ross FV, Adams DL, Gilbert CM},
    title = {Effect of online literature searching on length of stay and patient care costs},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {182-190},
    abstract = {PURPOSE: To examine the associations between (1) the economic indicators of hospital costs, charges, and length of stay (LOS) for inpatient cases and (2) the use of MEDLINE searches for such cases. METHOD: An outcome-based, objective, prospective study with an economic evaluation was conducted from September 1989 to September 1990 at three metropolitan Detroit teaching hospitals representing both allopathic and osteopathic care. The study consisted of (1) 192 test cases, derived from a consecutive sample of inpatients of all ages for whom MEDLINE searches were requested at the participating medical libraries, and (2) 10,409 control cases, which were of the same diagnosis-related groups (DRGs) as the test cases but did not involve identified MEDLINE searches. Statistical analysis included the use of multivariate analyses of variance and correlation coefficients. Comparisons of cases were made on case-by-case and DRG bases regarding total patient costs, charges, and lengths of stay for cases with or without MEDLINE searches. RESULTS: The test cases were found to have a higher severity of illness. Among test cases, statistically significant relationships existed between (1) hospital expenses and LOS and (2) hospital expenses and the timing of the search during hospitalization when controlling for LOS. When cases were matched for DRG and LOS, the cases with early searches (i.e., conducted during the first half of hospitalization) had significantly lower expenses. CONCLUSION: Of the test-case patients (for whom MEDLINE searches were conducted during hospitalization), those whose searches were conducted earlier had statistically significantly lower costs, charges, and lengths of stay than those whose searches were conducted later. Reprinted from: Acad Med 1994;69:489-95},
    note = {Acad Med 1994;69:489-95}
}

@article{IMIA1995191,
    author = {Borst F},
    title = {Computer-based patient records. Synopsis.},
}
A model for structured data entry based on explicit descriptional knowledge

Clinical narratives in patient records are usually recorded in free text, limiting the use of this information for research, quality assessment, and decision support. This study focuses on the capture of clinical narratives in a structured format by supporting physicians with structured data entry (SDE). We analyzed and made explicit which requirements SDE should meet to be acceptable for the physician on the one hand, and generate unambiguous patient data on the other. Starting from these requirements, we found that in order to support SDE, the knowledge on which it is based needs to be made explicit: we refer to this knowledge as descriptional knowledge. We articulate the nature of this knowledge, and propose a model in which it can be formally represented. The model allows the construction of specific knowledge bases, each representing the knowledge needed to support SDE within a circumscribed domain. Data entry is made possible through a general entry program, of which the behavior is determined by a combination of user input and the content of the applicable domain knowledge base. We clarify how descriptional knowledge is represented, modeled, and used for data entry to achieve SDE, which meets the proposed requirements.

A logical foundation for representation of clinical data

OBJECTIVE: A general framework for representation of clinical data that provides a declarative semantics of terms and that allows developers to define explicitly the relationships among both terms and combinations of terms. DESIGN: Use of conceptual graphs as a standard representation of logic and of an existing standardized vocabulary, the Systematized Nomenclature of Medicine (SNOMED International), for lexical elements. Concepts such as time, anatomy, and uncertainty must be modeled explicitly in a way that allows relation of these foundational concepts to surface-level clinical descriptions in a uniform manner. RESULTS: The proposed framework was used to model a simple radiology report, which included temporal references. CONCLUSION: Formal logic provides a framework for formalizing the representation of medical concepts. Actual implementations will be required to evaluate the practicality of this approach.
@article{IMIA1995220,
author = {Powsner SM, Tuft e ER},
title = {Graphical summary of patient status},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {220-223},
abstract = {Lancet 1994;344:386-9},
note = {Lancet 1994;344:386-9}
}

@article{IMIA1995224,
author = {Henry SB, Holzemwer WL, Reilly CA, Campbell KE},
title = {Terms used by nurses to describe patient problems: can SNOMED III represent nursing concepts in the patient record?},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {224-237},
abstract = {OBJECTIVE: To analyze the terms used by nurses in a variety of data sources and to test the feasibility of using SNOMED III to represent nursing terms. DESIGN: Prospective research design with manual matching of terms to the SNOMED III vocabulary. MEASUREMENTS: The terms used by nurses to describe patient problems during 485 episodes of care for 201 patients hospitalized for Pneumocystis carinii pneumonia were identified. Problems from four data sources (nurse interview, intershift report, nursing care plan, and nurse progress note/flowsheet) were classified based on the substantive area of the problem and on the terminology used to describe the problem. A test subset of the 25 most frequently used terms from the two written data sources (nursing care plan and nurse progress note/flowsheet) were manually matched to SNOMED III terms to test the feasibility of using that existing vocabulary to represent nursing terms. RESULTS: Nurses most frequently described patient problems as signs/symptoms in the verbal nurse interview and intershift report. In the written data sources, problems were recorded as North American Nursing Diagnosis Association (NANDA) terms and signs/symptoms with similar frequencies. Of the nursing terms in the test subset, 69% were represented using one or more SNOMED III terms. Reprinted from: J Am Med Informatics Assoc 1994;1:61-74},
note = {J Am Med Informatics Assoc 1994;1:61-74}
}

@article{IMIA1995238,
author = {Frisse ME, Schnase JL, Metcalfe ES},
title = {Models for patient records},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {238-242},
abstract = {Acad Med 1994;69:546-50},
note = {Acad Med 1994;69:546-50}
}
BACKGROUND: Greater use of computers has been touted as one way in which health care quality can be enhanced while reducing costs. The authors assessed factors associated with acceptance of computerized order-writing. METHOD: From April 1990 through October 1991 a survey was administered to 275 medical students and housestaff who used computer workstations to write all their orders on the general medicine wards at Wishard Memorial Hospital. The survey assessed computer literacy, ease of workstation use, effects on practice and time management, and usefulness of information provided. RESULTS: A total of 212 (77%) of the computer-workstation users responded. Opinions were generally positive. Those of junior students were the most positive, with opinions declining progressively for senior students, interns, and residents. The housestaff were most critical of time spent using the workstations, although they required less time to write orders than the students did. CONCLUSION: The favorableness of the respondents' opinions declined as the level of training increased, a trend that was independent of computer literacy. Hence, increasing computer use by physicians will probably require modification of the educational and socialization process rather than mere reliance on increasing computer literacy.

note = {Acad Med 1994;69:386-9}

BACKGROUND: Despite emerging interest in computer-based patient records (CPRs), less than 1% of medical records in the United States are stored electronically. Some physicians may be reluctant to implement CPR systems because of fear that the physician-patient relationship would be adversely affected. This study ascertained the attitudes of patients regarding the use of CPR systems. METHODS: This study was an in-depth interview survey of 16 patients concerning the CPR system used at the family medicine department at the Medical University of South Carolina. Interview topics included patient knowledge, perceived advantages and disadvantages, and the impact of the CPR system on their relationship with their physician. RESULTS: Most patients were informed about the nature of the CPR system and had positive attitudes toward it. Common perceptions were that CPR provides physicians with easy access to information, facilitates clinical encounters, and improves physician-patient relationship and the quality of care delivered. Although confidentiality was the major concern expressed about the CPR system, only one respondent indicated that this factor limited his interaction with his physician. CONCLUSIONS: This study demonstrated patient acceptance and support for the CPR system in use at the study site. These findings should encourage physicians to use CPRs Reprinted from: J Fam Pract 1994;38:606-10,

note = {J Fam Pract 1994;38:606-10}
@article{IMIA1995252,
  author = {Ridsdale L, Hudd S},
  title = {Computers in the consultation: the patient’s view},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {252-254},
  abstract = {BACKGROUND: The use of computers in general practice consultations is becoming widespread. AIM: A qualitative study was undertaken to determine how patients in one practice responded to the use of computers, and the issues which particularly concerned them when doctors used computers in the consultation. METHOD: Thirty patients whose age-sex characteristics were proportional to the age-sex distribution of one practice were selected to be interviewed within two weeks of a consultation. The interviews were taped, transcribed and analysed. RESULTS: Patients had seen or used computers in many other places and accepted their role in data management. Patients with more experience of computers were more aware of their limitations, particularly with regard to the possibility of loss of confidentiality. Patients did not think the use of a computer led to a loss of the personal touch in the consultation as long as verbal skills and eye contact were maintained. However, they did expect doctors using computers to have acquired computer skills. All but one patient said they wanted to see what was on the screen, although 11 did not know they had the right to read their notes on the screen. CONCLUSION: Patients regarded the use of computers by their doctors as normal and indicative of the doctors being up to date. Most respondents were concerned about possible loss of confidentiality. This concern, and their expressed preference for computer details to be visible and shared, pose challenges to doctors' technical and communication skills. Reprinted from: Br J Gen Pract 1994;44:367-9},
  note = {Br J Gen Pract 1994;44:367-9}
}

@article{IMIA1995255,
  author = {Kluge E-HW},
  title = {Health information, the fair information principles and ethics},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {255-266},
  abstract = {If advanced electronic patient records are construed as epistemic patient analogues in information space, then the traditional property-model of patient records is longer appropriate. A new paradigm is required. This paper suggests a new paradigm, examines its ethical implications and explores ways in which these could be reflected in legal and regulatory mechanisms. Special attention is paid to privacy, security and access relative to the so-called "fair information principles". Reprinted from: Methods Inf Med 1994;33:336-45},
  note = {Methods Inf Med 1994;33:336-45}
}

@article{IMIA1995267,
  author = {Frisse ME},
  title = {Information systems. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {267-270},
  note = {Br J Gen Pract 1994;44:367-9}
abstract = {},
note = {}
The representation of patient information for use in clinical workstations is a complex problem. Ideally, it should be addressed in a way that allows multiple uses of the data, including simple manual review, sharing and pooling across institutions, and as input to knowledge-based decision support systems. To a great extent, this means coding information with controlled medical vocabularies, but it does not mean that all information must be codable before workstations are feasible. This paper defines some of the choices, both current and future, that are available to address the needs of controlled medical vocabularies for representing data and knowledge in clinical workstations and explores some of the implications of those choices. Reprinted from: Int J Biomed Comput 1994;34:185-94,
Service (NHS). Selected as the basis for clinical coding across the NHS, they form the cornerstone of computerised patient records. Computer use has been encouraged in general practice in the UK, with financing schemes and functional inducements resulting in 70% of practices being at least partly computerised, and 84% of these using Read codes. Their promotion has been backed by a major development program to broaden the codes to include all clinical specialities, nursing, and professions allied to medicine. The codes will require significant adaptation for Australian use, including the development of an administrative chapter and a pharmaceutical classification. The impact of information management systems on health care in the UK has relevance for the continuing development of the Australian National Health Information Strategy and for future record keeping in general practice in Australia. If the trial proves successful, the adoption of Read codes as a standard for information management in patient medical records will need to be considered.

Reprinted from: Med J Aust 1993;159:471-6,
We present the clinical experiences of PACS based on 20 months routine operation of the first filmless radiology department worldwide. PACS planning and implementation strategies for potential vendors are discussed. The actual implementation status of this major teaching hospital with currently 560 acute-care beds comprises three computed radiography systems, five digital fluoroscopic units, five mobile units, three angio suites and two CT's interconnected with a PACS, a RIS, which is coupled with three voice-recognition systems for report generation during nights, and a HIS. Primary diagnosis is performed on 16 workstations with two to six high-resolution, high-contrast monitors. Twenty-six peripheral viewing stations provide image display on the wards and in outpatient clinics. During the first 20 months 586,047 images have been acquired, resulting in 1.3 Tbyte of data stored on optical disks. Currently the daily data production is 5-6 Gbyte, the network traffic 15-18 Gbyte. Benefits of PACS primarily are reliable access to image information, speeding up report cycle time, which contributes to the reduction of the average patient length of stay (LOS). The LOS in our hospital is the shortest (6.4 days) of all Austrian hospitals. So it may be stated that PACS improves the quality of health care.

Reprinted from: Med Inf 1994;19:149-59

@article{IMIA1995345,
    author = {Becker SII, Arenson RL},
    title = {Costs and benefits of picture archiving and communication systems},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {345-355},
    abstract = {A picture archiving and communication system (PACS) is an electronic and ideally filmless information system for acquiring, sorting, transporting, storing, and electronically displaying medical images. PACS have developed rapidly and are in operation in a number of hospitals. Before widespread adoption of PACSs can occur, however, their cost-effectiveness must be proven. This article introduces the basic components of a PACS. The current PACS cost-analysis literature is reviewed. Some authors conclude that the PACS would pay for itself, while others find the PACS much more expensive. Explanations for these differences are explored. Almost all of these studies focus on direct costs and ignore indirect costs and benefits. The literature characterizing the indirect costs of PACS is reviewed. The authors conclude that there is a need for uniform, well-defined criteria for the calculation of the costs and savings of PACSs. Reprinted from: J Am Med Informatics Assoc 1994;1:361-71},
    note = {J Am Med Informatics Assoc 1994;1:361-71}
}

@article{IMIA1995356,
    title = {Multimedia E-mail systems for computer-assisted radiological communication},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {356-365},
    abstract = {A picture archiving and communication system (PACS) is an electronic and ideally filmless information system for acquiring, sorting, transporting, storing, and electronically displaying medical images. PACS have developed rapidly and are in operation in a number of hospitals. Before widespread adoption of PACSs can occur, however, their cost-effectiveness must be proven. This article introduces the basic components of a PACS. The current PACS cost-analysis literature is reviewed. Some authors conclude that the PACS would pay for itself, while others find the PACS much more expensive. Explanations for these differences are explored. Almost all of these studies focus on direct costs and ignore indirect costs and benefits. The literature characterizing the indirect costs of PACS is reviewed. The authors conclude that there is a need for uniform, well-defined criteria for the calculation of the costs and savings of PACSs. Reprinted from: J Am Med Informatics Assoc 1994;1:361-71},
    note = {J Am Med Informatics Assoc 1994;1:361-71}
}
abstract = {In the film-based organization of communicating radiological results to the referring physician, the different media (text, images, graphics, voice) are separated. When using computer technology, multimedia reports containing links between these different media can be used. This changes the way radiological reports are generated, accessed, and possibly discussed. We performed experiments in a clinical setting using two different metaphors for communicating multimedia information. In the 'paper metaphor', labels in the report text are linked to annotations in selected images. In the 'slide presentation metaphor', annotated images are presented synchronously to a spoken report. With both systems additional interaction between radiologist and referring physician is supported using multimedia 'electronic mail'. The experiments indicate that multimedia does not only significantly increase the efficiency of information transfer, but also has the potential to make reporting itself more efficient. Given that the amount of image-related information keeps growing, multimedia links are a promising method to give efficient access to the most relevant information. Reprinted from: Med Inf 1994;19:139-48},

@article{IMIA1995366,
  author = {Bell RM, Keesey J, Richards T},
  title = {The urge to merge: linking vital statistics records and Medicaid claims},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {366-382},
  abstract = {This paper describes a procedure used to link Medicaid claims data to California vital statistics records for very low birthweight infants. The linkage involved about 53,000 infants born from 1980 to 1987 and 1.46 million claims for delivery/birth-related hospital admissions during the same period. Because the two data files did not share a unique identifier, record linkage required combining evidence across several linking variables: delivery hospital, delivery/birth date or hospitalization period, names, mother's age, and zip code. To combine the various pieces of evidence, we used record linkage theory to compute scores that measure the likelihood of a match, i.e., that two records correspond to the same delivery. These scores appropriately weight the various pieces of evidence for or against a match. Implementation required dealing with large amounts of missing data in one of the files, errors and variations in reported names, and the need to minimize the number of incorrect links. The approach applies to a wide range of linkage problems. The ability to combine existing datasets to form new datasets containing analysis variables from each facilitates analyses that would otherwise be impossible, or prohibitively expensive. Reprinted from: Med Care 1994;32:1004-18},
  note = {Med Care 1994;32:1004-18}
}

@article{IMIA1995383,
  author = {Saranummi N},
  title = {Image and signal processing. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {383-385},
  abstract = {},
  note = {}}
A decade of clinical three-dimensional imaging: a review. Part 2: Clinical applications

Invest Radiol 1994;29:574-89

New method for mechanistic studies of cardiomyoplasty: three-dimensional MRI reconstructions


Robotic assistance in orthopaedic surgery. A proof of principle using distal femoral, arthroplasty

The term "robot" refers to a precision mechanical device that is accurately controlled by a computer using intelligent software. The term "robotic assistance" refers to the use of such a device to aid a surgeon in the optimal conduct of a procedure, particularly one requiring specified geometrical relationships. The authors have been exploring the application of robotic assistance in situations in which accuracy and precision are required in orthopaedic surgery. The initial application concerned the planning, positioning, and orientation cuts and holes of the bone
required for the femoral component of a total knee arthroplasty. A three-dimensional digitizing
template allowed the surgeon to specify the desired position and orientation of the component’s
articular surfaces in relation to the distal femur. The robotic system used this spatial relationship,
along with its knowledge of the geometry of the component selected by the surgeon, to plan the
precise location of the required bone cuts and holes. Finally, the robotic assistant sequentially
positioned saw and drill guides with respect to the distal femur so that the surgeon made these cuts
and holes in the locations necessary for optimal component fit, position, and orientation. The robotic
assistant functioned easily in the operating room environment; increased the accuracy; and
decreased the time, equipment, and personnel required for the conduct of the geometrical part of
this surgical procedure. Reprinted from: Clin Orthop 1993;296:178-86,
    note = {Clin Orthop 1993;296:178-86}

@article{IMIA1995418,
    author = {Nonnenmacher TF, Baumann G, Barth A, Losa GA},
    title = {Digital image analysis of self-similar cell profiles},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {418-425},
    abstract = {Many biological objects appear to have self-similar structures which can be
characterized by their fractal dimension D. However, applications of the concept of fractal geometry
are rather scarce in cell and tissue biology. Here we adapt and analyse critically 3 methods of digital
image analysis to measure D of cellular profiles. As prototype examples we investigate in detail 2
samples of cells: (i) human T-lymphocytes from normal donors, and (ii) hairy leukemic cells. It is
shown that D correlates to the structural complexity of the individual cell contour. The calculated D
values for cells out of the same cell line scatter around a mean value D = 1.15 for T-lymphocytes (S.D.
= 0.03) and D = 1.34 for hairy leukemic cells (S.D. = 0.04). Consequently, we interprete D as a
statistical measure for the sample's fractal dimension. Reprinted from: Int J Biomed Comput
1994;37:131-8},
}

@article{IMIA1995426,
    author = {Sun YN, Ko CC, Mao CW, Lin CJ},
    title = {A computer system for skeletal growth measurement},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {426-436},
    abstract = {In this paper, we have presented a new image-processing system for the
measurement of skeletal growth in pediatric radiology. From a standard posterior and anterior view
radiograph, taken from a left hand, the proposed system first automatically locates the phalangeal
region of interest, and then measures the geometrical parameters associated with skeletal maturity.
Finally, the bone age is estimated by using the standard phalangeal length table. Clinical studies
reveal that the computer processing has resulted in an objective and accurate assessment of skeletal
age. It greatly improves the shortcomings, including inter- and intraobserver variations and
inaccuracy, reported in other research by manual methods. In conclusion, it is an inexpensive and
useful tool for the evaluation of short-term abnormalities in the skeletal growth of children.
    note = {Comput Biomed Res 1994;27:2-12}
@article{IMIA1995437,
    author = {Nave G, Cohen A},
    title = {ECG compression using long-term prediction},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {437-445},
    abstract = {A new algorithm for ECG signal compression is introduced. The compression system is based on the subautoregression (SAR) model, known also as the long-term prediction (LTP) model. The "periodicity" of the ECG signal is employed in order to further reduce redundancy, thus yielding high compression ratios. The suggested algorithm was evaluated using an in-house database. Very low bit rates on the order of 70 b/s are achieved with a relatively low reconstruction error (percent rms difference-PRD) of less than 10%. The algorithm was compared, using the same database, with the conventional linear prediction (short-term prediction--STP) method, and was found superior at any bit rate. The suggested algorithm can be considered a generalization of the recently published average beat subtraction method. Reprinted from: IEEE Trans Biomed Eng 1993;40:877-85},
}

@article{IMIA1995446,
    author = {Wolpaw JR, McFarland DJ},
    title = {Multichannel EEG-based brain-computer communication},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {446-454},
    abstract = {Individuals who are paralyzed or have other severe movement disorders often need alternative means for communicating with and controlling their environments. In this study, human subjects learned to use two channels of bipolar EEG activity to control 2-dimensional movement of a cursor on a computer screen. Amplitudes of 8-12 Hz activity in the EEG recorded from the scalp across right and left central sulci were determined by fast Fourier transform and combined to control vertical and horizontal cursor movements simultaneously. This independent control of two separate EEG channels cannot be attributed to a non-specific change in brain activity and appeared to be specific to the mu rhythm frequency range. With further development, multichannel EEG-based communication may prove of significant value to those with severe motor disabilities. Reprinted from: Electroenceph Clin Neurophysiol 1994;90:444-9},
    note = {Electroenceph Clin Neurophysiol 1994;90:444-9}
}

@article{IMIA1995455,
    author = {Heathfield H},
    title = {Decision-support systems. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {455-457},
    abstract = {}}
BACKGROUND: Computer-based diagnostic systems are available commercially, but there has been limited evaluation of their performance. We assessed the diagnostic capabilities of four internal medicine diagnostic systems: Dxplain, Iliad, Meditel, and QMR. METHODS: Ten expert clinicians created a set of 105 diagnostically challenging clinical case summaries involving actual patients. Clinical data were entered into each program with the vocabulary provided by the program's developer. Each of the systems produced a ranked list of possible diagnoses for each patient, as did the group of experts. We calculated scores on several performance measures for each computer program. RESULTS: No single computer program scored better than the others on all performance measures. Among all cases and all programs, the proportion of correct diagnoses ranged from 0.52 to 0.71, and the mean proportion of relevant diagnoses ranged from 0.19 to 0.37. On average, less than half the diagnoses on the experts' original list of reasonable diagnoses were suggested by any of the programs. However, each program suggested an average of approximately two additional diagnoses per case that the experts found relevant but had not originally considered. CONCLUSIONS: The results provide a profile of the strengths and limitations of these computer programs. The programs should be used by physicians who can identify and use the relevant information and ignore the irrelevant information that can be produced. Reprinted from: N Engl J Med 1994;330:1792-6.

One of the most accountable methods of providing machine assistance in medical diagnosis is to retrieve and display similar previously diagnosed cases from a database. In practice, however, classifying cases according to the diagnoses of their nearest neighbours is often significantly less accurate than other statistical classifiers. In this paper the transparency of the nearest neighbours method is combined with the accuracy of another statistical method. This is achieved by using the other statistical method to define a measure of similarity between the presentations of two cases. The diagnosis of abdominal pain of suspected gynaecological origin is used as a case study to evaluate this method. Bayes' theorem, with the usual assumption of conditional independence, is used to define a metric on cases. This new metric was found to correspond as well as Hamming distance to the clinical notion of "similarity" between cases, while significantly increasing accuracy to that of the Bayes' method itself. Reprinted from: Methods Inf Med 1994;33:205-13,
The first decision-support system designed for the management of septicaemia was MYCIN. Although MYCIN played a vital role in the conception of knowledge-based systems, it never became an established clinical system. This paper describes an alternative decision-support system for septicaemia management currently under development at St. Thomas' Hospital (London) where a large database of septicaemia episodes has been compiled. The three statistical approaches that have been considered are described. These are (i) relative frequencies, (ii) the naive Bayes method and (iii) logistic regression. We also discuss how the concept of probabilistic influence diagrams could be of benefit to the development and implementation of the decision-support system.

OBJECTIVE: To review the evidence from controlled trials of the effects of computer-based clinical decision support systems (CDSSs) on clinician performance and patient outcomes. DATA SOURCES: The literature in the MEDLARS, EMBASE, SCISEARCH, and INSPEC databases was searched from 1974 to the present. Conference proceedings and reference lists of relevant articles were reviewed. Evaluators of CDSSs were asked to identify additional studies. STUDY SELECTION: 793 citations were examined, and 28 controlled trials that met predefined criteria were reviewed in detail. DATA EXTRACTION: Study quality was assessed, and data on setting, clinicians and patients, method of allocation, computer system, and outcomes were abstracted and verified using a structured form. Separate summaries were prepared for physician and patient outcomes. Within each of these categories, studies were classified further according to the primary purpose of the CDSS: drug dose determination, diagnosis, or quality assurance.

RESULTS: Three of 4 studies of computer-assisted dosing, 1 of 5 studies of computer-aided diagnosis, 4 of 6 studies of preventive care reminder systems, and 7 of 9 studies of computer-aided quality assurance for active medical care that assessed clinician performance showed improvements in clinician performance using a CDSS. Three of 10 studies that assessed patient outcomes reported significant improvements. CONCLUSIONS: Strong evidence suggests that some CDSSs can improve physician performance. Additional well-designed studies are needed to assess their effects and cost-effectiveness, especially on patient outcomes.

note = {Methods Inf Med 1994;33:205-13}

note = {Artif Intel' Med 1993;5:489-502}

note = {Ann Intern Med 1994;120:135-42}
@article{IMIA1995494,
  author = {Das AK, Musen MA},
  title = {A temporal query system for protocol-directed decision support},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {494-508},
  abstract = {Chronus is a query system that supports temporal extensions to the Structured Query Language (SQL) for relational databases. Although the relational data model can store time-stamped data and can permit simple temporal-comparison operations, it does not provide either a closed or a sufficient algebra for manipulating temporal data. In this paper, we outline an algebra that maintains a consistent relational representation of temporal data and that allows the type of temporal queries needed for protocol-directed decision support. We also discuss how Chronus can translate between our temporal algebra and the relational algebra used for SQL queries. We have applied our system to the task of screening patients for clinical trials. Our results demonstrate that Chronous can express sufficiently all required temporal queries, and that the search time of such queries is similar to that of standard SQL. Reprinted from: Methods Inf Med 1994;33:358-70},
  note = {Methods Inf Med 1994;33:358-70}
}

@article{IMIA1995509,
  author = {Shahar Y},
  title = {Knowledge processing. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {509-512},
  abstract = {},
  note = {}}

@article{IMIA1995513,
  title = {A methodology for evaluation of knowledge based systems in medicine},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {513-527},
  abstract = {Evaluation is critical to the development and successful integration of knowledge-based systems into their application environment. This is of particular importance in the medical domain--not only for reasons of safety and correctness, but also to reinforce the users' confidence in these systems. In this paper we describe an iterative, four-phased development evaluation cycle covering the following areas: (i) early prototype development, (ii) validity of the system, (iii) functionality of the system, and (iv) impact of the system. Reprinted from: Artif Intell Med 1994;6:107-21},
  note = {Artif Intell Med 1994;6:107-21}}
The history of knowledge based systems in medicine has been that they are generally very localised, serving a special need in a single setting. Very few have proven to be capable of transfer to a distant environment. With the advent of tele-medical services and the associated transfer of data and knowledge in such services, the ability of medical KBS to transfer will be crucial to the success of tele-medical services. Differences in knowledge acquisition methods, knowledge representation techniques and in the epidemiological composition of training databases may influence viable transfer of knowledge based systems. Through experiments we demonstrate how rule-based systems may impose inflexible demands on data, how different knowledge acquisition techniques acquire different aspects of knowledge, though trained on a common training database, and how different knowledge acquisition techniques show varying degrees of robustness to slight changes in training databases. Reprinted from: Artif Intell Med 1994;6:189-201.

Symbolic decision procedures offer a flexible alternative to classical quantitative procedures for decision making, particularly when precise parameters (such as probabilities) are hard to estimate. One such procedure, based on a logic of argumentation, is described. Specifications of inference methods for such functions as proposing and refining decision options, deducing and inheriting arguments for and against options, and selecting among alternatives are presented. These exploit declarative models for patient data, domain and task knowledge. A simple method for translating the specifications into executable Prolog is described. A practical and efficient toolset for using the procedure in a wide range of clinical environments is being developed within the DILEMMA project of the European Commission's Advanced Informatics in Medicine research programme. Reprinted from: Artif Intell Med 1993;5:415.-30.

Multiple disorder diagnosis with adaptive competitive neural networks.
abstract = {Backpropagation neural networks have repeatedly been used for diagnostic problem-solving, but have not been demonstrated to work well when multiple disorders are present. We hypothesized that letting nodes in a backpropagation neural network compete to be part of a diagnostic solution would produce better performance than the use of existing backpropagation methods. To test this hypothesis, we derived an error backpropagation learning rule that can be used with competitive units (competitive backpropagation). Artificial neural networks were then trained using both this new learning rule and standard error backpropagation on a specific medical diagnosis problem: identification of the location of damage in the brain given a set of examination findings. Training samples included solely 'prototypical' cases where a single location of damage is present. The trained networks were then tested with atypical cases where the manifestations of more than one disorder were present or only a single manifestation was present. Networks employing competition among units were found to perform qualitatively better with these multiple-disorder cases than standard networks and also to perform better on single-manifestation cases. The reasons for this are explained. The competitive backpropagation learning rule described here provides a promising new tool for adaptive diagnostic problem-solving. Reprinted from: Artif Intell Med 1993;5:469-87},

note = {Artif Intell Med 1993;5:469-87}

@article{IMIA1995576,
author = {Zhao YK, Tsutsui T, Endo A, Minato K, Takahashi T},
title = {Design and development of an expert system to assist diagnosis and treatment of chronic hepatitis using traditional Chinese medicine},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {576-586},
abstract = {Med Inf 1994;19:37-45},
note = {Med Inf 1994;19:37-45}
}

@article{IMIA1995587,
author = {Dev P},
title = {Education. Synopsis.},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {587-589},
abstract = {},
note = {}
}

@article{IMIA1995590,
author = {Bergeron BP, Sato L, Rouse RL},
title = {Morphing as a means of generating variation in visual medical teaching materials},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {590-597},
abstract = {In computer-based medical education, there is frequently a need to present students with pictorial data representative of the natural variation associated with disease presentations as well as the progression of disease within an individual. Because of the difficulty in acquiring such data, image acquisition is often the most resource-intensive phase of multimedia courseware development. In light of the resource demands associated with image content, many courseware designers do not make opportune use of image data, but rely instead upon text descriptions to provide variation in content. The resulting lack of adequate pictorial content often lessens the overall impact of the courseware. To overcome constraints imposed by the difficulty in acquiring pictorial content of sufficient richness, a methodology of generating variation in visual teaching materials has been developed through the use of morphing. These techniques have general applicability in creating variation in pictorial teaching materials in a variety of image-intensive domains. Reprinted from: Comput Biol Med 1994;24:11-8},

note = {Comput Biol Med 1994;24:11-8}

@article{IMIA1995598,
    author = {Elieson SW, Papa FJ},
    title = {The effects of various knowledge formats on diagnostic performance},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {598-600},
    abstract = {Acad Med 1994;69:S81-3},
    note = {Acad Med 1994;69:S81-3}
}

@article{IMIA1995601,
    author = {Fontaine D, Le Beux P, Riou C, Jacquelinet C},
    title = {An intelligent computer-assisted instruction system for clinical case teaching},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {601-613},
    abstract = {The use of computers in the field of medical education is common. Our purpose is to present a Computer-Assisted Instruction system which has been developed over ten years at the University of Compiègne and the University of Rennes Medical School. This system can be used to help the student to solve clinical cases by analyzing and critiquing their answers and by using a knowledge base which has been previously structured in a rule network. It is an intelligent Computer-Assisted Instruction system comprising an author module, a pedagogical module and a student module. The CAI system can be used as a simulation model for any type of diagnostic or therapeutic problem. In this paper we present the author and pedagogical module which have been built using our previous work on intelligent computer-assisted instruction systems. Reprinted from: Methods Inf Med 1994;33:433-45},
    note = {Methods Inf Med 1994;33:433-45}
}

@article{IMIA1995614,
    author = {McGaghie WC, Boerger RL, McCrimmon DR, Ravitch MM},
    title = {Agreement among medical experts about the structure of concepts in pulmonary physiology},
}
The participants of the panel on education and training in Medical Informatics, concurred that health/medical informatics is today thriving as a separate discipline, despite inevitable uncertainties regarding the future. Conferences discussed the distinctions between physician-built systems and those designed by medical informaticians, focusing on methodology as critical to medical informatics. Reprinted from: Methods Inf Med 1994;33:318-26,
@article{IMIA19951,
    author = {Bait MJ},
    title = {Preface},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {1-2},
    abstract = {},
    note = {} }

@article{IMIA19953,
    author = {van Bemmel JH, McCray AT},
    title = {Editorial - The Computer-based Patient Record},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {3-4},
    abstract = {},
    note = {} }

@article{IMIA19955,
    author = {Anonymous},
    title = {Information on IMIA},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {5-8},
    abstract = {},
    note = {} }

@article{IMIA19959,
    author = {Anonymous},
    title = {Addresses of IMIA Member Societies},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {9-17},
    abstract = {},
    note = {} }
@article{IMIA199518,
    author = {Anonymous},
    title = {Information on IMIA Societies},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {18-36},
    abstract = {},
    note = {}
}
Medical informatics, statistics and epidemiology education in the framework of the Tempus-Phare joint European project,

- **Title:** Medical informatics, statistics and epidemiology education in the framework of the Tempus-Phare joint European project
- **Author:** Zvarova J
- **Journal:** IMIA Yearbook of medical informatics
- **Volume:** 1995
- **Pages:** 121-124
- **Year:** 1995

Medical Informatics training at the Columbia University and the Columbia-Presbyterian Medical Center,

- **Title:** Medical Informatics training at the Columbia University and the Columbia-Presbyterian Medical Center
- **Author:** Cimino JJ, Allen BA, Clayton PD
- **Journal:** IMIA Yearbook of medical informatics
- **Volume:** 1995
- **Pages:** 125-132
- **Year:** 1995

Health and clinical management. Synopsis,

- **Title:** Health and clinical management. Synopsis
- **Author:** Takeda H
- **Journal:** IMIA Yearbook of medical informatics
- **Volume:** 1995
- **Pages:** 133-134
- **Year:** 1995

PC-based system for an objective quantification of manual movement disability for clinical and scientific purposes,

- **Title:** PC-based system for an objective quantification of manual movement disability for clinical and scientific purposes
- **Author:** Machetanz J, Forster J, Bischoff C, Meyer BU, Isenberg C, Conrad B
- **Journal:** IMIA Yearbook of medical informatics
- **Volume:** 1995
- **Pages:** 135-142
- **Year:** 1995

In clinical management and research of movement disorders exact knowledge about the extent of motor impairment is essential. This paper presents a computer program which allows for an objective measurement of manual movement disability. The program was developed for standard hardware and can easily be used in a variety of clinical and research environments. The
program runs on MS-DOS computers and uses a Microsoft computer mouse as the only input device. The temporal resolution is 100 Hz, the spatial resolution 400 dots per inch. The user may choose between standard test sets or he may design sets according to his individual needs from a pool of available protocols which includes tracking tasks, ballistic tasks, complex sequential tasks, and finger tapping. All tasks are implemented in a similar way in order to keep the test environment as consistent as possible for the patient. The patient must usually carry out movements which correspond to the movements of a target symbol on the computer screen. This entails the manipulation of a follower symbol, also visible on the computer screen, via the computer mouse. The program itself and the theoretical background of the protocols are described in the paper. 

Additionally, preliminary results from pilot experiments are presented. Reprinted from: J Biomed Eng 1993;15:363-70,

note = {J Biomed Eng 1993;15:363-70}

@article{IMIA1995143,
  author = {Astion ML, Wener MH, Thomas RG, Hunder GG, Bloch DA},
  title = {Application of neural networks to the classification of giant cell arteritis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {143-153},
  abstract = {OBJECTIVE: Neural networks are a group of computer-based pattern recognition methods that have recently been applied to clinical diagnosis and classification. In this study, we applied one type of neural network, the backpropagation network, to the diagnostic classification of giant cell arteritis (GCA). METHODS: The analysis was performed on the 807 cases in the vasculitis database of the American College of Rheumatology. Classification was based on the 8 clinical criteria previously used for classification of this data set: 1) age > or = 50 years, 2) new localized headache, 3) temporal artery tenderness or decrease in temporal artery pulse, 4) polymyalgia rheumatica, 5) abnormal result on artery biopsy, 6) erythrocyte sedimentation rate > or = 50 mm/hour, 7) scalp tenderness or nodules, and 8) claudication of the jaw, of the tongue, or on swallowing. To avoid overtraining, network training was terminated when the generalization error reached a minimum. True cross-validation classification rates were obtained. RESULTS: Neural networks correctly classified 94.4% of the GCA cases (n = 214) and 91.9% of the other vasculitis cases (n = 593). In comparison, classification trees correctly classified 91.6% of the GCA cases and 93.4% of the other vasculitis cases. Neural nets and classification trees were compared by receiver operating characteristic (ROC) analysis. The ROC curves for the two methods crossed, indicating that the better classification method depended on the choice of decision threshold. At a decision threshold that gave equal costs to percentage increases in false-positive and false-negative results, the methods were not significantly different in their performance (P = 0.45). CONCLUSION: Neural networks are a potentially useful method for developing diagnostic classification rules from clinical data. Reprinted from: Arthritis Rheum 1994;37:760-70},
  note = {Arthritis Rheum 1994;37:760-70}
}

@article{IMIA1995154,
  author = {Linnarsson R},
  title = {Drug interactions in primary health care. A retrospective database study and its implications for the design of a computerized decision support system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  note = {IMIA Yearbook of medical informatics}
}
OBJECTIVE: To investigate the occurrence of potential drug interactions in primary health care from the perspective of the prescribing general practitioner. DESIGN: Retrospective database study of computer-based patient records with a query language. All drug prescriptions during a four year period were compared with concurrent or overlapping prescriptions for the same patient and these drug pairs were compared with a database of drug interactions from the Swedish drug catalogue. SETTING: One health centre in Sweden with six general practitioners and two doctors on vocational training. PARTICIPANTS: All patients who had visited a doctor at the health centre between 1 November 1986 and 31 October 1990. MAIN OUTCOME MEASURES: The rate of potential interactions in relation to all drug prescriptions and the incidence rate of potential interactions for patients at risk (those receiving two or more drugs). RESULTS: Approximately 55,000 drug prescriptions were analysed for potential drug interactions. A total of 1,074 cases of potential drug interactions were found, which corresponds to a rate of 1.9% of all drug prescriptions. The incidence rate of potential interactions was 12% for all patients at risk (those receiving two or more drugs) and 22% for elderly (> = 65 years of age) patients at risk. Major interactions were investigated concerning the extent to which the prescribing doctors were aware of the potential interactions. CONCLUSION: Potential drug interactions occur at a high rate in general practice, in particular for elderly patients. Properly designed computer-based decision-support might increase the prescribing doctor's awareness of clinically significant interactions and improve the quality of drug treatment. Reprinted from: Scand J Prim Health Care 1993;11:181-6.

Clinical databases and critical care research

Medical librarians and informatics professionals believe the medical journal literature can be useful in clinical practice, but evidence suggests that practicing physicians do not share this belief. The authors designed a study to determine whether a random sample of "native"
questions asked by primary care practitioners could be answered using the journal literature. Participants included forty-nine active, nonacademic primary care physicians providing ambulatory care in rural and nonrural Oregon, and seven medical librarians. The study was conducted in three stages: (1) office interviews with physicians to record clinical questions; (2) online searches to locate answers to selected questions; and (3) clinician feedback regarding the relevance and usefulness of the information retrieved. Of 295 questions recorded during forty-nine interviews, 60 questions were selected at random for searches. The average total time spent searching for and selecting articles for each question was forty-three minutes. The average cost per question searched was $27.37. Clinician feedback was received for 48 of 56 questions (four physicians could not be located, so their questions were not used in tabulating the results). For 28 questions (56%), clinicians judged the material relevant; for 22 questions (46%) the information provided a "clear answer" to their question. They expected the information would have had an impact on their patient in nineteen (40%) cases, and an impact on themselves or their practice in twenty-four (51%) cases. If the results can be generalized, and if the time and cost of performing searches can be reduced, increased use of the journal literature could significantly improve the extent to which primary care physicians' information needs are met. Reprinted from: Bull Med Libr Assoc 1994;82:140-6,

\text{note = \{Bull Med Libr Assoc 1994;82:140-6\}}

@article{IMIA1995182,
    author = \{Klein MS, Ross FV, Adams DL, Gilbert CM\},
    title = \{Effect of online literature searching on length of stay and patient care costs\},
    journal = \{IMIA Yearbook of medical informatics\},
    volume = \{1995\},
    year = \{1995\},
    pages = \{182-190\},
    abstract = \{PURPOSE: To examine the associations between (1) the economic indicators of hospital costs, charges, and length of stay (LOS) for inpatient cases and (2) the use of MEDLINE searches for such cases. METHOD: An outcome-based, objective, prospective study with an economic evaluation was conducted from September 1989 to September 1990 at three metropolitan Detroit teaching hospitals representing both allopathic and osteopathic care. The study consisted of (1) 192 test cases, derived from a consecutive sample of inpatients of all ages for whom MEDLINE searches were requested at the participating medical libraries, and (2) 10,409 control cases, which were of the same diagnosis-related groups (DRGs) as the test cases but did not involve identified MEDLINE searches. Statistical analysis included the use of multivariate analyses of variance and correlation coefficients. Comparisons of cases were made on case-by-case and DRG bases regarding total patient costs, charges, and lengths of stay for cases with or without MEDLINE searches. RESULTS: The test cases were found to have a higher severity of illness. Among test cases, statistically significant relationships existed between (1) hospital expenses and LOS and (2) hospital expenses and the timing of the search during hospitalization when controlling for LOS. When cases were matched for DRG and LOS, the cases with early searches (i.e., conducted during the first half of hospitalization) had significantly lower expenses. CONCLUSION: Of the test-case patients (for whom MEDLINE searches were conducted during hospitalization), those whose searches were conducted earlier had statistically significantly lower costs, charges, and lengths of stay than those whose searches were conducted later. Reprinted from: Acad Med 1994;69:489-95},

\text{note = \{Acad Med 1994;69:489-95\}}

@article{IMIA1995191,
    author = \{Borst F\},
    title = \{Computer-based patient records. Synopsis.\},

Clinical narratives in patient records are usually recorded in free text, limiting the use of this information for research, quality assessment, and decision support. This study focuses on the capture of clinical narratives in a structured format by supporting physicians with structured data entry (SDE). We analyzed and made explicit which requirements SDE should meet to be acceptable for the physician on the one hand, and generate unambiguous patient data on the other. Starting from these requirements, we found that in order to support SDE, the knowledge on which it is based needs to be made explicit: we refer to this knowledge as descriptive knowledge. We articulate the nature of this knowledge, and propose a model in which it can be formally represented. The model allows the construction of specific knowledge bases, each representing the knowledge needed to support SDE within a circumscribed domain. Data entry is made possible through a general entry program, of which the behavior is determined by a combination of user input and the content of the applicable domain knowledge base. We clarify how descriptive knowledge is represented, modeled, and used for data entry to achieve SDE, which meets the proposed requirements.

Reprinted from: Methods Inf Med 1994;33:454-63,

note = {Methods Inf Med 1994;33:454-63}
@article{IMIA1995220,  
  author = {Powsner SM, Tufte ER},  
  title = {Graphical summary of patient status},  
  journal = {IMIA Yearbook of medical informatics},  
  volume = {1995},  
  year = {1995},  
  pages = {220-223},  
  abstract = {Lancet 1994;344:386-9},  
  note = {Lancet 1994;344:386-9}  
}

@article{IMIA1995224,  
  author = {Henry SB, Holzemer WL, Reilly CA, Campbell KE},  
  title = {Terms used by nurses to describe patient problems: can SNOMED III represent nursing concepts in the patient record?},  
  journal = {IMIA Yearbook of medical informatics},  
  volume = {1995},  
  year = {1995},  
  pages = {224-237},  
  abstract = {OBJECTIVE: To analyze the terms used by nurses in a variety of data sources and to test the feasibility of using SNOMED III to represent nursing terms. DESIGN: Prospective research design with manual matching of terms to the SNOMED III vocabulary. MEASUREMENTS: The terms used by nurses to describe patient problems during 485 episodes of care for 201 patients hospitalized for Pneumocystis carinii pneumonia were identified. Problems from four data sources (nurse interview, intershift report, nursing care plan, and nurse progress note/flowsheet) were classified based on the substantive area of the problem and on the terminology used to describe the problem. A test subset of the 25 most frequently used terms from the two written data sources (nursing care plan and nurse progress note/flowsheet) were manually matched to SNOMED III terms to test the feasibility of using that existing vocabulary to represent nursing terms. RESULTS: Nurses most frequently described patient problems as signs/symptoms in the verbal nurse interview and intershift report. In the written data sources, problems were recorded as North American Nursing Diagnosis Association (NANDA) terms and signs/symptoms with similar frequencies. Of the nursing terms in the test subset, 69% were represented using one or more SNOMED III terms. Reprinted from: J Am Med Informatics Assoc 1994;1:61-74},  
  note = {J Am Med Informatics Assoc 1994;1:61-74}  
}

@article{IMIA1995238,  
  author = {Frisse ME, Schnase JL, Metcalfe ES},  
  title = {Models for patient records},  
  journal = {IMIA Yearbook of medical informatics},  
  volume = {1995},  
  year = {1995},  
  pages = {238-242},  
  abstract = {Acad Med 1994;69:546-50},  
  note = {Acad Med 1994;69:546-50}  
}
@article{IMIA1995243,
    author = {Tierney WM, Overhage JM, McDonald CJ, Wolinsky FD},
    title = {Medical students' and housestaff's opinions of computerized order-writing},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {243-246},
    abstract = {BACKGROUND: Greater use of computers has been touted as one way in which health care quality can be enhanced while reducing costs. The authors assessed factors associated with acceptance of computerized order-writing. METHOD: From April 1990 through October 1991 a survey was administered to 275 medical students and housestaff who used computer workstations to write all their orders on the general medicine wards at Wishard Memorial Hospital. The survey assessed computer literacy, ease of workstation use, effects on practice and time management, and usefulness of information provided. RESULTS: A total of 212 (77%) of the computer-workstation users responded. Opinions were generally positive. Those of junior students were the most positive, with opinions declining progressively for senior students, interns, and residents. The housestaff were most critical of time spent using the workstations, although they required less time to write orders than the students did. CONCLUSION: The favorableness of the respondents' opinions declined as the level of training increased, a trend that was independent of computer literacy. Hence, increasing computer use by physicians will probably require modification of the educational and socialization process rather than mere reliance on increasing computer literacy. Acad Med 1994;69:386-9},
    note = {Acad Med 1994;69:386-9}
}

@article{IMIA1995247,
    author = {Ornstein S, Bearden A},
    title = {Patient perspectives on computer-based medical records},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {247-251},
    abstract = {BACKGROUND: Despite emerging interest in computer-based patient records (CPRs), less than 1% of medical records in the United States are stored electronically. Some physicians may be reluctant to implement CPR systems because of fear that the physician-patient relationship would be adversely affected. This study ascertained the attitudes of patients regarding the use of CPR systems. METHODS: This study was an in-depth interview survey of 16 patients concerning the CPR system used at the family medicine department at the Medical University of South Carolina. Interview topics included patient knowledge, perceived advantages and disadvantages, and the impact of the CPR system on their relationship with their physician. RESULTS: Most patients were informed about the nature of the CPR system and had positive attitudes toward it. Common perceptions were that CPR provides physicians with easy access to information, facilitates clinical encounters, and improves physician-patient relationship and the quality of care delivered. Although confidentiality was the major concern expressed about the CPR system, only one respondent indicated that this factor limited his interaction with his physician. CONCLUSIONS: This study demonstrated patient acceptance and support for the CPR system in use at the study site. These findings should encourage physicians to use CPRs. Reprinted from: J Fam Pract 1994;38:606-10},
    note = {J Fam Pract 1994;38:606-10}
}
BACKGROUND: The use of computers in general practice consultations is becoming widespread. AIM: A qualitative study was undertaken to determine how patients in one practice responded to the use of computers, and the issues which particularly concerned them when doctors used computers in the consultation. METHOD: Thirty patients whose age-sex characteristics were proportional to the age-sex distribution of one practice were selected to be interviewed within two weeks of a consultation. The interviews were taped, transcribed and analysed. RESULTS: Patients had seen or used computers in many other places and accepted their role in data management. Patients with more experience of computers were more aware of their limitations, particularly with regard to the possibility of loss of confidentiality. Patients did not think the use of a computer led to a loss of the personal touch in the consultation as long as verbal skills and eye contact were maintained. However, they did expect doctors using computers to have acquired computer skills. All but one patient said they wanted to see what was on the screen, although 11 did not know they had the right to read their notes on the screen. CONCLUSION: Patients regarded the use of computers by their doctors as normal and indicative of the doctors being up to date. Most respondents were concerned about possible loss of confidentiality. This concern, and their expressed preference for computer details to be visible and shared, pose challenges to doctors' technical and communication skills. Reprinted from: Br J Gen Pract 1994;44:367-9.

@article{IMIA1995255,
    author = {Kluge E-HW},
    title = {Health information, the fair information principles and ethics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {255-266},
    abstract = {If advanced electronic patient records are construed as epistemic patient analogues in information space, then the traditional property-model of patient records is longer appropriate. A new paradigm is required. This paper suggests a new paradigm, examines its ethical implications and explores ways in which these could be reflected in legal and regulatory mechanisms. Special attention is paid to privacy, security and access relative to the so-called "fair information principles". Reprinted from: Methods Inf Med 1994;33:336-45},
    note = {Methods Inf Med 1994;33:336-45}
}

@article{IMIA1995267,
    author = {Frisse ME},
    title = {Information systems. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {267-270},
    note = {Br J Gen Pract 1994;44:367-9}
abstract = {},
note = {}
The representation of patient information for use in clinical workstations is a complex problem. Ideally, it should be addressed in a way that allows multiple uses of the data, including simple manual review, sharing and pooling across institutions, and as input to knowledge-based decision support systems. To a great extent, this means coding information with controlled medical vocabularies, but it does not mean that all information must be codable before workstations are feasible. This paper defines some of the choices, both current and future, that are available to address the needs of controlled medical vocabularies for representing data and knowledge in clinical workstations and explores some of the implications of those choices. Reprinted from: Int J Biomed Comput 1994;34:185-94.

note = {Int J Biomed Comput 1994;34:185-94}

@article{IMIA1995299,
    author = {Joubert M, Fieschi M, Robert J-J, Tafazzoli A},
    title = {Users conceptual views on medical information databases},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {299-310},
    abstract = {As information databases we consider all the kinds of information repositories that are handled by computer systems. When querying very large information databases, the end-users are often faced with the problem to parse their questions efficiently into the query languages of the computer systems. Conceptual graphs were initially designed for natural language analysis and understanding. Due to their closeness to semantic networks, their expressiveness is powerful enough to be applied to knowledge representation and use by computer systems. This work demonstrates that conceptual graphs are a suitable means to model both the information in patient databases and the queries to these databases, and that operations on graphs can compute the pattern matching process needed to provide the answers. A prototype that exploits this model is presented. Experiments have been made with the material furnished by the Unified Medical Language System project (version 2, 1992) of the National Library of Medicine, USA. Reprinted from: Int J Biomed Comput 1994;37:93-104},
}

@article{IMIA1995311,
    author = {Miller G, Britt H},
    title = {Data collection and changing health care systems. 1. United Kingdom.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {311-315},
    abstract = {The adoption of "Read Clinical Codes" for computerised patient records could profoundly alter the nature and quality of Western medicine in the next decade. The increasing awareness of the need for a standardised coding system has led to the funding of a pilot project to test Read codes in Australian general practice. Read codes are a comprehensive nomenclature of clinical terms incorporating over 100,000 codes in a structured hierarchical form. Designed by a general practitioner, they are now owned, controlled, and developed by the British National Health
Service (NHS). Selected as the basis for clinical coding across the NHS, they form the cornerstone of computerised patient records. Computer use has been encouraged in general practice in the UK, with financing schemes and functional inducements resulting in 70% of practices being at least partly computerised, and 84% of these using Read codes. Their promotion has been backed by a major development program to broaden the codes to include all clinical specialities, nursing, and professions allied to medicine. The codes will require significant adaptation for Australian use, including the development of an administrative chapter and a pharmaceutical classification. The impact of information management systems on health care in the UK has relevance for the continuing development of the Australian National Health Information Strategy and for future record keeping in general practice in Australia. If the trial proves successful, the adoption of Read codes as a standard for information management in patient medical records will need to be considered.

Reprinted from: Med J Aust 1993;159:471-6,

note = {Med J Aust 1993;159:471-6}

@article{IMIA1995316,
author = {Britt H, Miller G},
title = {Data collection and changing health care systems. 2. New Zealand.},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {316-319},
abstract = {Radical changes planned in the New Zealand health system aim to improve its cost effectiveness, quality and consumer responsiveness. These changes will take place despite a paucity of data on the use of resources and outcomes. Data collection systems are to be introduced into hospitals and primary care with the use of the Read clinical codes (RCC) in addition to ICD-9-CM (International classification of disease—clinical modification) and ICPC (International classification of primary care). This paper discusses the proposed changes to the New Zealand health care system and describes their effect on the present and future data collection methods in general practice.} Reprinted from: Med J Aust 1993;159:476-9,

note = {Med J Aust 1993;159:476-9}

@article{IMIA1995320,
author = {Engelmann U, Schroter A, Gunnel U, Demiris AM, Makabe M, Evers H, Meinzer H-P},
title = {The HELIOS image related services},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {320-333},
abstract = {Comput Methods Programs Biomed 1994;45 Supp1:65-78},
note = {Comput Methods Programs Biomed 1994;45 Supp1:65-78}

@article{IMIA1995334,
author = {Mosser H, Urban M, Hruby W},
title = {Filmless digital radiology—feasibility and 20 month experience in clinical routine},
journal = {IMIA Yearbook of medical informatics},


We present the clinical experiences of PACS based on 20 months routine operation of the first filmless radiology department worldwide. PACS planning and implementation strategies for potential vendors are discussed. The actual implementation status of this major teaching hospital with currently 560 acute-care beds comprises three computed radiography systems, five digital fluoroscopic units, five mobile units, three angio suites and two CT's interconnected with a PACS, a RIS, which is coupled with three voice-recognition systems for report generation during nights, and a HIS. Primary diagnosis is performed on 16 workstations with two to six high-resolution, high-contrast monitors. Twenty-six peripheral viewing stations provide image display on the wards and in outpatient clinics. During the first 20 months 586.047 images have been acquired, resulting in 1.3 Tbyte of data stored on optical disks. Currently the daily data production is 5-6 Gbyte, the network traffic 15-18 Gbyte. Benefits of PACS primarily are reliable access to image information, speeding up report cycle time, which contributes to the reduction of the average patient length of stay (LOS). The LOS in our hospital is the shortest (6.4 days) of all Austrian hospitals. So it may be stated that PACS improves the quality of health care.

Reprinted from: Med Inf 1994;19:149-59

@article{IMIA1995345,
  author = {Becker SII, Arenson RL},
  title = {Costs and benefits of picture archiving and communication systems},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {345-355},
  abstract = {A picture archiving and communication system (PACS) is an electronic and ideally filmless information system for acquiring, sorting, transporting, storing, and electronically displaying medical images. PACS have developed rapidly and are in operation in a number of hospitals. Before widespread adoption of PACSs can occur, however, their cost-effectiveness must be proven. This article introduces the basic components of a PACS. The current PACS cost-analysis literature is reviewed. Some authors conclude that the PACS would pay for itself, while others find the PACS much more expensive. Explanations for these differences are explored. Almost all of these studies focus on direct costs and ignore indirect costs and benefits. The literature characterizing the indirect costs of PACS is reviewed. The authors conclude that there is a need for uniform, well-defined criteria for the calculation of the costs and savings of PACSs. Reprinted from: J Am Med Informatics Assoc 1994;1:361-71},
  note = {J Am Med Informatics Assoc 1994;1:361-71}
}

@article{IMIA1995356,
  title = {Multimedia E-mail systems for computer-assisted radiological communication},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {356-365},
  abstract = {A picture archiving and communication system (PACS) is an electronic and ideally filmless information system for acquiring, sorting, transporting, storing, and electronically displaying medical images. PACS have developed rapidly and are in operation in a number of hospitals. Before widespread adoption of PACSs can occur, however, their cost-effectiveness must be proven. This article introduces the basic components of a PACS. The current PACS cost-analysis literature is reviewed. Some authors conclude that the PACS would pay for itself, while others find the PACS much more expensive. Explanations for these differences are explored. Almost all of these studies focus on direct costs and ignore indirect costs and benefits. The literature characterizing the indirect costs of PACS is reviewed. The authors conclude that there is a need for uniform, well-defined criteria for the calculation of the costs and savings of PACSs. Reprinted from: J Am Med Informatics Assoc 1994;1:361-71},
  note = {J Am Med Informatics Assoc 1994;1:361-71}
}
abstract = {In the film-based organization of communicating radiological results to the referring physician, the different media (text, images, graphics, voice) are separated. When using computer technology, multimedia reports containing links between these different media can be used. This changes the way radiological reports are generated, accessed, and possibly discussed. We performed experiments in a clinical setting using two different metaphors for communicating multimedia information. In the 'paper metaphor', labels in the report text are linked to annotations in selected images. In the 'slide presentation metaphor', annotated images are presented synchronously to a spoken report. With both systems additional interaction between radiologist and referring physician is supported using multimedia 'electronic mail'. The experiments indicate that multimedia does not only significantly increase the efficiency of information transfer, but also has the potential to make reporting itself more efficient. Given that the amount of image-related information keeps growing, multimedia links are a promising method to give efficient access to the most relevant information. Reprinted from: Med Inf 1994;19:139-48},

note = {Med Inf 1994;19:139-48}

@article{IMIA1995366,
  author = {Bell RM, Keesey J, Richards T},
  title = {The urge to merge: linking vital statistics records and Medicaid claims},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {366-382},
  abstract = {This paper describes a procedure used to link Medicaid claims data to California vital statistics records for very low birthweight infants. The linkage involved about 53,000 infants born from 1980 to 1987 and 1.46 million claims for delivery/birth-related hospital admissions during the same period. Because the two data files did not share a unique identifier, record linkage required combining evidence across several linking variables: delivery hospital, delivery/birth date or hospitalization period, names, mother's age, and zip code. To combine the various pieces of evidence, we used record linkage theory to compute scores that measure the likelihood of a match, i.e., that two records correspond to the same delivery. These scores appropriately weight the various pieces of evidence for or against a match. Implementation required dealing with large amounts of missing data in one of the files, errors and variations in reported names, and the need to minimize the number of incorrect links. The approach applies to a wide range of linkage problems. The ability to combine existing datasets to form new datasets containing analysis variables from each facilitates analyses that would otherwise be impossible, or prohibitively expensive. Reprinted from: Med Care 1994;32:1004-18},
  note = {Med Care 1994;32:1004-18}
}

@article{IMIA1995383,
  author = {Saranummi N},
  title = {Image and signal processing. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {383-385},
  abstract = {},
  note = {}}
@article{IMIA1995386,
    author = {Zonneveld FW, Fukuta K},
    title = {A decade of clinical three-dimensional imaging: a review. Part 2: Clinical applications},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {386-401},
    abstract = {Invest Radiol 1994;29:574-89},
    note = {Invest Radiol 1994;29:574-89}
}

@article{IMIA1995402,
    author = {Cho PW, Levin HR, Moore CC, Tsitlik JE, McVeigh ER, Gardner TJ, Acker MA},
    title = {New method for mechanistic studies of cardiomyoplasty: three-dimensional MRI reconstructions},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {402-408},
    abstract = {The imaging modalities used to study the mechanism of cardiomyoplasty, such as echocardiography and radionuclide scintigraphy, are seriously limited by their two-dimensional format. Radiofrequency-pulse-tagged magnetic resonance imaging was used to generate three-dimensional reconstructions of the left ventricle throughout the cardiac cycle after cardiomyoplasty. In 2 dogs that had undergone conditioned, right anterior cardiomyoplasty, wrap stimulation with alternating heartbeats was found to produce marked translation of the left ventricle in the short-axis plane, rotation around the long axis, and displacement along the long axis with net long-axis compression; there was no augmentation of radial squeeze. The findings from this study suggest that any systolic augmentation produced by the right anterior wrap is due primarily to long-axis compression. Our study demonstrates a new, more accurate technique of assessing the mechanical effects of cardiomyoplasty in three dimensions, thus permitting a more rational optimization of wrap configurations, and emphasizes the perils of using standard two-dimensional imaging modalities in this setting of exaggerated three-dimensional motion. Reprinted from: Ann Thorac Surg 1994;57:1605-11},
    note = {Ann Thorac Surg 1994;57:1605-11}
}

@article{IMIA1995409,
    author = {Matsen FA, Garbini JL, Sidles JA, Pratt B, Baumgarten D, Kauria R},
    title = {Robotic assistance in orthopaedic surgery. A proof of principle using distal femoral, arthroplasty},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {409-417},
    abstract = {The term "robot" refers to a precision mechanical device that is accurately controlled by a computer using intelligent software. The term "robotic assistance" refers to the use of such a device to aid a surgeon in the optimal conduct of a procedure, particularly one requiring specified geometrical relationships. The authors have been exploring the application of robotic assistance in situations in which accuracy and precision are required in orthopaedic surgery. The initial application concerned the planning, positioning, and orientation cuts and holes of the bone
required for the femoral component of a total knee arthroplasty. A three-dimensional digitizing template allowed the surgeon to specify the desired position and orientation of the component’s articular surfaces in relation to the distal femur. The robotic system used this spatial relationship, along with its knowledge of the geometry of the component selected by the surgeon, to plan the precise location of the required bone cuts and holes. Finally, the robotic assistant sequentially positioned saw and drill guides with respect to the distal femur so that the surgeon made these cuts and holes in the locations necessary for optimal component fit, position, and orientation. The robotic assistant functioned easily in the operating room environment; increased the accuracy; and decreased the time, equipment, and personnel required for the conduct of the geometrical part of this surgical procedure. Reprinted from: Clin Orthop 1993;296:178-86}

@article{IMIA1995418,
author = {Nonnenmacher TF, Baumann G, Barth A, Losa GA},
title = {Digital image analysis of self-similar cell profiles},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {418-425},
abstract = {Many biological objects appear to have self-similar structures which can be characterized by their fractal dimension D. However, applications of the concept of fractal geometry are rather scarce in cell and tissue biology. Here we adapt and analyse critically 3 methods of digital image analysis to measure D of cellular profiles. As prototype examples we investigate in detail 2 samples of cells: (i) human T-lymphocytes from normal donors, and (ii) hairy leukemic cells. It is shown that D correlates to the structural complexity of the individual cell contour. The calculated D values for cells out of the same cell line scatter around a mean value D = 1.15 for T-lymphocytes (S.D. = 0.03) and D = 1.34 for hairy leukemic cells (S.D. = 0.04). Consequently, we interprete D as a statistical measure for the sample’s fractal dimension. Reprinted from: Int J Biomed Comput 1994;37:131-8},
}

@article{IMIA1995426,
author = {Sun YN, Ko CC, Mao CW, Lin CJ},
title = {A computer system for skeletal growth measurement},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {426-436},
abstract = {In this paper, we have presented a new image-processing system for the measurement of skeletal growth in pediatric radiology. From a standard posterior and anterior view radiograph, taken from a left hand, the proposed system first automatically locates the phalangeal region of interest, and then measures the geometrical parameters associated with skeletal maturity. Finally, the bone age is estimated by using the standard phalangeal length table. Clinical studies reveal that the computer processing has resulted in an objective and accurate assessment of skeletal age. It greatly improves the shortcomings, including inter- and intraobserver variations and inaccuracy, reported in other research by manual methods. In conclusion, it is an inexpensive and useful tool for the evaluation of short-term abnormalities in the skeletal growth of children. Reprinted from: Comput Biomed Res 1994;27:2-12},
note = {Comput Biomed Res 1994;27:2-12}
A new algorithm for ECG signal compression is introduced. The compression system is based on the subautoregression (SAR) model, known also as the long-term prediction (LTP) model. The "periodicity" of the ECG signal is employed in order to further reduce redundancy, thus yielding high compression ratios. The suggested algorithm was evaluated using an in-house database. Very low bit rates on the order of 70 b/s are achieved with a relatively low reconstruction error (percent rms difference-PRD) of less than 10%. The algorithm was compared, using the same database, with the conventional linear prediction (short-term prediction--STP) method, and was found superior at any bit rate. The suggested algorithm can be considered a generalization of the recently published average beat subtraction method. Reprinted from: IEEE Trans Biomed Eng 1993;40:877-85,

Individuals who are paralyzed or have other severe movement disorders often need alternative means for communicating with and controlling their environments. In this study, human subjects learned to use two channels of bipolar EEG activity to control 2-dimensional movement of a cursor on a computer screen. Amplitudes of 8-12 Hz activity in the EEG recorded from the scalp across right and left central sulci were determined by fast Fourier transform and combined to control vertical and horizontal cursor movements simultaneously. This independent control of two separate EEG channels cannot be attributed to a non-specific change in brain activity and appeared to be specific to the mu rhythm frequency range. With further development, multichannel EEG-based communication may prove of significant value to those with severe motor disabilities. Reprinted from: Electroenceph Clin Neurophysiol 1994;90:444-9,
Performance of four computer-based diagnostic systems

BACKGROUND: Computer-based diagnostic systems are available commercially, but there has been limited evaluation of their performance. We assessed the diagnostic capabilities of four internal medicine diagnostic systems: Dxplain, Iliad, Meditel, and QMR. METHODS: Ten expert clinicians created a set of 105 diagnostically challenging clinical case summaries involving actual patients. Clinical data were entered into each program with the vocabulary provided by the program's developer. Each of the systems produced a ranked list of possible diagnoses for each patient, as did the group of experts. We calculated scores on several performance measures for each computer program. RESULTS: No single computer program scored better than the others on all performance measures. Among all cases and all programs, the proportion of correct diagnoses ranged from 0.52 to 0.71, and the mean proportion of relevant diagnoses ranged from 0.19 to 0.37. On average, less than half the diagnoses on the experts' original list of reasonable diagnoses were suggested by any of the programs. However, each program suggested an average of approximately two additional diagnoses per case that the experts found relevant but had not originally considered. CONCLUSIONS: The results provide a profile of the strengths and limitations of these computer programs. The programs should be used by physicians who can identify and use the relevant information and ignore the irrelevant information that can be produced. Reprinted from: N Engl J Med 1994;330:1792-6.

One of the most accountable methods of providing machine assistance in medical diagnosis is to retrieve and display similar previously diagnosed cases from a database. In practice, however, classifying cases according to the diagnoses of their nearest neighbours is often significantly less accurate than other statistical classifiers. In this paper the transparency of the nearest neighbours method is combined with the accuracy of another statistical method. This is achieved by using the other statistical method to define a measure of similarity between the presentations of two cases. The diagnosis of abdominal pain of suspected gynaecological origin is used as a case study to evaluate this method. Bayes' theorem, with the usual assumption of conditional independence, is used to define a metric on cases. This new metric was found to correspond as well as Hamming distance to the clinical notion of "similarity" between cases, while significantly increasing accuracy to that of the Bayes' method itself. Reprinted from: Methods Inf Med 1994;33:205-13.
The first decision-support system designed for the management of septicaemia was MYCIN. Although MYCIN played a vital role in the conception of knowledge-based systems, it never became an established clinical system. This paper describes an alternative decision-support system for septicaemia management currently under development at St. Thomas' Hospital (London) where a large database of septicaemia episodes has been compiled. The three statistical approaches that have been considered are described. These are (i) relative frequencies, (ii) the naive Bayes method and (iii) logistic regression. We also discuss how the concept of probabilistic influence diagrams could be of benefit to the development and implementation of the decision-support system. Reprinted from: Artif Intel' Med 1993;5:489-502,

OBJECTIVE: To review the evidence from controlled trials of the effects of computer-based clinical decision support systems (CDSSs) on clinician performance and patient outcomes. DATA SOURCES: The literature in the MEDLARS, EMBASE, SCISEARCH, and INSPEC databases was searched from 1974 to the present. Conference proceedings and reference lists of relevant articles were reviewed. Evaluators of CDSSs were asked to identify additional studies. STUDY SELECTION: 793 citations were examined, and 28 controlled trials that met predefined criteria were reviewed in detail. DATA EXTRACTION: Study quality was assessed, and data on setting, clinicians and patients, method of allocation, computer system, and outcomes were abstracted and verified using a structured form. Separate summaries were prepared for physician and patient outcomes. Within each of these categories, studies were classified further according to the primary purpose of the CDSS: drug dose determination, diagnosis, or quality assurance. RESULTS: Three of 4 studies of computer-assisted dosing, 1 of 5 studies of computer-aided diagnosis, 4 of 6 studies of preventive care reminder systems, and 7 of 9 studies of computer-aided quality assurance for active medical care that assessed clinician performance showed improvements in clinician performance using a CDSS. Three of 10 studies that assessed patient outcomes reported significant improvements. CONCLUSIONS: Strong evidence suggests that some CDSSs can improve physician performance. Additional well-designed studies are needed to assess their effects and cost-effectiveness, especially on patient outcomes. Reprinted from: Ann Intern Med 1994;120:135-42,
Chronus is a query system that supports temporal extensions to the Structured Query Language (SQL) for relational databases. Although the relational data model can store time-stamped data and can permit simple temporal-comparison operations, it does not provide either a closed or a sufficient algebra for manipulating temporal data. In this paper, we outline an algebra that maintains a consistent relational representation of temporal data and that allows the type of temporal queries needed for protocol-directed decision support. We also discuss how Chronus can translate between our temporal algebra and the relational algebra used for SQL queries. We have applied our system to the task of screening patients for clinical trials. Our results demonstrate that Chronus can express sufficiently all required temporal queries, and that the search time of such queries is similar to that of standard SQL. Reprinted from: Methods Inf Med 1994;33:358-70

Evaluation is critical to the development and successful integration of knowledge-based systems into their application environment. This is of particular importance in the medical domain—not only for reasons of safety and correctness, but also to reinforce the users' confidence in these systems. In this paper we describe an iterative, four-phased development evaluation cycle covering the following areas: (i) early prototype development, (ii) validity of the system, (iii) functionality of the system, and (iv) impact of the system. Reprinted from: Artif Intell Med 1994;6:107-21

Evaluation is critical to the development and successful integration of knowledge-based systems into their application environment. This is of particular importance in the medical domain—not only for reasons of safety and correctness, but also to reinforce the users' confidence in these systems. In this paper we describe an iterative, four-phased development evaluation cycle covering the following areas: (i) early prototype development, (ii) validity of the system, (iii) functionality of the system, and (iv) impact of the system. Reprinted from: Artif Intell Med 1994;6:107-21

Evaluation is critical to the development and successful integration of knowledge-based systems into their application environment. This is of particular importance in the medical domain—not only for reasons of safety and correctness, but also to reinforce the users' confidence in these systems. In this paper we describe an iterative, four-phased development evaluation cycle covering the following areas: (i) early prototype development, (ii) validity of the system, (iii) functionality of the system, and (iv) impact of the system. Reprinted from: Artif Intell Med 1994;6:107-21
The history of knowledge based systems in medicine has been that they are generally very localised, serving a special need in a single setting. Very few have proven to be capable of transfer to a distant environment. With the advent of tele-medical services and the associated transfer of data and knowledge in such services, the ability of medical KBS to transfer will be crucial to the success of tele-medical services. Differences in knowledge acquisition methods, knowledge representation techniques and in the epidemiological composition of training databases may influence viable transfer of knowledge based systems. Through experiments we demonstrate how rule-based systems may impose inflexible demands on data, how different knowledge acquisition techniques acquire different aspects of knowledge, though trained on a common training database, and how different knowledge acquisition techniques show varying degrees of robustness to slight changes in training databases. Reprinted from: Artif Intell Med 1994;6:189-201.

Symbolic decision procedures offer a flexible alternative to classical quantitative procedures for decision making, particularly when precise parameters (such as probabilities) are hard to estimate. One such procedure, based on a logic of argumentation, is described. Specifications of inference methods for such functions as proposing and refining decision options, deducing and inheriting arguments for and against options, and selecting among alternatives are presented. These exploit declarative models for patient data, domain and task knowledge. A simple method for translating the specifications into executable Prolog is described. A practical and efficient toolset for using the procedure in a wide range of clinical environments is being developed within the DILEMMA project of the European Commission's Advanced Informatics in Medicine research programme. Reprinted from: Artif Intell Med 1993;5:415.-30.

Multiple disorder diagnosis with adaptive competitive neural networks,

Author: Cho S, Reggia JA,
abstract = {Backpropagation neural networks have repeatedly been used for diagnostic problem-solving, but have not been demonstrated to work well when multiple disorders are present. We hypothesized that letting nodes in a backpropagation neural network compete to be part of a diagnostic solution would produce better performance than the use of existing backpropagation methods. To test this hypothesis, we derived an error backpropagation learning rule that can be used with competitive units (competitive backpropagation). Artificial neural networks were then trained using both this new learning rule and standard error backpropagation on a specific medical diagnosis problem: identification of the location of damage in the brain given a set of examination findings. Training samples included solely 'prototypical' cases where a single location of damage is present. The trained networks were then tested with atypical cases where the manifestations of more than one disorder were present or only a single manifestation was present. Networks employing competition among units were found to perform qualitatively better with these multiple-disorder cases than standard networks and also to perform better on single-manifestation cases. The reasons for this are explained. The competitive backpropagation learning rule described here provides a promising new tool for adaptive diagnostic problem-solving. Reprinted from: Artif Intell Med 1993;5:469-87},

note = {Artif Intell Med 1993;5:469-87}
}

@article{IMIA1995576,
author = {Zhao YK, Tsutsui T, Endo A, Minato K, Takahashi T},
title = {Design and development of an expert system to assist diagnosis and treatment of chronic hepatitis using traditional Chinese medicine},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {576-586},
abstract = {Med Inf 1994;19:37-45},
note = {Med Inf 1994;19:37-45}
}

@article{IMIA1995587,
author = {Dev P},
title = {Education. Synopsis.},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {587-589},
abstract = {},
note = {}
}

@article{IMIA1995590,
author = {Bergeron BP, Sato L, Rouse RL},
title = {Morphing as a means of generating variation in visual medical teaching materials},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {590-597},
}
abstract = {In computer-based medical education, there is frequently a need to present students with pictorial data representative of the natural variation associated with disease presentations as well as the progression of disease within an individual. Because of the difficulty in acquiring such data, image acquisition is often the most resource-intensive phase of multimedia courseware development. In light of the resource demands associated with image content, many courseware designers do not make opportune use of image data, but rely instead upon text descriptions to provide variation in content. The resulting lack of adequate pictorial content often lessens the overall impact of the courseware. To overcome constraints imposed by the difficulty in acquiring pictorial content of sufficient richness, a methodology of generating variation in visual teaching materials has been developed through the use of morphing. These techniques have general applicability in creating variation in pictorial teaching materials in a variety of image-intensive domains. Reprinted from: Comput Biol Med 1994;24:11-8},

@article{IMIA1995598,
  author = {Elieson SW, Papa FJ},
  title = {The effects of various knowledge formats on diagnostic performance},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {598-600},
  abstract = {Acad Med 1994;69:S81-3},
  note = {Acad Med 1994;69:S81-3}
}

@article{IMIA1995601,
  author = {Fontaine D, Le Beux P, Riou C, Jacquelin C},
  title = {An intelligent computer-assisted instruction system for clinical case teaching},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {601-613},
  abstract = {The use of computers in the field of medical education is common. Our purpose is to present a Computer-Assisted Instruction system which has been developed over ten years at the University of Compiègne and the University of Rennes Medical School. This system can be used to help the student to solve clinical cases by analyzing and critiquing their answers and by using a knowledge base which has been previously structured in a rule network. It is an intelligent Computer-Assisted Instruction system comprising an author module, a pedagogical module and a student module. The CAI system can be used as a simulation model for any type of diagnostic or therapeutic problem. In this paper we present the author and pedagogical module which have been built using our previous work on intelligent computer-assisted instruction systems. Reprinted from: Methods Inf Med 1994;33:433-45},
  note = {Methods Inf Med 1994;33:433-45}
}

@article{IMIA1995614,
  author = {McGaghie WC, Boerger RL, McCrimmon DR, Ravitch MM},
  title = {Agreement among medical experts about the structure of concepts in pulmonary physiology},

Can health/medical informatics be regarded as a separate discipline?

The participants of the panel on education and training in Medical Informatics, concurred that health/medical informatics is today thriving as a separate discipline, despite inevitable uncertainties regarding the future. Conferees discussed the distinctions between physician-built systems and those designed by medical informaticians, focusing on methodology as critical to medical informatics. Reprinted from: Methods Inf Med 1994;33:318-26,
@article{IMIA19951,  
author = {Bait MJ},  
title = {Preface},  
journal = {IMIA Yearbook of medical informatics},  
volume = {1995},  
year = {1995},  
pages = {1-2},  
abstract = {},  
note = {}
}

@article{IMIA19953,  
author = {van Bemmel JH, McCray AT},  
title = {Editorial - The Computer-based Patient Record},  
journal = {IMIA Yearbook of medical informatics},  
volume = {1995},  
year = {1995},  
pages = {3-4},  
abstract = {},  
note = {}
}

@article{IMIA19955,  
author = {Anonymous},  
title = {Information on IMIA},  
journal = {IMIA Yearbook of medical informatics},  
volume = {1995},  
year = {1995},  
pages = {5-8},  
abstract = {},  
note = {}
}

@article{IMIA19959,  
author = {Anonymous},  
title = {Addresses of IMIA Member Societies},  
journal = {IMIA Yearbook of medical informatics},  
volume = {1995},  
year = {1995},  
pages = {9-17},  
abstract = {},  
note = {}  
}
@article{IMIA199537,
    author = {Anonymous},
    title = {IMIA Working Groups},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {37-54},
    abstract = {},
    note = {}
}

@article{IMIA199555,
    author = {Detmer DE, Steen EB},
    title = {Countdown to 2001: The computer-based patient record after the Institute of Medicine report},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {55-60},
    abstract = {},
    note = {}
}

@article{IMIA199561,
    author = {Van Ginneken AM},
    title = {The structure of data in medical records},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {61-70},
    abstract = {},
    note = {}
}

@article{IMIA199571,
    author = {Cimino JJ},
    title = {Coding systems in health care},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {71-85},
    abstract = {},
    note = {}
}

@article{IMIA199586,
    author = {Scherrer JR, Lovis C, Borst F},
    title = {DIIOGENE 2, a distributed hospital information system with an emphasis on its medical information content},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {86-95},
    abstract = {},
    note = {}
@article{IMIA199598,
    author = {Safran C},
    title = {Electronic patient records and clinical research},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {98-104},
    abstract = {},
    note = {} 
}

@article{IMIA1995105,
    author = {Shortliffe EH},
    title = {Medical Informatics training at Stanford University School of Medicine},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {105-109},
    abstract = {},
    note = {} 
}

@article{IMIA1995110,
    author = {Degoulet P, Venot A, Auvert B, Gremy F},
    title = {Graduate programs in Medical Informatics at the Paris Universities},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {110-114},
    abstract = {},
    note = {} 
}

@article{IMIA1995115,
    author = {Ahlfeldt H, Wigertz O},
    title = {Study programmes in Medical Informatics at Linkoping University},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {115-120},
    abstract = {},
    note = {} 
}
@article{IMIA1995121,
    author = {Zvarova J},
    title = {Medical informatics, statistics and epidemiology education in the framework of the Tempus-Phare joint European proje},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {121-124},
    abstract = {},
    note = {}}

@article{IMIA1995125,
    author = {Cimino JJ, Allen BA, Clayton PD},
    title = {Medical Informatics training at the Columbia University and the Columbia-Presbyterian Medical Center},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {125-132},
    abstract = {},
    note = {}}

@article{IMIA1995133,
    author = {Takeda H},
    title = {Health and clinical management. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {133-134},
    abstract = {},
    note = {}}

@article{IMIA1995135,
    title = {PC-based system for an objective quantification of manual movement disability for clinical and scientific purposes},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {135-142},
    abstract = {[In clinical management and research of movement disorders exact knowledge about the extent of motor impairment is essential. This paper presents a computer program which allows for an objective measurement of manual movement disability. The program was developed for standard hardware and can easily be used in a variety of clinical and research environments. The]}
program runs on MS-DOS computers and uses a Microsoft computer mouse as the only input device. The temporal resolution is 100 Hz, the spatial resolution 400 dots per inch. The user may choose between standard test sets or he may design sets according to his individual needs from a pool of available protocols which includes tracking tasks, ballistic tasks, complex sequential tasks, and finger tapping. All tasks are implemented in a similar way in order to keep the test environment as consistent as possible for the patient. The patient must usually carry out movements which correspond to the movements of a target symbol on the computer screen. This entails the manipulation of a follower symbol, also visible on the computer screen, via the computer mouse. The program itself and the theoretical background of the protocols are described in the paper. Additionally, preliminary results from pilot experiments are presented.

Reprinted from: J Biomed Eng 1993;15:363-70,

note = {J Biomed Eng 1993;15:363-70}

@article{IMIA1995143,
  author = {Astion ML, Wener MH, Thomas RG, Hunder GG, Bloch DA},
  title = {Application of neural networks to the classification of giant cell arteritis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {143-153},
  abstract = {OBJECTIVE: Neural networks are a group of computer-based pattern recognition methods that have recently been applied to clinical diagnosis and classification. In this study, we applied one type of neural network, the backpropagation network, to the diagnostic classification of giant cell arteritis (GCA). METHODS: The analysis was performed on the 807 cases in the vasculitis database of the American College of Rheumatology. Classification was based on the 8 clinical criteria previously used for classification of this data set: 1) age \( \geq 50 \) years, 2) new localized headache, 3) temporal artery tenderness or decrease in temporal artery pulse, 4) polymyalgia rheumatica, 5) abnormal result on artery biopsy, 6) erythrocyte sedimentation rate \( > 50 \) mm/hour, 7) scalp tenderness or nodules, and 8) claudication of the jaw, of the tongue, or on swallowing. To avoid overtraining, network training was terminated when the generalization error reached a minimum. True cross-validation classification rates were obtained. RESULTS: Neural networks correctly classified 94.4% of the GCA cases \( (n = 214) \) and 91.9% of the other vasculitis cases \( (n = 593) \). In comparison, classification trees correctly classified 91.6% of the GCA cases and 93.4% of the other vasculitis cases. Neural nets and classification trees were compared by receiver operating characteristic (ROC) analysis. The ROC curves for the two methods crossed, indicating that the better classification method depended on the choice of decision threshold. At a decision threshold that gave equal costs to percentage increases in false-positive and false-negative results, the methods were not significantly different in their performance \( (P = 0.45) \). CONCLUSION: Neural networks are a potentially useful method for developing diagnostic classification rules from clinical data. Reprinted from: Arthritis Rheum 1994;37:760-70},

note = {Arthritis Rheum 1994;37:760-70}

@article{IMIA1995154,
  author = {Linnarsson R},
  title = {Drug interactions in primary health care. A retrospective database study and its implications for the design of a computerized decision support system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  abstract = {OBJECTIVE: Neural networks are a group of computer-based pattern recognition methods that have recently been applied to clinical diagnosis and classification. In this study, we applied one type of neural network, the backpropagation network, to the diagnostic classification of giant cell arteritis (GCA). METHODS: The analysis was performed on the 807 cases in the vasculitis database of the American College of Rheumatology. Classification was based on the 8 clinical criteria previously used for classification of this data set: 1) age \( \geq 50 \) years, 2) new localized headache, 3) temporal artery tenderness or decrease in temporal artery pulse, 4) polymyalgia rheumatica, 5) abnormal result on artery biopsy, 6) erythrocyte sedimentation rate \( > 50 \) mm/hour, 7) scalp tenderness or nodules, and 8) claudication of the jaw, of the tongue, or on swallowing. To avoid overtraining, network training was terminated when the generalization error reached a minimum. True cross-validation classification rates were obtained. RESULTS: Neural networks correctly classified 94.4% of the GCA cases \( (n = 214) \) and 91.9% of the other vasculitis cases \( (n = 593) \). In comparison, classification trees correctly classified 91.6% of the GCA cases and 93.4% of the other vasculitis cases. Neural nets and classification trees were compared by receiver operating characteristic (ROC) analysis. The ROC curves for the two methods crossed, indicating that the better classification method depended on the choice of decision threshold. At a decision threshold that gave equal costs to percentage increases in false-positive and false-negative results, the methods were not significantly different in their performance \( (P = 0.45) \). CONCLUSION: Neural networks are a potentially useful method for developing diagnostic classification rules from clinical data. Reprinted from: Arthritis Rheum 1994;37:760-70},

note = {Arthritis Rheum 1994;37:760-70}

@article{IMIA1995154,
OBJECTIVE: To investigate the occurrence of potential drug interactions in primary health care from the perspective of the prescribing general practitioner. DESIGN: Retrospective database study of computer-based patient records with a query language. All drug prescriptions during a four year period were compared with concurrent or overlapping prescriptions for the same patient and these drug pairs were compared with a database of drug interactions from the Swedish drug catalogue. SETTING: One health centre in Sweden with six general practitioners and two doctors on vocational training. PARTICIPANTS: All patients who had visited a doctor at the health centre between 1 November 1986 and 31 October 1990. MAIN OUTCOME MEASURES: The rate of potential interactions in relation to all drug prescriptions and the incidence rate of potential interactions for patients at risk (those receiving two or more drugs). RESULTS: Approximately 55,000 drug prescriptions were analysed for potential drug interactions. A total of 1,074 cases of potential drug interactions were found, which corresponds to a rate of 1.9% of all drug prescriptions. The incidence rate of potential interactions was 12% for all patients at risk (those receiving two or more drugs) and 22% for elderly (> = 65 years of age) patients at risk. Major interactions were investigated concerning the extent to which the prescribing doctors were aware of the potential interactions. CONCLUSION: Potential drug interactions occur at a high rate in general practice, in particular for elderly patients. Properly designed computer-based decision-support might increase the prescribing doctor’s awareness of clinically significant interactions and improve the quality of drug treatment. Reprinted from: Scand J Prim Health Care 1993;11:181-6,

note = {Scand J Prim Health Care 1993;11:181-6}

Clinical investigators who seek to exploit electronic databases for clinical research need to be aware of the strengths and limitations of the data stored in these systems. Generic issues are examined that can arise from the use of any electronic database, as well as more specific and unique issues that need to be resolved before a comprehensive medical-record database can be realized. Specific suggestions are provided that can be employed by the critical care director who seeks to exploit the rich clinical data available in electronic form for clinical research. Reprinted from: Crit Care Clin 1994;10:37-51,

note = {Crit Care Clin 1994;10:37-51}

Medical librarians and informatics professionals believe the medical journal literature can be useful in clinical practice, but evidence suggests that practicing physicians do not share this belief. The authors designed a study to determine whether a random sample of "native"
questions asked by primary care practitioners could be answered using the journal literature. Participants included forty-nine active, nonacademic primary care physicians providing ambulatory care in rural and nonrural Oregon, and seven medical librarians. The study was conducted in three stages: (1) office interviews with physicians to record clinical questions; (2) online searches to locate answers to selected questions; and (3) clinician feedback regarding the relevance and usefulness of the information retrieved. Of 295 questions recorded during forty-nine interviews, 60 questions were selected at random for searches. The average total time spent searching for and selecting articles for each question was forty-three minutes. The average cost per question searched was $27.37. Clinician feedback was received for 48 of 56 questions (four physicians could not be located, so their questions were not used in tabulating the results). For 28 questions (56%), clinicians judged the material relevant; for 22 questions (46%) the information provided a "clear answer" to their question. They expected the information would have had an impact on their patient in nineteen (40%) cases, and an impact on themselves or their practice in twenty-four (51%) cases. If the results can be generalized, and if the time and cost of performing searches can be reduced, increased use of the journal literature could significantly improve the extent to which primary care physicians' information needs are met. Reprinted from: Bull Med Libr Assoc 1994;82:140-6,

note = {Bull Med Libr Assoc 1994;82:140-6}

@article{IMIA1995182,
    author = {Klein MS, Ross FV, Adams DL, Gilbert CM},
    title = {Effect of online literature searching on length of stay and patient care costs},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {182-190},
    abstract = {PURPOSE: To examine the associations between (1) the economic indicators of hospital costs, charges, and length of stay (LOS) for inpatient cases and (2) the use of MEDLINE searches for such cases. METHOD: An outcome-based, objective, prospective study with an economic evaluation was conducted from September 1989 to September 1990 at three metropolitan Detroit teaching hospitals representing both allopathic and osteopathic care. The study consisted of (1) 192 test cases, derived from a consecutive sample of inpatients of all ages for whom MEDLINE searches were requested at the participating medical libraries, and (2) 10,409 control cases, which were of the same diagnosis-related groups (DRGs) as the test cases but did not involve identified MEDLINE searches. Statistical analysis included the use of multivariate analyses of variance and correlation coefficients. Comparisons of cases were made on case-by-case and DRG bases regarding total patient costs, charges, and lengths of stay for cases with or without MEDLINE searches. RESULTS: The test cases were found to have a higher severity of illness. Among test cases, statistically significant relationships existed between (1) hospital expenses and LOS and (2) hospital expenses and the timing of the search during hospitalization when controlling for LOS. When cases were matched for DRG and LOS, the cases with early searches (i.e., conducted during the first half of hospitalization) had significantly lower expenses. CONCLUSION: Of the test-case patients (for whom MEDLINE searches were conducted during hospitalization), those whose searches were conducted earlier had statistically significantly lower costs, charges, and lengths of stay than those whose searches were conducted later. Reprinted from: Acad Med 1994;69:489-95},
    note = {Acad Med 1994;69:489-95}
}

@article{IMIA1995191,
    author = {Borst F},
    title = {Computer-based patient records. Synopsis.},
Clinical narratives in patient records are usually recorded in free text, limiting the use of this information for research, quality assessment, and decision support. This study focuses on the capture of clinical narratives in a structured format by supporting physicians with structured data entry (SDE). We analyzed and made explicit which requirements SDE should meet to be acceptable for the physician on the one hand, and generate unambiguous patient data on the other. Starting from these requirements, we found that in order to support SDE, the knowledge on which it is based needs to be made explicit: we refer to this knowledge as descriptive knowledge. We articulate the nature of this knowledge, and propose a model in which it can be formally represented. The model allows the construction of specific knowledge bases, each representing the knowledge needed to support SDE within a circumscribed domain. Data entry is made possible through a general entry program, of which the behavior is determined by a combination of user input and the content of the applicable domain knowledge base. We clarify how descriptive knowledge is represented, modeled, and used for data entry to achieve SDE, which meets the proposed requirements. Reprinted from: Methods Inf Med 1994;33:454-63.

Note: Methods Inf Med 1994;33:454-63

A general framework for representation of clinical data that provides a declarative semantics of terms and that allows developers to define explicitly the relationships among both terms and combinations of terms. DESIGN: Use of conceptual graphs as a standard representation of logic and of an existing standardized vocabulary, the Systematized Nomenclature of Medicine (SNOMED International), for lexical elements. Concepts such as time, anatomy, and uncertainty must be modeled explicitly in a way that allows relation of these foundational concepts to surface-level clinical descriptions in a uniform manner. RESULTS: The proposed framework was used to model a simple radiology report, which included temporal references. CONCLUSION: Formal logic provides a framework for formalizing the representation of medical concepts. Actual implementations will be required to evaluate the practicality of this approach. Reprinted from: J Am Med Informatics Assoc 1994;1:218-32.

Note: J Am Med Informatics Assoc 1994;1:218-32
@article{IMIA1995220,
  author = {Powsner SM, Tufte ER},
  title = {Graphical summary of patient status},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {220-223},
  abstract = {Lancet 1994;344:386-9},
  note = {Lancet 1994;344:386-9}
}

@article{IMIA1995224,
  author = {Henry SB, Holzemer WL, Reilly CA, Campbell KE},
  title = {Terms used by nurses to describe patient problems: can SNOMED III represent nursing concepts in the patient record?},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {224-237},
  abstract = {OBJECTIVE: To analyze the terms used by nurses in a variety of data sources and to test the feasibility of using SNOMED III to represent nursing terms. DESIGN: Prospective research design with manual matching of terms to the SNOMED III vocabulary. MEASUREMENTS: The terms used by nurses to describe patient problems during 485 episodes of care for 201 patients hospitalized for Pneumocystis carinii pneumonia were identified. Problems from four data sources (nurse interview, intershift report, nursing care plan, and nurse progress note/flowsheet) were classified based on the substantive area of the problem and on the terminology used to describe the problem. A test subset of the 25 most frequently used terms from the two written data sources (nursing care plan and nurse progress note/flowsheet) were manually matched to SNOMED III terms to test the feasibility of using that existing vocabulary to represent nursing terms. RESULTS: Nurses most frequently described patient problems as signs/symptoms in the verbal nurse interview and intershift report. In the written data sources, problems were recorded as North American Nursing Diagnosis Association (NANDA) terms and signs/symptoms with similar frequencies. Of the nursing terms in the test subset, 69% were represented using one or more SNOMED III terms. Reprinted from: J Am Med Informatics Assoc 1994;1:61-74},
  note = {J Am Med Informatics Assoc 1994;1:61-74}
}

@article{IMIA1995238,
  author = {Frisse ME, Schnase JL, Metcalfe ES},
  title = {Models for patient records},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {238-242},
  abstract = {Acad Med 1994;69:546-50},
  note = {Acad Med 1994;69:546-50}
}
BACKGROUND: Greater use of computers has been touted as one way in which health care quality can be enhanced while reducing costs. The authors assessed factors associated with acceptance of computerized order-writing. METHOD: From April 1990 through October 1991 a survey was administered to 275 medical students and housestaff who used computer workstations to write all their orders on the general medicine wards at Wishard Memorial Hospital. The survey assessed computer literacy, ease of workstation use, effects on practice and time management, and usefulness of information provided. RESULTS: A total of 212 (77%) of the computer-workstation users responded. Opinions were generally positive. Those of junior students were the most positive, with opinions declining progressively for senior students, interns, and residents. The housestaff were most critical of time spent using the workstations, although they required less time to write orders than the students did. CONCLUSION: The favorableness of the respondents' opinions declined as the level of training increased, a trend that was independent of computer literacy. Hence, increasing computer use by physicians will probably require modification of the educational and socialization process rather than mere reliance on increasing computer literacy.

note = {Acad Med 1994;69:386-9}

BACKGROUND: Despite emerging interest in computer-based patient records (CPRs), less than 1% of medical records in the United States are stored electronically. Some physicians may be reluctant to implement CPR systems because of fear that the physician-patient relationship would be adversely affected. This study ascertained the attitudes of patients regarding the use of CPR systems. METHODS: This study was an in-depth interview survey of 16 patients concerning the CPR system used at the family medicine department at the Medical University of South Carolina. Interview topics included patient knowledge, perceived advantages and disadvantages, and the impact of the CPR system on their relationship with their physician. RESULTS: Most patients were informed about the nature of the CPR system and had positive attitudes toward it. Common perceptions were that CPR provides physicians with easy access to information, facilitates clinical encounters, and improves physician-patient relationship and the quality of care delivered. Although confidentiality was the major concern expressed about the CPR system, only one respondent indicated that this factor limited his interaction with his physician. CONCLUSIONS: This study demonstrated patient acceptance and support for the CPR system in use at the study site. These findings should encourage physicians to use CPRs Reprinted from: J Fam Pract 1994;38:606-10,

note = {J Fam Pract 1994;38:606-10}
BACKGROUND: The use of computers in general practice consultations is becoming widespread. AIM: A qualitative study was undertaken to determine how patients in one practice responded to the use of computers, and the issues which particularly concerned them when doctors used computers in the consultation. METHOD: Thirty patients whose age-sex characteristics were proportional to the age-sex distribution of one practice were selected to be interviewed within two weeks of a consultation. The interviews were taped, transcribed and analysed. RESULTS: Patients had seen or used computers in many other places and accepted their role in data management. Patients with more experience of computers were more aware of their limitations, particularly with regard to the possibility of loss of confidentiality. Patients did not think the use of a computer led to a loss of the personal touch in the consultation as long as verbal skills and eye contact were maintained. However, they did expect doctors using computers to have acquired computer skills. All but one patient said they wanted to see what was on the screen, although 11 did not know they had the right to read their notes on the screen. CONCLUSION: Patients regarded the use of computers by their doctors as normal and indicative of the doctors being up to date. Most respondents were concerned about possible loss of confidentiality. This concern, and their expressed preference for computer details to be visible and shared, pose challenges to doctors' technical and communication skills. Reprinted from: Br J Gen Pract 1994;44:367-9,

@article{IMIA1995255,
    author = {Kluge E-HW},
    title = {Health information, the fair information principles and ethics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {255-266},
    abstract = {If advanced electronic patient records are construed as epistemic patient analogues in information space, then the traditional property-model of patient records is longer appropriate. A new paradigm is required. This paper suggests a new paradigm, examines its ethical implications and explores ways in which these could be reflected in legal and regulatory mechanisms. Special attention is paid to privacy, security and access relative to the so-called "fair information principles". Reprinted from: Methods Inf Med 1994;33:336-45},
    note = {Methods Inf Med 1994;33:336-45}
}

@article{IMIA1995267,
    author = {Frisse ME},
    title = {Information systems. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {267-270},
    }
Multimedia medical workstations represent the natural tool for accessing the hospital information system environment. They are complex medical systems that have to gather, in a single framework, a large collection of components dealing with multimedia medical objects. To remain current with both medical practice and with advances in the computer science field, they have to allow the iterative addition of new functions to the set of existing ones. In this paper, after a survey of commonly required medical workstation functional components, we shall try to discuss how a software engineering approach can streamline the development of a medical workstation. Different software engineering tools needed to build the functional components of a workstation are described. Their integration in a single dedicated environment is considered through four perspectives: data, presentation, communication and control. Benefits and limitations of an object-oriented approach are discussed. Reprinted from: Int J Biomed Comput 1994;34:249-60

Patient histories, discharge summaries, and medical consultant reports are made up of written texts. Therefore, the gathering and archiving of these texts in machine-readable form has many characteristics of computer-based medical records. In Geneva, approximately 1,540 PCs are connected to the Hospital Information System DIOGENE 2, with the possibility of accessing all the functions offered by the system without losing any of their MS-DOS word processing capabilities. The UNIDOC system, presented in this paper, takes all these features into account, a real marriage of technologies between the MS-DOS environment and the distributed client-server architecture. The INGRES database management system supports the entire archiving process of the medical patient texts, structured by prelabelled paragraphs and automatically indexed. Both the quality and accessibility of the records are enhanced, while the archiving capacity is neither too limited nor too expensive. Reprinted from: Methods Inf Med 1994;33:174-9

Data storage and knowledge representation for clinical workstations,
The representation of patient information for use in clinical workstations is a complex problem. Ideally, it should be addressed in a way that allows multiple uses of the data, including simple manual review, sharing and pooling across institutions, and as input to knowledge-based decision support systems. To a great extent, this means coding information with controlled medical vocabularies, but it does not mean that all information must be codable before workstations are feasible. This paper defines some of the choices, both current and future, that are available to address the needs of controlled medical vocabularies for representing data and knowledge in clinical workstations and explores some of the implications of those choices. Reprinted from: Int J Biomed Comput 1994;34:185-94,

note = {Int J Biomed Comput 1994;34:185-94}

---

As information databases we consider all the kinds of information repositories that are handled by computer systems. When querying very large information databases, the end-users are often faced with the problem to parse their questions efficiently into the query languages of the computer systems. Conceptual graphs were initially designed for natural language analysis and understanding. Due to their closeness to semantic networks, their expressiveness is powerful enough to be applied to knowledge representation and use by computer systems. This work demonstrates that conceptual graphs are a suitable means to model both the information in patient databases and the queries to these databases, and that operations on graphs can compute the pattern matching process needed to provide the answers. A prototype that exploits this model is presented. Experiments have been made with the material furnished by the Unified Medical Language System project (version 2, 1992) of the National Library of Medicine, USA. Reprinted from: Int J Biomed Comput 1994;37:93-104,


---

The adoption of "Read Clinical Codes" for computerised patient records could profoundly alter the nature and quality of Western medicine in the next decade. The increasing awareness of the need for a standardised coding system has led to the funding of a pilot project to test Read codes in Australian general practice. Read codes are a comprehensive nomenclature of clinical terms incorporating over 100,000 codes in a structured hierarchical form. Designed by a general practitioner, they are now owned, controlled, and developed by the British National Health
Service (NHS). Selected as the basis for clinical coding across the NHS, they form the cornerstone of computerised patient records. Computer use has been encouraged in general practice in the UK, with financing schemes and functional inducements resulting in 70% of practices being at least partly computerised, and 84% of these using Read codes. Their promotion has been backed by a major development program to broaden the codes to include all clinical specialities, nursing, and professions allied to medicine. The codes will require significant adaptation for Australian use, including the development of an administrative chapter and a pharmaceutical classification. The impact of information management systems on health care in the UK has relevance for the continuing development of the Australian National Health Information Strategy and for future record keeping in general practice in Australia. If the trial proves successful, the adoption of Read codes as a standard for information management in patient medical records will need to be considered.

Reprinted from: Med J Aust 1993;159:471-6,

note = {Med J Aust 1993;159:471-6}

@article{IMIA1995316,
  author = {Britt H, Miller G},
  title = {Data collection and changing health care systems. 2. New Zealand.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {316-319},
  abstract = {Radical changes planned in the New Zealand health system aim to improve its cost effectiveness, quality and consumer responsiveness. These changes will take place despite a paucity of data on the use of resources and outcomes. Data collection systems are to be introduced into hospitals and primary care with the use of the Read clinical codes (RCC) in addition to ICD-9-CM (International classification of disease—clinical modification) and ICPC (International classification of primary care). This paper discusses the proposed changes to the New Zealand health care system and describes their effect on the present and future data collection methods in general practice. Reprinted from: Med J Aust 1993;159:476-9},
  note = {Med J Aust 1993;159:476-9}
}

@article{IMIA1995320,
  author = {Engelmann U, Schroter A, Gunnel U, Demiris AM, Makabe M, Evers H, Meinzer H-P},
  title = {The HELIOS image related services},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {320-333},
  abstract = {Comput Methods Programs Biomed 1994;45 Supp1:65-78},
  note = {Comput Methods Programs Biomed 1994;45 Supp1:65-78}
}

@article{IMIA1995334,
  author = {Mosser H, Urban M, Hruby W},
  title = {Filmless digital radiology—feasibility and 20 month experience in clinical routine},
  journal = {IMIA Yearbook of medical informatics},

@article{IMIA1995345,  
    author = {Becker SII, Arenson RL},  
    title = {Costs and benefits of picture archiving and communication systems},  
    journal = {IMIA Yearbook of medical informatics},  
    volume = {1995},  
    year = {1995},  
    pages = {345-355},  
    abstract = {A picture archiving and communication system (PACS) is an electronic and ideally filmless information system for acquiring, sorting, transporting, storing, and electronically displaying medical images. PACS have developed rapidly and are in operation in a number of hospitals. Before widespread adoption of PACS can occur, however, their cost-effectiveness must be proven. This article introduces the basic components of a PACS. The current PACS cost-analysis literature is reviewed. Some authors conclude that the PACS would pay for itself, while others find the PACS much more expensive. Explanations for these differences are explored. Almost all of these studies focus on direct costs and ignore indirect costs and benefits. The literature characterizing the indirect costs of PACS is reviewed. The authors conclude that there is a need for uniform, well-defined criteria for the calculation of the costs and savings of PACSs. Reprinted from: J Am Med Informatics Assoc 1994;1:361-71},  
    note = {J Am Med Informatics Assoc 1994;1:361-71}  
}  

@article{IMIA1995356,  
    title = {Multimedia E-mail systems for computer-assisted radiological communication},  
    journal = {IMIA Yearbook of medical informatics},  
    volume = {1995},  
    year = {1995},  
    pages = {356-365},  
    abstract = {We present the clinical experiences of PACS based on 20 months routine operation of the first filmless radiology department worldwide. PACS planning and implementation strategies for potential vendors are discussed. The actual implementation status of this major teaching hospital with currently 560 acute-care beds comprises three computed radiography systems, five digital fluoroscopic units, five mobile units, three angio suites and two CT's interconnected with a PACS, a RIS, which is coupled with three voice-recognition systems for report generation during nights, and a HIS. Primary diagnosis is performed on 16 workstations with two to six high-resolution, high-contrast monitors. Twenty-six peripheral viewing stations provide image display on the wards and in outpatient clinics. During the first 20 months 586,047 images have been acquired, resulting in 1.3 Tbyte of data stored on optical disks. Currently the daily data production is 5-6 Gbyte, the network traffic 15-18 Gbyte. Benefits of PACS primarily are reliable access to image information, speeding up report cycle time, which contributes to the reduction of the average patient length of stay (LOS). The LOS in our hospital is the shortest (6.4 days) of all Austrian hospitals. So it may be stated that PACS improves the quality of health care. Reprinted from: Med Inf 1994;19:149-59},  
    note = {Med Inf 1994;19:149-59}  
}
In the film-based organization of communicating radiological results to the referring physician, the different media (text, images, graphics, voice) are separated. When using computer technology, multimedia reports containing links between these different media can be used. This changes the way radiological reports are generated, accessed, and possibly discussed. We performed experiments in a clinical setting using two different metaphors for communicating multimedia information. In the 'paper metaphor', labels in the report text are linked to annotations in selected images. In the 'slide presentation metaphor', annotated images are presented synchronously to a spoken report. With both systems additional interaction between radiologist and referring physician is supported using multimedia 'electronic mail'. The experiments indicate that multimedia does not only significantly increase the efficiency of information transfer, but also has the potential to make reporting itself more efficient. Given that the amount of image-related information keeps growing, multimedia links are a promising method to give efficient access to the most relevant information. Reprinted from: Med Inf 1994;19:139-48,

note = {Med Inf 1994;19:139-48}

@article{IMIA1995366,
  author = {Bell RM, Keesey J, Richards T},
  title = {The urge to merge: linking vital statistics records and Medicaid claims},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {366-382},
  abstract = {This paper describes a procedure used to link Medicaid claims data to California vital statistics records for very low birthweight infants. The linkage involved about 53,000 infants born from 1980 to 1987 and 1.46 million claims for delivery/birth-related hospital admissions during the same period. Because the two data files did not share a unique identifier, record linkage required combining evidence across several linking variables: delivery hospital, delivery/birth date or hospitalization period, names, mother's age, and zip code. To combine the various pieces of evidence, we used record linkage theory to compute scores that measure the likelihood of a match, i.e., that two records correspond to the same delivery. These scores appropriately weight the various pieces of evidence for or against a match. Implementation required dealing with large amounts of missing data in one of the files, errors and variations in reported names, and the need to minimize the number of incorrect links. The approach applies to a wide range of linkage problems. The ability to combine existing datasets to form new datasets containing analysis variables from each facilitates analyses that would otherwise be impossible, or prohibitively expensive. Reprinted from: Med Care 1994;32:1004-18},
  note = {Med Care 1994;32:1004-18}
}

@article{IMIA1995383,
  author = {Saranummi N},
  title = {Image and signal processing. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {383-385},
  abstract = {},
  note = {}}
A decade of clinical three-dimensional imaging: a review. Part 2: Clinical applications

New method for mechanistic studies of cardiomyoplasty: three-dimensional MRI reconstructions

Robotic assistance in orthopaedic surgery. A proof of principle using distal femoral, arthroplasty

The term "robot" refers to a precision mechanical device that is accurately controlled by a computer using intelligent software. The term "robotic assistance" refers to the use of such a device to aid a surgeon in the optimal conduct of a procedure, particularly one requiring specified geometrical relationships. The authors have been exploring the application of robotic assistance in situations in which accuracy and precision are required in orthopaedic surgery. The initial application concerned the planning, positioning, and orientation cuts and holes of the bone...
required for the femoral component of a total knee arthroplasty. A three-dimensional digitizing template allowed the surgeon to specify the desired position and orientation of the component’s articular surfaces in relation to the distal femur. The robotic system used this spatial relationship, along with its knowledge of the geometry of the component selected by the surgeon, to plan the precise location of the required bone cuts and holes. Finally, the robotic assistant sequentially positioned saw and drill guides with respect to the distal femur so that the surgeon made these cuts and holes in the locations necessary for optimal component fit, position, and orientation. The robotic assistant functioned easily in the operating room environment; increased the accuracy; and decreased the time, equipment, and personnel required for the conduct of the geometrical part of this surgical procedure. Reprinted from: Clin Orthop 1993;296:178-86,

note = {Clin Orthop 1993;296:178-86}

@article{IMIA1995418,
  author = {Nonnenmacher TF, Baumann G, Barth A, Losa GA},
  title = {Digital image analysis of self-similar cell profiles},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {418-425},
  abstract = {Many biological objects appear to have self-similar structures which can be characterized by their fractal dimension D. However, applications of the concept of fractal geometry are rather scarce in cell and tissue biology. Here we adapt and analyse critically 3 methods of digital image analysis to measure D of cellular profiles. As prototype examples we investigate in detail 2 samples of cells: (i) human T-lymphocytes from normal donors, and (ii) hairy leukemic cells. It is shown that D correlates to the structural complexity of the individual cell contour. The calculated D values for cells out of the same cell line scatter around a mean value D = 1.15 for T-lymphocytes (S.D. = 0.03) and D = 1.34 for hairy leukemic cells (S.D. = 0.04). Consequently, we interprete D as a statistical measure for the sample's fractal dimension. Reprinted from: Int J Biomed Comput 1994;37:131-8},
}

@article{IMIA1995426,
  author = {Sun YN, Ko CC, Mao CW, Lin CJ},
  title = {A computer system for skeletal growth measurement},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {426-436},
  abstract = {In this paper, we have presented a new image-processing system for the measurement of skeletal growth in pediatric radiology. From a standard posterior and anterior view radiograph, taken from a left hand, the proposed system first automatically locates the phalangeal region of interest, and then measures the geometrical parameters associated with skeletal maturity. Finally, the bone age is estimated by using the standard phalangeal length table. Clinical studies reveal that the computer processing has resulted in an objective and accurate assessment of skeletal age. It greatly improves the shortcomings, including inter- and intraobserver variations and inaccuracy, reported in other research by manual methods. In conclusion, it is an inexpensive and useful tool for the evaluation of short-term abnormalities in the skeletal growth of children. Reprinted from: Comput Biomed Res 1994;27:2-12},
  note = {Comput Biomed Res 1994;27:2-12}
A new algorithm for ECG signal compression is introduced. The compression system is based on the subautoregression (SAR) model, known also as the long-term prediction (LTP) model. The "periodicity" of the ECG signal is employed in order to further reduce redundancy, thus yielding high compression ratios. The suggested algorithm was evaluated using an in-house database. Very low bit rates on the order of 70 b/s are achieved with a relatively low reconstruction error (percent rms difference-PRD) of less than 10%. The algorithm was compared, using the same database, with the conventional linear prediction (short-term prediction--STP) method, and was found superior at any bit rate. The suggested algorithm can be considered a generalization of the recently published average beat subtraction method. Reprinted from: IEEE Trans Biomed Eng 1993;40:877-85.

Individuals who are paralyzed or have other severe movement disorders often need alternative means for communicating with and controlling their environments. In this study, human subjects learned to use two channels of bipolar EEG activity to control 2-dimensional movement of a cursor on a computer screen. Amplitudes of 8-12 Hz activity in the EEG recorded from the scalp across right and left central sulci were determined by fast Fourier transform and combined to control vertical and horizontal cursor movements simultaneously. This independent control of two separate EEG channels cannot be attributed to a non-specific change in brain activity and appeared to be specific to the mu rhythm frequency range. With further development, multichannel EEG-based communication may prove of significant value to those with severe motor disabilities. Reprinted from: Electroenceph Clin Neurophysiol 1994;90:444-9.

Individuals who are paralyzed or have other severe movement disorders often need alternative means for communicating with and controlling their environments. In this study, human subjects learned to use two channels of bipolar EEG activity to control 2-dimensional movement of a cursor on a computer screen. Amplitudes of 8-12 Hz activity in the EEG recorded from the scalp across right and left central sulci were determined by fast Fourier transform and combined to control vertical and horizontal cursor movements simultaneously. This independent control of two separate EEG channels cannot be attributed to a non-specific change in brain activity and appeared to be specific to the mu rhythm frequency range. With further development, multichannel EEG-based communication may prove of significant value to those with severe motor disabilities. Reprinted from: Electroenceph Clin Neurophysiol 1994;90:444-9.
@article{IMIA1995458,
  title = {Performance of four computer-based diagnostic systems},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {458-462},
  abstract = {BACKGROUND: Computer-based diagnostic systems are available commercially, but there has been limited evaluation of their performance. We assessed the diagnostic capabilities of four internal medicine diagnostic systems: Dxplain, Iliad, Meditel, and QMR. METHODS: Ten expert clinicians created a set of 105 diagnostically challenging clinical case summaries involving actual patients. Clinical data were entered into each program with the vocabulary provided by the program's developer. Each of the systems produced a ranked list of possible diagnoses for each patient, as did the group of experts. We calculated scores on several performance measures for each computer program. RESULTS: No single computer program scored better than the others on all performance measures. Among all cases and all programs, the proportion of correct diagnoses ranged from 0.52 to 0.71, and the mean proportion of relevant diagnoses ranged from 0.19 to 0.37. On average, less than half the diagnoses on the experts' original list of reasonable diagnoses were suggested by any of the programs. However, each program suggested an average of approximately two additional diagnoses per case that the experts found relevant but had not originally considered. CONCLUSIONS: The results provide a profile of the strengths and limitations of these computer programs. The programs should be used by physicians who can identify and use the relevant information and ignore the irrelevant information that can be produced. Reprinted from: N Engl J Med 1994;330:1792-6},
}

@article{IMIA1995463,
  author = {Stamper R, Todd BS, Macpherson P},
  title = {Case-based explanation for medical diagnostic programs, with an example from gynaecology},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1995},
  year = {1995},
  pages = {463-471},
  abstract = {One of the most accountable methods of providing machine assistance in medical diagnosis is to retrieve and display similar previously diagnosed cases from a database. In practice, however, classifying cases according to the diagnoses of their nearest neighbours is often significantly less accurate than other statistical classifiers. In this paper the transparency of the nearest neighbours method is combined with the accuracy of another statistical method. This is achieved by using the other statistical method to define a measure of similarity between the presentations of two cases. The diagnosis of abdominal pain of suspected gynaecological origin is used as a case study to evaluate this method. Bayes' theorem, with the usual assumption of conditional independence, is used to define a metric on cases. This new metric was found to correspond as well as Hamming distance to the clinical notion of "similarity" between cases, while significantly increasing accuracy to that of the Bayes' method itself. Reprinted from: Methods Inf Med 1994;33:205-13},

Towards a statistically oriented decision support system for the management of septicaemia

The first decision-support system designed for the management of septicaemia was MYCIN. Although MYCIN played a vital role in the conception of knowledge-based systems, it never became an established clinical system. This paper describes an alternative decision-support system for septicaemia management currently under development at St. Thomas' Hospital (London) where a large database of septicaemia episodes has been compiled. The three statistical approaches that have been considered are described. These are (i) relative frequencies, (ii) the naive Bayes method and (iii) logistic regression. We also discuss how the concept of probabilistic influence diagrams could be of benefit to the development and implementation of the decision-support system.

Effects of computer-based clinical decision support systems on clinician performance and patient outcome. A critical appraisal of research

OBJECTIVE: To review the evidence from controlled trials of the effects of computer-based clinical decision support systems (CDSSs) on clinician performance and patient outcomes. DATA SOURCES: The literature in the MEDLARS, EMBASE, SCISEARCH, and INSPEC databases was searched from 1974 to the present. Conference proceedings and reference lists of relevant articles were reviewed. Evaluators of CDSSs were asked to identify additional studies. STUDY SELECTION: 793 citations were examined, and 28 controlled trials that met predefined criteria were reviewed in detail. DATA EXTRACTION: Study quality was assessed, and data on setting, clinicians and patients, method of allocation, computer system, and outcomes were abstracted and verified using a structured form. Separate summaries were prepared for physician and patient outcomes. Within each of these categories, studies were classified further according to the primary purpose of the CDSS: drug dose determination, diagnosis, or quality assurance.

RESULTS: Three of 4 studies of computer-assisted dosing, 1 of 5 studies of computer-aided diagnosis, 4 of 6 studies of preventive care reminder systems, and 7 of 9 studies of computer-aided quality assurance for active medical care that assessed clinician performance showed improvements in clinician performance using a CDSS. Three of 10 studies that assessed patient outcomes reported significant improvements. CONCLUSIONS: Strong evidence suggests that some CDSSs can improve physician performance. Additional well-designed studies are needed to assess their effects and cost-effectiveness, especially on patient outcomes.
@article{IMIA1995494,
author = {Das AK, Musen MA},
title = {A temporal query system for protocol-directed decision support},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {494-508},
abstract = {Chronus is a query system that supports temporal extensions to the Structured Query Language (SQL) for relational databases. Although the relational data model can store time-stamped data and can permit simple temporal-comparison operations, it does not provide either a closed or a sufficient algebra for manipulating temporal data. In this paper, we outline an algebra that maintains a consistent relational representation of temporal data and that allows the type of temporal queries needed for protocol-directed decision support. We also discuss how Chronus can translate between our temporal algebra and the relational algebra used for SQL queries. We have applied our system to the task of screening patients for clinical trials. Our results demonstrate that Chronous can express sufficiently all required temporal queries, and that the search time of such queries is similar to that of standard SQL. Reprinted from: Methods Inf Med 1994;33:358-70},
note = {Methods Inf Med 1994;33:358-70}
}

@article{IMIA1995509,
author = {Shahar Y},
title = {Knowledge processing. Synopsis.},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {509-512},
abstract = {},
note = {}  
}

@article{IMIA1995513,
title = {A methodology for evaluation of knowledge based systems in medicine},
journal = {IMIA Yearbook of medical informatics},
volume = {1995},
year = {1995},
pages = {513-527},
abstract = {Evaluation is critical to the development and successful integration of knowledge-based systems into their application environment. This is of particular importance in the medical domain--not only for reasons of safety and correctness, but also to reinforce the users' confidence in these systems. In this paper we describe an iterative, four-phased development evaluation cycle covering the following areas: (i) early prototype development, (ii) validity of the system, (iii) functionality of the system, and (iv) impact of the system. Reprinted from: Artif Intell Med 1994;6:107-21},
note = {Artif Intell Med 1994;6:107-21}
}
The history of knowledge based systems in medicine has been that they are generally very localised, serving a special need in a single setting. Very few have proven to be capable of transfer to a distant environment. With the advent of tele-medical services and the associated transfer of data and knowledge in such services, the ability of medical KBS to transfer will be crucial to the success of tele-medical services. Differences in knowledge acquisition methods, knowledge representation techniques and in the epidemiological composition of training databases may influence viable transfer of knowledge based systems. Through experiments we demonstrate how rule-based systems may impose inflexible demands on data, how different knowledge acquisition techniques acquire different aspects of knowledge, though trained on a common training database, and how different knowledge acquisition techniques show varying degrees of robustness to slight changes in training databases. Reprinted from: Artif Intel Med 1994;6:189-201.

Symbolic decision procedures offer a flexible alternative to classical quantitative procedures for decision making, particularly when precise parameters (such as probabilities) are hard to estimate. One such procedure, based on a logic of argumentation, is described. Specifications of inference methods for such functions as proposing and refining decision options, deducing and inheriting arguments for and against options, and selecting among alternatives are presented. These exploit declarative models for patient data, domain and task knowledge. A simple method for translating the specifications into executable Prolog is described. A practical and efficient toolset for using the procedure in a wide range of clinical environments is being developed within the DILEMMA project of the European Commission's Advanced Informatics in Medicine research programme. Reprinted from: Artif Intell Med 1993;5:415.-30.

Multiple disorder diagnosis with adaptive competitive neural networks

@article{IMIA1995557,
    author = {Cho S, Reggia JA},
    title = {Multiple disorder diagnosis with adaptive competitive neural networks},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {557-575},
}
abstract = {Backpropagation neural networks have repeatedly been used for diagnostic problem-solving, but have not been demonstrated to work well when multiple disorders are present. We hypothesized that letting nodes in a backpropagation neural network compete to be part of a diagnostic solution would produce better performance than the use of existing backpropagation methods. To test this hypothesis, we derived an error backpropagation learning rule that can be used with competitive units (competitive backpropagation). Artificial neural networks were then trained using both this new learning rule and standard error backpropagation on a specific medical diagnosis problem: identification of the location of damage in the brain given a set of examination findings. Training samples included solely 'prototypical' cases where a single location of damage is present. The trained networks were then tested with atypical cases where the manifestations of more than one disorder were present or only a single manifestation was present. Networks employing competition among units were found to perform qualitatively better with these multiple-disorder cases than standard networks and also to perform better on single-manifestation cases. The reasons for this are explained. The competitive backpropagation learning rule described here provides a promising new tool for adaptive diagnostic problem-solving. Reprinted from: Artif Intell Med 1993;5:469-87},

note = {Artif Intell Med 1993;5:469-87}
abstract = {In computer-based medical education, there is frequently a need to present students with pictorial data representative of the natural variation associated with disease presentations as well as the progression of disease within an individual. Because of the difficulty in acquiring such data, image acquisition is often the most resource-intensive phase of multimedia courseware development. In light of the resource demands associated with image content, many courseware designers do not make opportune use of image data, but rely instead upon text descriptions to provide variation in content. The resulting lack of adequate pictorial content often lessens the overall impact of the courseware. To overcome constraints imposed by the difficulty in acquiring pictorial content of sufficient richness, a methodology of generating variation in visual teaching materials has been developed through the use of morphing. These techniques have general applicability in creating variation in pictorial teaching materials in a variety of image-intensive domains. Reprinted from: Comput Biol Med 1994;24:11-8},

note = {Comput Biol Med 1994;24:11-8}

@article{IMIA1995598,
    author = {Elieson SW, Papa FJ},
    title = {The effects of various knowledge formats on diagnostic performance},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {598-600},
    abstract = {Acad Med 1994;69:S81-3},
    note = {Acad Med 1994;69:S81-3}
}

@article{IMIA1995601,
    author = {Fontaine D, Le Beux P, Riou C, Jacquelinet C},
    title = {An intelligent computer-assisted instruction system for clinical case teaching},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1995},
    year = {1995},
    pages = {601-613},
    abstract = {The use of computers in the field of medical education is common. Our purpose is to present a Computer-Assisted Instruction system which has been developed over ten years at the University of Compiègne and the University of Rennes Medical School. This system can be used to help the student to solve clinical cases by analyzing and critiquing their answers and by using a knowledge base which has been previously structured in a rule network. It is an intelligent Computer-Assisted Instruction system comprising an author module, a pedagogical module and a student module. The CAI system can be used as a simulation model for any type of diagnostic or therapeutic problem. In this paper we present the author and pedagogical module which have been built using our previous work on intelligent computer-assisted instruction systems. Reprinted from: Methods Inf Med 1994;33:433-45},
    note = {Methods Inf Med 1994;33:433-45}
}

@article{IMIA1995614,
    author = {McGaghie WC, Boerger RL, McCrimmon DR, Ravitch MM},
    title = {Agreement among medical experts about the structure of concepts in pulmonary physiology},
}
Can health/medical informatics be regarded as a separate discipline? 

The participants of the panel on education and training in Medical Informatics, concurred that health/medical informatics is today thriving as a separate discipline, despite inevitable uncertainties regarding the future. Conferees discussed the distinctions between physician-built systems and those designed by medical informaticians, focusing on methodology as critical to medical informatics. Reprinted from: Methods Inf Med 1994;33:318-26,

note = {Methods Inf Med 1994;33:318-26}
@article{IMIA19981,
    author = {Lindberg DAB},
    title = {Preface - Access to Knowledge},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {1-3},
    abstract = {},
    note = {}
}

@article{IMIA19984,
    author = {van Bemmel JH, McCray AT},
    title = {Editorial - Health Informatics and the Internet},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {4-6},
    abstract = {},
    note = {}
}

@article{IMIA19987,
    author = {Anonymous},
    title = {Information on IMIA},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {7-10},
    abstract = {},
    note = {}
}

@article{IMIA199811,
    author = {Anonymous},
    title = {Addresses of IMIA Member Societies},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {11-21},
    abstract = {},
    note = {}
}

@article{IMIA199822,
    author = {Anonymous},
    title = {Information on IMIA Societies},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {},
    abstract = {},
    note = {}
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {22-46},
abstract = {},
note = {}
}

@article{IMIA199847,
author = {Anonymous},
title = {IMIA Working Groups},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {47-70},
abstract = {},
note = {}
}

@article{IMIA199871,
author = {Le Beux P, Burgun A, Jarno P, Siregar P.},
title = {Medical informatics training and research at Rennes University},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {71-77},
abstract = {},
note = {}
}

@article{IMIA199878,
author = {Whymark GK, Hovenga EJS},
title = {Health informatics and health management education at Central Queensland University},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {78-84},
abstract = {},
note = {}
}

@article{IMIA199885,
author = {Lun KC.},
title = {The medical informatics program at the National University of Singapore},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {85-89},
abstract = {},
@article{IMIA199890,
author = {Mantas J.},
title = {Health informatics education and research at the University of Athens},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {90-94},
abstract = {},
note = {}
}

@article{IMIA199895,
author = {Pinciroli F.},
title = {Medical informatics and telemedicine at the Politecnico di Milano},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {95-102},
abstract = {},
note = {}
}

@article{IMIA1998103,
author = {Takahashi T.},
title = {Current status of the world health cards systems},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {103-107},
abstract = {},
note = {}
}

@article{IMIA1998108,
author = {Yu-Chuan Li.},
title = {Finding medical resources on the internet},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {108-114},
abstract = {},
note = {}
}

@article{IMIA1998115,
author = {Campbell KE.},
The domain of medical imaging is anatomy. Therefore, anatomic knowledge should be a rational basis for organizing and analyzing images. The goals of the Digital Anatomist Program at the University of Washington include the development of an anatomically based software framework for organizing, analyzing, visualizing and utilizing biomedical information. The framework is based on representations for both spatial and symbolic anatomic knowledge, and is being implemented in a distributed architecture in which multiple client programs on the Internet are used to update and access an expanding set of anatomical information resources. The development of this framework is driven by several practical applications, including symbolic anatomic reasoning, knowledge based image segmentation, anatomy information retrieval, and functional brain mapping. Since each of these areas involves many difficult image processing issues, our research strategy is an evolutionary one, in which applications are developed somewhat independently, and partial solutions are integrated in a piecemeal fashion, using the network as the substrate. This approach assumes that networks of interacting components can synergistically work together to solve problems larger than either could solve on its own. Each of the individual projects is described, along with evaluations that show that the individual components are solving the problems they were designed for, and are beginning to interact with each other in a synergistic manner. We argue that this synergy will increase, not only within our own group, but also among groups as the Internet matures, and that an anatomic knowledge base will be a useful means for fostering these interactions. Reprinted from: J Am Med Inform Assoc 1997;4:165-83.
thereby giving access to anyone with an Internet connection. The Web technology allows others to use our powerful computers to perform the complex calculations that are necessary and effectively eliminates the problems of modifying and compiling the program to run on more than one hardware platform. The changes that take place during the simulation are presented as a video using the MPEG video format; they may then be viewed on many different types of computers. The toolbox provides a novel approach to computer-based biological simulations and an excellent resource for teaching. Reprinted from: Comput Methods Programs Biomed 1997;52:203-11,

note = {Comput Methods Programs Biomed 1997;52:203-11}

@article{IMIA1998147,
  author = {Kahn CE Jr.},
  title = {A generalized language for platform-independent structured reporting},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {147-155},
  abstract = {Structured reporting systems allow health-care workers to record observations using predetermined data elements and formats. The author developed the Data-entry and Reporting Markup Language (DRML) to provide a generalized representational language for describing concepts to be included in structured reporting applications. DRML is based on the Standard Generalized Markup Language (SGML), an internationally accepted standard for document interchange. The use of DRML is demonstrated with the SPIDER system, which uses public-domain internet technology for structured data entry and reporting. SPIDER uses DRML documents to create structured data-entry forms, outline-format textual reports, and datasets for analysis of aggregate results. Applications of DRML include its use in radiology results reporting and a health status questionnaire. DRML allows system designers to create a wide variety of clinical reporting applications and survey instruments, and helps overcome some of the limitations seen in earlier structured reporting systems. Reprinted from: Methods Inf Med 1997;36:163-71},
  note = {Methods Inf Med 1997;36:163-71}
}

@article{IMIA1998156,
  title = {Approaching equity in consumer health information delivery: NetWellness},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {156-163},
  abstract = {The growing public interest in health and wellness information stems from many sources, including social changes related to consumers' rights and women's health movements, and economic changes brought about by the managed health care revolution. Public, hospital, and medical center libraries have been ill-equipped to meet the increasing need for consumer-oriented materials, even though a few notable programs have been established. The "Information Superhighway" could be an effective tool for sharing health information if access to telecomputing equipment and training were available to those with an information need. The University of Cincinnati Medical Center, with its libraries in the leading role, is delivering NetWellness, an electronic consumer health library service, to residents of 29 counties in three midwestern states. Users connect directly through the Internet, through regional Free-Nets, and by visiting one of 43 public access sites where networked workstations have been installed. The continued success of the project depends on developing partnerships, providing quality content and maintaining fair access. Reprinted from: J Am Med Inform Assoc 1997;4:6-13},
  note = {J Am Med Inform Assoc 1997;4:6-13}
Electronic clinical trial protocol distribution via the World-Wide Web: a prototype for reducing costs and errors, improving accrual, and saving trees.

Clinical trials today typically are inefficient, paper-based operations. Poor community physician awareness of available trials and difficult referral mechanisms also contribute to poor accrual. The Physicians Research Network (PRN) web was developed for more efficient trial protocol distribution and eligibility inquiries. The Medical University of South Carolina’s Hollings Cancer Center trials program and two community oncology practices served as a testbed. In 581 man-hours over 18 months, 147 protocols were loaded into PRN. The trials program eliminated all protocol hardcopies except the masters, reduced photocopier use 59%, and saved 1.0 full-time equivalents (FTE), but 1.0 FTE was needed to manage PRN. There were no known security breaches, downtime, or content-related problems. Therefore, PRN is a paperless, user-preferred, reliable, secure method for distributing protocols and reducing distribution errors and delays because only a single copy of each protocol is maintained. Furthermore, PRN is being extended to serve other aspects of trial operations. Reprinted from: J Am Med Inform Assoc 1997;4:25-35.


OBJECTIVE: To assess the reliability of healthcare information on the world wide web and therefore how it may help lay people cope with common health problems. METHODS: Systematic search by means of two search engines, Yahoo and Excite, of parent oriented web pages relating to home management of feverish children. Reliability of information on the web sites was checked by comparison with published guidelines. MAIN OUTCOME MEASURES: Minimum temperature of child that should be considered as fever, optimal sites for measuring temperature, pharmacological and physical treatment of fever, conditions that may warrant a doctor’s visit. RESULTS: 41 web pages were retrieved and considered. 28 web pages gave a temperature above which a child is feverish; 26 pages indicated the optimal site for taking temperature, most recommending rectal measurement; 31 of the 34 pages that mentioned drug treatment recommended paracetamol as an antipyretic; 38 pages recommended non-drug measures, most commonly tepid sponging, dressing lightly, and increasing fluid intake; and 36 pages gave some indication of when a doctor should be called. Only four web pages adhered closely to the main recommendations in the guidelines. The largest deviations were in sponging procedures and how to take a child’s temperature, whereas there was a general agreement in the use of paracetamol. CONCLUSIONS: Only a few web sites provided complete and accurate information for this common and widely discussed condition. This suggests an urgent need to check public oriented healthcare information on the internet for accuracy, completeness, and consistency. Reprinted from: BMJ 1997;314:1875-9,
@article{IMIA1998180,
author = {Wyatt JC.},
title = {Commentary: measuring quality and impact of the World Wide Web},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {180-184},
abstract = {BMJ 1997;314:1879-81},
note = {BMJ 1997;314:1879-81}
}

@article{IMIA1998185,
author = {Teich JM.},
title = {Health and clinical management. Synopsis.},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {185-188},
abstract = {},
note = {BMJ 1997;314:1879-81}
}

@article{IMIA1998189,
author = {Lobach DF, Hammond WE.},
title = {Computerized decision support based on a clinical practice guideline improves compliance with care standards},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {189-198},
abstract = {PURPOSE: Clinical guidelines are designed to assist in the management of specific diseases; however, these guidelines are often neglected in the delivery of care. The purpose of this study was to determine whether clinician use of an clinical practice guideline would increase in response to having, at the patient visit, a decision support system based on a practice guideline that generates a customized management protocol for the individual patient using data from the patient’s electronic medical record. SUBJECTS AND METHODS: In a 6-month controlled trial at a primary care clinic, 58 primary care clinicians were randomized to receive either a special encounter form with the computer-generated guideline recommendations or a standard encounter form. The effect of computer-generated advice on clinician behavior was measured as rate of compliance with guideline recommendations. Data from 30 clinicians were analyzed; data from 28 clinicians were excluded because these clinicians did not meet predefined criteria for minimum exposure to diabetic patient care. RESULTS: Availability of patient management recommendations generated by the decision support system resulted in a two-fold increase in clinician compliance with care guidelines for diabetes mellitus (P = 0.01). Median compliance for the group receiving the recommendations was 32.0% versus 15.6% for the control group. CONCLUSION: Decision support based on a clinical practice guideline is an effective tool for assisting clinicians in the management of diabetic patients. This decision support system provides a model for how a clinical practice guideline can be integrated into}
the care process by computer to assist clinicians in managing a specific disease through helping them comply with care standards. Use of decision support systems based on clinical practice guidelines could ultimately improve the quality of medical care. Reprinted from: Am J Med 1997;102:89-98,

@article{IMIA1998199,
    title = {Experiences with the german teleradiology system MEDICUS},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {199-207},
    abstract = {This paper introduces the teleradiology system, MEDICUS, which has been developed at the Deutsches Krebsforschungszentrum (German Cancer Research Center) in Heidelberg, Germany. The system is designed to work on ISDN lines as well as in a local area network. The global software architecture is explained in the article. Special attention has been given to the design of the user interface and data security, integrity and authentication. The software has been evaluated in a German field test at 13 radiology departments in university clinics, small hospitals, private practices and research institutes. More than 30 thousand images have been transmitted using this system during a 9 month period. Realized application scenarios are: in-house communication, image and report delivery to referring hospitals, remote reporting, radiotherapy treatment planning and research cooperation. Experience has shown that the system is easy to use and saves time. It obviates the need for patient transport and reduces film costs. Experiences of individuals while using the system during the field test helped define the functionality of the second generation teleradiology system which is even more flexible and is also available as a commercial product. Reprinted from: Comput Methods Programs Biomed 1997;54:131-9},
    note = {Comput Methods Programs Biomed 1997;54:131-9}
}

@article{IMIA1998208,
    author = {Singh AK, Kohli M, Trell E, Wigertz O, Kohli S.},
    title = {Bhorugram (India): revisited. A 4 year follow-up of a computer-based information system for distributed MCH services},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {208-216},
    abstract = {Int J Med Inf 1997;44:1 17-25},
    note = {Int J Med Inf 1997;44:1 17-25}
}

@article{IMIA1998217,
    author = {Rizzo M, Reinach S, McGehee D, Dawson J.},
    title = {Simulated car crashes and crash predictors in drivers with Alzheimer disease},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {217-226},
}
BACKGROUND: Alzheimer disease (AD) is the most common cause of dementia and can impair cognitive abilities crucial to the task of driving. Rational decisions about whether such impaired individuals should continue to drive require objective assessments of driver performance. OBJECTIVE: To measure relevant performance factors using high-fidelity driving simulation. DESIGN: We examined the effect of AD on driver collision avoidance using the Iowa Driving Simulator, which provided a high-fidelity, closely controlled environment in which to observe serious errors by at-risk drivers. We determined how such unsafe events are predicted by visual and cognitive factors sensitive to decline in aging and AD. SETTING: The University of Iowa Hospitals and Clinics, Iowa City, and the Iowa Driving Simulator. PARTICIPANTS: Thirty-nine licensed drivers: 21 with AD and 18 controls without dementia. MAIN OUTCOME MEASURES: We determined the number of crashes and related performance errors and analyzed how these occurrences were predicted by visual and cognitive factors. RESULTS: Six participants (29%) with AD experienced crashes vs 0 of 18 control participants (P = .022). Drivers with AD were more than twice as likely to experience close calls (P = .042). Plots of critical control factors in the moments preceding a crash revealed patterns of driver in-attention and error. Strong predictors of crashes included visuospatial impairment, reduction in the useful field of view, and reduced perception of 3-dimensional structure-from-motion. CONCLUSIONS: High-fidelity driving simulation provides a unique new source of performance parameters to standardize the assessment of driver fitness. Detailed observations of crashes and other safety errors provide unbiased evidence to aid in the difficult clinical decision of whether older or medically impaired individuals should continue to drive. The findings are complementary to evidence currently being gathered using techniques from epidemiology and cognitive neuroscience. Reprinted from: Arch Neur11997;54:545-51.

@article{IMIA1998227,
  author = {Kohane IS.},
  title = {Computer-based patient record. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {227-229},
  abstract = {},
  note = {Arch Neuro11997;54:545-51}
}

@article{IMIA1998230,
  author = {Tange HJ, Hasman A, De Vries Robbe PF, Schouten HC.},
  title = {Medical narratives in electronic medical records},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {230-252},
  abstract = {In this article, we describe the state of the art and directions of current development and research with respect to the inclusion of medical narratives in electronic medical-record systems. We used information about 20 electronic medical-record systems as presented in the literature. We divided these systems into 'classical' systems that matured before 1990 and are now used in a broad range of medical domains, and 'experimental' systems, more recently developed and, in general, more innovative. In the literature, three major challenges were addressed: facilitation of direct data entry, achieving unambiguous understandability of data, and improvement of data presentation. Promising approaches to tackle the first and second challenge are the use of}
dynamic data-entry forms that anticipate sensible input, and free-text data entry followed by
natural-language interpretation. Both these approaches require a highly expressive medical
terminology. How to facilitate the access to medical narratives has not been studied much. We found
facilitating examples of presenting this information as fluent prose, of optimising the screen design
with fixed position cues, and of imposing medical narratives with a structure of indexable paragraphs
that can be used in flowsheets. We conclude that further study is needed to develop an optimal
searching structure for medical narratives. Reprinted from: Int J Med Inform 1997;46:7-29,

note = {Int J Med Inform 1997;46:7-29}

@article{IMIA1998253,
  author = {Nguyen DT, Diamond LW, Cavenagh JD, Parameswaran R, Amess JA.},
  title = {Haematological validation of a computer-based bone marrow reporting system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {253-256},
  abstract = {AIMS: To prove the safety and effectiveness of "Professor Belmonte", a
knowledge-based system for bone marrow reporting, a formal evaluation of the reports generated
by the system was performed. METHODS: Three haematologists (a consultant, a senior registrar, and
a junior registrar), none of whom were involved in the development of the software, compared the
unedited reports generated by Professor Belmonte with the original bone marrow reports in 785
unselected cases. Each haematologist independently graded the quality of Belmonte's reports using
one of four categories: (a) better than the original report (more informative, containing useful
information missing in the original report); (b) equivalent to the original report; (c) satisfactory, but
missing information that should have been included; and (d) unsatisfactory. RESULTS: The consultant
graded 64 reports as more informative than the original, 687 as equivalent to the original, 32 as
satisfactory, and two as unsatisfactory. The senior registrar considered 29 reports to be better than
the original, 739 to be equivalent to the original, 15 to be satisfactory, and two to be unsatisfactory.
The junior registrar found that 88 reports were better than the original, 681 were equivalent to the
original, 14 were satisfactory, and two were unsatisfactory. Each judge found two different reports to
be unsatisfactory according to their criteria. All 785 reports generated by the computer system
received at least two scores of satisfactory or better. CONCLUSIONS: In this representative study,
Professor Belmonte generated bone marrow reports that proved to be as accurate as the original
reports in a large university hospital. The haematology knowledge contained within the system, the
reasoning process, and the function of the software are safe and effective for assisting
haematologists in generating high quality bone marrow reports. Reprinted from: J Clin Pathol
1997;50:375-8},

note = {J Clin Pathol 1997;50:375-8}

@article{IMIA1998257,
  author = {Pierik FH, Van Ginneken AM, Timmers T, Stam H, Weber RF},
  title = {Restructuring routinely collected patient data: ORCA applied to andrology},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {257-263},
  abstract = {Hospital information systems do not always cover all required detail per specialty.
This may lead to scattering of data over disparate systems and the paper record. The ORCA (Open
Record for CAre) CPR offers a generic structure for record sharing, and record keeping tailored to
specific needs. We studied whether a semantic integration of existing and new data was possible,
using the ORCA structure. Existing andrology data, originating from separate sources, were utilized for this purpose. During normalization, validation and explication steps, latent problems in the source data were exposed and removed, followed by a merge with new data items. By conversion of source data to ORCA, a unique representation of medical concepts in the database was attained, facilitating retrieval of univocal data for multiple purposes. We conclude that the expansion to the andrology domain, including transparent integration of existing data, provides support for the generality of ORCA.

Reprinted from: Methods Inf Med 1997;36:184-90,

note = {Methods Inf Med 1997;36:184-90}

@article{IMIA1998264,
author = {Als AB.},
title = {The desk-top computer as a magic box: patterns of behaviour connected with the desk-top computer; GPs' and patients' perceptions},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {264-272},
abstract = {BACKGROUND: The use of computers in general practice is becoming increasingly common. There has been concern about effects on doctor-patient communication. OBJECTIVES: The aim of this study was to identify common patterns in the use of desk-top computers by GPs with regard to interaction with the patients, and to assess the GPs' and patients' perceptions of the use of the computer. METHOD: Thirty-nine video-taped consultations with five different GPs were analysed inductively, inspired by the principles of 'grounded theory'. On separate occasions the five GPs and 12 of the previously video-taped patients watched and commented on the video recordings of their own consultation. RESULTS: The study showed that the computer was sometimes used in a way that was not originally intended. Use of the computer could be identified as a way of obtaining 'time-out' in the consultation. It could also be a referral to a 'magic box'. The conversation often changed when the computer was used. The interviews showed that the patients lacked understanding about the computer's functions. They also lacked knowledge about the possibility of loss of confidentiality with electronic files. The patients found it disturbing not knowing what their doctor was doing when he worked on the computer, and they preferred being able to see the computer screen. The GPs were surprised at how their own use of the computer looked on the video, and as a result of the interview they wanted to change their behaviour. CONCLUSIONS: It is concluded that patients need more information about the use of computers by GPs, and that GPs may benefit from paying more attention to their computer use. Reprinted from: Fam Pract 1997;14:17-23},

note = {Fam Pract 1997;14:17-23}

@article{IMIA1998273,
author = {Messerle J.},
title = {Information systems. Synopsis.},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {273-275},
abstract = {},
note = {}
This study examined the efficacy of computer-assisted cognitive rehabilitation (CACR) in persons with traumatic brain injury (TBI). Twenty persons with TBI who received hierarchically based CACR following inpatient neurorehabilitation were compared to a group of 20 persons with TBI matched for age, education, days in coma and time between testing. The comparison group received various other therapies including speech therapy and occupational therapy. The difference between pre- and post-treatment neuropsychological test scores was used to measure improvements in the domains of attention, visual spatial ability, memory and problem-solving. CACR and the comparison group showed significant post-treatment gains on the neuropsychological test scores, with CACR making significant gains on 15 measures and the comparison group on seven measures. However, we found no significant differences between the groups on their post-treatment gains. Results from this preliminary study found that, though significant cognitive gains were obtained after CACR, the extent and nature of these gains remains to be shown in controlled, prospective group studies. Reprinted from: Brain Inj 1997;11:197-209.
author = {Nobre FF, Braga AL, Pinheiro RS, Lopes JA.},
title = {GISEpi: a simple geographical information system to support public health surveillance and epidemiological investigations},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {295-307},
abstract = {One important question for the implementation of a surveillance system concern the type of instrument that can provide timely information on the course of diseases and other health events. This may facilitate prompt implementation of prevention and intervention efforts, such as strengthening control action in one specific area or initiation of epidemiological investigation. Since health related variables of interest are often spatially distributed they require special tools for representation and analysis. Owing to their inherent ability to manage spatial information, geographical information systems (GIS) provide an excellent framework for the design of surveillance systems. This paper presents a simple information system, based on the concepts of GIS, designed for representation and elementary analysis of epidemiological data. An example of its potential use to support malaria control activities in Brazil is discussed. Reprinted from: Comput Methods Programs Biomed 1997;53:33-45},

@article{IMIA1998308,
    author = {Young ST, Chang JS.},
    title = {Implementation of a patient-centred and physician-oriented healthcare information system},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {308-318},
    abstract = {Integration of information has enabled expeditious operation in air transfer, banking, shopping, and stock brokerage, but not in healthcare. Existing health information systems (HIS) are concerned too much with departmental performance and charge billing, and neglect the end users—the patients and the physicians. The resultant HIS then has divergent operation to antagonize the physicians, and has fragmented data to the disadvantage of patients. Recognizing the problems and the trend of HIS, this study proposed and implemented a patient-centred and physician-oriented HIS in a Urology clinic. The proposed HIS had patient care as its core, and accurately coded the patient’s diagnoses and therapy information. It also offered a friendly environment and complete function for the physician to administrate medical records and to provide healthcare services. The HIS had client/server structure and an open system to protect the hardware investment and the software implementation. It will be the key to success in complete hospital environments. Reprinted from: Med Inf (Land) 1997;22:207-14},
    note = {Med Inf (Land) 1997;22:207-14}
}

@article{IMIA1998319,
    author = {Maglaveras N.},
    title = {Intelligent signal and image processing. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {319-322},
    abstract = {}}
A method for respiration monitoring during MR sequences using the electrocardiogram signal (ECG) is presented. The basic principle is known in conventional patient monitoring and is based on the fact that the amplitude of the ECG signal varies with respiratory motion. A demodulation of this "cardio-respiratory signal" yields a respiration curve that can be used for patient monitoring, triggering, or respiration compensation of MRI sequences. Since no drift is introduced by digital demodulation, this method is superior to analog signal processing. The proposed method was applied during MR examinations using an optically coupled ECG sensor that has the advantage of almost negligible interference due to the MR sequences (< 10% of the main ECG signal). The respiration signal obtained is strongly correlated ($r = 0.79$ to $0.98$) with the position of the diaphragm in inferior-superior direction measured during breath-holding MRI. Reprinted from: Magn Reson Med 1997;38:129-36.

The joint use of total and partial coherence between pairs of EEGs simultaneously recorded in a standard set, is shown to enhance what is caused by direct correlation between cortical subsystems and what is instead related to the spread of the electromagnetic field. A multi-variable autoregressive approach is employed in the computation, giving results even for a very short time window, thus allowing coherence to be investigated at the main cortical latencies of evoked potentials. In particular, when a combined visual and somatosensory stimulation is applied, cortical interactions are captured in the frequency domain. Reprinted from: Med Biol Eng Comput 1997;35:124-30.

Automated fetal breathing movement detection from internal small displacement measurement.
We have previously proposed a method to measure small displacements of internal tissue which is based on an ultrasonic pulsed Doppler technique. The Doppler frequency shift of the ultrasonic waves due to the tissue movement is detected using a modified quadrature detector, and the displacement of the internal tissue is estimated by using an arctangent method. Based on the algorithm, we have constructed a quantitative monitoring system for fetal breathing movement. The fetal breathing movement is a rhythmic movement of the fetal diaphragm and it is recorded as a nearly sinusoidal displacement with a repetition frequency from 0.5 Hz to 2 Hz. In this paper, an automated fetal breathing movement detection algorithm for the displacement data observed by using the small displacement measurement system is proposed. This method uses a modified autocorrelation technique for detecting the displacement due to the fetal breathing movement. The method is applied to five fetuses of late pregnancy and the result is compared with the manual detection. Reprinted from: Biomed Tech (Berl) 1996;41:242-7.

The aim of this study was to assess the variability in automated electrocardiogram (ECG) interpretation due to electrode positioning variations. Such variations were simulated by using a set of 746 body surface potential mappings from apparently healthy individuals and patients with myocardial infarction or left ventricular hypertrophy. Four types of electrode position changes were simulated, and the effect on ECG measurements and diagnostic classifications was determined by a computer program. At most 6% of the cases showed important changes in classification for longitudinal shifts. Transversal shifts causes less than 1.5% of important changes. An expert cardiologist, who analyzed a subset of 80 cases, agreed with the computer in 38 of 40 cases in which it made no change. In the 40 cases with large diagnostic changes, the cardiologist made no change in 18 cases. The effect of electrode position changes on ECG classification by an expert cardiologist was about half of the effect determined by computerized ECG classification. The effects on classification are significant; therefore, correct placement of chest electrodes remains mandatory. Reprinted from: J Electrocardiol 1997;30:247-56.

The aim of this study was to assess the variability in automated electrocardiogram (ECG) interpretation due to electrode positioning variations. Such variations were simulated by using a set of 746 body surface potential mappings from apparently healthy individuals and patients with myocardial infarction or left ventricular hypertrophy. Four types of electrode position changes were simulated, and the effect on ECG measurements and diagnostic classifications was determined by a computer program. At most 6% of the cases showed important changes in classification for longitudinal shifts. Transversal shifts causes less than 1.5% of important changes. An expert cardiologist, who analyzed a subset of 80 cases, agreed with the computer in 38 of 40 cases in which it made no change. In the 40 cases with large diagnostic changes, the cardiologist made no change in 18 cases. The effect of electrode position changes on ECG classification by an expert cardiologist was about half of the effect determined by computerized ECG classification. The effects on classification are significant; therefore, correct placement of chest electrodes remains mandatory. Reprinted from: J Electrocardiol 1997;30:247-56.

The aim of this study was to assess the variability in automated electrocardiogram (ECG) interpretation due to electrode positioning variations. Such variations were simulated by using a set of 746 body surface potential mappings from apparently healthy individuals and patients with myocardial infarction or left ventricular hypertrophy. Four types of electrode position changes were simulated, and the effect on ECG measurements and diagnostic classifications was determined by a computer program. At most 6% of the cases showed important changes in classification for longitudinal shifts. Transversal shifts causes less than 1.5% of important changes. An expert cardiologist, who analyzed a subset of 80 cases, agreed with the computer in 38 of 40 cases in which it made no change. In the 40 cases with large diagnostic changes, the cardiologist made no change in 18 cases. The effect of electrode position changes on ECG classification by an expert cardiologist was about half of the effect determined by computerized ECG classification. The effects on classification are significant; therefore, correct placement of chest electrodes remains mandatory. Reprinted from: J Electrocardiol 1997;30:247-56.

The aim of this study was to assess the variability in automated electrocardiogram (ECG) interpretation due to electrode positioning variations. Such variations were simulated by using a set of 746 body surface potential mappings from apparently healthy individuals and patients with myocardial infarction or left ventricular hypertrophy. Four types of electrode position changes were simulated, and the effect on ECG measurements and diagnostic classifications was determined by a computer program. At most 6% of the cases showed important changes in classification for longitudinal shifts. Transversal shifts causes less than 1.5% of important changes. An expert cardiologist, who analyzed a subset of 80 cases, agreed with the computer in 38 of 40 cases in which it made no change. In the 40 cases with large diagnostic changes, the cardiologist made no change in 18 cases. The effect of electrode position changes on ECG classification by an expert cardiologist was about half of the effect determined by computerized ECG classification. The effects on classification are significant; therefore, correct placement of chest electrodes remains mandatory. Reprinted from: J Electrocardiol 1997;30:247-56.

The aim of this study was to assess the variability in automated electrocardiogram (ECG) interpretation due to electrode positioning variations. Such variations were simulated by using a set of 746 body surface potential mappings from apparently healthy individuals and patients with myocardial infarction or left ventricular hypertrophy. Four types of electrode position changes were simulated, and the effect on ECG measurements and diagnostic classifications was determined by a computer program. At most 6% of the cases showed important changes in classification for longitudinal shifts. Transversal shifts causes less than 1.5% of important changes. An expert cardiologist, who analyzed a subset of 80 cases, agreed with the computer in 38 of 40 cases in which it made no change. In the 40 cases with large diagnostic changes, the cardiologist made no change in 18 cases. The effect of electrode position changes on ECG classification by an expert cardiologist was about half of the effect determined by computerized ECG classification. The effects on classification are significant; therefore, correct placement of chest electrodes remains mandatory. Reprinted from: J Electrocardiol 1997;30:247-56.

The aim of this study was to assess the variability in automated electrocardiogram (ECG) interpretation due to electrode positioning variations. Such variations were simulated by using a set of 746 body surface potential mappings from apparently healthy individuals and patients with myocardial infarction or left ventricular hypertrophy. Four types of electrode position changes were simulated, and the effect on ECG measurements and diagnostic classifications was determined by a computer program. At most 6% of the cases showed important changes in classification for longitudinal shifts. Transversal shifts causes less than 1.5% of important changes. An expert cardiologist, who analyzed a subset of 80 cases, agreed with the computer in 38 of 40 cases in which it made no change. In the 40 cases with large diagnostic changes, the cardiologist made no change in 18 cases. The effect of electrode position changes on ECG classification by an expert cardiologist was about half of the effect determined by computerized ECG classification. The effects on classification are significant; therefore, correct placement of chest electrodes remains mandatory. Reprinted from: J Electrocardiol 1997;30:247-56.
The most important rendering methods applied in medical imaging are surface and volume rendering techniques. Each approach has its own advantages and limitations: Fast surface-oriented methods are able to support real-time interaction and manipulation. The underlying representation, however, is dependent on intensive image processing to extract the object surfaces. In contrast, volume visualization is not necessarily based on extensive image processing and interpretation. No data reduction to geometric primitives, such as polygons, is required. Therefore, the process of volume rendering is currently not operating in real time. In order to provide the radiological diagnosis with additional information as well as to enable simulation and preoperative treatment planning we developed a new hybrid rendering method which combines the advantages of surface and volume presentation, and minimizes the limitations of these approaches. We developed a common data representation method for both techniques. A preprocessing module enables the construction of a data volume by interpolation as well as the calculation of object surfaces by semiautomatic image interpretation and surface construction. The hybrid rendering system is based on transparency and texture mapping features. It is embedded in a user-friendly open system which enables the support of new application fields such as virtual reality and stereolithography. The efficiency of our new method is described for 3-D subtraction angiography and the visualization of morpho-functional relationships. Reprinted from: Methods Inf Med 1997;36:1-10,

note = {Methods Inf Med 1997;36:1-10}
@article{IMIA1998385,
author = {Kors JA.},
title = {Decision support systems and knowledge processing. Synopsis.},
journal = {IMIA Yearbook of medical informatics},
title = {Decision support systems and knowledge processing. Synopsis.},
volume = {1998},
year = {1998},
pages = {385-388},
abstract = {},
note = {}
}

@article{IMIA1998389,
author = {Haddad M, Adlassnig KP, Porenta G.},
title = {Feasibility analysis of a case-based reasoning system for automated detection of coronary heart disease from myocardial scintigrams},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {389-406},
abstract = {Myocardial perfusion scintigraphy is a noninvasive diagnostic method for the evaluation of patients with suspected or proven coronary artery disease (CAD). We utilized case-based reasoning (CBR) methods to develop the computer-based image interpretation system SCINA which automatically derives from a scintigraphic image data set an assessment concerning the presence of CAD. We compiled a case library of 100 patients who underwent both perfusion scintigraphy and coronary angiography to document or exclude the presence of CAD. The angiographic diagnosis of the retrieved nearest neighbor match of a scintigraphic input case was selected as the CBR diagnosis. We examined the effects of input data granularity, case indexing, similarity metric, and adaptation on the diagnostic accuracy of the CBR application SCINA. For the final prototype, sensitivity and specificity for detection of coronary heart disease were 98% and 70% suggesting that CBR systems may achieve a diagnostic accuracy that appears feasible for clinical use. Reprinted from: Artif Intell Med 1997;9:61-78},
note = {Artif Intell Med 1997;9:61-78}
}

@article{IMIA1998407,
author = {Schmidt R, Heindi B, Poliwein B, Gierl L.},
title = {Multiparametric time course prognoses by means of case-based reasoning and abstractions of data and time},
journal = {IMIA Yearbook of medical informatics},
volume = {1998},
year = {1998},
pages = {407-420},
abstract = {In this paper we describe an approach to utilize Case-Based Reasoning methods for trend prognoses for medical problems. Since using conventional methods for reasoning over time does not fit for course predictions without medical knowledge of typical course pattern, we have developed abstraction methods suitable for integration into our Case-Based Reasoning system ICONS. These methods combine medical experience with prognoses of multiparametric courses. We have chosen the monitoring of the kidney function in an Intensive Care Unit (ICU) setting as an

}
example for diagnostic problems. On the ICU, the monitoring system NIMON provides a daily report based on current measured and calculated kidney function parameters. We abstract these parameters to a daily kidney function state. Subsequently, we use these states to generate course-characteristic trend descriptions of the renal function over the course of time. Using Case-Based Reasoning retrieval methods, we search in the case base for courses similar to the current trend descriptions. Finally, we present the current course together with similar courses as comparisons and as possible prognoses to the user. Reprinted from: Med Inf (Lond) 1997;22:237-50,

note = {Med Inf (Lond) 1997;22:237-50}

@article{IMIA1998421,
  author = {Lo JY, Baker JA, Komguth PJ, Iglehart JD, Floyd CE Jr.},
  title = {Predicting breast cancer invasion with artificial neural networks on the basis of mammographic features},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {421-425},
  abstract = {PURPOSE: To evaluate whether an artificial neural network (ANN) can predict breast cancer invasion on the basis of readily available medical findings (ie, mammographic findings classified according to the American College of Radiology Breast Imaging Reporting and Data System and patient age). MATERIALS AND METHODS: In 254 adult patients, 266 lesions that had been sampled at biopsy were randomly selected for the study. There were 96 malignant and 170 benign lesions. On the basis of nine mammographic findings and patient age, a three-layer backpropagation network was developed to predict whether the malignant lesions were in situ or invasive. RESULTS: The ANN predicted invasion among malignant lesions with an area under the receiver operating characteristic curve (Az) of .91 +/- .03. It correctly identified all 28 in situ cancers (specificity, 100%) and 48 of 68 invasive cancers (sensitivity, 71%). CONCLUSION: The ANN used mammographic features and patient age to accurately classify invasion among breast cancers, information that was previously available only by means of biopsy. This knowledge may assist in surgical planning and may help reduce the cost and morbidity of unnecessary biopsy Reprint ed from: Radiology 1997;203:159-63},
  note = {Radiology 1997;203:159-63}
}

@article{IMIA1998426,
  author = {Brickley MR, Cowpe JG, Shepherd JP.},
  title = {Performance of a computer simulated neural network trained to categorise normal, premalignant and malignant oral smears},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {426-430},
  abstract = {The accurate detection of malignant neoplasms whilst they are still small is recognised as one of the main factors increasing chances of survival. Neural networks have many biomedical applications and they have been applied to neoplasia but their use in oral pathology has only recently been documented. The objectives of this study were to train networks to discriminate between normal and dysplastic mucosa. Each network was trained by back propagation, internal cross validation and tested on additional data. The data were derived by analysing 348 intra-oral smears and included mean nuclear and mean cytoplasmic areas of the smears measured by image analysis. A neural network differentiated between normal/non-dysplastic mucosa and dysplastic/malignant mucosa (specificity 0.82, sensitivity 0.76). These early results suggest that integrating neural networks and image analysis, as well as investigating additional criteria, could


@article{IMIA1998431,
    title = {Agreement between artificial neural networks and experienced electrocardiographer on electrocardiographic diagnosis of healed myocardial infarction},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {431-435},
    abstract = {OBJECTIVES: The purpose of this study was to compare the diagnoses of healed myocardial infarction made from the 12-lead electrocardiogram (ECG) by artificial neural networks and an experienced electrocardiographer. BACKGROUND: Artificial neural networks have proved of value in pattern recognition tasks. Studies of their utility in ECG interpretation have shown performance exceeding that of conventional ECG interpretation programs. The latter present verbal statements, often with an indication of the likelihood for a certain diagnosis, such as "possible left ventricular hypertrophy." A neural network presents its output as a numeric value between 0 and 1; however, these values can be interpreted as Bayesian probabilities. METHODS: The study was based on 351 healthy volunteers and 1,313 patients with a history of chest pain who had undergone diagnostic cardiac catheterization. A 12-lead ECG was recorded in each subject. An expert electrocardiographer classified the ECGs in five different groups by estimating the probability of anterior myocardial infarction. Artificial neural networks were trained and tested to diagnose anterior myocardial infarction. The network outputs were divided into five groups by using the output values and four thresholds between 0 and 1. RESULTS: The neural networks diagnosed healed anterior myocardial infarctions at high levels of sensitivity and specificity. The network outputs were transformed to verbal statements, and the agreement between these probability estimates and those of an expert electrocardiographer was high. CONCLUSIONS: Artificial neural networks can be of value in automated interpretation of ECGs in the near future. Reprinted from: J AmCollCardiol 1996;28:1012-6},
    \textit{note} = \{J AmCollCardiol 1996;28:1012-6\}
}

@article{IMIA1998436,
    author = {Kennedy RL, Harrison RF, Burton AM, Fraser HS, Hamer WG, MacArthur D, McAllum R, Steedman DJ.},
    title = {An artificial neural network system for diagnosis of acute myocardial infarction (AMI) in the accident and emergency department: evaluation and comparison with serum myoglobin measurements},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {436-446},
    abstract = {Recent studies have confirmed that artificial neural networks (ANNs) are adept at recognising patterns in sets of clinical data. The diagnosis of acute myocardial infarction (AMI) in patients presenting with chest pain remains one of the greatest challenges in emergency medicine. The aim of this study was to evaluate the performance of an ANN trained to analyse clinical data from chest pain patients. The ANN was compared with serum myoglobin measurements--cardiac damage is associated with increased circulating myoglobin levels, and this is widely used as an early marker for evolving AMI. We used 39 items of clinical and ECG data from the time of presentation to
derive 53 binary inputs to a back propagation network. On test data (200 cases), overall accuracy, sensitivity, specificity and positive predictive value (PPV) of the ANN were 91.8, 91.2, 90.2 and 84.9% respectively. Corresponding figures using linear discriminant analysis were 81.0, 77.9, 82.6 and 69.7% (P < 0.01). Using a further test set from a different centre (91 cases), the accuracy, sensitivity, specificity and PPV for the admitting physicians were 65.1, 28.5, 76.9 and 28.6% respectively compared with 73.6, 52.4, 80.0 and 44.0% for the ANN. Although myoglobin at presentation was highly specific, it was only 38.0% sensitive, compared with 85.7% at 3 h. Simple strategies to combine clinical opinion, ANN output and myoglobin at presentation could greatly improve sensitivity and specificity of AMI diagnosis. The ideal support for emergency room physicians may come from a combination of computer-aided analysis of clinical factors and biochemical markers such as myoglobin. This study demonstrates that the two approaches could be usefully combined, the major benefit of the decision support system being in the first 3 h before biochemical markers have become abnormal. Reprinted from: Comput Methods Programs Biomed 1997;52:93-103,

@article{IMIA1998447,
  author = {Ohno-Machado L.},
  title = {A comparison of Cox proportional hazards and artificial neural network models for medical prognosis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {447-457},
  abstract = {Modeling survival of populations and establishing prognoses for individual patients are important activities in the practice of medicine. For patients with diseases that may extend for several years, in particular, accurate assessment of survival probabilities is essential. New methods, such as neural networks, have been used increasingly to model disease progression. Their advantages and disadvantages, when compared to statistical methods such as Cox proportional hazards, have seldom been explored in real-world data. In this study, we compare the performances of a Cox model and a neural network model that are used as prognostic tools for a set of people living with AIDS. We modeled disease progressions for patients who had AIDS (according to the 1993 CDC definition) in a set of 588 patients in California, using data from the ATHOS project. We divided the study population into 10 training and 10 test sets and evaluated the prognostic accuracy of a Cox proportional hazards model and of a neural network model by determining sensitivities, specificities, positive and negative predictive values for an arbitrary threshold (0.5), and the areas under the receiver operating characteristics (ROC) curves that utilized all possible thresholds for intervals of 1 yr following the diagnosis of AIDS. There was no evidence that the Cox model performed better than did the neural network model or vice versa, but the former method had the advantage of providing some insight on which variables were most influential for prognosis. Nevertheless, it is likely that the assumptions required by the Cox model may not be satisfied in all data sets, justifying the use of neural networks in certain cases. Reprinted from: Comput Biol Med 1997;27:55-65},
  note = {Comput Methods Programs Biomed 1997;52:93-103}
}

@article{IMIA1998458,
  author = {Silver DL, Hurwitz GA.},
  title = {The predictive and explanatory power of inductive decision trees: a comparison with artificial neural network learning as applied to the noninvasive diagnosis of coronary artery disease},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  note = {Comput Biol Med 1997;27:55-65}
}
BACKGROUND: This paper compares two machine learning systems, an inductive decision tree (IDT) and a back-propagation neural network (ANN), in the noninvasive assessment of coronary artery disease given a set of diagnostic input attributes. A collection of 490 patient cases were accumulated from the reference of diagnostic stress myocardial scintigraphy performed in a nuclear medicine department. All cases had correlating angiography, the results of which were used to derive the target diagnoses. Input attributes included 4 baseline clinical characteristics, 4 nonimaging stress components, and 3 scintigraphic findings. METHODS: We chose 4 possible angiographic criteria for coronary artery disease and assessed the ability of each learning system to develop a diagnostic model. The 2 machine learning systems were compared on the basis of predictive performance and explanatory power. RESULTS: Cross-validation experiments showed the 2 machine learning systems to have equivalent predictive power at the same level as the clinical scan reading. For the 70% stenosis criterion, the IDT had a sensitivity of 94 +/- 3% (mean +/- 95% confidence interval) and a specificity of 59 +/- 8%, and the ANN had a sensitivity of 97 +/- 2% and a specificity of 51 +/- 13%. However the IDT system exhibited excellent explanatory power; producing simple representations of the diagnostic models which agree with previous research. CONCLUSION: In comparison with the more widely used ANNs, the IDT learning system may bring advantages to certain problems in diagnostic classification. Reprinted from: J Investig Med 1997;45:99-108.

@article{IMIA1998471,
    author = {Haux R.},
    title = {Health and medical informatics education. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {471-472},
    abstract = {},
    note = {}}

@article{IMIA1998473,
    title = {Medical student response to an interactive patient simulation program used to supplement child abuse education},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {473-477},
    abstract = {Child Abuse Negl 1996;20:973-7},
    note = {Child Abuse Negl 1996;20:973-7}}

@article{IMIA1998478,
    author = {Ohm MA, Van Oostrom JH, Van Meurs WL.},
    title = {A comparison of traditional textbook and interactive computer learning of neuromuscular block},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {478-483},
    abstract = {},
    note = {J Investig Med 1997;45:99-108}}
We designed an educational software package, RELAX, for teaching first-year anesthesiology residents about the pharmacology and clinical management of neuromuscular blockade. The software uses an interactive, problem-based approach and moves the user through cases in an operating room environment. It can be run on personal computers with Microsoft Windows (Microsoft Corp., Redmond, WA) and combines video, graphics, and text with mouse-driven user input. We utilized test scores 1) to determine whether our software was beneficial to the educational progress of anesthesiology residents and 2) to compare computer-based learning with textbook learning. Twenty-three residents were divided into two groups matched for age and sex, and a pretest was administered to all 23 residents. There was no significant difference (P > 0.05) in the pretest scores of the two groups. Three weeks later, both groups were subjected to an educational intervention; one with our computer software and the other with selected textbooks. Both groups took a posttest immediately after the intervention. The test scores of the computer group improved significantly more (P < 0.05) than those of the textbook group. Although prior to the study the two groups showed no statistical difference in their familiarity with computers, the computer group reported much higher satisfaction with their learning experience than did the textbook group (P < 0.0001). Reprinted from: Anesth Anali1997;84:657-61.

@article{IMIA1998483,
  author = {Giuse NB, Huber JT, Giuse DA, Kafantaris SR, Stead WW.},
  title = {Integrating health sciences librarians into biomedicine},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {483-489},
  abstract = {Vanderbilt University Medical Center (VUMC) developed a model training program to prepare current and future health sciences librarians for roles that are integrated into the diverse fabric of the health care professions. As a complement to the traditional and theoretical aspects of a librarian's education, this mixture of supplemental coursework and intensive practical training emphasizes active management of information, problem-solving skills, learning in context, and direct participation in research, while providing the opportunity for advanced academic pursuits. The practical training will take place under the auspices of an established Integrated Advanced Information Management Systems (IAIMS) library that is fully integrated with the Health Center Information Management Unit and Academic Biomedical Informatics Unit. During the planning phase, investigators are analyzing the model's aims and requirements, concentrating on (a) refining the current understanding of the roles health sciences librarians occupy; (b) developing educational strategies that prepare librarians to fulfill expanded roles; and (c) planning for an evaluation process that will support iterative revision and refinement of the model. Reprinted from: Bull Med Libr Assoc 1996;84:534-40},
  note = {Bull Med Libr Assoc 1996;84:534-40}
}

@article{IMIA1998490,
  author = {Brown SJ, Lieberman DA, Gerneny BA, Fan YC, Wilson DM, Pasta DJ},
  title = {Educational video game for juvenile diabetes: results of a controlled trial},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {490-502},
  abstract = {We designed an educational software package, RELAX, for teaching first-year anesthesiology residents about the pharmacology and clinical management of neuromuscular blockade. The software uses an interactive, problem-based approach and moves the user through cases in an operating room environment. It can be run on personal computers with Microsoft Windows (Microsoft Corp., Redmond, WA) and combines video, graphics, and text with mouse-driven user input. We utilized test scores 1) to determine whether our software was beneficial to the educational progress of anesthesiology residents and 2) to compare computer-based learning with textbook learning. Twenty-three residents were divided into two groups matched for age and sex, and a pretest was administered to all 23 residents. There was no significant difference (P > 0.05) in the pretest scores of the two groups. Three weeks later, both groups were subjected to an educational intervention; one with our computer software and the other with selected textbooks. Both groups took a posttest immediately after the intervention. The test scores of the computer group improved significantly more (P < 0.05) than those of the textbook group. Although prior to the study the two groups showed no statistical difference in their familiarity with computers, the computer group reported much higher satisfaction with their learning experience than did the textbook group (P < 0.0001). Reprinted from: Anesth Anali1997;84:657-61},
  note = {Anesth Anali1997;84:657-61}
}
abstract = {Packy & Marlon, an interactive video game designed to improve self-care among children and adolescents with diabetes, was evaluated in a six-month randomized controlled trial. In the game, players take the role of animated characters who manage their diabetes by monitoring blood glucose, taking insulin injections, and choosing foods, while setting out to save a diabetes summer camp from marauding rats and mice who have stolen the diabetes supplies. Study participants were patients aged 8 to 16 from two separate diabetes clinics. Each participant received a Super Nintendo video game system at an initial clinic visit and was randomly assigned to receive either Packy & Marlon (treatment group, N = 31) or an entertainment video game containing no diabetes-related content (control group, N = 28). Participants were interviewed and a parent filled out a questionnaire at baseline, three months, and six months. The findings in this study indicate that well-designed, educational video games can be effective interventions. There was improvement in the treatment group relative to the control group in terms of diabetes-related self-efficacy (p = 0.07), communication with parents about diabetes (p = 0.025), and self-care behaviours (p = 0.003), and a decrease in unscheduled urgent doctor visits (p = 0.08). There were no significant differences between the groups in knowledge about diabetes or in glycated haemoglobin (HbA1c) levels. Since participants in the study were in general well-controlled patients who were receiving excellent medical care, future research is contemplated involving youngsters who are not under good glycaemic control. Reprinted from: Med Inf (Land) 1997;22:77-89},

@article{IMIA1998503,
    author = {Turner A, Singleton N, Easterbrook S.},
    title = {Developing sexual health software incorporating user feedback: a British experience},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {503-521},
    abstract = {This article describes an interactive prototyping model for development of four computer software modules for British youth on sexual issues. An iterative cycle of development, user review and feedback, and subsequent modification and retesting was used with approximately 150 young adults, with particular attention to presentation style, screen design, usability, relevance of material, enjoyment, and learning. The software was designed to be realistically accommodated in school settings, to be used as a reference tool by students working alone or in a group teaching situation. Feedback from youth and adults attests to the feasibility of development, implementation, and instructional usefulness. Interactive prototyping proved essential in the face of skepticism from teachers concerning young people's information needs and acceptance of a computerized educational approach. Reprinted from: Health Educ Behav 1997;24:102-20},
    note = {Health Educ Behav 1997;24:102-20}
}

@article{IMIA1998522,
    author = {King K, Carstairs M.},
    title = {Supporting multi-level medical education with knowledge-based systems},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1998},
    year = {1998},
    pages = {522-527},
    abstract = {Knowledge-based systems for medicine have enjoyed minimal success in developing countries as end-user systems. The reasons for this are complex. As funding agencies understandably tend to err on the side of caution, and knowledge-based systems are still (despite an almost 40 year history) seen as a new and untried technology, few have been implemented. Of those which have, most are inappropriately simple and thus do not fit in with the real-life clinical
environment. In contrast to the sophisticated systems in use in developed countries which reflect a mature technology, the use of knowledge-based systems in medicine in developing countries has primarily revolved around simple 'expert' systems, where the program functions more as a 'guru' than as a support function. We propose the more appropriate use of these systems as educational tools in medicine. In this discussion paper we describe a multi-level programme to support medical education, focusing on patient information systems involving natural language generation, decision-support systems as educational aids for primary health-care workers and model-based reasoning tools which allow exploratory learning for physicians in training. Throughout this paper we refer to Knowledge-Based Medical Education Systems as KBMES. Reprinted from: Methods Inf Med 1997;36:102-7,

note = {Methods Inf Med 1997;36:102-7}
}

@article{IMIA1998528,
  author = {Haux R, Frank J, Knaup P.},
  title = {The IMIA WG 1 database on health and medical informatics programs and courses: a call for participation},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1998},
  year = {1998},
  pages = {528-530},
  abstract = {Working Group 1 on health and medical informatics education of the International Medical Informatics Association (IMIA) has established a WWW site (http://ix.urz.uni-heidelberg.de/-d16) to provide up-to-date information about its work. The core of the site is an underlying database providing information on health and medical informatics (HMI) programs and courses worldwide. To be able to have a database of high quality and value we encourage all teachers and institutions to submit information about courses and programs on HMI education offered and to set pointers to their own WWW sites. In addition, a mailing list was installed to facilitate communication between all persons interested in HMI education. For subscription a message has to be sent to "listserv@listserv.net". The body of the message should read "SUBSCRIBE IMIA-WG1". Messages to the IMIA WG1 list have to be sent to "imia-wg1@urzinfo.urz.uni-heidelberg.de". Reprinted from: Methods Inf Med 1997;36:233-4},
  note = {Methods Inf Med 1997;36:233-4}
}
OBJECTIVE: To describe denervation features of facial musculature following facial nerve injury in a rodent model. METHODS: Six Wistar-Hannover rats underwent unilateral transection and immediate repair of the facial nerve. After 8 weeks, muscular bundles consisting of dilator naris and levator labii superioris from both sides were analyzed for mean muscle cell diameter and the percentage of muscle cell cross-sectional area using image processing software. The atrophic features of facial muscles were quantified and compared with the contralateral, healthy side of the face. RESULTS: Weekly postoperative whisking assessment demonstrated the anticipated course of recovery. We observed significant differences between the normal side and the manipulated side, respectively, in the percentage of muscle specimen cross-sectional area attributable to muscle cell profiles (57% vs 29%; P = .006) and total fiber counts (1346 vs 794; P = .02). The mean cross-sectional area of individual muscle fibers was higher on the normal side (1129 vs 928 μm2; P = .39); however, this difference was statistically nonsignificant. CONCLUSION: The objective, quantitative measures of muscle microstructure used in this report provide a valuable point of comparison for whisking function and electrophysiologic measures and can be used in future studies to assess muscle atrophic features associated with facial nerve injury and repair techniques. Reprinted from: JAMA 1968;205:141-6,
To help the physician decide whether or not to treat a patient who may or may not have a disease, a method has been developed for calculating a therapeutic threshold. If the probability of disease in a given patient exceeds the threshold, the preferable course of action is to treat; if the probability is below the threshold, the preferable course of action is to withhold treatment. This method is applicable in many medical and surgical settings in which some diagnostic uncertainty exists after all appropriate studies have been carried out. The technic not only exposes
some of the basic principles of therapeutic decision making in the face of diagnostic uncertainty but also forms a convenient framework for analyzing the impact of "soft" clinical data on the decision-making process. Reprinted from: N Engl J Med 1975;293:229-34,
note = {N Engl J Med 1975;293:229-34}

@article{IMIA1999113,
author = {Gouvernet J, Fieschi M, Giorgi R.},
title = {Commentary},
journal = {IMIA Yearbook of medical informatics},
volume = {1999},
year = {1999},
pages = {113-116},
abstract = {},
note = {}}

@article{IMIA1999117,
author = {De Dombal FT, Leaper DJ, Staniland JR, McCann AP, Horrocks JC.},
title = {Computer-aided diagnosis of acute abdominal pain},
journal = {IMIA Yearbook of medical informatics},
volume = {1999},
year = {1999},
pages = {117-121},
abstract = {This paper reports a controlled prospective unselected real-time comparison of human and computer-aided diagnosis in a series of 304 patients suffering from abdominal pain of acute onset. The computing system's overall diagnostic accuracy (91.8%) was significantly higher than that of the most senior member of the clinical team to see each case (79.6%). It is suggested as a result of these studies that the provision of such a system to aid the clinician is both feasible in a real-time clinical setting, and likely to be of practical value, albeit in a small percentage of cases. Reprinted from: BMJ 1972;2:9-13},
note = {BMJ 1972;2:9-13}

@article{IMIA1999122,
author = {Hasman A.},
title = {Commentary},
journal = {IMIA Yearbook of medical informatics},
volume = {1999},
year = {1999},
pages = {122-124},
abstract = {},
note = {}}

@article{IMIA1999125,
author = {McDonald CJ.},
To determine whether clinical errors can be reduced by prospective computer suggestions about the management of simple clinical events, I studied the responses of nine physicians to computer suggestions generated by 390 protocols in a controlled crossover design. These protocols dealt primarily with conditions managed (e.g., elevated blood pressure) or caused (e.g., liver toxicity) by drugs. Physicians responded to 51 per cent of 327 events when given, and 22 per cent of 385 events when not given computer suggestions. Neither level of postgraduate training (first-year postgraduate or third-year post-graduate) nor the order in which physicians served as study and control subjects had statistically significant overall effect on the results. It appears that the prospective reminders do reduce errors, and that many of these errors are probably due to man's limitations as a data processor rather than to correctable human deficiencies. Reprinted from: N Engl J Med 1976;295:1351-5,
experiments on large medical databases show that our new approach can provide useful knowledge with better semantics in this field. Reprinted from: Math Biosci 1975;23:351-79,

    note = {Math Biosci 1975;23:351-79}

}
@article{IMIA1999238,
  author = {Cote RA.},
  title = {The SNOP-SNOMED concept: Evolution towards common medical nomenclature and classification},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {238-244},
  abstract = {Pathologist 1979;31:383-9},
  note = {Pathologist 1979;31:383-9}
}

@article{IMIA1999245,
  author = {Roger France FH},
  title = {Commentary},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {245-246},
  abstract = {},
  note = {}
}

@article{IMIA1999247,
  author = {Reichertz PL, Moehr JR, Schwarz B, Von Gartner-Holthoff G, Filsinger E.},
  title = {Evaluation of a field test of computers for the doctor's office},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {247-256},
  abstract = {Meth Inform Med 1979;18:61-70},
  note = {Meth Inform Med 1979;18:61-70}
}

@article{IMIA1999257,
  author = {Moehr JR.},
  title = {Commentary},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {257-261},
  abstract = {},
  note = {}
}

@article{IMIA1999262,
  author = {Barnett GO, Justice NS, Somand ME, Adams JB, Waxman DB, Beaman PD, Parent MS, Van Deusen FR, Greenlie JK.},
  title = {COSTAR - A computer-based medical information system for ambulatory care},

journal = {IMIA Yearbook of medical informatics},
volume = {1999},
year = {1999},
pages = {262-273},
abstract = {Proc IEEE 1979;67:1226-37},
note = {Proc IEEE 1979;67:1226-37}
}

@article{IMIA1999274,
  author = {Hayes GM},
  title = {Commentary},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {274-276},
  abstract = {},
  note = {}
}

@article{IMIA1999277,
  author = {Gremy F.},
  title = {Why teach information sciences in medicine? Will they contribute to a solution in the present crisis of medicine},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {277-279},
  abstract = {Meth Inform Med 1983;22:121-3},
  note = {Meth Inform Med 1983;22:121-3}
}

@article{IMIA1999280,
  author = {Van Bemmel JH},
  title = {Commentary},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {280-282},
  abstract = {},
  note = {}
}

@article{IMIA1999283,
  author = {Blois MS.},
  title = {On the proper use of men and machine},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {283-303},
}
OBJECTIVE: The World Wide Web (WWW) is a new communications medium that permits investigators to contact patients in nonmedical settings and study the effects of disease on quality of life through self-administered questionnaires. However, little is known about the feasibility and, what is more important, the validity of this approach. An online survey for patients with ulcerative colitis (UC) and patients whose UC had been treated with surgical procedures was developed. To understand how patients on the WWW might differ from those in practice and the potential biases in conducting epidemiological research in volunteers recruited on the Internet, post-surgery patients who responded to the WWW survey were compared with those in a surgical practice. SETTING: The Internet and private practice surgical clinic. MAIN OUTCOMES: Scores from the Short form 36 (SF-36) Health Assessment Questionnaire and the Self-Administered Inflammatory Bowel Disease Questionnaire (IBDQ). RESULTS: Over a 5-month period, 53 post-surgery patients enrolled in the Internet study; 47 patients from a surgical clinic completed the same computer-based questionnaire. Surgically treated patients on the WWW were younger than their clinic counterparts (median age category 35-44 years vs. 45-54 years, p = 0.01) but more ill with a lower summary IBDQ score (168 vs. 186, p = 0.019) and lower health status across almost all dimensions of the SF-36 (p = 0.016). CONCLUSIONS: It is feasible to conduct epidemiological research on the effects of UC on quality of life on the Web; however, systematic differences in disease activity
between volunteer patients on the WWW and "in the clinic" may limit the applicability of results.


@article{IMIA1998325,
  author = {Petersen LA, Orav EJ, Teich JM, O Neil AC, Brennan TA.},
  title = {Using a computerized sign-out program to improve continuity of inpatient care and prevent adverse events},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {325-335},
  abstract = {BACKGROUND: Many medical injuries are preventable, but there are few reported successful strategies to prevent such injuries. Previous work identified coverage by house staff not primarily responsible for the patient (cross-coverage) as a significant correlate of risk for preventable adverse events. A four-month intervention--computerized sign-outs--was introduced in 1993 in an urban teaching hospital to improve continuity of care during cross-coverage and thereby reduce risk for preventable adverse events. MEASUREMENTS: A previously tested confidential self-report system was used to identify adverse events, which were defined as unexpected complications of medical therapy that resulted in increased length of stay or disability at discharge. A panel of three board-certified internists confirmed events and evaluated preventability based on case summaries. RESULTS: After the intervention, the rate of preventable adverse events among the 3,747 patients admitted to the medical service decreased from 1.7% to 1.2% (p < 0.10). Both univariate and multivariate analysis revealed no association between cross coverage and preventable adverse events after the intervention. In the baseline period, the odds ratio (OR) for a patient suffering a preventable adverse event during cross coverage was 5.2 (95% confidence interval [CI], 1.5-18.2; p = 0.01), but was no longer significant after the intervention (OR, 1.5; 95% CI, 0.2-9.0). CONCLUSION: House staff are willing participants in efforts to measure and improve the quality of health care systems. The intervention may have reduced the risk for medical injury associated with discontinuity of inpatients care. Four years after the end of the study, the computerized sign-out program remained an integral part of the computing support system for house staff and was widely used. Reprinted from: Jt Comm J Qual Improv 1998;24:77-87.},
  note = {Jt Comm J Qual Improv 1998;24:77-87}
}
using parasitologic and entomologic data are presented as examples. Background information on DGPS is presented along with estimates of effort and expense to produce the map information. Reprinted from: Am J Trop Med Hyg 1998;58:266-72,

note = {Am J Trop Med Hyg 1998;58:266-72}

@article{IMIA1999343,
  title = {Diagnostic interpretation of electrocardiograms in population-based research: computer program research physicians, or cardiologists?},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {343-350},
  abstract = {We assessed the performance of diagnostic electrocardiogram (ECG) interpretation by the computer program MEANS and by research physicians, compared to cardiologists, in a physician-based study. To establish a strategy for ECG interpretation in health surveys, we also studied the diagnostic capacity of three scenarios: use of the computer program alone (A), computer program and cardiologist (B), and computer program, research physician, and cardiologist (C). A stratified random sample of 381 ECGs was drawn from ECGs collected in the Rotterdam Study (n = 3057), which were interpreted both by a trained research physician using a form for structured clinical evaluation and by MEANS. All ECGs were interpreted independently by two cardiologists; if they disagreed (n = 175) the ECG was judged by a third cardiologist. Five ECG diagnoses were considered: anterior and inferior myocardial infarction (MI), left and right bundle branch block (LBBB and RBBB), and left ventricular hypertrophy (LVH). Overall, sensitivities and specificities of MEANS and the research physicians were high. The sensitivity of MEANS ranged from 73.8% to 92.9% and of the research physician from 71.8% to 96.9%. The specificity of MEANS ranged from 97.5% to 99.8% and of the research physician from 96.3% to 99.6%. To diagnose LVH, LBBB, and RBBB, use of the computer program alone gives satisfactory results. Preferably, all positive findings of anterior and inferior MI by the program should be verified by a cardiologist. We conclude that diagnostic ECG interpretation by computer can be very helpful in population-based research, being at least as good as ECG interpretation by a trained research physician, but much more efficient and therefore less expensive. Reprinted from: J Clin Epidemiol 1997;50:947-52},
  note = {J Clin Epidemiol 1997;50:947-52}
}

@article{IMIA1999351,
  author = {Moorman PW.},
  title = {Computer-based patient records. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {351-353},
  abstract = {},
  note = {} }

@article{IMIA1999354,
  author = {Nordyke RA, Kulikowski CA.},
  title = {},
  journal = {},
  volume = {},
  year = {},
  pages = {},
  abstract = {},
  note = {} }
An informatics-based chronic disease practice: case study of a 35-year computer-based longitudinal record system,


Abstract: The authors present the case study of a 35-year informatics-based single subspecialty practice for the management of patients with chronic thyroid disease. This extensive experience provides a paradigm for the organization of longitudinal medical information by integrating individual patient care with clinical research and education. The kernel of the process is a set of worksheets easily completed by the physician during the patient encounter. It is a structured medical record that has been computerized since 1972, enabling analysis of different groups of patients to answer questions about chronic conditions and the effects of therapeutic interventions. The recording process and resulting studies serve as an important vehicle for medical education about the nuances of clinical practice. The authors suggest ways in which computerized medical records can become an integral part of medical practice, rather than a luxury or novelty. Reprinted from: J Am Med Inform Assoc 1998;5:88-103.

Note: J Am Med Inform Assoc 1998;5:88-103

Shiffman RN, Brandt CA, Freeman BG.

Transition to a computer-based record using scannable, structured encounter forms.


Abstract: OBJECTIVE: To evaluate the quality of documentation and user satisfaction with a structured documentation system for pediatric health maintenance encounters, using scanned paper-based forms to generate an electronic medical record. DESIGN: (1) A retrospective medical record review comparing 16 structured (ST) records with 16 contemporaneously created unstructured records, (2) a questionnaire evaluation of user satisfaction, and (3) an electronic records review of patients seen 1 year following the full implementation of the system to evaluate persistence of the effect. SETTING: The Yale-New Haven Hospital Pediatric Primary Care Center, New Haven, Conn, an inner-city clinic in an academic center. PARTICIPANTS: (1) A random sample of 16 health maintenance records completed by first- and second-year residents in February 1996 matched for patient's age and provider training level with 16 contemporaneously documented visits, (2) 16 of 18 pediatric level 1 residents and 14 of 16 pediatric level 2 residents who completed questionnaires, and (3) all electronic records of health maintenance visits during February 1997. MAIN OUTCOME MEASURES: The number of data elements documented and the percentage of records that record specific components of the health maintenance encounter. User satisfaction was specified on a Likert scale. RESULTS: Overall, residents in the ST records group documented more data elements per visit than did those in the unstructured records group. The number of developmental items documented was 11.5 per visit in the ST records group and 4.8 per visit in the unstructured records group (P = .004). Likewise, anticipatory guidance was more thoroughly documented in the ST records group—8.3 items per visit vs 2.5 items per visit (P < .001). Ninety percent of the users preferred the ST records. One year after the adoption of the ST recording system, high levels of thoroughness persisted. CONCLUSIONS: Structured, scannable encounter forms can facilitate documentation of patient care and are well accepted by users. They can provide an effective mechanism to ease the transition to a computer-based patient record. Reprinted from: Arch Pediatr Adolesc Med 1997;151:1247-53.

Note: Arch Pediatr Adolesc Med 1997;151:1247-53
@article{IMIA1999377,
  author = {Swanson T, Dostal J, Eichhorst B, Jernigan C, Knox M, Roper K.},
  title = {Recent implementations of electronic medical records in four family practice residency programs},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {377-382},
  abstract = {Electronic medical records (EMRs) are increasingly replacing paper records, and many residency program directors are interested in incorporating EMR systems into their clinics. The authors describe their experiences implementing EMRs in their family practice residency programs; the four programs are the Eau Claire Family Practice Residency Program, the Galveston Family Practice Residency Program, the Mayo-Scottsdale Residency Program, and the Wyoming Valley Family Practice Residency. The authors provide background information about each program and an overview of the EMR systems; they then describe the implementation processes, addressing training, integration with other software- and paper-based systems, security, costs, and effects on patient volume and staffing levels. Finally, they discuss the general benefits of and barriers to EMR-system implementations, and make recommendations for other programs considering implementing EMRs. Reprinted from: Acad Med 1997;72:607-12},
  note = {Acad Med 1997;72:607-12}
}

@article{IMIA1999383,
  author = {Goossen WT, Epping PJ, Dassen T.},
  title = {Criteria for nursing information systems as a component of the electronic patient record. An international Delphi study},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {383-394},
  abstract = {In many countries nurses lack an adequate tool to assist in determining the essentials of an information policy in health care institutions and to outline the nursing component of the electronic patient record. In the United States criteria exist for systems that support the nursing process and for the electronic patient record, and the United Kingdom has the disposal of an Information Management and Technology Strategy that includes nursing information. The objective of this study was to determine international criteria for nursing information systems when such systems become part of the electronic patient record. Using the Delphi methodology, criteria for nursing information systems development, content, structure, and use are established by an international panel of 36 experts in three succeeding rounds. Most criteria gained consensus and are useful for application in practice for development of information policy and information systems for nursing. Eventually, the list of criteria will be included in a nursing information reference model. Nursing will benefit from the application of the reference model and the criteria to develop adequate information and communication technology. Reprinted from: Comput Nurs 1997;15:307-15},
}

@article{IMIA1999395,
  author = {Gell G.},
  title = {Information systems. Synopsis.},
}

A WWW implementation of national recommendations for protecting electronic health information

In March of 1997, the National Research Council (NRC) of the National Academy of Sciences issued the report, "For the Record: Protecting Electronic Health Information." Concluding that the current practices at the majority of health care facilities in the United States are insufficient, the Council delineated both technical and organizational approaches to protecting electronic health information. The Beth Israel Deaconess Medical Center recently implemented a proof-of-concept, Web-based, cross-institutional medical record, CareWeb, which incorporates the NRC security and confidentiality recommendations. We report on our WWW implementation of the NRC recommendations and an initial evaluation of the balance between ease of use and confidentiality. Reprinted from: J Am Med Inform Assoc 1997;4:458-64,

Best-link matching of Scottish health data sets

Methods are described used to link the Community Health Index and the National Health Service Central Register (NHSCR) in Scotland to provide a basis for a national patient index. The linkage used a combination of deterministic and probability matching techniques. A best-link principle was used by which each Community Health Index record was allowed to link only to the NHSCR record with which it achieved the highest match weight. This strategy, applied in the context of two files which each covered virtually the entire population of Scotland, increased the accuracy of linkage approximately a thousand-fold compared with the likely results of a less structured probability matching approach. By this means, 98.8% of linkable records were linked automatically with a sufficient degree of confidence for administrative purposes. Reprinted from: Methods Inf Med 1998;37:64-8,

Methods are described used to link the Community Health Index and the National Health Service Central Register (NHSCR) in Scotland to provide a basis for a national patient index. The linkage used a combination of deterministic and probability matching techniques. A best-link principle was used by which each Community Health Index record was allowed to link only to the NHSCR record with which it achieved the highest match weight. This strategy, applied in the context of two files which each covered virtually the entire population of Scotland, increased the accuracy of linkage approximately a thousand-fold compared with the likely results of a less structured probability matching approach. By this means, 98.8% of linkable records were linked automatically with a sufficient degree of confidence for administrative purposes. Reprinted from: Methods Inf Med 1998;37:64-8,

Methods are described used to link the Community Health Index and the National Health Service Central Register (NHSCR) in Scotland to provide a basis for a national patient index. The linkage used a combination of deterministic and probability matching techniques. A best-link principle was used by which each Community Health Index record was allowed to link only to the NHSCR record with which it achieved the highest match weight. This strategy, applied in the context of two files which each covered virtually the entire population of Scotland, increased the accuracy of linkage approximately a thousand-fold compared with the likely results of a less structured probability matching approach. By this means, 98.8% of linkable records were linked automatically with a sufficient degree of confidence for administrative purposes. Reprinted from: Methods Inf Med 1998;37:64-8,
The paper describes a used-centred design for the summary screen of a computerised ICU patient data management system (PDMS). The screen also forms the resting state display, or default screen, and provides the principal navigation tool to other functionality within the system. The design process identified the most frequent potential users of this screen to be the nurses. Their tasks and the information resources required to perform them were analysed. The analysis identified that the nurses’ main task of planning and implementing patient care required an awareness of a set of physiological parameters which provided an overview of the patient’s general condition. Novel formats are proposed for displaying the trends in physiological parameters and these have been incorporated into a proposed screen design. These display formats have been evaluated by ICU nurses; they were adjudged to be clear, relevant, easy to learn and simple to use. Nurses considered the content of the screen, and the display formats used, to be suitable for maintaining an awareness of a patient’s state during routine patient management. Reprinted from: Med Biol Eng Comput 1997;35:397-401.

OBJECTIVE: To show that an integrated graphic data display can shorten the time taken to detect and correctly identify critical events during anesthesia. METHODS: We developed a graphic display which presents 30 anesthesia-related physiologic variables as shapes and colors, rather than traditional digits and waveforms. To evaluate the new display, we produced four critical events on a computer-based anesthesia simulator and asked two groups of five anesthesiologists to identify the events as quickly as possible. One group observed the new display while the other group viewed a traditional cardiovascular monitor with digital and waveform displays. RESULTS: The group which observed the integrated graphic display saw changes caused by inadequate paralysis 2.4 min sooner, and changes caused by a cuff leak 3.1 min sooner than those observing the traditional display. The integrated display group correctly identified the reason for the change 2.8 min sooner for inadequate paralysis, 3.1 min sooner for cuff leak and 3.1 min sooner for bleeding. These differences were all statistically significant. CONCLUSIONS: The results show that some simulated critical events are detected and correctly identified sooner, when an anesthesiologist views an integrated graphic display, rather than a traditional digital/waveform monitor. Reprinted from: J Clin Monit 1997;13:249-59.
Image processing algorithms for retinal montage synthesis, mapping, and real-time location determination,

Although laser retinal surgery is the best available treatment for choroidal neovascularization, the current procedure has a low success rate (50%). Challenges, such as motion-compensated beam steering, ensuring complete coverage and minimizing incidental photodamage, can be overcome with improved instrumentation. This paper presents core image processing algorithms for 1) rapid identification of branching and crossover points of the retinal vasculature; 2) automatic montaging of video retinal angiograms; 3) real-time location determination and tracking using a combination of feature-tagged point-matching and dynamic-pixel templates. These algorithms tradeoff conflicting needs for accuracy, robustness to image variations (due to movements and the difficulty of providing steady illumination) and noise, and operational speed in the context of available hardware. The algorithm for locating vasculature landmarks performed robustly at a speed of 16-30 video image frames/s depending upon the field on a Silicon Graphics workstation. The montaging algorithm performed at a speed of 1.6-4 s for merging 5-12 frames. The tracking algorithm was validated by manually locating six landmark points on an image sequence with 180 frames, demonstrating a mean-squared error of 1.35 pixels. It successfully detected and rejected instances when the image dimmed, faded, lost contrast, or lost focus. Reprinted from: IEEE Trans Biomed Eng 1998;45:105-18,

A frameless radiosurgical treatment system has been developed by coupling an orthogonal pair of real-time x-ray cameras to a robotically manipulated linear accelerator to guide the therapy beam to treatment sites within a patient’s cranium. The two cameras observe the position and orientation of the patient’s head in the treatment system coordinate frame. An image registration algorithm compares the two real-time radiographs to a corresponding pair of digitally synthesized radiographs derived from a CT study of the patient. The algorithm determines all six degrees of translational and rotational difference between the position of the head in the CT coordinate frame and its position in the treatment room coordinate frame. This allows translation of treatment planning coordinates into treatment room coordinates without rigidly fixing the patient’s
head position during either the CT scan or treatment. In this paper the image registration algorithm is described and measurements of the precision and speed with which the process can determine the patient’s position are reported. The tests have demonstrated translational uncertainty of 0.5-1.0 mm per axis and rotational uncertainty of 0.6-1.3 degrees per axis, accomplished in approximately 2 s elapsed time. Reprinted from: Med Phys 1997;24:857-66.

@article{IMIA1999457,
  author = {Rudolph DJ, Sinclair PM, Coggins JM.},
  title = {Automatic computerized radiographic identification of cephalometric landmarks},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {457-463},
  abstract = {Computerized cephalometric analysis currently requires manual identification of landmark locations. This process is time-consuming and limited in accuracy. The purpose of this study was to develop and test a novel method for automatic computer identification of cephalometric landmarks. Spatial spectroscopy (SS) is a computerized method that identifies image structure on the basis of a convolution of the image with a set of filters followed by a decision method using statistical pattern recognition techniques. By this method, characteristic features are used to recognize anatomic structures. This study compared manual identification on a computer monitor and the SS automatic method for landmark identification on minimum resolution images (0.16 cm2 per pixel). Minimum resolution (defined as the lowest resolution at which a cephalometric structure could be identified) was used to reduce computational time and memory requirements during this development stage of the SS method. Fifteen landmarks were selected on a set of 14 test images. The results showed no statistical difference (p > 0.05) in mean landmark identification errors between manual identification on the computer display and automatic identification using SS. We conclude that SS shows potential for the automatic detection of landmarks, which is an important step in the development of a completely automatic cephalometric analysis. Reprinted from: Am J Orthod Dentofacial Orthop 1998;113:173-9},
  note = {Am J Orthod Dentofacial Orthop 1998;113:173-9}
}

@article{IMIA1999464,
  author = {Spiegl A, Steinbigler P, Schmucking I, Knez A, Haber R.},
  title = {Analysis of beat-to-beat variability of frequency contents in the electrocardiogram using two-dimensional Fourier transforms},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {464-472},
  abstract = {Late potentials are very small signals (1-20 microV) in the surface ECG with high-frequency components, which are found in patients prone to sustained ventricular tachycardia. Evaluation of these signals requires either very sophisticated recording techniques for single-beat analysis or signal averaging. Signal averaging, however, might disregard information about risk stratification. Therefore, we developed the Single-Beat Spectral Variance (SBSV) based on two-dimensional (2-D) Fourier transform of 80 ms segments of 128 consecutive beats. This approach depicts the beat-to-beat variability of the frequency contents of these ECG segments. An index function enables an objective detection of late potentials. We investigated 35 patients after myocardial infarction and sustained ventricular tachycardia (Group 1), 50 patients after myocardial infarction without ventricular arrhythmias (Group 2) and ten healthy volunteers. SBSV classified 29 of
35 patients (83%) of Group 1 as pathologic, 14 of these 29 patients (48%) exclusively on the basis of marked Wenckebach-like conduction pattern. In Group 2, only five of 50 patients showed abnormal SBSV. In Group 3, we found no pathologic result. Thus, SBSV is a promising new method to investigate late potentials in patients after myocardial infarction. SBSV contains not only the results of frequency analysis after signal averaging, but also evaluates variable ECG components. Reprinted from: IEEE Trans Biomed Eng 1998;45:235-41,

note = {IEEE Trans Biomed Eng 1998;45:235-41}

@article{IMIA1999473,
    author = {Giuse DA, Giuse NB.},
    title = {Knowledge processing and decision support systems. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1999},
    year = {1999},
    pages = {473-475},
    abstract = {},
    note = {}
}

@article{IMIA1999476,
    author = {Kuilboer MM, Van der Lei J, De Jongste JC, Overbeek SE, Ponsioen B, Van Bemmel JH.},
    title = {Simulating an integrated critiquing system},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1999},
    year = {1999},
    pages = {476-484},
    abstract = {OBJECTIVE: To investigate factors that determine the feasibility and effectiveness of a critiquing system for asthma/COPD that will be integrated with a general practitioner's (GP's) information system. DESIGN: A simulation study. Four reviewers, playing the role of the computer, generated critiquing comments and requests for additional information on six electronic medical records of patients with asthma/COPD. Three GPs who treated the patients, playing users, assessed the comments and provided missing information when requested. The GPs were asked why requested missing information was unavailable. The reviewers reevaluated their comments after receiving requested missing information. MEASUREMENTS: Descriptions of the number and nature of critiquing comments and requests for missing information. Assessment by the GPs of the critiquing comments in terms of agreement with each comment and judgment of its relevance, both on a five-point scale. Analysis of causes for the (un-)availability of requested missing information. Assessment of the impact of missing information on the generation of critiquing comments. RESULTS: Four reviewers provided 74 critiquing comments on 87 visits in six medical records. Most were about prescriptions (n = 28) and the GPs' workplans (n = 27). The GPs valued comments about diagnostics the most. The correlation between the GPs' agreement and relevance scores was 0.65. However, the GPs' agreements with prescription comments (complete disagreement, 31.3%; disagreement, 20.0%; neutral, 13.8%; agreement, 17.5%; complete agreement, 17.5%) differed from their judgments of these comments' relevance (completely irrelevant, 9.0%; irrelevant, 24.4%; neutral, 24.4%; relevant, 32.1%; completely relevant, 10.3%). The GPs were able to provide answers to 64% of the 90 requests for missing information. Reasons available information had not been recorded were: the GPs had not recorded the information explicitly; they had assumed it to be common knowledge; it was available elsewhere in the record. Reasons information was unavailable were: the decision had been made by another; the GP had not recorded the information. The reviewers left 74% of the comments...
unchanged after receiving requested missing information. CONCLUSION: Human reviewers can generate comments based on information currently available in electronic medical records of patients with asthma/COPD. The GPs valued comments regarding the diagnostic process the most. Although they judged prescription comments relevant, they often strongly disagreed with them, a discrepancy that poses a challenge for the presentation of critiquing comments for the future critiquing system. Requested additional information that was provided by the GPs led to few changes. Therefore, as system developers faced with the decision to build an integrated, non-inquisitive or an inquisitive critiquing system, the authors choose the former. Reprinted from: J Am Med Inform Assoc 1998;5:194-202,

note = {J Am Med Inform Assoc 1998;5:194-202}

@article{IMIA1999485,
    author = {Hripcsak G, Kuperman GJ, Friedman C.},
    title = {Extracting findings from narrative reports: software transferability and sources of physician disagreement},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1999},
    year = {1999},
    pages = {485-491},
    abstract = {While natural language processing systems are beginning to see clinical use, it remains unclear whether they can be disseminated effectively through the health care community. MedLEE, a general-purpose natural language processor developed for Columbia-Presbyterian Medical Center, was compared to physicians' ability to detect seven clinical conditions in 200 Brigham and Women's Hospital chest radiograph reports. Using the system on the new institution's results reported in a small but measurable drop in performance (it was distinguishable from physicians at p = 0.011). By making adjustments to the interpretation of the processor's coded output (without changing the processor itself), local behavior was better accommodated, and performance improved so that it was indistinguishable from the physicians. Pairs of physicians disagreed on at least one condition for 22% of reports; the source of disagreement appeared to be interpretation of findings, gauging likelihood and degree of disease, and coding errors. Reprinted from: Methods Inf Med 1998;37:1-7},
    note = {Methods Inf Med 1998;37:1-7}
}

@article{IMIA1999492,
    author = {De Bruijn LM, Hasman A, Arends JW.},
    title = {Automatic SNOMED classification - a corpus-based method},
    journal = {IMIA Yearbook of medical informatics},
    volume = {1999},
    year = {1999},
    pages = {492-499},
    abstract = {This paper presents a method of automatic classification of clinical narrative through text comparison. A diagnosis report can be classified by searching archive texts that show a high textual similarity, and the 'nearest neighbor classifies the case. This paper describes the method's theoretical background and gives implementation details. Large scale simulation experiments were run with a wide range of histology reports. Results showed that for 80-84% of the trials, relevant classification lines were included among the first five alternatives. In 5% of the cases, retrieval was unsuccessful due to the absence of relevant archive reports. From the results it is concluded that the method is a versatile approach for finding potentially good classifications. Reprinted from: Comput Methods Programs Biomed 1997;54:115-22},
    note = {Comput Methods Programs Biomed 1997;54:115-22}
}
OBJECTIVE: The aim of the project ARIANE is to model and implement seamless, natural, and easy-to-use interfaces with various kinds of heterogeneous biomedical information databases. DESIGN: A conceptual model of some of the Unified Medical Language System (UMLS) knowledge sources has been developed to help end users to query information databases. A query is represented by a conceptual graph that translates the deep structure of an end-user's interest in a topic. A computational model exploits this conceptual model to build a query interactively represented as query graph. A query graph is then matched to the data graph built with data issued from each record of a database by means of a pattern-matching (projection) rule that applies to conceptual graphs. RESULTS: Prototypes have been implemented to test the feasibility of the model with different kinds of information databases. Three cases are studied: 1) information in records is structured according to the UMLS knowledge sources; 2) information is able to be structured without error in the frame of the UMLS knowledge; 3) information cannot be structured. In each case the pattern-matching is processed by the projection rule according to the structure of information that has been implemented in the databases. CONCLUSION: The conceptual graphs theory provides with a homogeneous and powerful formalism able to represent both concepts, instances of concepts in medical contexts, and associations by means of relationships, and to represent data at different levels of details. The conceptual-graphs formalism allows powerful capabilities to operate a semantic integration of information databases using the UMLS knowledge sources. Reprinted from: J Am Med Inform Assoc 1998;5:52-61,

note = {J Am Med Inform Assoc 1998;5:52-61}

BACKGROUND: Neural networks are nonparametric, robust, pattern recognition techniques that can be used to model complex relationships. METHODS: The applicability of multilayer perceptron neural networks (MLP) to coronary artery bypass grafting risk prediction was assessed using The Society of Thoracic Surgeons database of 80,606 patients who underwent coronary artery bypass grafting in 1993. The results of traditional logistic regression and Bayesian analysis were compared with single-layer (no hidden layer), two-layer (one hidden layer), and three-layer (two hidden layer) MLP neural networks. These networks were trained using stochastic gradient descent with early stopping. All prediction models used the same variables and were evaluated by training on 40,480 patients and cross-validation testing on a separate group of 40,126 patients. Techniques were also developed to calculate effective odds ratios for MLP networks and to generate confidence intervals for MLP risk predictions using an auxiliar "confidence MLP." RESULTS: Receiver operating characteristic curve areas for predicting mortality were approximately 76% for all classifiers, including neural networks. Calibration (accuracy of posterior probability prediction) was
slightly better with a two-member committee classifier that averaged the outputs of a MLP network and a logistic regression model. Unlike the individual methods, the committee classifier did not overestimate or underestimate risk for high-risk patients. CONCLUSIONS: A committee classifier combining the best neural network and logistic regression provided the best model calibration, but the receiver operating characteristic curve area was only 76% irrespective of which predictive model was used. Reprinted from: Ann Thorac Surg 1997;63:1635-43,

note = {Ann Thorac Surg 1997;63:1635-43}

@article{IMIA1999519,
  author = {Katsuragawa S, Doi K, MacMahon H, Monnier-Cholley L, Ishida T, Kobayashi T.},
  title = {Classification of normal and abnormal lungs with interstitial diseases rule-based method and artificial neural networks},
  journal = {IMIA Yearbook of medical informatics},
  volume = {1999},
  year = {1999},
  pages = {519-526},
  abstract = {We devised an automated classification scheme by using the rule-based method plus artificial neural networks (ANN) for distinction between normal and abnormal lungs with interstitial disease in digital chest radiographs. Four measures used in the classification scheme are determined from the texture and geometric-pattern feature analyses. The rms variation and the first moment of the power spectrum of lung patterns are determined as measures for the texture analysis. In addition, the total area of nodular opacities and the total length of linear opacities are determined as measures for the geometric-pattern feature analysis. In our classification scheme with these measures, we identify obviously normal and abnormal cases first by the rule-based method and then ANN is applied for the remaining difficult cases. The rule-based plus ANN method provided a sensitivity of 0.926 at the specificity of 0.900, which was considerably improved compared to performance of either the rule-based method alone or ANNs alone. Reprinted from: J Digit Imaging 1997;10:108-14},
  note = {J Digit Imaging 1997;10:108-14}
}

527 Authors' Index of Selected Articles
@article{IMIA200087,
  author = {Engelbrecht R, Hildebrand C, Moser W.},
  title = {Electronic healthcare records: an essential part of health telematics applications},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {87-94},
  abstract = {},
  note = {} }

@article{IMIA200095,
  author = {McCray AT.},
  title = {Medical informatics research and training at the Lister Hill National Center for Biomedical Communications},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {95-99},
  abstract = {},
  note = {} }

@article{IMIA2000100,
  author = {Hasman A, Talmon JL.},
  title = {Education and research at the Department of Medical Informatics Maastricht},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {100-106},
  abstract = {},
  note = {} }

@article{IMIA2000107,
  author = {Fuller 5, Kalet I, Tarczy-Hornoch P.},
  title = {Biomedical and health informatics research and education at the University of Washington},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {107-113},
  abstract = {},
  note = {} }

@article{IMIA2000114,
  author = {Gell G, Errath M, Simonic K-M.},}
@article{IMIA2000120,
    author = {Leven FJ, Haux R.},
    title = {Twenty five years of medical informatics education at Heidelberg/Heilbron: a discussion of a specialized curriculum for medical informatics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {120-130},
    abstract = {},
    note = {}
}

@article{IMIA2000131,
    author = {Timpka T.},
    title = {Health and clinical management. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {131-133},
    abstract = {},
    note = {}
}

@article{IMIA2000134,
    author = {Brossette SE, Sprague AP, Hardin JM, Waites KB, Jones WT, Moser SA.},
    title = {Association rules and data mining in hospital infection control and public health surveillance},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {134-142},
    abstract = {OBJECTIVES: The authors consider the problem of identifying new, unexpected, and interesting patterns in hospital infection control and public health surveillance data and present a new data analysis process and system based on association rules to address this problem. DESIGN: The authors first illustrate the need for automated pattern discovery and data mining in hospital infection control and public health surveillance. Next, they define association rules, explain how those rules can be used in surveillance, and present a novel process and system--the Data Mining Surveillance System (DMSS)--that utilize association rules to identify new and interesting patterns in surveillance data. RESULTS: Experimental results were obtained using DMSS to analyze Pseudomonas aeruginosa infection control data collected over one year (1996) at University of Alabama at}
Birmingham Hospital. Experiments using one-, three-, and six-month time partitions yielded 34, 57, and 28 statistically significant events, respectively. Although not all statistically significant events are clinically significant, a subset of events generated in each analysis indicated potentially significant shifts in the occurrence of infection or antimicrobial resistance patterns of P. aeruginosa.

CONCLUSION: The new process and system are efficient and effective in identifying new, unexpected, and interesting patterns in surveillance data. The clinical relevance and utility of this process await the results of prospective studies currently in progress. Reprinted from: J Am Med Inform Assoc 1998;5:373-81.

@article{IMIA2000143,
  author = {Borowitz SM, Wyatt JC.},
  title = {The origin, content, and workload of e-mail consultations},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {143-146},
  abstract = {CONTEXT: Despite the common use of e-mail, little beyond anecdote or impressions has been published on patient-clinician e-mail consultation. OBJECTIVE: To report our experiences with free-of-charge e-mail consultations. DESIGN: Retrospective review of all e-mail consultation requests received between November 1, 1995, and June 31, 1998. SETTING AND PARTICIPANTS: Consecutive e-mail consultation requests sent to the Division of Pediatric Gastroenterology at the Children's Medical Center of the University of Virginia in Charlottesville. MAIN OUTCOME MEASURES: Number of consultation requests per month, time required to respond, who initiated the request and their geographic origin, and the kind of information requested in the consultation. RESULTS: During the 33-month period studied, we received 1239 requests, an average (SD) of 37.6 (15.9) each month. A total of 1001 consultation requests (81%) were initiated by parents, relatives, or guardians, 126 (10%) by physicians, and 112 (9%) by other health care professionals. Consultation requests were received from 39 states and 37 other countries. In 855 requests (69%), there was a specific question about the cause of a particular child's symptoms, diagnostic tests, and/or therapeutic interventions. In 112 (9%), the requester sought a second opinion about diagnosis or treatment for a particular child, and 272 consultations (22%) requested general information concerning a disorder, treatment, or medication without reference to a particular child. A total of 1078 requests (87%) were answered within 48 hours of the initial request. On average, reading and responding to each e-mail took slightly less than 4 minutes. CONCLUSION: E-mail provides a means for parents, guardians, and health care professionals to obtain patient and disease-specific information from selected medical consultants in a timely manner. Reprinted from: JAMA 1998;280:1321-4},
  note = {JAMA 1998;280:1321-4}
}

@article{IMIA2000147,
  author = {Spielberg AR.},
  title = {On call and online: sociohistorical, legal, and ethical implications of e-mail for the patient-physician relationship},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {147-153},
  abstract = {Increased use of e-mail by physicians, patients, and other health care organizations and staff has the potential to reshape the current boundaries of relationships in...
medical practice. By comparing reception of e-mail technology in medical practice with its historical analogue, reception of the telephone, this article suggests that new expectations, practice standards, and potential liabilities emerge with the introduction of this new communication technology. Physicians using e-mail should be aware of these considerations and construct their e-mail communications accordingly, recognizing that e-mail may be included in the patient's medical record. Likewise, physicians should discuss the ramifications of communicating electronically with patients and obtain documented informed consent before using e-mail. Physicians must keep patient information confidential, which will require taking precautions (including encryption to prevent interception) to preserve patient information, trust, and the integrity of the patient-physician relationship. Reprinted from: JAMA 1998;280:1353-9,

note = {JAMA 1998;280:1353-9}

@article{IMIA2000154,
  title = {Effectiveness of computer-generated reminders for increasing discussions about advance directives and completion of advance directive forms. A randomized, controlled trial},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {154-162},
  abstract = {BACKGROUND: Physicians can increase the rate of completion of advance directive forms by discussing directives with their patients, but the means by which physicians can be induced to initiate these discussions are unclear. Computer-generated reminders have been shown to increase physician compliance with practice guidelines. OBJECTIVE: To determine the effects of computer-generated reminders to physicians on the frequency of advance directive discussions between patients and their primary caregivers and the frequency of consequent establishment of advance directives. DESIGN: Randomized, controlled trial with a 2 x 2 factorial design. SETTING: An outpatient general medicine practice associated with an urban public hospital. PARTICIPANTS: Participants were 1) 1009 patients who were at least 75 years of age or were at least 50 years of age with serious underlying disease and 2) 147 primary care physicians (108 housestaff and 39 faculty). INTERVENTION: Computer-generated reminders that recommended discussion of one or both of two types of advance directives compared with no reminders. MEASUREMENTS: Discussions about advance directives, determined by patient interviews after all scheduled patient-physician outpatient encounters, and completed advance directive forms. The study period was approximately 1 year. RESULTS: Physicians who did not receive reminders (controls) discussed advance directives with 4% of the study patients compared with 24% for physicians who received both types of reminders (adjusted odds ratio, 7.7 [95% CI, 3.4 to 18]; P < 0.001). Physicians who did not receive reminders completed advance directive forms with only 4% of their study patients compared with 15% for physicians who received both types of reminders (adjusted odds ratio, 7.0 [CI, 2.9 to 17]; P < 0.001). Overall, 45% of patients with whom advance directives were discussed completed at least one type of advance directive. CONCLUSIONS: Simple computer-generated reminders aimed at primary caregivers can increase the rates of discussion of advance directives and completion of advance directive forms among elderly outpatients with serious illnesses. Reprinted from: Ann Intern Med 1998;128:102-10},
  note = {Ann Intern Med 1998;128:102-10}
}

@article{IMIA2000163,
author = {Poller L, Shiach CR, MacCallum PK, Johansen AM, Munster AM, Magalhaes A, Jespersen J.},
title = {Multicentre randomised study of computerised anticoagulant dosage. European Concerted Action on Anticoagulation.},
journal = {IMIA Yearbook of medical informatics},
volume = {2000},
year = {2000},
pages = {163-167},
abstract = {BACKGROUND: The demand for anticoagulant treatment is increasing. We compared the benefits of computer-generated anticoagulant dosing with traditional dosing decided by experienced medical staff in achieving target international normalised ratios (INRs). METHODS: In five European centres we randomly assigned 285 patients in the stabilisation period and stabilised patients to the computer-generated-dose group (n=137) or traditional-dose group (n=148). Centres had a specialist interest in oral anticoagulation but no previous experience with computer-generated dosing. The computer program calculated doses and times to next visit. Our main endpoint was time spent in target INR range (Rosendaal method). FINDINGS: For all patients combined, computer-generated dosing was significantly beneficial overall in achieving target INR (p=0.004). The mean time within target INR range for all patients and all ranges was 63.3% (SD 28.0) of days in the computer-generated-dose group compared with 53.2% (27.7) in the traditional-dose group. For the stabilisation patients alone, computer-generated doses led to a non-significant benefit in all INR ranges (p=0.06), whereas in the stable patients the benefit was significant (p=0.02). INTERPRETATION: The computer program gave better INR control than the experienced medical staff and at least similar standards to the specialised centres should be generally available. Clinical outcome and cost effectiveness remain to be assessed. Reprinted from: Lancet 1998;352:1505-9},

@article{IMIA2000168,
author = {Evans RS, Pestotnik SL, Classen DC, Clemmer TP, Weaver LK, Orme JF Jr, Lloyd JF, Burke JP.},
title = {A computer-assisted management program for antibiotics and other antiinfective agents},
journal = {IMIA Yearbook of medical informatics},
volume = {2000},
year = {2000},
pages = {168-176},
abstract = {BACKGROUND AND METHODS: Optimal decisions about the use of antibiotics and other antiinfective agents in critically ill patients require access to a large amount of complex information. We have developed a computerized decision-support program linked to computer-based patient records that can assist physicians in the use of antiinfective agents and improve the quality of care. This program presents epidemiologic information, along with detailed recommendations and warnings. The program recommends antiinfective regimens and courses of therapy for particular patients and provides immediate feedback. We prospectively studied the use of the computerized antiinfectives-management program for one year in a 12-bed intensive care unit. RESULTS: During the intervention period, all 545 patients admitted were cared for with the aid of the antiinfectives-management program. Measures of processes and outcomes were compared with those for the 1136 patients admitted to the same unit during the two years before the intervention period. The use of the program led to significant reductions in orders for drugs to which the patients had reported allergies (35 vs. 146 during the preintervention period; P<0.01), excess drug dosages (87 vs. 405, P<0.01), and antibiotic-susceptibility mismatches (12 vs. 206, P<0.01). There were also marked reductions in the mean number of days of excessive drug dosage (2.7 vs. 5.9, P<0.002) and in adverse events caused by antiinfective agents (4 vs. 28, P<0.02). In analyses of patients who received antiinfective agents, those treated during the intervention period who always
received the regimens recommended by the computer program (n=203) had significant reductions, as compared with those who did not always receive the recommended regimens (n= 195) and those in the preintervention cohort (n = 766), in the cost of antiinfective agents (adjusted mean, $102 vs. $427 and $340, respectively; P<0.001), in total hospital costs (adjusted mean, $26,315 vs. $44,865 and $35,283; P<0.001), and in the length of the hospital stay days (adjusted mean, 10.0 vs. 16.7 and 12.9; P<0.001). CONCLUSIONS: A computerized antiinfectives-management program can improve the quality of patient care and reduce costs. Reprinted from: N Engl J Med 1998;338:232-8,


@article{IMIA2000177,
   author = {Heathfield HA.},
   title = {Changing the paradigm for computer-based patient records. Synopsis.},
   journal = {IMIA Yearbook of medical informatics},
   volume = {2000},
   year = {2000},
   pages = {177-179},
   abstract = {},
   note = {};
}

@article{IMIA2000180,
   author = {Stair TO.},
   title = {Reduction of redundant laboratory orders by access to computerized patient records},
   journal = {IMIA Yearbook of medical informatics},
   volume = {2000},
   year = {2000},
   pages = {180-182},
   abstract = {From a convenience sample of 500 consecutive patients seen in the emergency department (ED), occasions were recorded when data from the Veterans Affairs Decentralized Hospital Computer Program provided immediate clinical decision support and obviated redundant laboratory tests. Patient care was improved by access to inpatient discharge summaries in 85 cases (19%), laboratory results in 34 (7%), pharmacy records of allergies and prescriptions in 30 (6%), radiologic reports in 19 (4%), and electrocardiograms in 11 (2%). Overall savings in tests, prescriptions, admissions, and errors were estimated at about $5 per visit. Availability of previous laboratory results clearly decreased ordering of redundant studies. Computer-based medical records also provided details of previous diagnoses, treatments, allergies, and current medications. On many occasions, the presumptive diagnosis had already been worked up and proven or disproven, thus simplifying the entire encounter. Reprinted from: J Emerg Med 1998;16:895-7},
}

@article{IMIA2000183,
   author = {Archbold RA, Laji K, Suliman A, Ranjadayalan K, Hemingway H, Timmis AD.},
   title = {Evaluation of a computer-generated discharge summary for patients with acute coronary syndromes},
   journal = {IMIA Yearbook of medical informatics},
   volume = {2000},
   year = {2000},
   pages = {183-184},
   abstract = {The discharge summary from hospital to community physician contributes importantly to patient management, but deficiencies in its preparation are well documented. We
sought to determine the preferences of general practitioners for standard dictated or computer-generated discharge summaries for patients with acute coronary syndromes. The majority (68.5%) of GPs preferred the computerized summary and particularly liked its comprehensive content, concise style, ease of access to relevant information, clarity and ease of reading. Most (66.9%) thought the computer-generated summary provided the clearer management plan and 70.8% recommended its use for other specialities. In addition, its speed of generation enables GPs to receive a summary within seven days of patient discharge. Reprinted from: Br J Gen Pract 1998;48:1163-4,

note = {Br J Gen Pract 1998;48:1163-4}

@article{IMIA2000185,
  author = {Tange HJ, Schouten HC, Kester AD, Hasman A.},
  title = {The granularity of medical narratives and its effect on the speed and completeness of information retrieval},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {185-196},
  abstract = {OBJECTIVE: Using electronic rather than paper-based record systems improves clinicians' information retrieval from patient narratives. However, few studies address how data should be organized for this purpose. Information retrieval from clinical narratives containing free text involves two steps: searching for a labeled segment and reading its content. The authors hypothesized that physicians can retrieve information better when clinical narratives are divided into many small, labeled segments ("high granularity"). DESIGN: The study tested the ability of 24 internists and 12 residents at a teaching hospital to retrieve information from an electronic medical record--in terms of speed and completeness--when using different granularities of clinical narratives. Participants solved, without time pressure, predefined problems concerning three voluminous, inpatient case records. To mitigate confounding factors, participants were randomly allocated to a sequence that was balanced by patient case and learning effect. RESULTS: Compared with retrieval from undivided notes, information retrieval from problem-partitioned notes was 22 percent faster (statistically significant), whereas retrieval from notes divided into organ systems was only 11 percent faster (not statistically significant). Subdividing segments beyond organ systems was 13 percent slower (statistically significant) than not subdividing. Granularity of medical narratives affected the speed but not the completeness of information retrieval. CONCLUSION: Dividing voluminous free-text clinical narratives into labeled segments makes patient-related information retrieval easier. However, too much subdivision slows retrieval. Study results suggest that a coarser granularity is required for optimal information retrieval than for structured data entry. Validation of these conclusions in real-life clinical practice is recommended. Reprinted from: J Am Med Inform Assoc 1998;5:571-82},

note = {J Am Med Inform Assoc 1998;5:571-82}

@article{IMIA2000197,
  author = {Berg M.},
  title = {Medical work and the computer-based patient record: a sociological perspective},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {197-206},
  abstract = {The computer-based patient record (CPR) is a tool likely to have great impact on the practice of medicine in the years to come. Yet, clinical settings with a fully integrated CPR are hard to find. This paper takes a sociological look at the attempts to construe and introduce CPRs. It is
argued that part of the current trouble in getting these tools to work lies in the model of medical work that is inscribed in many (attempted) CPRs. A more sociological perspective on medical work should be able to offer points of departure for the construction of systems which might fit the needs of health care workers better. Based on participatory observation, the paper outlines what it is medical work comes down to from a sociological perspective, and how the medical record figures in this work. Finally, some consequences this depiction has for current discussions on and (proposed) implementations of CPRs are described. Reprinted from: Methods Inf Med 1998;37:294-301,

   note = {Methods Inf Med 1998;37:294-301}

@article{IMIA2000207,
   author = {Gorman P.},
   title = {Integrated information systems. Synopsis.},
   journal = {IMIA Yearbook of medical informatics},
   volume = {2000},
   year = {2000},
   pages = {207-210},
   abstract = {},
   note = {}
}

@article{IMIA2000211,
   author = {Jadad AR, Gagliardi A.},
   title = {Rating health information on the Internet: navigating to knowledge or to Babel?},
   journal = {IMIA Yearbook of medical informatics},
   volume = {2000},
   year = {2000},
   pages = {211-214},
   abstract = {CONTEXT: The rapid growth of the Internet has triggered an information revolution of unprecedented magnitude. Despite its obvious benefits, the increase in the availability of information could also result in many potentially harmful effects on both consumers and health professionals who do not use it appropriately. OBJECTIVES: To identify instruments used to rate Web sites providing health information on the Internet, rate criteria used by them, establish the degree of validation of the instruments, and provide future directions for research in this area. DATA SOURCES: MEDLINE (1966-1997), CINAHL (1982-1997), HEALTH (1975-1997), Information Science Abstracts (1966 to September 1995), Library and Information Science Abstracts (1969-1995), and Library Literature (1984-1996); the search engines Lycos, Excite, Open Text, Yahoo, HotBot, Infoseek, and Magellan; Internet discussion lists; meeting proceedings; multiple Web pages; and reference lists. INSTRUMENT SELECTION: Instruments used at least once to rate the quality of Web sites providing health information with their rating criteria available on the Internet. DATA EXTRACTION: The name of the developing organization, Internet address, rating criteria, information on the development of the instrument, number and background of people generating the assessments, and data on the validity and reliability of the measurements. DATA SYNTHESIS: A total of 47 rating instruments were identified. Fourteen provided a description of the criteria used to produce the ratings, and 5 of these provided instructions for their use. None of the instruments identified provided information on the interobserver reliability and construct validity of the measurements. CONCLUSIONS: Many incompletely developed instruments to evaluate health information exist on the Internet. It is unclear, however, whether they should exist in the first place, whether they measure what they claim to measure, or whether they lead to more good than harm. Reprinted from: JAMA 1998;279:611-4},
   note = {JAMA 1998;279:611-4}
}
OBJECTIVES: To analyze the motivation, expectations, and misconceptions of patients seeking teleadvice or medical information on the Internet. To explore the possible economics and problems of direct physician-to-patient teleadvice via electronic mails (e-mail).

DESIGN: Exploratory survey of 209 unsolicited e-mails mostly sent to physicians by individuals seeking teleadvice. SETTING: University dermatology hospital with a major Web site on the World Wide Web. PATIENTS: Two hundred nine patients and information-seeking individuals, mainly with dermatologic problems. MAIN OUTCOME MEASURES: Previous contacts with live physicians, disease duration, level of frustration expressed in the e-mails, and type of information sought.

RESULTS: Many dermatologic patients who request teleadvice have a chronic disease (81%) and seek a second opinion. Seventeen percent express frustration about previous encounters with live physicians. Forty percent of all e-mails could have been answered by a librarian, 28% of all e-mails were suitable to be answered by a physician via e-mail alone, and in 27% of the cases any kind of consultation would not have been possible without seeing the patient. In at least 5 instances patients attempt self-diagnosis.

CONCLUSIONS: We found examples for the beneficial effects of the provision of medical information on the World Wide Web but also evidence suggesting that patients are trying to use information on the Internet as a supplement for physicians and that teleadvice might be overused by chronically ill and frustrated patients looking desperately for additional information. Telemedicine via e-mail could substitute a physician visit or telephone call in some cases, but many principal problems must be solved beforehand. Reprinted from: Arch Dermatol 1999;135:151-6,

note = {Arch Dermatol 1999;135:151-6}
CONTEXT: Pharmacotherapy is among the most powerful interventions to improve health outcomes in the elderly. However, since some medications are less appropriate for older patients, systems approaches to improving pharmacy care may be an effective way to reduce inappropriate medication use. OBJECTIVE: To determine whether a computerized drug utilization review (DUR) database linked to a telepharmacy intervention can improve suboptimal medication use in the elderly. DESIGN: Population-based cohort design, April 1, 1996, through March 31, 1997. SETTING: Ambulatory care. PATIENTS: A total of 23,269 patients aged 65 years and older throughout the United States receiving prescription drug benefits from a large pharmaceutical benefits manager during a 12-month period. INTERVENTION: Evaluation of provider prescribing through a computerized online DUR database using explicit criteria to identify potentially inappropriate drug use in the elderly. Computer alerts triggered telephone calls to physicians by pharmacists with training in geriatrics, whereby principles of geriatric pharmacology were discussed along with therapeutic substitution options. MAIN OUTCOME MEASURES: Contact rate with physicians and change rate to suggested drug regimen. RESULTS: A total of 43,007 alerts were triggered. From a total of 43,007 telepharmacy calls generated by the alerts, we were able to reach 19,368 physicians regarding 24,266 alerts (56%). Rate of change to a more appropriate therapeutic agent was 24% (5,860), but ranged from 40% for long half-life benzodiazepines to 2% to 7% for drugs that theoretically were contraindicated by patients' self-reported history. Except for rate of change of beta-blockers in patients with chronic obstructive pulmonary disease, all rates of change were significantly greater than the expected baseline 2% rate of change. CONCLUSIONS: Using a system integrating computers, pharmacists, and physicians, our large-scale intervention improved prescribing patterns and quality of care and thus provides a population-based approach to advance geriatric clinical pharmacology. Future research should focus on the demonstration of improved health outcomes resulting from improved prescribing choices for the elderly. Reprinted from: JAMA 1998;280:1249-52.

@article{IMIA2000227,
  author = {Monane M, Matthias DM, Nagle BA, Kelly MA.},
  title = {Improving prescribing patterns for the elderly through an online drug utilization review intervention: system linking the physician, pharmacist, and computer},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {227-230},
  abstract = {CONTEXT: Pharmacotherapy is among the most powerful interventions to improve health outcomes in the elderly. However, since some medications are less appropriate for older patients, systems approaches to improving pharmacy care may be an effective way to reduce inappropriate medication use. OBJECTIVE: To determine whether a computerized drug utilization review (DUR) database linked to a telepharmacy intervention can improve suboptimal medication use in the elderly. DESIGN: Population-based cohort design, April 1, 1996, through March 31, 1997. SETTING: Ambulatory care. PATIENTS: A total of 23,269 patients aged 65 years and older throughout the United States receiving prescription drug benefits from a large pharmaceutical benefits manager during a 12-month period. INTERVENTION: Evaluation of provider prescribing through a computerized online DUR database using explicit criteria to identify potentially inappropriate drug use in the elderly. Computer alerts triggered telephone calls to physicians by pharmacists with training in geriatrics, whereby principles of geriatric pharmacology were discussed along with therapeutic substitution options. MAIN OUTCOME MEASURES: Contact rate with physicians and change rate to suggested drug regimen. RESULTS: A total of 43,007 alerts were triggered. From a total of 43,007 telepharmacy calls generated by the alerts, we were able to reach 19,368 physicians regarding 24,266 alerts (56%). Rate of change to a more appropriate therapeutic agent was 24% (5,860), but ranged from 40% for long half-life benzodiazepines to 2% to 7% for drugs that theoretically were contraindicated by patients' self-reported history. Except for rate of change of beta-blockers in patients with chronic obstructive pulmonary disease, all rates of change were significantly greater than the expected baseline 2% rate of change. CONCLUSIONS: Using a system integrating computers, pharmacists, and physicians, our large-scale intervention improved prescribing patterns and quality of care and thus provides a population-based approach to advance geriatric clinical pharmacology. Future research should focus on the demonstration of improved health outcomes resulting from improved prescribing choices for the elderly. Reprinted from: JAMA 1998;280:1249-52},
  note = {JAMA 1998;280:1249-52}
}

@article{IMIA2000231,
  author = {Wang C, Ohe K.},
  title = {A CORBA-based object framework with patient identification translation and dynamic linking. Methods for exchanging patient data},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {231-240},
  abstract = {Exchanging and integration of patient data across heterogeneous databases and institutional boundaries offers many problems. We focused on two issues: (1) how to identify identical patients between different systems and institutions while lacking universal patient identifiers; and (2) how to link patient data across heterogeneous databases and institutional boundaries. To solve these problems, we created a patient identification (ID) translation model and a dynamic linking method in the Common Object Request Broker Architecture (CORBA) environment. The algorithm for the patient ID translation is based on patient attribute matching plus computer-
based human checking; the method for dynamic linking is temporal mapping. By implementing these methods into computer systems with help of the distributed object computing technology, we built a prototype of a CORBA-based object framework in which the patient ID translation and dynamic linking methods were embedded. Our experiments with a Web-based user interface using the object framework and dynamic linking-through the object framework were successful. These methods are important for exchanging and integrating patient data across heterogeneous databases and institutional boundaries. Reprinted from: Methods Inf Med 1999;38:56-65,

\[\text{note} = \{\text{Methods Inf Med 1999;38:56-65}\}\]

@article{IMIA2000241,
author = {Quantin C, Bouzelat H, Allaert FA, Benhamiche AM, Faivre J, Dusserre L.},
title = {Automatic record hash coding and linkage for epidemiological follow-up data confidentiality},
journal = {IMIA Yearbook of medical informatics},
volume = {2000},
year = {2000},
pages = {241-247},
abstract = {A protocol is proposed to allow linkage of anonymous medical information within the framework of epidemiological follow-up studies. The protocol is composed of two steps; the first concerns the irreversible transformation of identification data, using a one-way hash function which is used after spelling processing. To avoid dictionary attacks, two large random files of keys, called pads, are introduced. The second step consists in the linkage of files rendered anonymous. The weight given to each linkage field is estimated by a mixture model, the likelihood of which being maximized with the Expectation and Maximization (EM) algorithm. The performance of this method has been assessed by comparing record linkage, based on exclusive use of the automatic procedure, with a manual linkage, obtained by the Burgundy Registry of Digestive Cancers. The result of the linkage of a file of 2,847 cancers with a file of 388,614 hospitalization stays in the Dijon university hospital showed a sensitivity of 97% and a specificity of 93%. Reprinted from: Methods Inf Med 1998;37:271-7},
\[\text{note} = \{\text{Methods Inf Med 1998;37:271-7}\}\]

@article{IMIA2000248,
author = {De Groen PC, Barry JA, Schaller WJ.},
title = {Applying World Wide Web technology to the study of patients with rare diseases},
journal = {IMIA Yearbook of medical informatics},
volume = {2000},
year = {2000},
pages = {248-254},
abstract = {Randomized, controlled trials of sporadic diseases are rarely conducted. Recent developments in communication technology, particularly the World Wide Web, allow efficient dissemination and exchange of information. However, software for the identification of patients with a rare disease and subsequent data entry and analysis in a secure Web database are currently not available. To study cholangiocarcinoma, a rare cancer of the bile ducts, we developed a computerized disease tracing system coupled with a database accessible on the Web. The tracing system scans computerized information systems on a daily basis and forwards demographic information on patients with bile duct abnormalities to an electronic mailbox. If informed consent is given, the patient's demographic and preexisting medical information available in medical database servers are electronically forwarded to a UNIX research database. Information from further patient-physician interactions and procedures is also entered into this database. The database is equipped
with a Web user interface that allows data entry from various platforms (PC-compatible, Macintosh, and UNIX workstations) anywhere inside or outside our institution. To ensure patient confidentiality and data security, the database includes all security measures required for electronic medical records. The combination of a Web-based disease tracing system and a database has broad applications, particularly for the integration of clinical research within clinical practice and for the coordination of multicenter trials. Reprinted from: Ann Intern Med 1998;129:107-13,

note = {Ann Intern Med 1998;129:107-13}

@article{IMIA2000255,
  author = {Snacken R, Manuguerra JC, Taylor P.},
  title = {European Influenza Surveillance Scheme on the Internet},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {255-259},
  abstract = {In 1995, The European Influenza Surveillance Scheme was created with the participation of eight networks from seven countries. The main objectives were to continue the previous CARE Telematics Network and to adapt the project to the Internet environment as well as to improve substantially the quality of the surveillance according to new epidemiological requirements. Clinical and virological data from the general population and hospitals are collected in an interactive real-time database which can then be used for data entry, queries and consultations. Research programmes have been undertaken in various fields such as standardisation of clinical data and comparability between countries. Validation and security processes guarantee the quality assurance as well as regular assessment by the steering committee. Two additional countries will participate during the next influenza season (1997-98). This will represent an early warning system in a region of approximately 264 million inhabitants. Reprinted from: Methods Inf Med 1998;37:266-70},
  note = {Methods Inf Med 1998;37:266-70}
}

@article{IMIA2000260,
  title = {FluNet as a tool for global monitoring of influenza on the Web},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {260-264},
  abstract = {In collaboration with the Institut National de la Santé et de la Recherche Médicale, the World Health Organization (WHO) has developed an Internet application linking the global WHO network of influenza centers (FluNet; http://oms.b3e.jussieu.fr/flunet/). During 1997, 22 pilot centers entered data on influenza activity and viral laboratory results directly into FluNet via secured access. In addition, 54 centers sent data to WHO for entry. Four countries (the Russian Federation, Romania, Sweden, and the United Kingdom) reported widespread outbreaks of at least 4 weeks' duration. The FluNet server ran 24 hours a day without interruption. To improve management and enhance standardization of reporting, this early-alert system for the global monitoring of influenza provides international and national authorities, the public, and the media with full access to real-time epidemiological and virological information. Reprinted from: JAMA 1998;280:1330-2},
  note = {JAMA 1998;280:1330-2}
}
@article{IMIA2000265,
    author = {Satomura Y.},
    title = {Image and signal processing. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {265-266},
    abstract = {},
    note = {} }

@article{IMIA2000267,
    title = {T axis as an indicator of risk of cardiac events in elderly people},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {267-272},
    abstract = {BACKGROUND: The T axis was postulated to be a general marker of repolarisation abnormality, indicative of subclinical myocardial damage. The aim of this investigation was to assess the prognostic importance of the T axis for fatal and non-fatal cardiac events, in a prospective cohort study of men and women aged 55 years and older. METHODS: 2352 men and 3429 women from the population-based Rotterdam Study took part in the study. Electrocardiograms were done, and T axes were categorised as normal, borderline, or abnormal. Data were analysed with Cox’s proportional-hazards models; adjustment for age and sex was done where appropriate. FINDINGS: During 3-6 (mean 4) years of follow-up of the 5781 participants, 165 (2.9%) fatal and 192 (3.3%) non-fatal cardiac events occurred. Participants with an abnormal T axis (n=609) had an increased risk of cardiac death (hazard ratio 3.9 [95% CI 2.8-5.6]), sudden cardiac death (4.4 [2.6-7.4]), non-fatal cardiac events (2.7 [1.9-3.9]), and combined fatal or non-fatal cardiac events (3.2 [2.5-4.1]); p<0.001 for each. Additional adjustment for established cardiovascular risk factors resulted in lower, but still significant risk for all endpoints. The risk associated with an abnormal T axis was higher than those for any other cardiovascular risk factor. Additional subgroup analyses indicated that the risk of cardiac death was not substantially modified by age, sex, or history of myocardial infarction. INTERPRETATION: The T axis is a strong and independent risk indicator of fatal and non-fatal cardiac events in the elderly. Reprinted from: Lancet 1998;352:601-605},
    note = {Lancet 1998;352:601-605}}

@article{IMIA2000273,
    author = {Andersson JL, Hedberg SE, Hirschberg J, Schuller H.},
    title = {A software sensor using neural networks for detection of patient workload},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {273-277},
    abstract = {The morphology of intracardiac electrograms (IEGMs) was used for pacemaker patient workload estimation. The body posture also was studied as another characteristic. The IEGMs were obtained and recorded via temporary transcutaneous leads connected to the implanted pacemaker. IEGMs were recorded during exercise and at rest. Recordings at rest were performed in different body positions. The morphology was analyzed visually in order to observe changes due to workload and posture. The recordings were digitized and processed by a computer-simulated neural network. The network was used as an automatic IEGM classifier based on the morphology. Our
results show that the morphology of the IEGM may be used as an indicator of patient workload and body posture. The necessary information is found mainly in the ST segment. We conclude that neural networks seem to be useful in an active cardiac device. Reprinted from: Pacing Clin Electrophysio1998;21:2204-8,

@article{IMIA2000278,
author = {Miner LA, McFarland DJ, Wolpaw JR.},
title = {Answering questions with an electroencephalogram-based brain-computer interface},
journal = {IMIA Yearbook of medical informatics},
volume = {2000},
year = {2000},
pages = {278-282},
abstract = {OBJECTIVE: To demonstrate that humans can learn to control selected electroencephalographic components and use that control to answer simple questions. METHODS: Four adults (one with amyotrophic lateral sclerosis) learned to use electroencephalogram (EEG) mu rhythm (8 to 12Hz) or beta rhythm (18 to 25Hz) activity over sensorimotor cortex to control vertical cursor movement to targets at the top or bottom edge of a video screen. In subsequent sessions, the targets were replaced with the words YES and NO, and individuals used the cursor to answer spoken YES/NO questions from single- or multiple-topic question sets. They confirmed their answers through the response verification (RV) procedure, in which the word positions were switched and the question was answered again. RESULTS: For 5 consecutive sessions after initial question training, individuals were asked an average of 4.0 to 4.6 questions per minute; 64% to 87% of their answers were confirmed by the RV procedure and 93% to 99% of these answer were correct. Performances for single- and multiple-topic question sets did not differ significantly. CONCLUSIONS: The results indicate that (1) EEG-based cursor control can be used to answer simple questions with a high degree of accuracy, (2) attention to auditory queries and formulation of answers does not interfere with EEG-based cursor control, (3) question complexity (at least as represented by single versus multiple-topic question sets) does not noticeably affect performance, and (4) the RV procedure improves accuracy as expected. Several options for increasing the speed of communication appear promising. An EEG-based brain-computer interface could provide a new communication and control modality for people with severe motor disabilities. Reprinted from: Arch Phys Med Rehabil 1998;79:1029-33},

@article{IMIA2000283,
author = {Laidlaw DH, Fleischer KW, Barr Al.},
title = {Partial-volume Bayesian classification of material mixtures in MR volume data using voxel histograms},
journal = {IMIA Yearbook of medical informatics},
volume = {2000},
year = {2000},
pages = {283-295},
abstract = {We present a new algorithm for identifying the distribution of different material types in volumetric datasets such as those produced with magnetic resonance imaging (MRI) or computed tomography (CT). Because we allow for mixtures of materials and treat voxels as regions, our technique reduces errors that other classification techniques can create along boundaries between materials and is particularly useful for creating accurate geometric models and renderings from volume data. It also has the potential to make volume measurements more accurately and classifies noisy, low-resolution data well. There are two unusual aspects to our approach. First, we assume that, due to partial-volume effects, or blurring, voxels can contain more than one material, e.g., both muscle and fat; we compute the relative proportion of each material in the voxels. Second,
we incorporate information from neighboring voxels into the classification process by reconstructing a continuous function, \( \rho(x) \), from the samples and then looking at the distribution of values that \( \rho(x) \) takes on within the region of a voxel. This distribution of values is represented by a histogram taken over the region of the voxel; the mixture of materials that those values measure is identified within the voxel using a probabilistic Bayesian approach that matches the histogram by finding the mixture of materials within each voxel most likely to have created the histogram. The size of regions that we classify is chosen to match the spacing of the samples because the spacing is intrinsically related to the minimum feature size that the reconstructed continuous function can represent.

Reprinted from: IEEE Trans Med Imaging 1998;17:74-86,

\text{note = {IEEE Trans Med Imaging 1998;17:74-86}}

\@article{IMIA2000296,
\author{Clark MC, Hall LO, Goldgof DB, Velthuizen R, Murtagh FR, Silbiger MS.},
\title{Automatic tumor segmentation using knowledge-based techniques},
\journal{IMIA Yearbook of medical informatics},
\volume{2000},
\year{2000},
\pages{296-310},
\abstract{A system that automatically segments and labels glioblastoma-multiforme tumors in magnetic resonance images (MRI's) of the human brain is presented. The MRI's consist of T1-weighted, proton density, and T2-weighted feature images and are processed by a system which integrates knowledge-based (KB) techniques with multispectral analysis. Initial segmentation is performed by an unsupervised clustering algorithm. The segmented image, along with cluster centers for each class are provided to a rule-based expert system which extracts the intracranial region. Multispectral histogram analysis separates suspected tumor from the rest of the intracranial region, with region analysis used in performing the final tumor labeling. This system has been trained on three volume data sets and tested on thirteen unseen volume data sets acquired from a single MRI system. The KB tumor segmentation was compared with supervised, radiologist-labeled "ground truth" tumor volumes and supervised k-nearest neighbors tumor segmentations. The results of this system generally correspond well to ground truth, both on a per slice basis and more importantly in tracking total tumor volume during treatment over time. Reprinted from: IEEE Trans Med Imaging 1998;17:187-201},
\text{note = {IEEE Trans Med Imaging 1998;17:187-201}}

\@article{IMIA2000311,
\author{Park W, Hoffman EA, Sonka M.},
\title{Segmentation of intrathoracic airway trees: a fuzzy logic approach},
\journal{IMIA Yearbook of medical informatics},
\volume{2000},
\year{2000},
\pages{311-319},
\abstract{Three-dimensional (3-D) analysis of airway trees extracted from computed tomography (CT) image data can provide objective information about lung structure and function. However, manual analysis of 3-D lung CT images is tedious, time consuming and, thus, impractical for routine clinical care. We have previously reported an automated rule-based method for extraction of airway trees from 3-D CT images using a priori knowledge about airway-tree anatomy. Although the method's sensitivity was quite good, its specificity suffered from a large number of falsely detected airways. We present a new approach to airway-tree detection based on fuzzy logic that increases the method's specificity without compromising its sensitivity. The method was validated in 32 CT image slices randomly selected from five volumetric canine electron-beam CT data sets. The fuzzy-logic

@article{IMIA2000320,
  author = {Harris G, Andreasen NC, Cizadlo T, Bailey JM, Bockholt HJ, Magnotta VA, Arndt S.},
  title = {Improving tissue classification in MRI: a three-dimensional multispectral discriminant analysis method with automated training class selection},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {320-330},
  abstract = {PURPOSE: To improve the reliability, accuracy, and computational efficiency of tissue classification with multispectral sequences [T1, T2, and proton density (PD)], we developed an automated method for identifying training classes to be used in a discriminant function analysis. We compared it with a supervised operator-dependent method, evaluating its reliability and validity. We also developed a fuzzy (continuous) classification to correct for partial voluming. METHOD: Images were obtained on a 1.5 T GE Signa MR scanner using three pulse sequences that were co-registered. Training classes for the discriminant analysis were obtained in two ways. The operator-dependent method involved defining circular ROIs containing 5-15 voxels that represented "pure" samples of gray matter (GM), white matter (WM), and cerebrospinal fluid (CSF), using a total of 150-300 voxels for each tissue type. The automated method involved selecting a large number of samples of brain tissue with sufficiently low variance and randomly placed throughout the brain ("plugs"), partitioning these samples into GM, WM, and CSF, and minimizing the amount of variance within each partition of samples to optimize its "purity." The purity of the plug was estimated by calculating the variance of 8 voxels in all modalities (T1, T2, and PD). We also compared "sharp" (discrete) measurements (which classified tissue only as GM, WM, or CSF) and "fuzzy" (continuous) measurements (which corrected for partial voluming by weighting the classification based on the mixture of tissue types in each voxel). RESULTS: Reliability was compared for the operator-dependent and automated methods as well as for the fuzzy versus sharp classification. The automated sharp classifications consistently had the highest interrater and intrarater reliability. Validity was assessed in three ways: reproducibility of measurements when the same individuals were scanned on multiple occasions, sensitivity of the method to detecting changes associated with aging, and agreement between the automated segmentation values and those produced through expert manual segmentation. The sharp automated classification emerged as slightly superior to the other three methods according to each of these validators. Its reproducibility index (intraclass r) was 0.97, 0.98, and 0.98 for total CSF, total GM, and total WM, respectively. Its correlations with age were 0.54, -0.61, and -0.53, respectively. Its percent agreement with the expert manually segmented tissue for the three tissue types was 93, 90, and 94%, respectively. CONCLUSION: Automated identification of training classes for discriminant analysis was clearly superior to a method that required operator intervention. A sharp (discrete) classification into three tissue types was also slightly superior to one that used "fuzzy" classification to produce continuous measurements to correct for partial voluming. This multispectral automated discriminant analysis method produces a computationally efficient, reliable, and valid method for classifying brain tissue into GM, WM, and CSF. It corrects some of the problems with reliability and computational inefficiency previously observed for operator-dependent approaches to segmentation. Reprinted from: J Comput Assist Tomogr 1999;23:144-54, note = {J Comput Assist Tomogr 1999;23:144-54}

@article{IMIA2000331,
  author = {Boukerroui D, Basset O, Guerin N, Baskurt A.},
OBJECTIVE: A specific algorithm is presented for the automatic extraction of breast tumors in ultrasonic imaging. METHOD: The algorithm involves two-dimensional adaptive K-means clustering of the gray scale and textural feature images. The segmentation problem is formulated as a maximum a posteriori (MAP) estimation problem. The MAP estimation is achieved using Besag's iterated conditional modes algorithm for the minimization of an energy function. This function has three components: the first constrains the region to be close to the data; the second imposes spatial continuity; and the third takes into consideration the texture of the various regions. A multiresolution implementation of the algorithm is performed using a waveless basis. RESULTS: Experiments were carried out on synthetic images and on in vivo breast ultrasound images. Various parameters involved in the algorithm are discussed to evaluate the robustness and accuracy of the segmentation method. CONCLUSION: Including textural features in the segmentation of ultrasonic data improves the robustness of the algorithm and makes the segmentation result less parameter dependent. Reprinted from: Eur J Ultrasound 1998;8:135-44,
the volume of distribution and clearance increased following the initiation of dialysis and as the patient's baseline clotting time increased. The volume of distribution also increased as the patient's weight increased but was decreased by smoking and diabetes. Population-based statistical techniques may provide a useful alternative to existing methods for prescribing heparin. Reprinted from: Artif Organs 1998;22:731-9,

note = {Artif Organs 1998;22:731-9}

@article{IMIA2000355,
  title = {Prediction of cirrhosis in patients with chronic hepatitis C infection by artificial neural network analysis of virus and clinical factors},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {355-364},
  abstract = {The diagnosis of cirrhosis in patients with hepatitis C virus (HCV) infection is currently made using a liver biopsy. In this study we have trained and validated artificial neural networks (ANN) with routine clinical host and viral parameters to predict the presence or absence of cirrhosis in patients with chronic HCV infection and assessed and interpreted the role of the different inputs on the ANN classification. Fifteen routine clinical and virological factors were collated from 112 patients who were HCV RNA positive by reverse transcriptase-polymerase chain reaction (RT-PCR). Standard and Ward-type feed-forward fully-connected ANN analyses were carried out both by training the networks with data from 82 patients and subsequently testing with data from 30 patients plus performing leave-one-out tests for the whole patient data set. The ANN results were also compared with those from multiple logistic regression. The performance of both ANN methods was superior compared with the logistic regression. The best performance was obtained with the Ward-type ANNs resulting in a sensitivity of 92% and a specificity of 98.9% together with a predictive value of a positive test of 95% and a predictive value of a negative test of 97% in the leave-one-out test. Hence, further validation of the ANN analysis is likely to provide a non-invasive test for diagnosing cirrhosis in HCV-infected patients. Reprinted from: Viral Hepat 1998;5:255-64},
  note = {Viral Hepat 1998;5:255-64}
}

@article{IMIA2000365,
  title = {Predicting severe angiographic coronary artery disease using computerization of clinical and exercise test data},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {365-373},
  abstract = {Currently the standard exercise test is shifting from being a tool for the cardiologist to utilization by the nonspecialist. This change could be facilitated by computerization similar to the interpretation programs available for the resting ECG. Therefore, we sought to determine if computerization of both exercise ECG measurements and prediction equations can substitute for visual analysis performed by cardiologists to predict which patients have severe angiographic coronary artery disease. We performed a retrospective analysis of consecutive patients referred for evaluation of possible or known coronary artery disease who underwent both exercise testing with digital recording of their exercise ECGs and coronary angiography at two university-affiliated Veteran's Affairs medical centers and a Hungarian hospital. There were 2,385 consecutive
male patients with complete data who had exercise tests between 1987 and 1997. Measurements included clinical and exercise test data, and visual interpretation of the ECG paper tracings and > 100 computed measurements from the digitized ECG recordings and compilation of angiographic data from clinical reports. The computer measurements had similar diagnostic power compared with visual interpretation. Computerized ECG measurements from maximal exercise or recovery were equivalent or superior to all other measurements. Prediction equations applied by computer were only able to correctly classify two or three more patients out of 100 tested than ECG measurements alone. beta-Blockers had no effect on test characteristics while ST depression on the resting ECG decreased specificity. By setting probability limits using the scores from the equations, the population was divided into high-, intermediate-, and low-probability groups. A strategy using further testing in the intermediate group resulted in 86% sensitivity and 85% specificity for identifying patients with severe coronary disease. We conclude that computerized exercise ST measurements are comparable to visual ST measurements by a cardiologist and computerized scores only minimally improved the discriminatory power of the test. However, using these scores in a stratification algorithm allows the nonspecialist physician to improve the discriminatory characteristics of the standard exercise test even when resting ST depression is present. Computerization permitted accurate identification of patients with severe coronary disease who require referral.

Reprinted from: Chest 1998;114:1437-45,

note = {Chest 1998;114:1437-45}

@article{IMIA2000374,
    author = {Marvin N, Bower M, Rowe JE.},
    title = {An evolutionary approach to constructing prognostic models},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {374-384},
    abstract = {A prognostic model is sought to determine whether or not patients suffering from an uncommon form of cancer will survive. Given a set of case histories, we attempt to find the relative weightings of the different variables that are used to describe the cases. Our first innovation is to use a diffusion genetic algorithm (DGA) to find weightings which will give optimal survival predictions. The DGA enables a number of criteria to be satisfied simultaneously, making it particularly suitable for model building. A further innovation is a method of representing synergies between interacting factors. The evolved model correctly predicts 90% of the survivors and 87% of deaths, an improvement over the current model. More significantly, the method enables a simple model to be evolved, one that produces well-balanced predictions, and one that is relatively easy for clinicians to use. The method was validated by running it on a training set made up of 90% of the original database and then studying the performance of the generated models on a test set consisting of the remaining 10% of the cases. Reprinted from: Artif Intell Med 1999;15:155-65},
    note = {Artif Intell Med 1999;15:155-65}
}

@article{IMIA2000385,
    author = {Ohno-Machado L, Getman 3H, Murphy SN, Jain NL, Tu SW, Oliver DE, Pattison-Gordon E, Greenes RA, Sh.},
    title = {The guideline interchange format: a model for representing guidelines},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2000},
    year = {2000},
    pages = {385-400},
    abstract = {OBJECTIVE: To allow exchange of clinical practice guidelines among institutions and computer-based applications. DESIGN: The GuideLine Interchange Format (GLIF) specification
consists of GLIF model and the GLIF syntax. The GLIF model is an object-oriented representation that consists of a set of classes for guideline entities, attributes for those classes, and data types for the attribute values. The GLIF syntax specifies the format of the test file that contains the encoding.

METHODS: Researchers from the InterMed Collaboratory at Columbia University, Harvard University (Brigham and Women's Hospital and Massachusetts General Hospital), and Stanford University analyzed four existing guideline systems to derive a set of requirements for guideline representation. The GLIF specification is a consensus representation developed through a brainstorming process. Four clinical guidelines were encoded in GLIF to assess its expressivity and to study the variability that occurs when two people from different sites encode the same guideline. RESULTS: The encoders reported that GLIF was adequately expressive. A comparison of the encodings revealed substantial variability. CONCLUSION: GLIF was sufficient to model the guidelines for the four conditions that were examined. GLIF needs improvement in standard representation of medical concepts, criterion logic, temporal information, and uncertainty. Reprinted from: J. Am Med Inform Assoc 1998;5:357-72

@article{IMIA2000401,
  author = {Tuttle MS, Olson NE, Keck KD, Cole WG, Erlbaum MS, Sherertz DD, Chute CG, Elkin PL, Atkin GE, Kaiho.},
  title = {Metaphrase: an aid to the clinical conceptualization and formalization of patient problems in healthcare enterprises},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {401-414},
  abstract = {Patient descriptors, or "problems," such as "brain metastases of melanoma" are an effective way for caregivers to describe patients. But most problems, e.g., "cubital tunnel syndrome" or "ulnar nerve compression," found in problem lists in an Electronic Medical Record (EMR) are not comparable computationally--in general, a computer cannot determine whether they describe the same or a related problem, or whether the user would have preferred "ulnar nerve compression syndrome." Metaphrase is a scalable, middleware component designed to be accessed from problem-manager applications in EMR systems. In response to caregivers' informal descriptors it suggests potentially equivalent, authoritative, and more formally comparable descriptors. Metaphrase contains a clinical subset of the 1997 UMLS Metathesaurus and some 10,000 "problems" from the Mayo Clinic and Harvard Beth Israel Hospital. Word and term completion, spelling correction, and semantic navigation, all combine to ease the burden of problem conceptualization, entry and formalization. Reprinted from: Methods Inf Med 1998;37:373-83},
  note = {Methods Inf Med 1998;37:373-83}
}

@article{IMIA2000415,
  author = {Fisher PD.},
  title = {Education. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2000},
  year = {2000},
  pages = {415-416},
  abstract = {},
  note = {}
Objective: To develop a generic methodology for the online assessment of medical education materials available on the World Wide Web and to implement it for pilot subject areas. Design: An online questionnaire was developed, based on an existing scheme for computer-based learning material. It was extended to involve five stages, covering general suitability, local suitability, the user interface, educational style, and a general review. It is available on the Web, so expert reviewers may be recruited from outside the home institution. The methodology was piloted in three subjects areas—clinical chemistry, radiology, and medical physics—concentrating initially on undergraduate teaching. Measurements: The contents of completed questionnaires were stored in an offline database. Selected fields, likely to be of use to students and educators searching for material, were input into an online database. Results: The online assessment was used successfully in clinical chemistry and medical physics but less well in radiology. Fewer resources were found to fit local needs than expected. Conclusion: The methodology was found to work well for topics where teaching is highly structured and formal and is potentially applicable in other such disciplines. The approach produces more structured and applicable lists of resources than can be obtained from search engines.

Note: J Am Med Inform Assoc 1998;5:382-9

Abstract: The last decade saw a rapid increase in the use of multimedia in health education. Easy availability, accessibility, low cost of technological resources and the expanding body of research on the role of multimedia in student learning, among others, have all contributed to this increase in usage. Since one of the roles of educators is to assess and select learning resources based on curriculum goals and student needs, the development of standardized methods for multimedia evaluation becomes vital. To the learner, it is important for reviews of the quality of the resource to be readily available. An evaluation tool was developed based on the recognition of this need. The validity of the tool was tested using experts in technology and education. Reliability was determined using faculty and students who reviewed the same software, using the tool. In addition, graduate students reviewed two versions of a nursing program, of varying quality. The results indicate that the tool is reliable and valid. It is envisaged that this tool can be utilized by health educators for evaluating multimedia resources and setting up a much needed clearinghouse for health education resources.

Note: Int J Med Inf 1998;50:243-50

Abstract: Interactive computerized health care education

Note: Int J Med Inform 1998;50:243-50
The Patient Education and Activation System (PEAS) project aims to prepare people to take a more active role in their health care decisions. In this paper, the authors describe their work on the Layman Education and Activation Form (LEAF). LEAF is designed to be an interactive, Internet-based system for collecting a patient’s medical history. It is unique in that it gives patients access to educational information when it is most pertinent, while they are attempting to complete a form. It avoids overwhelming the patient, by providing information only when it is likely to be relevant. The system avoids asking irrelevant questions or providing irrelevant facts by tailoring the content of the form to the patient’s responses. The system also uses the patient’s answers to suggest questions that the patient might ask a doctor and provides online resources that the patient can browse. Reprinted from: J Am Med Inform Assoc 1998;5:347-56,

Abstract:

In response to the explosion in medical information, there have been considerable recent changes in medical curriculum development. The move to problem based
learning (PBL) is, in part, a result of these changes. The Faculty of Medicine at the University of Sydney has exploited a WWW based intranet for the development, delivery, management and evaluation of its problem based, graduate medical program (GMP). This system has been employed to develop the 72 medical problems that contribute to the first two years of the GMP. The activities of more than 400 members of the faculty have been coordinated using the intranet to develop the wide range of resources to support learning in the program. Daily management of the curriculum is also enabled using Web site posting of bulletins, e-mail and ongoing development of technology training. Coupled with the PBL problems is a formative assessment system that provides questions and feedback that cover the whole range of learning topics. Part of the student and staff evaluation is supported both informally and formally through the use of a 'Feedback' button on each web page and web delivered structured formal evaluations, respectively. Reprinted from: Int J Med Inf 1998;50:225-33,

note = {Int J Med Inf 1998;50:225-33}
Working Group 1: Health and Medical Informatics Education. Recommendations of the International Medical Informatics Association (IMIA) on Education in Health and Medical Informatics.


OBJECTIVES: To evaluate prescription drug information contained in six consumer drug information databases available on CD-ROM, and to make health care professionals aware of the information provided, so that they may appropriately recommend these databases for use by their patients. DESIGN: Observational study of six consumer drug information databases: The Corner Drug Store, Home Medical Advisor, Mayo Clinic Family Pharmacist, Medical Drug Reference, Mosby's Medical Encyclopedia, and PharmAssist. SETTING: Not applicable. PATIENTS OR OTHER PARTICIPANTS: Not applicable. INTERVENTIONS: Information on 20 frequently prescribed drugs was evaluated in each database. The databases were ranked using a point-scale system based on primary and secondary assessment criteria. MAIN OUTCOME MEASURES: For the primary assessment, 20 categories of information based on those included in the 1998 edition of the USP DI Volume II, Advice for the Patient: Drug Information in Lay Language were evaluated for each of the 20 drugs, and each database could earn up to 400 points (for example, 1 point was awarded if the database mentioned a drug's mechanism of action). For the secondary assessment, the inclusion of 8 additional features that could enhance the utility of the databases was evaluated (for example, 1 point was awarded if the database contained a picture of the drug), and each database could earn up to 8 points. RESULTS: The results of the primary and secondary assessments, listed in order of highest to lowest number of points earned, are as follows: Primary assessment--Mayo Clinic Family Pharmacist (379), Medical Drug Reference (251), PharmAssist (176), Home Medical Advisor (113.5), The Corner Drug Store (98), and Mosby's Medical Encyclopedia (18.5); secondary assessment--The Mayo Clinic Family Pharmacist (8), The Corner Drug Store (5), Mosby's Medical Encyclopedia (5), Home Medical Advisor (4), Medical Drug Reference (4), and PharmAssist (3). CONCLUSION: The Mayo Clinic Family Pharmacist was the most accurate and complete source of prescription drug information based on the USP DI Volume II and would be an appropriate database for health care professionals to recommend to patients.

In this paper, we give a case history illustrating the real-world application of a useful technique for data mining of text databases. The technique, which we call Term Domain Distribution Analysis (TDDA), consists of keeping track of term frequencies for specific finite domains and announcing significant differences from standard frequency distributions over these domains as a hypothesis. TDDA is part of a larger framework, the Digital Filter Model, for data mining of text documents. In the case study presented, the domain of terms was the pair \{right, left\}, over which we expected a uniform distribution. In analyzing term frequencies in a thoracic lung cancer database, the TDDA technique led to the surprising discovery that primary thoracic lung cancer tumors appear in the right lung more often than the left lung, with a ratio of 3:2. Treating the text discovery as a hypothesis, we verified this relationship against the medical literature in which primary lung tumor sites were reported, using a standard chi 2 statistic. We subsequently developed a working theoretical model of lung cancer that may explain the discovery. This discovery and our model may change how oncologists view the mechanisms of primary lung tumor location.

Structured reporting is the process of using standardized data elements and predetermined data-entry formats to record observations. The Standard Generalized Markup Language (SGML; International Standards Organization (ISO) 8879:1986)--an open, internationally accepted standard for document interchange was used to encode medical observations acquired in an Internet-based structured reporting system. The resulting report is self-documenting: it includes a definition of its allowable data fields and values encoded as a report-specific SGML document type definition (DTD). The data-entry forms, DTD, and report document instances are based on report specifications written in a simple, SGML-based language designed for that purpose. Reporting concepts can be linked with those of external vocabularies such as the Unified Medical Language System (UMLS) Metathesaurus. The use of open standards such as SGML is an important step in the creation of open, universally comprehensible structured reports.

Current and future models for nursing e-journals: making the most of the web's potential.
We are presently witnessing an increasing number of nursing, medical and health-related electronic journals (e-journals) being made available on the World Wide Web, a minority of which are specifically devoted to informatics. We would expect, given the potential of interacting multimedia and computer-mediated communications (i.e. telematics), to also see an increasing diversity of models, but this is not currently the case. Following a brief discussion of some of the issues relevant to electronic publications, the authors present a taxonomy of current nursing e-journal models, including discussion of some examples from around the world that fall into categories within this taxonomy. We describe the model and levels of usage of one particular e-journal, Nursing Standard Online. Some of the issues presented may account for the current relative paucity of high quality content and innovative models in the development of Web-based e-journals for nurses and other health professionals. We believe it likely that nursing e-journals using current models will need to be specialist rather than generalist if they are to attract a larger audience. In concluding our paper, we advocate the development of innovative and increasingly interactive nursing e-journals as the way forward, discussing one particular model which holds promise.

@article{IMIA2001182,
    author = {Pagesy R, Soula G, Fieschi M.},
    title = {Improving knowledge navigation with adaptive hypermedia.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {182-196},
    abstract = {Web applications provide access to a tremendous amount of information: hypertext, hypermedia and on-line databases. However, since users' knowledge, motivation and goals are different, they cannot find the relevant information in the data being diffused. Giving the users applications or environments that will take their differences into account is one way of improving their access to knowledge. The authors' objective is to improve knowledge navigation by adapting users' navigation. Adaptive hypermedia is one way of returning information adapted to the user. This paper presents an adaptive hypermedia system based on user representation with the stereotype model. Both adaptive presentation and navigation techniques are also implemented. This paper focuses on the architecture of the general adaptive hypermedia system as well as adaptivity management. A-TOP, a medical adaptive hypermedia prototype implemented in a hospital intranet system, is described. Adaptive hypermedia is a preliminary approach to the vast problem of user access to knowledge. In conclusion, we hope to extend our reflections to the problems involved in access to knowledge on the World Wide Web (Web).},
    note = {Med Inform Internet Med 2000;25(1):63-77.}
}

@article{IMIA2001197,
    author = {Pandolfini C, Impicciatore P, Bonati M.},
    title = {Parents on the Web: Risks for Quality Management of Cough in Children.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {197-206},
    abstract = {BACKGROUND: Health information on the Internet, with respect to common, self-limited childhood illnesses, has been found to be unreliable. Therefore, parents navigating on the Internet risk finding advice that is incomplete or, more importantly, not evidence-based. The importance that a resource such as the Internet as a source of quality health information for consumers should, however, be taken into consideration. For this reason, studies need to be
performed regarding the quality of material provided. Various strategies have been proposed that would allow parents to distinguish trustworthy web documents from unreliable ones. One of these strategies is the use of a checklist for the appraisal of web pages based on their technical aspects.

OBJECTIVE: The purpose of this study was to assess the quality of information present on the Internet regarding the home management of cough in children and to examine the applicability of a checklist strategy that would allow consumers to select more trustworthy web pages. METHODS: The Internet was searched for web pages regarding the home treatment of cough in children with the use of different search engines. Medline and the Cochrane database were searched for available evidence concerning the management of cough in children. Three checklists were created to assess different aspects of the web documents. The first checklist was designed to allow for a technical appraisal of the web pages and was based on components such as the name of the author and references used. The second was constructed to examine the completeness of the health information contained in the documents, such as causes and mechanism of cough, and pharmacological and nonpharmacological treatment. The third checklist assessed the quality of the information by measuring it against a gold standard document. This document was created by combining the policy statement issued by the American Academy of Pediatrics regarding the pharmacological treatment of cough in children with the guide of the World Health Organization on drugs for children. For each checklist, the web page contents were analyzed and quantitative measurements were assigned. RESULTS: Of the 19 web pages identified, 9 explained the purpose and/or mechanism of cough and 14 the causes. The most frequently mentioned pharmacological treatments were single-ingredient suppressant preparations, followed by single-ingredient expectorants. Dextromethorphan was the most commonly referred to suppressant and guaifenesin the most common expectorant. No documents discouraged the use of suppressants, although 4 of the 10 web documents that addressed expectorants discouraged their use. Sixteen web pages addressed nonpharmacological treatment, 14 of which suggested exposure to a humid environment and/or extra fluid. In most cases, the criteria in the technical appraisal checklist were not present in the web documents; moreover, 2 web pages did not provide any of the items. Regarding content completeness, 3 web pages satisfied all the requirements considered in the checklist and 2 documents did not meet any of the criteria. Of the 3 web pages that scored highest in technical aspect, 2 also supplied complete information. No relationship was found, however, between the technical aspect and the content completeness. Concerning the quality of the health information supplied, 10 pages received a negative score because they contained more incorrect than correct information, and 1 web page received a high score. This document was 1 of the 2 that also scored high in technical aspect and content completeness. No relationship was found, however, among quality of information, technical aspect, and content completeness. CONCLUSIONS: As the results of this study show, a parent navigating the Internet for information on the home management of cough in children will no doubt find incorrect advice among the search results. (ABSTRACT TRUNCATED),


@article{IMIA2001207,
  author = {Hanmer LA.},
  title = {Information Systems to facilitate Health and Clinical Management. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {162-170},
  abstract = {},
  note = {}  
}

@article{IMIA2001210,
  author = {Dini EF, Linkins RW, Sigafoos J.},
title = {The Impact of Computer-Generated Messages on Childhood Immunization Coverage.},
journal = {IMIA Yearbook of medical informatics},
volume = {2001},
year = {2001},
pages = {210-217},
abstract = {INTRODUCTION: Recent evaluations of computer-generated reminder/recall messages have suggested that they are an inexpensive, labor-saving method of improving office visitation rates of childhood immunization providers. This study assesses the sustained impact of computer-generated messages on immunization coverage during the first two years of life. DESIGN: Randomized, controlled trial. SETTING: County health department in the Denver metropolitan area. STUDY PARTICIPANTS: Children (n = 1227) 60 to 90 days of age who had received the first dose of diphtheria-tetanus-pertussis (DTP) and/or poliovirus vaccines. INTERVENTION: Households of children were randomized into four groups to receive: telephone messages followed by letters (Group A); telephone messages alone (Group B); letters only (Group C); or no notification (Group D). Households in the intervention groups (A, B, and C) received up to five computer-generated telephone messages and/or up to four letters each time their children became due for immunization(s). MAIN OUTCOME MEASURE: Immunization series completion at 24 months of age. RESULTS: Children whose families were randomized to receive any of the interventions were 21% more likely to have completed the immunization series by 24 months of age than were children randomized into the control group (49.2% vs 40.9%; RR [rate ratio] = .21; CI [confidence interval] = 1.01, 1.44). While not statistically significant, children in Group A were 23% more likely to complete their immunization series by 24 months of age than those in the control group (50.2% vs 40.9%; RR = 1.23; CI = 1.00, 1.52). No differences were detected among the intervention groups. The costs per additional child completing the series by 24 months of age in Group A was $226 ($79 after start-up costs were discounted). CONCLUSION: Computer-generated contacts, either by phone or by mail (or both combined), used each time vaccines become due, are efficacious in increasing immunization coverage of children under 2 years of age.},

@article{IMIA2001218,
  title = {Statewide System of Electronic Notifiable Disease Reporting From Clinical Laboratories. Comparing Automated Reporting With Conventional Methods.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {218-223},
  abstract = {CONTEXT: Notifiable disease surveillance is essential to rapidly identify and respond to outbreaks so that further illness can be prevented. Automating reports from clinical laboratories has been proposed to reduce underreporting and delays. OBJECTIVE: To compare the timeliness and completeness of a prototypal electronic reporting system with that of conventional laboratory reporting. DESIGN: Laboratory-based reports for 5 conditions received at a state health department between July 1 and December 31, 1998, were reviewed. Completeness of coverage for each reporting system was estimated using capture-recapture methods. SETTING: Three statewide private clinical laboratories in Hawaii. MAIN OUTCOME MEASURES: The number and date of reports received, by reporting system, laboratory, and pathogen; completeness of data fields. RESULTS: A total of 357 unique reports of illness were identified; 201 (56%) were received solely through the automated electronic system, 32 (9%) through the conventional system only, and 124 (35%) through both. Thus, electronic reporting resulted in a 2.3-fold (95% confidence interval [CI], 2.0-2.6) increase in reports. Electronic reports arrived an average of 3.8 (95% CI, 2.6-5.0) days earlier than conventional reports. Of 21 data fields common to paper and electronic formats, electronic reports were significantly more likely to be complete for 12 and for 1 field with the conventional system. The
estimated completeness of coverage for electronic reporting was 80% (95% CI, 75%-85%) [corrected] compared with 38% (95% CI, 36%-41%) [corrected] for the conventional system. CONCLUSIONS: In this evaluation, electronic reporting more than doubled the total number of laboratory-based reports received. On average, the electronic reports were more timely and more complete, suggesting that electronic reporting may ultimately facilitate more rapid and comprehensive institution of disease control measures.

@article{IMIA2001224,
  author = {Gustafson DH, Hawkins R, Boberg E, Pingree S, Serlin RE, Graziano F, Chan CL.},
  title = {Impact of a Patient-Centered, Computer-Based Health Information/Support System},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {224-232},
  abstract = {BACKGROUND: Consumer health information systems potentially improve a patient's quality of life and activate patient self-care. OBJECTIVES: Test a computerized system (CHESS: Comprehensive Health Enhancement Support System), which, in this application, provided HIV-positive patients with information, decision support, and connections to experts and other patients. Would patients given in-home access to computers use the system, improve their quality of life, reduce health-risk behaviors, and use medical services more efficiently? RESEARCH DESIGN: Randomized controlled trial: CHESS computers in experimental subjects' homes in Madison or Milwaukee, Wisconsin, for 3 or 6 months; controls received no intervention. Subjects were compensated for self-report surveys completed before, during, and after CHESS installation. SUBJECTS: Of 204 HIV-positive patients recruited (90% male, 84% white, average education some college, and 65% experiencing HIV-related symptoms), 90% completed the study. MEASURES: Self-reports of quality of life and frequency and duration of use of medical services. RESULTS: CHESS was used daily with little difference between demographic subgroups. While CHESS was in the home, its users reported quality-of-life improvements: active life, negative emotions, cognitive function, social support, and participation in health care. They also reported spending less time during ambulatory care visits, making more phone calls to providers, and experiencing fewer and shorter hospitalizations. CONCLUSIONS: A computer-based personal health support system can improve a patient's quality of life and promote more efficient use of health care.},
}

@article{IMIA2001223,
  title = {Randomised trial of personalised computer based information for cancer patients.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {223-239},
  abstract = {BACKGROUND: Consumer health information systems potentially improve a patient's quality of life and activate patient self-care. OBJECTIVES: Test a computerized system (CHESS: Comprehensive Health Enhancement Support System), which, in this application, provided HIV-positive patients with information, decision support, and connections to experts and other patients. Would patients given in-home access to computers use the system, improve their quality of life, reduce health-risk behaviors, and use medical services more efficiently? RESEARCH DESIGN: Randomized controlled trial: CHESS computers in experimental subjects' homes in Madison or Milwaukee, Wisconsin, for 3 or 6 months; controls received no intervention. Subjects were compensated for self-report surveys completed before, during, and after CHESS installation. SUBJECTS: Of 204 HIV-positive patients recruited (90% male, 84% white, average education some college, and 65% experiencing HIV-related symptoms), 90% completed the study. MEASURES: Self-reports of quality of life and frequency and duration of use of medical services. RESULTS: CHESS was used daily with little difference between demographic subgroups. While CHESS was in the home, its users reported quality-of-life improvements: active life, negative emotions, cognitive function, social support, and participation in health care. They also reported spending less time during ambulatory care visits, making more phone calls to providers, and experiencing fewer and shorter hospitalizations. CONCLUSIONS: A computer-based personal health support system can improve a patient's quality of life and promote more efficient use of health care.},
}
OBJECTIVE: To compare the use and effect of a computer based information system for cancer patients that is personalised using each patient’s medical record with a system providing only general information and with information provided in booklets. DESIGN: Randomised trial with three groups. Data collected at start of radiotherapy, one week later (when information provided), three weeks later, and three months later. PARTICIPANTS: 525 patients started radical radiotherapy; 438 completed follow up. INTERVENTIONS: Two groups were offered information via computer (personalised or general information, or both) with open access to computer thereafter; the third group was offered a selection of information booklets. OUTCOMES: Patients’ views and preferences, use of computer and information, and psychological status; doctors’ perceptions; cost of interventions. RESULTS: More patients offered the personalised information said that they had learnt something new, thought the information was relevant, used the computer again, and showed their computer printouts to others. There were no major differences in doctors’ perceptions of patients. More of the general computer group were anxious at three months. With an electronic patient record system, in the long run the personalised information system would cost no more than the general system. Full access to booklets cost twice as much as the general system. CONCLUSIONS: Patients preferred computer systems that provided information from their medical records to systems that just provided general information. This has implications for the design and implementation of electronic patient record systems and reliance on general sources of patient information.

note = {BMJ 1999;319(7219):1241-7.}

@article{IMIA2001240,
  author = {Mönnich G, Wetter T.},
  title = {Requirements for Speech Recognition to Support Medical Documentation.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {240-246},
  abstract = {Recent advances in the development of automated speech recognition (ASR) have made routine applications for medical documentation possible. To achieve this, ASR has to be optimally integrated into the specific documentation scenario. The classification presented in this paper allows the definition of specification requirements. For two different documentation scenarios the appropriate product selection has been done according to this classification. Two evaluation studies are presented, addressing the usefulness of applying automated speech recognition.},
  note = {Methods Inf Med 2000;39:63-9.}
}

@article{IMIA2001247,
  author = {Ruland CM.},
  title = {Decision Support for Patient Preference-based Care Planning: Effects on Nursing Care and Patient Outcomes.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {247-258},
  abstract = {OBJECTIVE: While preference elicitation techniques have been effective in helping patients make decisions consistent with their preferences, little is known about whether information about patient preferences affects clinicians in clinical decision making and improves patient outcomes. The purpose of this study was to evaluate a decision support system for eliciting elderly patients’ preferences for self-care capability and providing this information to nurses in clinical practice-specifically, its effect on nurses’ care priorities and the patient outcomes of preference achievement and patient satisfaction. DESIGN: Three-group quasi-experimental design with one
experimental and two control groups (N = 151). In the experimental group computer-processed information about individual patient's preferences was placed in patients' charts to be used for care planning. RESULTS: Information about patient preferences changed nurses' care priorities to be more consistent with patient preferences and improved patients' preference achievement and physical functioning. Further, higher consistency between patient preferences and nurses' care priorities was associated with higher preference achievement, and higher preference achievement with greater patient satisfaction. CONCLUSION: This study demonstrated that decision support for eliciting patient preferences and including them in nursing care planning is an effective and feasible strategy for improving nursing care and patient outcomes.

note = {J Am Med Inform Assoc 1999;6(4):304-12.}

@article{IMIA2001259,
  author = {Wigertz OB.},
  title = {Computer-based Patient Records. Synopsis.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {259-262},
  abstract = {},
  note = {}
}

@article{IMIA2001263,
  author = {de Keizer NF, Abu-Hanna A.},
  title = {Understanding Terminological Systems II: Experience with Conceptual and Formal Representation of Structure.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {263-270},
  abstract = {This article describes the application of two popular conceptual and formal representation formalisms, as part of a framework for understanding terminological systems. A precise understanding of the structure of a terminological system is essential to assess existing terminological systems, to recognize patterns in various systems and to build new terminological systems. Our experience with the application of this framework to five well-known terminological systems is described.},
}

@article{IMIA2001271,
  title = {Representing the UMLS as an Object-oriented Database: Modeling Issues and Advantages.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {271-285},
  abstract = {OBJECTIVE: The Unified Medical Language System (UMLS) combines many well-established authoritative medical informatics terminologies in one knowledge representation system. Such a resource is very valuable to the health care community and industry. However, the UMLS is very large and complex and poses serious comprehension problems for users and maintenance personnel. The authors present a representation to support the user's comprehension


and navigation of the UMLS. **DESIGN:** An object-oriented database (OODB) representation is used to represent the two major components of the UMLS—the Metathesaurus and the Semantic Network—as a unified system. The semantic types of the Semantic Network are modeled as semantic type classes. Intersection classes are defined to model concepts of multiple semantic types, which are removed from the semantic type classes. **RESULTS:** The authors provide examples of how the intersection classes help expose omissions of concepts, highlight errors of semantic type classification, and uncover ambiguities of concepts in the UMLS. The resulting UMLS OODB schema is deeper and more refined than the Semantic Network, since intersection classes are introduced. The Metathesaurus is classified into more mutually exclusive, uniform sets of concepts. The schema improves the user’s comprehension and navigation of the Metathesaurus. **CONCLUSIONS:** The UMLS OODB schema supports the user’s comprehension and navigation of the Metathesaurus. It also helps expose and resolve modeling problems in the UMLS.

@article{IMIA2001286,
    author = {Rector AL.,}
    title = {Clinical Terminology: Why Is it so Hard?},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {286-299},
    abstract = {Despite years of work, no re-usable clinical terminology has yet been demonstrated in widespread use. This paper puts forward ten reasons why developing such terminologies is hard. All stem from underestimating the change entailed in using terminology in software for ‘patient centred’ systems rather than for its traditional functions of statistical and financial reporting. Firstly, the increase in scale and complexity are enormous. Secondly, the resulting scale exceeds what can be managed manually with the rigour required by software, but building appropriate rigorous representations on the necessary scale is, in itself, a hard problem. Thirdly, ‘clinical pragmatics’—practical data entry, presentation and retrieval for clinical tasks—must be taken into account, so that the intrinsic differences between the needs of users and the needs of software are addressed. This implies that validation of clinical terminologies must include validation in use as implemented in software.,}
    note = {Methods Inf Med 1999;38(4-5):239-52.}
}

@article{IMIA2001300,
    author = {Tang PC, LaRosa MP, Gorden SM.},
    title = {Use of Computer-based Records, Completeness of Documentation, and Appropriateness of Documented Clinical Decisions.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {300-306},
    abstract = {OBJECTIVE: To investigate whether using a computer-based patient record (CPR) affects the completeness of documentation and appropriateness of documented clinical decisions. **DESIGN:** A blinded expert panel of four experienced internists evaluated 50 progress notes of patients who had chronic diseases and whose physicians used either a CPR or a traditional paper record. **MEASUREMENTS:** Completeness of problem and medication lists in progress notes, allergies noted in the entire record, consideration of relevant patient factors in the progress note's diagnostic and treatment plans, and appropriateness of documented clinical decisions. **RESULTS:** The expert reviewers rated the problem lists and medication lists in the CPR progress notes as more complete (1.79/2.00 vs 0.93/2.00, P < 0.001, and 1.75/2.00 vs. 0.91/2.00, P < 0.001, respectively) than those in}
the paper record. The allergy lists in both records were similar. Providers using a CPR documented consideration of more relevant patient factors when making their decisions (1.53/2.00 vs. 1.07/2.00, P < 0.001), and documented more appropriate clinical decisions (3.63/5.00 vs. 2.50/5.00, P < 0.001), compared with providers who used traditional paper records. CONCLUSIONS: Physicians in our study who used a CPR produced more complete documentation and documented more appropriate clinical decisions, as judged by an expert review panel. Because the physicians who used the CPR in our study volunteered to do so, further study is warranted to test whether the same conclusions would apply to all CPR users and whether the improvement in documentation leads to better clinical outcomes.

note = {J Am Med Inform Assoc 1999;6:245-51.} 

@article{IMIA2001307,
    author = {Vlug AE, van der Lei J, Mosseveld BM, van Wijk MA, van der Linden PD, Sturkenboom MC, van Bemmel JH.},
    title = {Postmarketing Surveillance Based on Electronic Patient Records: The IPCI Project.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {307-312},
    abstract = {Researchers claim that data in electronic patient records can be used for a variety of purposes including individual patient care, management, and resource planning for scientific research. Our objective in the project Integrated Primary Care Information (IPCI) was to assess whether the electronic patient records of Dutch general practitioners contain sufficient data to perform studies in the area of postmarketing surveillance studies. We determined the data requirements for postmarketing surveillance studies, implemented additional software in the electronic patient records of the general practitioner, developed an organization to monitor the use of data, and performed validation studies to test the quality of the data. Analysis of the data requirements showed that additional software had to be installed to collect data that is not recorded in routine practice. To avoid having to obtain informed consent from each enrolled patient, we developed IPCI as a semianonymous system: both patients and participating general practitioners are anonymous for the researchers. Under specific circumstances, the researcher can contact indirectly (through a trusted third party) the physician that made the data available. Only the treating general practitioner is able to decode the identity of his patients. A Board of Supervisors predominantly consisting of participating general practitioners monitors the use of data. Validation studies show the data can be used for postmarketing surveillance. With additional software to collect data not normally recorded in routine practice, data from electronic patient record of general practitioners can be used for postmarketing surveillance.},
    note = {Methods Inf Med 1999;38(4-5):339-44.} 

@article{IMIA2001313,
    author = {Weatherburn GC, Bryan S.},
    title = {The effect of a picture archiving and communication system (PACS) on patient radiation doses for examination of the lateral lumbar spine.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {313-324},
    abstract = {This study was conducted to determine whether the doses for the radiographic examination of the lateral lumbar spine changed as a result of the introduction of a hospital-wide picture archiving and communication system (PACS). Doses were measured by thermoluminescent dosimeters (TLD) and dose-area product (DAP) meter readings for 100 patient examinations using a
300-speed conventional film/screen system and for 96 patient examinations when PACS was fully operational. Radiographic technique, exposure factors and patient characteristics were noted and effective doses were calculated, and a comparison was made of all variables. No significant differences between conventional and PACS working were found in surface entry and effective doses for single views of the lateral lumbar spine, but there was a 20% reduction in DAP readings with PACS. However, when summed doses for all images, including rejects, required to demonstrate the lateral lumbar spine for each patient were compared, PACS was found to be associated with significantly lower surface entry (TLD) dose, DAP reading and effective dose (28%, 36% and 16%, respectively) than conventional film. For single images of L1-5, when PACS was in use, there was a significant reduction in the DAP readings and increases in the area of the film/plate irradiated, the focus-to-skin distance and the focus-to-film distance. In addition, significantly fewer lumbosacral junction views were undertaken when PACS was in use. Since many confounding factors may have influenced the results over the period of dose measurement, regression models were used to determine the significance of PACS. These models showed that the use of PACS was not significant in causing any differences in the dose for single images as compared with when film was used, but was significant in the resulting total dose reductions for the examinations.

\[\text{note} = \{\text{Br J Radiol 1999;72:534-45.}\}\]

@article{IMIA2001325,
    author = {Yamazaki S, Satomura Y.},
    title = {Standard Method for Describing an Electronic Patient Record Template: Application of XML to Share Domain Knowledge.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {325-332},
    abstract = {A Template Definition Language (TDL) was developed to share knowledge of how to construct an electronic patient record (EPR) template. Based on the extensible markup language XML, TDL has been designed to be independent of EPR platforms or databases. Our research of TDL was conducted through evaluation of the description of various templates in the currently available EPRs and through comparisons with some electronic clinical guidelines. We conclude that TDL is sufficient for the objective but still needs improvement of the algorithm for describing dynamic changes.},
    note = {Methods Inf Med 2000;39(1):50-5.}
}

@article{IMIA2001333,
    author = {Clayton PD.},
    title = {The state of clinical information systems after four decades of effort. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {333-337},
    abstract = {},
    note = {}\}

@article{IMIA2001338,
    author = {Ammenwerth E, Buchauer A, Bludau B, Haux R.},
    title = {Mobile information and communication tools in the hospital.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},}
abstract = {Mobile information and communication systems in clinical routine have the potential to greatly improve communication, facilitate information access, eliminate double documentation, and increase quality of patient care in the long run. Projects to date have focused, for the most part, on highly specialized applications of the mobile computer. In our research project, 'Cooperative Problem Solving in Health Care', we have, among other things, designed a multifunctional mobile information and communication assistant. A prototype version of this system was implemented. This article outlines the close-to-reality evaluation of our prototype in a 1-week simulation study in a Heidelberg University hospital. We describe methods, aims, design and results of the simulation study, as well as discuss our methodology and the results we have obtained. We argue that the diverse requirements of different professional groups cannot be fulfilled by a single multifunctional device and propose, therefore, a 'multi-device mobile computer architecture'. Finally, we present consequences for the future computing infrastructure.},

note = {Int J Med Inf 2000;57:21-40.}

@article{IMIA2001358,
author = {Bates DW, Teich JM, Lee J, Seger D, Kuperman GJ, Maluf N, Boyle D, Leape L.},
title = {The Impact of Computerized Physician Order Entry on Medication Error Prevention.},
journal = {IMIA Yearbook of medical informatics},
volume = {2001},
year = {2001},
pages = {358-366},
abstract = {BACKGROUND: Medication errors are common, and while most such errors have little potential for harm they cause substantial extra work in hospitals. A small proportion do have the potential to cause injury, and some cause preventable adverse drug events. OBJECTIVE: To evaluate the impact of computerized physician order entry (POE) with decision support in reducing the number of medication errors. DESIGN: Prospective time series analysis, with four periods. SETTING AND PARTICIPANTS: All patients admitted to three medical units were studied for seven to ten-week periods in four different years. The baseline period was before implementation of POE, and the remaining three were after. Sophistication of POE increased with each successive period. INTERVENTION: Physician order entry with decision support features such as drug allergy and drug-drug interaction warnings. MAIN OUTCOME MEASURE: Medication errors, excluding missed dose errors. RESULTS: During the study, the non-missed-dose medication error rate fell 81 percent, from 142 per 1,000 patient-days in the baseline period to 26.6 per 1,000 patient-days in the final period \(P < 0.0001\). Non-intercepted serious medication errors (those with the potential to cause injury) fell 86 percent from baseline to period 3, the final period \(P = 0.0003\). Large differences were seen for all main types of medication errors: dose errors, frequency errors, route errors, substitution errors, and allergies. For example, in the baseline period there were ten allergy errors, but only two in the following three periods combined \(P < 0.0001\). CONCLUSIONS: Computerized POE substantially decreased the rate of non-missed-dose medication errors. A major reduction in errors was achieved with the initial version of the system, and further reductions were found with addition of decision support features.},

note = {J Am Med Inform Assoc 1999;6:313-21.}
}

@article{IMIA2001367,
title = {Development of the Nursing Minimum Data Set for the Netherlands (NMDSN): identification of categories and items.},
journal = {IMIA Yearbook of medical informatics},
volume = {2001},
Development of the Nursing Minimum Data Set for the Netherlands (NMDSN): identification of categories and items

Rationale
Currently, there is no systematic collection of nursing care data in the Netherlands, while pressure is growing from the profession, policy-makers and society to justify the contribution of nursing and its costs. A nursing minimum data set can provide data to demonstrate nursing's contribution to health care as it can be used to describe the diversity of different patient populations and the variability of nursing activities, and to calculate the associated nursing workload.

Objective
To identify categories and items for inclusion in the Nursing Minimum Data Set for the Netherlands.

Design
A multimethod, exploratory approach was used. This included interviews, document analysis, consensus rounds, seeking validation in the literature, and drawing up lists of most frequently occurring patient problems, interventions and outcomes of care.

Eight hospitals, with a total of 16 wards, participated in the study.

Results
Relevant categories and items emerged after analysis and grouping of the material and included: five hospital-related items, six patient demographics items, seven medical condition items, 10 nursing process items, 24 patient problems, 32 nursing interventions, four outcomes of nursing care, and three complexity of care items.

Almost every item could be located in the existing documentation systems, the lists of patient problems, outcomes and interventions, or in the literature.

Conclusion
A set of categories and items of nursing data has been identified. The content validity of this set is partly supported by its consistency with the literature, findings from practice and the judgement of potential users. Nursing outcomes need further development. The data set will be tested in practice to find out whether the categories and items are useful, and whether they can be minimized.
OBJECTIVE: To review the effectiveness of computer support for determining optimum drug dose. DESIGN: Systematic review of comparative studies where computers gave advice to clinicians on the most appropriate drug dose. Search methods used were standard for the Cochrane Collaboration on Effective Professional Practice. SUBJECTS: Comparative studies conducted worldwide and published between 1966 and 1996. MAIN OUTCOME MEASURES: For qualitative review, relative percentage differences were calculated to compare effects of computer support in different settings. For quantitative data, effect sizes were calculated and combined in meta-analyses. RESULTS: Eighteen studies met the inclusion criteria. The drugs studied were theophylline, warfarin, heparin, aminoglycosides, nitroprusside, lignocaine, oxytocin, fentanyl, and midazolam. The computer programs used individualised pharmacokinetic models to calculate the most appropriate dose. Meta-analysis of data from 671 patients showed higher blood concentrations of drug with computer support (effect size 0.69, 95% confidence interval 0.36 to 1.02) and reduced time to achieve therapeutic control (0.44, 0.17 to 0.71). The total dose of drug used was unchanged, and there were fewer unwanted effects of treatment. Five of six studies measuring outcomes of care showed benefit from computer assistance. CONCLUSIONS: This review suggests that using computers to determine the correct dose of certain drugs in acute hospital settings is beneficial. Computers may give doctors the confidence to use higher doses when necessary, adjusting the drug dose more accurately to individual patients. Further research is necessary to evaluate the benefits in general use.}

note = {BMJ 1999;318(7189):984-90.}
and ST60 in III) it was possible to correctly classify 76% of patients by the occlusion site, and with three KLT-derived indexes (first-order KLT index for ST-T complex in I and for QRS in leads V3 and I) 83% of correct classification was obtained. Using six indexes for local and KLT-derived indexes the correct classification was increased to 85 and 90% of patients, respectively. The use of different ECG indexes (from different intervals) on quasiorthogonal leads permitted the identification of the occluded artery in patients undergoing PTCA and may be extended to more general use. Copyright 1999 Academic Press.,


@article{IMIA2001414,
  title = {AnatomyBrowser: A Novel Approach to Visualization and Integration of Medical Information.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {414-428},
  abstract = {In this article, we present a novel technique for visualization of three-dimensional (3D) surface models, as well as its implementation in a system called AnatomyBrowser. Using our approach, visualization of 3D surface models is performed in two separate steps: a pre-rendering step, in which the models are rendered and saved in a special format, and an actual display step, in which the final result of rendering is generated using information from the prerendering step. Whereas prerendering requires high-end graphics hardware, the final image generation and display can be implemented efficiently in software. Moreover, our current implementation of AnatomyBrowser interface uses the Java programming language and can therefore be readily run on a wide range of systems, including low-end computers with no special graphics hardware. In addition to visualization of 3D models and 2D slices, AnatomyBrowser provides a rich set of annotation and cross-referencing capabilities. We demonstrate several possible applications for AnatomyBrowser, including interactive anatomy atlases, surgery planning, and assistance in segmentation. Copyright 1999 Wiley-Liss, Inc.,
  note = {Comput Aided Surg 1999;4:129-43.}
}

@article{IMIA2001429,
  author = {Kyriacou SK, Davatzikos C, Zinreich SJ, Bryan RN.},
  title = {Nonlinear Elastic Registration of Brain Images with Tumor Pathology Using a Biomechanical Model.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {429-441},
  abstract = {A biomechanical model of the brain is presented, using a finite-element formulation. Emphasis is given to the modeling of the soft-tissue deformations induced by the growth of tumors and its application to the registration of anatomical atlases, with images from patients presenting such pathologies. First, an estimate of the anatomy prior to the tumor growth is obtained through a simulated biomechanical contraction of the tumor region. Then a normal-to-normal atlas registration to this estimated pre-tumor anatomy is applied. Finally, the deformation from the tumor-growth model is applied to the resultant registered atlas, producing an atlas that has been deformed to fully register to the patient images. The process of tumor growth is simulated in a nonlinear optimization framework, which is driven by anatomical features such as boundaries of brain structures. The deformation of the surrounding tissue is estimated using a nonlinear elastic model of soft tissue under the boundary conditions imposed by the skull, ventricles, and the falx and...}
tentorium. A preliminary two-dimensional (2-D) implementation is presented in this paper, and tested on both simulated and patient data. One of the long-term goals of this work is to use anatomical brain atlases to estimate the locations of important brain structures in the brain and to use these estimates in presurgical and radiosurgical planning systems.

@article{IMIA2001442,
    author = {McInerney T, Terzopoulos D.},
    title = {Topology Adaptive Deformable Surfaces for Medical Image Volume Segmentation.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {442-452},
    abstract = {Deformable models, which include deformable contours (the popular snakes) and deformable surfaces, are a powerful model-based medical image analysis technique. We develop a new class of deformable models by formulating deformable surfaces in terms of an affine cell image decomposition (ACID). Our approach significantly extends standard deformable surfaces, while retaining their interactivity and other desirable properties. In particular, the ACID induces an efficient reparameterization mechanism that enables parametric deformable surfaces to evolve into complex geometries, even modifying their topology as necessary. We demonstrate that our new ACID-based deformable surfaces, dubbed T-surfaces, can effectively segment complex anatomic structures from medical volume images.},
}

@article{IMIA2001453,
    author = {Mori K, Hasegawa J, Suenaga Y, Toriwaki J.},
    title = {Automated Anatomical Labeling of the Bronchial Branch and Its Application to the Virtual Bronchoscopy System.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {453-464},
    abstract = {This paper describes a method for the automated anatomical labeling of the bronchial branch extracted from a three-dimensional (3-D) chest X-ray CT image and its application to a virtual bronchoscopy system (VBS). Automated anatomical labeling is necessary for implementing an advanced computer-aided diagnosis system of 3-D medical images. This method performs the anatomical labeling of the bronchial branch using the knowledge base of the bronchial branch name. The knowledge base holds information on the bronchial branch as a set of rules for its anatomical labeling. A bronchus region is automatically extracted from a given 3-D CT image. A tree structure representing the essential structure of the extracted bronchus is recognized from the bronchus region. Anatomical labeling is performed by comparing this tree structure of the bronchus with the knowledge base. As an application, we implemented the function to automatically present the anatomical names of the branches that are shown in the currently rendered image in real time on the VBS. The result showed that the method could segment about 57% of the branches from CT images and extracted a tree structure of about 91% in branches in the segmented bronchus. The anatomical labeling method could assign the correct branch name to about 93% of the branches in the extracted tree structure. Anatomical names were appropriately displayed in the endoscopic view.},
    note = {IEEE Trans Med Imaging 2000;19(2):103-14.}
}
@article{IMIA2001465,
    author = {Munteanu A, Cornelis J, Cristea P.},
    title = {Wavelet-Based Lossless Compression of Coronary Angiographic Images.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {465-474},
    abstract = {The final diagnosis in coronary angiography has to be performed on a large set of original images. Therefore, lossless compression schemes play a key role in medical database management and telediagnosis applications. This paper proposes a wavelet-based compression scheme that is able to operate in the lossless mode. The quantization module implements a new way of coding of the wavelet coefficients that is more effective than the classical zerotree coding. The experimental results obtained on a set of 20 angiograms show that the algorithm outperforms the embedded zerotree coder, combined with the integer wavelet transform, by 0.38 bpp, the set partitioning coder by 0.21 bpp, and the lossless JPEG coder by 0.71 bpp. The scheme is a good candidate for radiological applications such as teleradiology and picture archiving and communications systems (PACS's).},
    note = {IEEE Trans Med Imaging 1999;18(3):272-81.}
}

@article{IMIA2001475,
    title = {Observer of the Human Cardiac Sympathetic Nerve Activity Using Noncausal Blind Source Separation.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {475-486},
    abstract = {We present a novel method for the blind reconstruction of the cardiac sympathetic nerve activity (CSNA) in the low-frequency (LF) band (0.04-0.15 Hz) using only heart rate and arterial blood pressure. The originality of the method consists in the application of blind source separation techniques to obtain an observer of CSNA. We show how this observer can be deduced from a linear model of the cardiovascular system by introduction of the fundamental assumptions about the independence of the cardiac sympathetic an parasympathetic outflow. In cardiovascular applications, the reliability of the observer has been assessed by verification of the fundamental assumption for the given data. A primer qualitative validation has been performed using the muscle sympathetic nerve activity as an indirect indicator of CSNA. Very satisfying and promising results have been obtained. Moreover, we have performed quantitative validations of the observer in various experimental conditions known to elicit selectively cardiac sympathetic or parasympathetic response. The experimental conditions include a supine-to-60 degrees tilt test, indirect sympathetic stimulation/inhibition by medication, and sympathetic stimulation by isometric handgrip. We show that the observer allows to highlight changing levels of the cardiac sympathetic activity in the LF band in all these experimental conditions.},
}

@article{IMIA2001487,
    author = {Fieschi M.},
    title = {Knowledge Processing and Decision Support Systems. Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2001},
    year = {2001},
    pages = {487-489},
    abstract = {Knowledge processing and decision support systems are becoming increasingly important in the medical field. They allow the integration of various types of information and the provision of support for decision-making processes. This article provides a synopsis of the latest developments in the field of knowledge processing and decision support systems in medical informatics.},
}
The authors describe a methodology for helping computational biologists diagnose discrepancies they encounter between experimental data and the predictions of scientific models. The authors call these discrepancies data-model conflicts. They have built a prototype system to help scientists resolve these conflicts in a more systematic, evidence-based manner. In computational biology, data-model conflicts are the result of complex computations in which data and models are transformed and evaluated. Increasingly, the data, models, and tools employed in these computations come from diverse and distributed resources, contributing to a widening gap between the scientist and the original context in which these resources were produced. This contextual rift can contribute to the misuse of scientific data or tools and amplifies the problem of diagnosing data-model conflicts. The authors' hypothesis is that systematic collection of metadata about a computational process can help bridge the contextual rift and provide information for supporting automated diagnosis of these conflicts. The methodology involves three major steps. First, the authors decompose the data-model evaluation process into abstract functional components. Next, they use this process decomposition to enumerate the possible causes of the data-model conflict and direct the acquisition of diagnostically relevant metadata. Finally, they use evidence statically and dynamically generated from the metadata collected to identify the most likely causes of the given conflict. They describe how these methods are implemented in a knowledge-based system called GRENDEL and show how GRENDEL can be used to help diagnose conflicts between experimental data and computationally built structural models of the 30S ribosomal subunit.
guidelines to a large stored data set of previous patients. If the new guidelines are approved, they are exported to the reminder system that is used in daily practice. RESULTS: ICU physicians used the knowledge acquisition tool to enter 58 guidelines into the reminder system’s knowledge base. These guidelines were tested on a data set consisting of 803 previously admitted patients. As a result, 27 guidelines fired at least once, generating 406 reminders in total. Of the 406 generated reminders, 356 (88%) were issued correctly and 50 (12%) were false alarms. The reminders that were issued correctly involved 3 situations: 1) the database contained inconsistent or incomplete information, 2) the actions or decisions of the health care workers were not the most appropriate ones, and 3) there was a potential risk involved. All false alarms were caused by the fact that the corresponding guidelines were not specific enough to handle certain exceptions. As a result of this analysis, the guidelines could be improved in such a way as to eliminate all false alarms. CONCLUSIONS: These first results demonstrate that this bottom-up knowledge acquisition strategy, implemented by the automated knowledge acquisition tools, enables medical specialists to improve the quality of computer support in an ICU without assistance of a knowledge engineer.

@article{IMIA2001518,
  author = {Johnson SB.},
  title = {A Semantic Lexicon for Medical Language Processing.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {518-531},
  abstract = {OBJECTIVE: Construction of a resource that provides semantic information about words and phrases to facilitate the computer processing of medical narrative. DESIGN: Lexemes (words and word phrases) in the Specialist Lexicon were matched against strings in the 1997 Metathesaurus of the Unified Medical Language System (UMLS) developed by the National Library of Medicine. This yielded a "semantic lexicon," in which each lexeme is associated with one or more syntactic types, each of which can have one or more semantic types. The semantic lexicon was then used to assign semantic types to lexemes occurring in a corpus of discharge summaries (603,306 sentences). Lexical items with multiple semantic types were examined to determine whether some of the types could be eliminated, on the basis of usage in discharge summaries. A concordance program was used to find contrasting contexts for each lexeme that would reflect different semantic senses. Based on this evidence, semantic preference rules were developed to reduce the number of lexemes with multiple semantic types. RESULTS: Matching the Specialist Lexicon against the Metathesaurus produced a semantic lexicon with 75,711 lexical forms, 22,805 (30.1 percent) of which had two or more semantic types. Matching the Specialist Lexicon against one year’s worth of discharge summaries identified 27,633 distinct lexical forms, 13,322 of which had at least one semantic type. This suggests that the Specialist Lexicon has about 79 percent coverage for syntactic information and 38 percent coverage for semantic information for discharge summaries. Of those lexemes in the corpus that had semantic types, 3,474 (12.6 percent) had two or more types. When semantic preference rules were applied to the semantic lexicon, the number of entries with multiple semantic types was reduced to 423 (1.5 percent). In the discharge summaries, occurrences of lexemes with multiple semantic types were reduced from 9.41 to 1.46 percent. CONCLUSION: Automatic methods can be used to construct a semantic lexicon from existing UMLS sources. This semantic information can aid natural language processing programs that analyze medical narrative, provided that lexemes with multiple semantic types are kept to a minimum. Semantic preference rules can be used to select semantic types that are appropriate to clinical reports. Further work is needed to increase the coverage of the semantic lexicon and to exploit contextual information when selecting semantic senses.},
  note = {[J Am Med Inform Assoc 1999;6(3):205-18]}
}
OBJECTIVES: Describe and evaluate an Internet-based approach to patient decision support using mathematical models that predict the probability of successful treatment on the basis of meta-analytic summaries of the mean and standard deviation of symptom response.

DESIGN: An Internet-based decision support tool was developed to help patients with benign prostatic hypertrophy (BPH) determine whether they wanted to use alpha blockers. The Internet site incorporates a meta-analytic model of the results of randomized trials of the alpha blocker terazosin. The site describes alternative treatments for BPH and potential adverse effects of alpha blockers. The site then measures patients' current symptoms and desired level of symptom reduction. In response, the site computes and displays the probability of a patient's achieving his objective by means of terazosin or placebo treatment.

SETTING: Self-identified BPH patients accessing the site over the Internet.

MAIN OUTCOME MEASURES: Patients' perceptions of the usefulness of information.

RESULTS: Over a three-month period, 191 patients who were over 50 years of age and who reported that they have BPH used the decision support tool. Respondents had a mean American Urological Association (AUA) score of 18.8 and a desired drop in symptoms of 10.1 AUA points. Patients had a 40 percent chance of achieving treatment goals with terazosin and a 20 percent chance with placebo. Patients found the information useful (93 percent), and most (71 percent) believed this type of information should be discussed before prescribing medications.

CONCLUSIONS: Interactive meta-analytic summary models of the effects of pharmacologic treatments can help patients determine whether a treatment offers sufficient benefits to offset its risks.

note = {J Am Med Inform Assoc 1999;6(5):412-9.}
The use of the Internet makes it possible to bring together learners and teachers from rural areas and academic centers and to deliver well-accepted educational materials quickly and effectively. The objective of this study was to determine feasibility and the effectiveness of a problem-based small-group learning (PBSGL) intervention conducted via the Internet in a randomized controlled trial. A group of 23 family physicians from rural Northern Ontario practices and across Canada were randomly assigned to a study group (n = 11) and a control group (n = 12). The study group spent two months discussing the topic of depression in the elderly with the help of a facilitator and two geriatric psychiatrists. The control group was given similar educational resources via the Internet but without the benefit of the small-group interaction. Outcome measures included qualitative feedback from the learners and teachers as well as a Multiple Choice Questions (MCQ) test before and after the study. The study provided important insight into the feasibility, keys to success, utility of Internet-assisted education from an education and evaluation perspective. Although the MCQ testing used revealed no significant differences between the study group and the control group, the usefulness of the measure is considered within the context of the educational approach. It is unclear whether this method of continuing medical education (CME) represents an effective way to conduct such activities.
The management of dysphagia is the largest recognized subspecialty in the field of speech-language pathology. Practicing speech-language pathologists require a comprehensive theoretical and functional knowledge base to underpin the safe and effective management of people with dysphagia. Students need to develop an understanding of the normal integrated swallow and how it can be affected to appreciate the assessment or treatment of dysphagia. Although students are well motivated to learn this material, assimilating knowledge of the dynamic nature of the swallow has typically been problematic because of its complex character. The limitations of currently available teaching resources have been addressed by the production of an interactive multimedia program that includes integrated presentation of text, graphics, voice-overs, and video and animation sequences to highlight various aspects of the swallowing process. Students can selectively manipulate parts of this process to understand the normal swallow and to simulate different aspects of dysfunction and the consequent effects on swallow safety and efficiency. Feedback from students, faculty, and experts has demonstrated that The Dynamic Swallow would be a valued tool in the teaching of dysphagia.

OBJECTIVE: Computerized realistic simulation technology has been used as a training tool in fields such as aviation and military training and in the nuclear power industry. More recently, it has been adapted for use in anesthesia crisis resource management. We describe the effectiveness of a simulation program like that used by anesthesiology departments that we developed to teach radiologists the principles of crisis management. MATERIALS AND METHODS: A mock CT scanner and patient simulator were used to simulate the environment in which radiologists encounter crises. Twenty-four residents attended the training program, four at each half-day session. Two responded to and two observed an initial crisis, after which they attended a lecture and watched a videotape review. The second pair then participated in a different crisis scenario. The scenario order was randomized. All scenarios were videotaped and randomly reviewed by two physicians not involved with the course. The following behavioral qualities of the participating residents were evaluated using a five-point scale, ranging from poor (1) to excellent (5): global assessment, communication skills, use of support personnel, use of resources, and role clarity. Residents then rated the course on a five-point scale using the following criteria: overall course usefulness, attainment of course goals, realism of scenarios, quality of lecture, and quality of videotape review. RESULTS: The trainees who had attended the lecture and watched the videotape review before participating in a scenario consistently scored higher than those who had not in the following areas (score after training/score before training): global assessment, 4.08/2.50; communication skills, 4.09/2.67; use of support personnel, 4.17/3.00; use of resources, 4.00/2.92; and role clarity, 4.17/2.67. Moreover, the participants gave the course the following average ratings: overall usefulness, 4.93; attainment of course goals, 4.78; realism of scenarios, 4.63; quality of
CONCLUSION: Although the critical assessment of a teaching method is difficult and subjective by nature, the improvement in behavioral performance scores suggests that simulation technology effectively conveyed the principles of crisis management. The course ratings show that the program was well accepted by participants.

@article{IMIA2001592,
  author = {Weidenbach M, Wick C, Pieper S, Quast KJ, Fox T, Grunst G, Redel DA.},
  title = {Augmented Reality Simulator for Training in Two-Dimensional Echocardiography.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2001},
  year = {2001},
  pages = {592-604},
  abstract = {In two-dimensional echocardiography the sonographer must synthesize multiple tomographic slices into a mental three-dimensional (3D) model of the heart. Computer graphics and virtual reality environments are ideal to visualize complex 3D spatial relationships. In augmented reality (AR) applications, real and virtual image data are linked, to increase the information content. In the presented AR simulator a 3D surface model of the human heart is linked with echocardiographic volume data sets. The 3D echocardiographic data sets are registered with the heart model to establish spatial and temporal congruence. The heart model, together with an animated ultrasound sector represents a reference scenario, which displays the currently selected two-dimensional echocardiographic cutting plane calculated from the volume data set. Modifications of the cutting plane within the echocardiographic data are transferred and visualized simultaneously and in real time within the reference scenario. The trainee can interactively explore the 3D heart model and the registered 3D echocardiographic data sets by an animated ultrasound probe, whose position is controlled by an electromagnetic tracking system. The tracking system is attached to a dummy transducer and placed on a plastic puppet to give a realistic impression of a two-dimensional echocardiographic examination. Copyright 2000 Academic Press.},
}
@article{IMIA20021,
  author = {Ayache N.},
  title = {Medical Imaging Informatics: From Digital Anatomy to Virtual Scalpels and Image Guided Therapy},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {1},
  abstract = {},
  note = {}
}

@article{IMIA20023,
  author = {Kulikowski C, Haux R.},
  title = {Medical Imaging Informatics},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {3},
  abstract = {},
  note = {}
}

@article{IMIA200291,
  author = {Kaplan B, Shaw NT.},
  title = {People, Organizational and Social Issues: Evaluation as an exemplar},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {91-102},
  abstract = {},
  note = {}
}

@article{IMIA2002103,
  author = {Klein G.},
  title = {Standardization of health informatics – results and challenges},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {103-114},
  abstract = {},
  note = {}
}

@article{IMIA2002115,
  author = {Ackerman MJ.},
  title = {Visible Human Project: From Data to Knowledge},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},

title = {Education in medical informatics on the basis of the information technology curriculum at the Veszprém University},
journal = {IMIA Yearbook of medical informatics},
volume = {2002},
year = {2002},
pages = {160-163},
abstract = {},
note = {}
The 21st century is said to be a century of the information society. We should be aware that continuing progress in information processing methodology (IPM) and information and communication technology (ICT) is changing our societies, including medicine and health care. At the start of the third Millennium we should ask ourselves, what progress can we expect from modern IPM/ICT for healthcare in the coming decade, what concerns does the information society have to face, and what steps have to be taken. These questions were addressed by clinicians, researchers and industrial representatives in a panel discussion at the joint conference ISCB-GMDS-99 of the International Society of Clinical Biostatistics and the German Society for Medical Informatics, Biometry and Epidemiology. Important aspects raised by the panelists and in the subsequent discussion were: (1) the main goal of expanding IPM/ICT should be to further improve quality of care, while maintaining reasonable costs; (2) with the support of modern IPM and ICT the boundaries between inpatient and outpatient care will fade away enabling a more efficient, patient-centered health care; (3) cooperation between health-care professionals will increase; there will be different ways of communication between them and with the patient, including modern ICT and the Internet; (4) society must be concerned with achieving equal opportunities in being informed about and in using new ICT; (5) misuse of data will remain a serious problem and can become an obstacle to progress. Reprinted from: Methods Inf Med. 2001 May;40(2):156-62,

note = {Methods Inf Med. 2001 May;40(2):156-62}

@article{IMIA2002194,
    author = {Musen M, van Bemmel JH.},
    title = {Challenges for Medical Informatics as an Academic Discipline: Workshop Report.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {194-200},
    abstract = {},
    note = {}}

@article{IMIA2002217,
    author = {Audette MA, Ferrie FP and Peters TM.},
    title = {An algorithmic overview of surface registration techniques for medical imaging},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {201-217},
    abstract = {This paper presents a literature survey of automatic 3D surface registration techniques emphasizing the mathematical and algorithmic underpinnings of the subject. The relevance of surface registration to medical imaging is that there is much useful anatomical

    note = {}}
information in the form of collected surface points which originate from complimentary modalities and which must be reconciled. Surface registration can be roughly partitioned into three issues: choice of transformation, elaboration of surface representation and similarity criterion, and matching and global optimization. The first issue concerns the assumptions made about the nature of relationships between the two modalities, e.g. whether a rigid-body assumption applies, and if not, what type and how general a relation optimally maps one modality onto the other. The second issue determines what type of information we extract from the 3D surfaces, which typically characterizes their local or global shape, and how we organize this information into a representation of the surface which will lead to improved efficiency and robustness in the last stage. The last issue pertains to how we exploit this information to estimate the transformation which best aligns local primitives in a globally consistent manner or which maximizes a measure of the similarity in global shape of two surfaces. Within this framework, this paper discusses in detail each surface registration issue and reviews the state-of-the-art among existing techniques. Reprinted from: Med Image Anal 2000;4(3):201-17.

@article{IMIA2002218,
  title = {Planning and simulation of neurosurgery in a virtual reality environment.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {218-237},
  abstract = {OBJECTIVE: To report our experience with preoperative neurosurgical planning in our stereoscopic virtual reality environment for 21 patients with intra- and extra-axial brain tumors and vascular malformations. METHODS: A neurosurgical planning system called VIVIAN (Virtual Intracranial Visualization and Navigation) was developed for the Dextroscope, a virtual reality environment in which the operator reaches with both hands behind a mirror into a computer-generated stereoscopic three-dimensional (3-D) object and moves and manipulates the object in real time with natural 3-D hand movements. Patient-specific data sets from multiple imaging techniques (magnetic resonance imaging, magnetic resonance angiography, magnetic resonance venography, and computed tomography) were coregistered, fused, and displayed as a stereoscopic 3-D object. A suite of 3-D tools accessible inside the VIVIAN workspace enabled users to coregister data, perform segmentation, obtain measurements, and simulate intraoperative viewpoints and the removal of bone and soft tissue. RESULTS: VIVIAN was used to plan neurosurgical procedures primarily in difficult-to-access areas, such as the cranial base and the deep brain. The intraoperative and virtual reality 3-D scenarios correlated well. The VIVIAN system substantially contributed to surgical planning by 1) providing a quick and better understanding of intracranial anatomic and abnormal spatial relationships, 2) simulating the craniotomy and the required cranial base bone work, and 3) simulating intraoperative views. CONCLUSION: The VIVIAN system allows users to work with complex imaging data in a fast, comprehensive, and intuitive manner. The 3-D interaction of this virtual reality environment is essential to the efficient assembly of surgically relevant spatial information from the data derived from multiple imaging techniques. The usefulness of the system is highly dependent on the accurate coregistration of the data and the real-time speed of the interaction. Reprinted from: Neurosurgery 2000;46(1):118-35; discussion 135-7},
  note = {Neurosurgery 2000;46(1):118-35; discussion 135-7.}
}

@article{IMIA2002228,
  author = {Lohmann G, von Cramon DY.},
  title = {Automatic labelling of the human cortical surface using sulcal basins},
  note = {Med Image Anal 2000;4(3):201-17.}
Human brain mapping aims at establishing correspondences between brain function and brain anatomy. One of the most intriguing problems in this field is the high interpersonal variability of human neuroanatomy which makes studies across many subjects very difficult. The cortical folds ('sulci') often serve as landmarks that help to establish correspondences between subjects. In this paper, we will present a method that automatically detects and attributes neuroanatomical names to the cortical folds using image analysis methods applied to magnetic resonance data of human brains. We claim that the cortical folds can be subdivided into a number of substructures which we call sulcal basins. The concept of sulcal basins allows us to establish a complete parcellation of the cortical surface into separate regions. These regions are neuroanatomically meaningful and can be identified from MR data sets across many subjects. Sulcal basins are segmented using a region growing approach. The automatic labelling is achieved by a model matching technique. Reprinted from: Med Image Anal 2000;4(3):179-88,

note = {Med Image Anal 2000;4(3):179-88}

@article{IMIA2002248,
  author = {Mueller K, Yagel R.},
  title = {Rapid 3-D cone-beam reconstruction with the simultaneous algebraic reconstruction technique (SART) using 2-D texture mapping hardware},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {248-258},
  abstract = {Algebraic reconstruction methods, such as the algebraic reconstruction technique (ART) and the related simultaneous ART (SART), reconstruct a two-dimensional (2-D) or three-dimensional (3-D) object from its X-ray projections. The algebraic methods have, in certain scenarios, many advantages over the more popular Filtered Backprojection approaches and have also recently been shown to perform well for 3-D cone-beam reconstruction. However, so far the slow speed of these iterative methods have prohibited their routine use in clinical applications. In this paper, we address this shortcoming and investigate the utility of widely available 2-D texture mapping graphics hardware for the purpose of accelerating the 3-D algebraic reconstruction. We find that this hardware allows 3-D cone-beam reconstructions to be obtained at almost interactive speeds, with speed-ups of over 50 with respect to implementations that only use general-purpose CPUs. However, we also find that the reconstruction quality is rather sensitive to the resolution of the framebuffer, and to address this critical issue we propose a scheme that extends the precision of a given framebuffer by 4 bits, using the color channels. With this extension, a 12-bit framebuffer delivers useful reconstructions for 0.5% tissue contrast, while an 8-bit framebuffer requires 4%. Since graphics hardware generates an entire image for each volume projection, it is most appropriately used with an algebraic reconstruction method that performs volume correction at that granularity as well, such as SART or SIRT. We chose SART for its faster convergence properties. Reprinted from: IEEE Trans Med Imaging 2000;19(12):1227-37},
  note = {IEEE Trans Med Imaging 2000;19(12):1227-37}
}

@article{IMIA2002259,
  author = {Wang J, Naghdy G.},
  title = {Three novel lossless image compression schemes for medical image archiving and telemedicine},

In this article, three novel lossless image compression schemes, hybrid predictive/vector quantization lossless image coding (HPVQ), shape-adaptive differential pulse code modulation (DPCM) (SADPCM), and shape-VQ-based hybrid ADPCM/DCT (ADPCMDCT) are introduced. All are based on the lossy coder, VQ. However, VQ is used in these new schemes as a tool to improve the decorrelation efficiency of those traditional lossless predictive coders such as DPCM, adaptive DPCM (ADPCM), and multiplicative autoregressive coding (MAR). A new kind of VQ, shape-VQ, is also introduced in this article. It provides predictive coders useful information regarding the shape characters of image block. These enhance the performance of predictive coders in the context of lossless coding. Simulation results of the proposed coders applied in lossless medical image compression are presented. Some leading lossless techniques such as DPCM, hierarchical interfold (HINT), CALIC, and the standard lossless JPEG are included in the tests. Promising results show that all these three methods are good candidates for lossless medical image compression. Reprinted from: Telemed J 2000;6(2):251-60,

note = {Telemed J 2000;6(2):251-60}
when used with medical texts. This algorithm usually performs at least twice as fast as the other algorithms tested. CONCLUSION: The time performance of exact string pattern matching can be greatly improved if an efficient algorithm is used. Considering the growing amount of text handled in the electronic patient record, it is worth implementing this efficient algorithm. Reprinted from: J Am Med Inform Assoc 2000;7(4):378-91,

note = {J Am Med Inform Assoc 2000;7(4):378-91}

@article{IMIA2002290,
    author = {Pratt W, Fagan L.},
    title = {The usefulness of dynamically categorizing search results},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {290-302},
    abstract = {OBJECTIVE: The authors' goal was to determine whether dynamic categorization, a new technique for organizing search results, is more useful than the two existing organizational techniques: relevance ranking and clustering. They define a useful tool as one that helps users learn about the kinds of information that pertain to their query, find answers to their questions efficiently and easily, and feel satisfied with their search experience. DESIGN: Fifteen patients with breast cancer and their family members completed query-related tasks using all three tools. The authors measured the time it took the subjects to accomplish their tasks, the number of answers to the query that the subjects found in four minutes, and the number of new answers that they could recall at the end of the study. Subjects also completed a user-satisfaction questionnaire. RESULTS: The results showed that patients with breast cancer and their family members could find significantly (P: < 0.05) more answers in a fixed amount of time and were significantly (P: < 0.05) more satisfied with their search experience when they used the dynamic categorization tool than when they used either the cluster tool or the ranking tool. Subjects indicated that the dynamic categorization tool provided an organization of search results that was more clear, easy to use, accurate, precise, and helpful than those of the other tools. CONCLUSION: The experiments indicate that dynamic categorization is an effective and useful approach for organizing search results. Tools that use this technique will help patients and their families gain quick and easy access to important medical information. Reprinted from: J Am Med Inform Assoc 2000;7(6):605-17,

note = {J Am Med Inform Assoc 2000;7(6):605-17}

@article{IMIA2002303,
    author = {Schleyer TK, Forrest JL.},
    title = {Methods for the design and administration of web-based surveys},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {303-312},
    abstract = {This paper describes the design, development, and administration of a Web-based survey to determine the use of the Internet in clinical practice by 450 dental professionals. The survey blended principles of a controlled mail survey with data collection through a Web-based database application. The survey was implemented as a series of simple HTML pages and tested with a wide variety of operating environments. The response rate was 74.2 percent. Eighty-four percent of the participants completed the Web-based survey, and 16 percent used e-mail or fax. Problems identified during survey administration included incompatibilities/technical problems, usability problems, and a programming error. The cost of the Web-based survey was 38 percent less than that
of an equivalent mail survey. A general formula for calculating breakeven points between electronic and hardcopy surveys is presented. Web-based surveys can significantly reduce turnaround time and cost compared with mail surveys and may enhance survey item completion rates. Reprinted from: J Am Med Inform Assoc 2000;7(4):416-25,

@article{IMIA2002313,
  author = {Schulz S, Hahn U.},
  title = {Morpheme-based, cross-lingual indexing for medical document retrieval},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {313-328},
  abstract = {The increasing availability of machine-readable medical documents is not really matched with the sophistication of currently used retrieval facilities to deal with a variety of critical natural language phenomena. Still most popular are string-matching methods which encounter problems for the medical sublanguage, in particular, concerning the wide-spread use of complex word forms such as noun compounds. We introduce a methodology for the segmentation of complex compounds into medically motivated morphemes. Given the sublanguage patterns in our data these morphemes derive from German, Greek and Latin roots. For indexing and retrieval purposes, such a morpheme dictionary may be further structured by defining the semantic relations among morpheme sets in order to build up a multilingual morpheme thesaurus. We present a tool for thesaurus compilation and management, and outline a methodology for the proper construction and maintenance of a multilingual morpheme thesaurus. Reprinted from: Int J Med Inf 2000 Sep;58-59:87-99},
  note = {Int J Med Inf 2000 Sep;58-59:87-99}
}

@article{IMIA2002329,
  author = {Kimura M.},
  title = {What can we currently expect from patient records? Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {329-331},
  abstract = {},
  note = {}
}

@article{IMIA2002332,
  author = {Brossette SE, Sprague AP, Jones WT, Moser SA.},
  title = {A data mining system for infection control surveillance},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {332-339},
  abstract = {Nosocomial infections and antimicrobial resistance are problems of enormous magnitude that impact the morbidity and mortality of hospitalized patients as well as their cost of care. The Data Mining Surveillance System (DMSS) uses novel data mining techniques to discover
unsuspected, useful patterns of nosocomial infections and antimicrobial resistance from the analysis of hospital laboratory data. This report details a mature version of DMSS as well as an experiment in which DMSS was used to analyze all inpatient culture data, collected over 15 months at the University of Alabama at Birmingham Hospital. Reprinted from: Methods Inf Med 2000;39(4-5):303-10.

@article{IMIA2002340,
  author = {Brown PJ, Sönksen P.},
  title = {Evaluation of the quality of information retrieval of clinical findings from a computerized patient database using a semantic terminological model},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {340-351},
  abstract = {OBJECTIVES: To measure the strength of agreement between the concepts and records retrieved from a computerized patient database, in response to physician-derived questions, using a semantic terminological model for clinical findings with those concepts and records excerpted clinically by manual identification. The performance of the semantic terminological model is also compared with the more established retrieval methods of free-text search, ICD-10, and hierarchic retrieval. DESIGN: A clinical database (Diabeta) of 106,000 patient problem record entries containing 2,625 unique concepts in an clinical academic department was used to compare semantic, free-text, ICD-10, and hierarchic data retrieval against a gold standard in response to a battery of 47 clinical questions. MEASUREMENTS: The performance of concept and record retrieval expressed as mean detection rate, positive predictive value, Yates corrected and Mantel-Haenszel chi-squared values, and Cohen kappa value, with significance estimated using the Mann-Whitney test. RESULTS: The semantic terminological model used to retrieve clinically useful concepts from a patient database performed well and better than other methods, with a mean detection rate of 0.86, a positive predictive value of 0.96, a Yates corrected chi-squared value of 1,537, a Mantel-Haenszel chi-squared value of 19,302, and a Cohen kappa of 0.88. Results for record retrieval were even better, with a mean record detection rate of 0.94, a positive predictive value of 0.99, a Yates corrected chi-squared value of 94, 774, a Mantel-Haenszel chi-squared value of 1,550,356, and a Cohen kappa value of 0.94. The mean detection rate, Yates corrected chi-squared value, and Cohen kappa value for semantic retrieval were significantly better than for the other methods. CONCLUSION: The use of a semantic terminological model in this test scenario provides an effective framework for representing clinical finding concepts and their relationships. Although currently incomplete, the model supports improved information retrieval from a patient database in response to clinically relevant questions, when compared with alternative methods of analysis. Reprinted from: J Am Med Inform Assoc 2000;7(4)392-403},
  note = {J Am Med Inform Assoc 2000;7(4)392-403}
}

@article{IMIA2002352,
  title = {Patients with cancer holding their own records: a randomised controlled trial},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {352-357},

abstract = {BACKGROUND: The burden of cancer care in general practice is increasing. Patient-held records may facilitate effective, coordinated care, but no randomised controlled trials of their use in cancer care have been conducted, and concerns about possible negative effects remain. AIM: To evaluate the use of a supplementary patient-held record in cancer care. METHOD: Six hundred and fifty radiotherapy outpatients with any form of cancer were randomised either to hold a supplementary record or to receive normal care. It was explained to record holders that the supplementary record was intended to improve communication with health professionals and act as an aide memoire. After three months, patients' satisfaction with communication and with participation in their own care were assessed. Global health status, emotional functioning, and cognitive functioning were measured using the European Organization for Research and Treatment of Cancer QLQ-C30 questionnaire. RESULTS: There were no significant differences between groups in any of the outcome measures. Patients in both groups expressed a high level of satisfaction with communication and participation in their care. Mean (SD) scores in the intervention and control groups were: global health status, 66.8 (24.2) and 65.3 (23.7); emotional functioning, 75.0 (24.6) and 77.4 (22.8); cognitive functioning, 84.5 (21.0) and 84.0 (21.3). CONCLUSION: A supplementary patient-held record for radiotherapy outpatients appears to have no effect on satisfaction with communication, participation in care, or quality of life. Reprinted from: Br J Gen Pract 2000;50(451):105-10},

@article{IMIA2002358,
  author = {Goorman E, Berg M.},
  title = {Modelling nursing activities: electronic patient records and their discontents},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {358-364},
  abstract = {A fully integrated and operating EPR in a clinical setting is hard to find: most applications can be found in outpatient or general practice settings or in isolated hospital wards. In clinical work practice problems with the electronic patient record (EPR) are frequent. These problems are at least partially due to the models of health care work embedded in EPRs. In this paper we will argue that these problems are at least partially due to the models of health care work embedded in current EPRs. We suggest that these models often contain projections of nurses' and doctors' work as it should be performed on the ward, rather than depicting how work is actually performed. We draw upon sociological insights to elucidate the fluid and pragmatic nature of healthcare work and give recommendations for the development of an empirically based EPR, which can support the work of nurses and other health care providers. We argue that these issues are of great importance to the nursing profession, since the EPR will help define the worksettings of the future. Since it is a tool that will impact the development of the nursing profession, nurses have and should have a stake in its development. Reprinted from: Nurs Inq 2000;7(1):3-9},
  note = {Nurs Inq 2000;7(1):3-9}
}

@article{IMIA2002365,
  author = {Nadkarni P, Chen R, Brandt C.},
  title = {UMLS Concept Indexing for Production Databases: A Feasibility Study},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {365-376},
  abstract = {}}
OBJECTIVES: To explore the feasibility of using the National Library of Medicine’s Unified Medical Language System (UMLS) Metathesaurus as the basis for a computational strategy to identify concepts in medical narrative text preparatory to indexing. To quantitatively evaluate this strategy in terms of true positives, false positives (spuriously identified concepts) and false negatives (concepts missed by the identification process).

METHODS: Using the 1999 UMLS Metathesaurus, the authors processed a training set of 100 documents (50 discharge summaries, 50 surgical notes) with a concept-identification program, whose output was manually analyzed. They flagged concepts that were erroneously identified and added new concepts that were not identified by the program, recording the reason for failure in such cases. After several refinements to both their algorithm and the UMLS subset on which it operated, they deployed the program on a test set of 24 documents (12 of each kind).

RESULTS: Of 8,745 matches in the training set, 7,227 (82.6 percent) were true positives, whereas of 1,701 matches in the test set, 1,298 (76.3 percent) were true positives. Matches other than true positive indicated potential problems in production-mode concept indexing. Examples of causes of problems were redundant concepts in the UMLS, homonyms, acronyms, abbreviations and elisions, concepts that were missing from the UMLS, proper names, and spelling errors.

CONCLUSIONS: The error rate was too high for concept indexing to be the only production-mode means of preprocessing medical narrative. Considerable curation needs to be performed to define a UMLS subset that is suitable for concept matching. Reprinted from: J Am Med Inform Assoc 2000;8(1):80-91,
When conversation is better than computation

While largely ignored in informatics thinking, the clinical communication space accounts for the major part of the information flow in health care. Growing evidence indicates that errors in communication give rise to substantial clinical morbidity and mortality. This paper explores the implications of acknowledging the primacy of the communication space in informatics and explores some solutions to communication difficulties. It also examines whether understanding the dynamics of communication between human beings can also improve the way we design information systems in health care. Using the concept of common ground in conversation, proposals are suggested for modeling the common ground between a system and human users. Such models provide insights into when communication or computational systems are better suited to solving information problems. Reprinted from: J Am Med Inform Assoc 2000 May-Jun;7(3):277-86.

Baby CareLink: using the internet and telemedicine to improve care for high-risk infants

OBJECTIVE: To evaluate an Internet-based telemedicine program designed to reduce the costs of care, to provide enhanced medical, informational, and emotional support to families of very low birth weight (VLBW) infants during and after their neonatal intensive care unit (NICU) stay.

BACKGROUND: Baby CareLink is a multifaceted telemedicine program that incorporates videoconferencing and World Wide Web (WWW) technologies to enhance interactions between families, staff, and community providers. The videoconferencing module allows virtual visits and distance learning from a family's home during an infant's hospitalization as well as virtual house calls and remote monitoring after discharge. Baby CareLink's WWW site contains information on issues that confront these families. In addition, its security architecture allows efficient and confidential sharing of patient-based data and communications among authorized hospital and community users.

DESIGN/METHODS: A randomized trial of Baby CareLink was conducted in a cohort of VLBW infants born between November 1997 and April 1999. Eligible infants were randomized within 10 days of birth. Families of intervention group infants were given access to the Baby CareLink telemedicine application. A multimedia computer with WWW browser and videoconferencing equipment was installed in their home within 3 weeks of birth. The control group received care as usually practiced in this NICU. Quality of care was assessed using a standardized family satisfaction survey administered after discharge. In addition, the effect of Baby CareLink on hospital length of stay as well as family visitation and interactions with infant and staff were measured. RESULTS: Of the 176 VLBW infants admitted during the study period, 30 control and 26 study patients were enrolled. The groups were similar in patient and family characteristics as well as rates of inpatient morbidity. The CareLink group reported higher overall quality of care. Families in the CareLink group reported
significantly fewer problems with the overall quality of care received by their family (mean problem score: 3% vs 13%). In addition, CareLink families also reported greater satisfaction with the unit’s physical environment and visitation policies (mean problem score: 13% vs 50%). The frequency of family visits, telephone calls to the NICU, and holding of the infant did not differ between groups. The duration of hospitalization until ultimate discharge home was similar in the 2 groups (68.5 +/- 28.3 vs 70.6 +/- 35.6 days). Among infants born weighing <1000 g (n = 31) there was a tendency toward shorter lengths of stay (77.4 +/- 26.2 vs 93.1 +/- 35.6 days). All infants in the CareLink group were discharged directly to home whereas 6/30 (20%) of control infants were transferred to community hospitals before ultimate discharge home. CONCLUSIONS: CareLink significantly improves family satisfaction with inpatient VLBW care and definitively lowers costs associated with hospital to hospital transfer. Our data suggest the use of telemedicine and the Internet support the educational and emotional needs of families facilitating earlier discharge to home of VLBW infants. We believe that further extension of the Baby CareLink model to the postdischarge period will significantly improve the coordination and efficiency of care. Reprinted from: Pediatrics 2000 Dec;106(6):1318-24,

note = {Pediatrics 2000 Dec;106(6):1318-24}

@article{IMIA2002406,
    author = {Mair F, Whitten P.},
    title = {Systematic review of studies of patient satisfaction with telemedicine},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {406-409},
    abstract = {OBJECTIVE: To review research into patient satisfaction with teleconsultation, specifically clinical consultations between healthcare providers and patients involving real time interactive video. DESIGN: Systematic review of telemedicine satisfaction studies. Electronic databases searched include Medline, Embase, Science Citation Index, Social Sciences Citation Index, Arts and Humanities Citation Index, and the TIE (Telemedicine Information Exchange) database. SUBJECTS: Studies conducted worldwide and published between 1966 and 1998. MAIN OUTCOME MEASURES: Quality of evidence about patient satisfaction. RESULTS: 32 studies were identified. Study methods used were simple survey instruments (26 studies), exact methods not specified (5), and qualitative methods (1). Study designs were randomised controlled trial (1 trial); random patient selection (2); case-control (1); and selection criteria not specified or participants represented consecutive referrals, convenience samples, or volunteers (28). Sample sizes were </=20 (10 trials), </=100 (14), >100 (7), and not specified (1). All studies reported good levels of patient satisfaction. Qualitative analysis revealed methodological problems with all the published work. Even so, important issues were highlighted that merit further investigation. There is a paucity of data examining patients’ perceptions or the effects of this mode of healthcare delivery on the interaction between providers and clients. CONCLUSIONS: Methodological deficiencies (low sample sizes, context, and study designs) of the published research limit the generalisability of the findings. The studies suggest that teleconsultation is acceptable to patients in a variety of circumstances, but issues relating to patient satisfaction require further exploration from the perspective of both clients and providers. Reprinted from: BMJ 2000 Jun 3;320(7248):1517-20},
    note = {BMJ 2000 Jun 3;320(7248):1517-20}
}

@article{IMIA2002410,
    author = {Marcelo A, Fontelo P, Farolan M, Cualing H.},
    title = {Effect of image compression on telepathology. A randomized clinical trial},
CONTEXT: For practitioners deploying store-and-forward telepathology systems, optimization methods such as image compression need to be studied. OBJECTIVE: To determine if Joint Photographic Expert Group (JPG or JPEG) compression, a glossy image compression algorithm, negatively affects the accuracy of diagnosis in telepathology. DESIGN: Double-blind, randomized, controlled trial. SETTING: University-based pathology departments. PARTICIPANTS: Resident and staff pathologists at the University of Illinois, Chicago, and University of Cincinnati, Cincinnati, Ohio. INTERVENTION: Compression of raw images using the JPEG algorithm. MAIN OUTCOME MEASURES: Image acceptability, accuracy of diagnosis, confidence level of pathologist, image quality. RESULTS: There was no statistically significant difference in the diagnostic accuracy between noncompressed (bitmap) and compressed (JPG) images. There were also no differences in the acceptability, confidence level, and perception of image quality. Additionally, rater experience did not significantly correlate with degree of accuracy. CONCLUSIONS: For providers practicing telepathology, JPG image compression does not negatively affect the accuracy and confidence level of diagnosis. The acceptability and quality of images were also not affected. Reprinted from: Arch Pathol Lab Med 2000 Nov;124(11):1653-6

@article{IMIA2002414,
  author = {Nahm R, Poston I.},
  title = {Measurement of the effects of an integrated, point-of-care computer system on quality of nursing documentation and patient satisfaction},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {414-426},
  abstract = {This quasi-experimental, modified time series study measured the effects of the nursing module of a point of care clinical information system on nursing documentation and patient satisfaction. Measurements were taken before implementation of the module and at 6-, 12-, and 18-month intervals postimplementation. Quality of nursing documentation was measured by compliance to items applicable to nursing documentation selected from the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Closed Medical Review Tool. Patient satisfaction was measured by using the Risser Patient Satisfaction Scale. The study data showed a statistically significant increase in the quality of nursing documentation after implementation of the computerized nursing documentation system, as well as a decrease in variability in charting, as evidenced by a decrease in standard deviations. A significant increase in charting compliance was still occurring between the 12- and the 18-month time points after initiation of automated documentation. The point of care computer system did not seem to affect patient satisfaction with the nurse-patient relationship. Reprinted from: Comput Nurs 2000 Sep-Oct;18(5):220-9},
}

@article{IMIA2002427,
  author = {Laguna P.},
  title = {Signal processing. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {410-413},
  abstract = {CONTEXT: For practitioners deploying store-and-forward telepathology systems, optimization methods such as image compression need to be studied. OBJECTIVE: To determine if Joint Photographic Expert Group (JPG or JPEG) compression, a glossy image compression algorithm, negatively affects the accuracy of diagnosis in telepathology. DESIGN: Double-blind, randomized, controlled trial. SETTING: University-based pathology departments. PARTICIPANTS: Resident and staff pathologists at the University of Illinois, Chicago, and University of Cincinnati, Cincinnati, Ohio. INTERVENTION: Compression of raw images using the JPEG algorithm. MAIN OUTCOME MEASURES: Image acceptability, accuracy of diagnosis, confidence level of pathologist, image quality. RESULTS: There was no statistically significant difference in the diagnostic accuracy between noncompressed (bitmap) and compressed (JPG) images. There were also no differences in the acceptability, confidence level, and perception of image quality. Additionally, rater experience did not significantly correlate with degree of accuracy. CONCLUSIONS: For providers practicing telepathology, JPG image compression does not negatively affect the accuracy and confidence level of diagnosis. The acceptability and quality of images were also not affected. Reprinted from: Arch Pathol Lab Med 2000 Nov;124(11):1653-6},
  note = {Arch Pathol Lab Med 2000 Nov;124(11):1653-6}
abstract = {Measures of signal complexity can be used to distinguish neurophysiological activation from noise in those neuroimaging techniques where we record variations of brain activity with time, e.g., fMRI, EEG, ERP. In this paper we explore a recently developed approach to calculate a quantitative measure of deterministic signal complexity and information content: The Renyi number. The Renyi number is by definition an entropy, i.e., a classically used measure of disorder in physical systems, and is calculated in this paper over the basis of the time frequency representation (TFRs) of the measured signals. When calculated in this form, the Renyi entropy (RE) indirectly characterizes the complexity of a signal by providing an approximate counting of the number of separated elementary atoms that compose the time series in the time frequency plane. In this sense, this measure conforms closely to our visual notion of complexity since low complexity values are obtained for signals formed by a small number of "components". The most remarkable properties of this measure are twofold: 1) It does not rely on assumptions about the time series such as stationarity or gaussianity and 2) No model of the neural process under study is required, e.g., no hemodynamic response model for fMRI. The method is illustrated in this paper using fMRI, intracranial ERPs and intracranial potentials estimated from scalp recorded ERPs through an inverse solution (ELECTRA). The main theoretical and practical drawbacks of this measure, especially its dependence of the selected TFR, are discussed. Also the capability of this approach to produce, with less restrictive hypothesis, results comparable to those obtained with more standard methods but is emphasized. Reprinted from: Hum Brain Mapp 2000 Sep;11(1):46-57},

note = {Hum Brain Mapp 2000 Sep;11(1):46-57}
5,214 individuals. The results show that the specificity improves from 68% to 83% at a sensitivity of 90% when compared with the conventional wave reproducibility parameter. Reprinted from: Med Biol Eng Comput 2001 Jan;39(1):134-9,


@article{IMIA2002449,
title = {Anticipation of epileptic seizures from standard EEG recordings},
journal = {IMIA Yearbook of medical informatics},
volume = {2002},
year = {2002},
pages = {449-454},
abstract = {BACKGROUND: New methods derived from non-linear analysis of intracranial recordings permit the anticipation of an epileptic seizure several minutes before the seizure. Nevertheless, anticipation of seizures based on standard scalp electroencephalographical (EEG) signals has not been reported yet. The accessibility to preictal changes from standard EEGs is essential for expanding the clinical applicability of these methods. METHODS: We analysed 26 scalp-EEG/video recordings, from 60 min before a seizure, in 23 patients with temporal-lobe epilepsy. For five patients, simultaneous scalp and intracranial EEG recordings were assessed. Long-term changes before seizure onset were identified by a measure of non-linear similarity, which is very robust in spite of large artifacts and runs in real-time. FINDINGS: In 25 of 26 recordings, measurement of non-linear changes in EEG signals allowed the anticipation of a seizure several minutes before it occurred (mean 7 min). These preictal changes in the scalp EEG correspond well with concurrent changes in depth recordings. INTERPRETATION: Scalp-EEG recordings retain sufficient dynamical information which can be used for the analysis of preictal changes leading to seizures. Seizure anticipation strategies in real-time can now be envisaged for diverse clinical applications, such as devices for patient warning, for efficacy of ictal-single photon emission computed tomography procedures, and eventual treatment interventions for preventing seizures. Reprinted from: Lancet 2001 Jan 20;357(9251):183-8},

note = {Lancet 2001 Jan 20;357(9251):183-8}
}

@article{IMIA2002455,
author = {Zhukov L, Weinstein D, Johnson C.},
title = {Independent Component Analysis for EEG Source Localization - An Algorithm that Reduces the Complexity of Localizing Multiple Neural Sources},
journal = {IMIA Yearbook of medical informatics},
volume = {2002},
year = {2002},
pages = {455-464},
}

@article{IMIA2002465,
author = {Zigel Y, Cohen A, Katz A.},
title = {The weighted diagnostic distortion (WDD) measure for ECG signal compression},
journal = {IMIA Yearbook of medical informatics},
volume = {},
In this paper, a new distortion measure for electrocardiogram (ECG) signal compression, called weighted diagnostic distortion (WDD) is introduced. The WDD measure is designed for comparing the distortion between original ECG signal and reconstructed ECG signal (after compression). The WDD is based on PQRST complex diagnostic features (such as P wave duration, QT interval, T shape, ST elevation) of the original ECG signal and the reconstructed one. Unlike other conventional distortion measures [e.g. percentage root mean square (rms) difference, or PRD], the WDD contains direct diagnostic information and thus is more meaningful and useful.

Four compression algorithms were implemented (AZTEC, SAPA2, LTP, ASEC) in order to evaluate the WDD. A mean opinion score (MOS) test was applied to test the quality of the reconstructed signals and to compare the quality measure (MOSerror) with the proposed WDD measure and the popular PRD measure. The evaluators in the MOS test were three independent expert cardiologists, who studied the reconstructed ECG signals in a blind and a semiblind tests. The correlation between the proposed WDD measure and the MOS test measure (MOSerror) was found superior to the correlation between thepopular PRD measure and the MOSerror. Reprinted from: IEEE Trans Biomed Eng. 2000 Nov;47(11):1422-30,
@article{IMIA2002501,
  author = {Schwarzer G, Vach W, Schumacher M.},
  title = {On the misuses of artificial neural networks for prognostic and diagnostic classification in oncology},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {501-521},
}

@article{IMIA2002522,
  author = {van Wijk MA, van der Lei J, Mosseveld M, Bohnen AM, van Bemmel JH.},
  title = {Assessment of decision support for blood test ordering in primary care. A randomized trial},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {522-532},
  abstract = {Ann Intern Med 2001 Feb 20;134(4):274-81},
  note = {Ann Intern Med 2001 Feb 20;134(4):274-81}
}

@article{IMIA2002533,
  author = {Dørup J.},
  title = {Educational technology as a scientific discipline. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {533-535},
  abstract = {},
  note = {}}

@article{IMIA2002536,
  author = {Bell DS, Fonarow GC, Hays RD, Mangione CM.},
  title = {Self-study from web-based and printed guideline materials. A randomized, controlled trial among resident physicians},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2002},
  year = {2002},
  pages = {536-544},}
@article{IMIA2002545,
    author = {Berridge E, Roudsari A, Taylor S, Carey S.},
    title = {Computer-aided learning for the education of patients and family practice professionals in the personal care of diabetes},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {545-558},
    note = {Comput Methods Programs Biomed 2000 Jul;62(3):191-204}
}

@article{IMIA2002559,
    author = {Popescu VG, Burdea GC, Bouzit M, Hentz VR.},
    title = {A virtual-reality-based telerehabilitation system with force feedback},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {559-565},
}

@article{IMIA2002566,
    author = {Shegog R, Bartholomew LK, Parcel GS, Sockrider MM, Masse L, Abramson SL.},
    title = {Impact of a computer-assisted education program on factors related to asthma self-management behavior},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {566-580},
    abstract = {J Am Med Inform Assoc 2001 Jan-Feb;8(1):49-61},
    note = {J Am Med Inform Assoc 2001 Jan-Feb;8(1):49-61}
}

@article{IMIA2002581,
    author = {Hofestädt R.},
    title = {Bioinformatics. Synopsis},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2002},
    year = {2002},
    pages = {581-584},
    abstract = {},
    note = {}}
@article{IMIA20031,  
author = {Côté RA.},  
title = {Preface - Quality health care requires quality patient data},  
journal = {IMIA Yearbook of medical informatics},  
volume = {2003},  
year = {2003},  
pages = {1},  
abstract = {},  
note = {}  
}  

@article{IMIA20035,  
author = {Haux R, Kulikowski C.},  
title = {Editorial - Quality of Health Care: Informatics Foundations},  
journal = {IMIA Yearbook of medical informatics},  
volume = {2003},  
year = {2003},  
pages = {5},  
abstract = {},  
note = {}  
}  

@article{IMIA2003109,  
author = {Lun KC.},  
title = {Jean-Raoul Scherrer–intellectual, renaissance man and dear IMIA colleague},  
journal = {IMIA Yearbook of medical informatics},  
volume = {2003},  
year = {2003},  
pages = {109},  
abstract = {},  
note = {}  
}  

@article{IMIA2003110,  
author = {Reichert A, Engelbrecht R.},  
title = {Jean-Raoul Scherrer, a professional leader},  
journal = {IMIA Yearbook of medical informatics},  
volume = {2003},  
year = {2003},  
pages = {110},  
abstract = {},  
note = {}  
}
@article{IMIA2003111,
    author = {van Bemmel JH.},
    title = {Medical information systems in the age of Jean-Raoul Scherrer},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {111-117},
    abstract = {},
    note = {}
}

@article{IMIA2003118,
    title = {A humanist's legacy in medical informatics: visions and accomplishments of Professor Jean-Raoul Scherrer},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {118-123},
    note = {Methods Inf Med 2002;41(3):237-42}
}

@article{IMIA2003124,
    author = {Scherrer JR.},
    title = {An integrated hospital information system in Geneva},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {124-134},
    abstract = {Since the initial design phase from 1971 to 1973, the DIOGENE hospital information system at the University Hospital of Geneva has been treated as a whole and has retained its architectural unity, despite the need for modification and extension over the years. In addition to having a centralized patient database with the mechanisms for data protection and recovery of a transactions-oriented system, the DIOGENE system has a centralized pool of operators who provide support and training to the users; a separate network of remote printers that provides a telex service between the hospital buildings, offices, medical departments, and wards; and a three-component structure that avoids barriers between administrative and medical applications. In 1973, after a 2-year design period, the project was approved and funded. The DIOGENE system has led to more efficient sharing of costly resources, more rapid performance of administrative tasks, and more comprehensive collection of information about the institution and its patients. Reprinted from: MD Comput 1990;7(2):81-9},
    note = {MD Comput 1990;7(2):81-9}
}

@article{IMIA2003135,
    author = {Anonymous},
    title = {IMIA Code of Ethics for Health Information Professionals},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {135-142},
    }
@article{IMIA2003209,  
    author = {Musen MA, van Bemmel JH.},  
    title = {Challenges for medical informatics: a discipline coming of age},  
    journal = {IMIA Yearbook of medical informatics},  
    volume = {2003},  
    year = {2003},  
    pages = {209-210},  
    abstract = {},  
    note = {}  
}

@article{IMIA2003211,  
    author = {Talmon JL, Hasman A.},  
    title = {Medical informatics as a discipline at the beginning of the 21st century},  
    journal = {IMIA Yearbook of medical informatics},  
    volume = {2003},  
    year = {2003},  
    pages = {211-214},  
    abstract = {OBJECTIVES: To analyse the present situation of the discipline medical informatics and to propose actions for change. METHODS: Evaluation of the current situation mainly based on anecdotal evidence. RESULTS: The difference between the scientific and the engineering aspects of medical informatics get blurred. Because of the requirements of European funding medical informatics focuses more on engineering than on science. Too many manuscripts are submitted that describe engineered artefacts without a scientific purpose. Some of the subjects (like security issues) that are studied in medical informatics are not considered important by medical faculties thus impeding support. CONCLUSIONS: The methodological underpinnings of our research should be strengthened, impact studies should be more frequently performed; the quality of results reporting should be increased. Reprinted from: Methods Inf Med 2002;41(1):4-7},  
    note = {Methods Inf Med 2002;41(1):4-7}  
}

@article{IMIA2003215,  
    author = {Musen MA.},  
    title = {Medical informatics: searching for underlying components},  
    journal = {IMIA Yearbook of medical informatics},  
    volume = {2003},  
    year = {2003},  
    pages = {215-222},  
    abstract = {OBJECTIVE: To discuss unifying principles that can provide a theory for the diverse aspects of work in medical informatics. If medical informatics is to have academic credibility, it must articulate a clear theory that is distinct from that of computer science or of other related areas of study. RESULTS: The notions of reusable domain antologies and problem-solving methods provide the foundation for current work on second-generation knowledge-based systems. These abstractions are also attractive for defining the core contributions of basic research in informatics. We can understand many central activities within informatics in terms defining, refining, applying, and evaluating domain ontologies and problem-solving methods. CONCLUSION: Construing work in medical informatics in terms of actions involving ontologies and problem-solving methods may move us closer to a theoretical basis for our field. Reprinted from: Methods Inf Med 2002;41(1):12-9},  
    note = {Methods Inf Med 2002;41(1):12-9}  
}
@article{IMIA2003223,
  author = {Kulikowski CA.},
  title = {The micro-macro spectrum of medical informatics challenges: from molecular medicine to transforming health care in a globalizing society},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {223-227},
  abstract = {BACKGROUND: Medical informatics has always encompassed a very broad spectrum of techniques for clinical and biomedical research, education and practice. There has been a concomitant variety of depth of specialization, ranging from the routine application of information processing methods to cutting-edge research on fundamental problems of computer-based systems and their relations to cognition and perception in biomedicine. OBJECTIVES: Challenges for the field can be placed in perspective by considering the scale of each--from the highly detailed scientific problems in bioinformatics and emerging molecular medicine to the broad and complex social problems of introducing medical informatics into web-related global settings. METHODS: The scale of an informatics problem is not only determined by the inherent physical space in which it exists, but also by the conceptual complexity that it involves, reinforcing the need to investigate the semantic web within which medical informatics is defined. RESULTS AND CONCLUSION: Bioinformatics, biomedical imaging and language understanding provide examples that anchor research and practice in biomedical informatics at the detailed, scientific end of the spectrum. Traditional concerns of medical informatics in the clinical arena make up the broad mid-range of the spectrum, while novel social interaction models of competition and cooperation will be needed to understand the implications of distributed health information technology for individual and societal change in an increasingly interconnected world. Reprinted from: Methods Inf Med 2002;41(1):20-4},
  note = {Methods Inf Med 2002;41(1):20-4}
}

@article{IMIA2003228,
  author = {Lun KC.},
  title = {Challenges in medical informatics: perspectives of an international medical informatics organization},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {228-234},
  abstract = {OBJECTIVE: As an international organization with the missions to promote informatics in health care and biomedical research, advance international cooperation, stimulate research, development and education, and disseminate and exchange information, the International Medical Informatics Association (IMIA) must be constantly cognizant of new developments in medical informatics and address the challenges to the discipline. From an international organization standpoint, it perceives three major challenges viz. the Identity, Organizational and Leadership challenges. METHOD: This paper attempts to identify and discuss these challenges and to offer ways to overcome them through the activities of an international organization for medical informatics. RESULTS AND CONCLUSION: From an international organization standpoint, IMIA can help overcome these organizational challenges by ensuring strong leadership throughout its echelon, actively promoting its goals and objectives worldwide through its national and institutional members as well as its regional groups and encouraging strategic partnerships between its many Working Groups and Special Interest Group on Nursing with other international organizations and industry to further promote the awareness and the perception of the relevance of medical informatics to health and medicine by the international community. Reprinted from: Methods Inf Med 2002;41(1):60-3},
  note = {Methods Inf Med 2002;41(1):60-3}
}
BACKGROUND: Increasing data suggest that error in medicine is frequent and results in substantial harm. The recent Institute of Medicine report (LT Kohn, JM Corrigan, MS Donaldson, eds: To Err Is Human: Building a Safer Health System. Washington, DC: National Academy Press, 1999) described the magnitude of the problem, and the public interest in this issue, which was already large, has grown. GOAL: The goal of this white paper is to describe how the frequency and consequences of errors in medical care can be reduced (although in some instances they are potentiated) by the use of information technology in the provision of care, and to make general and specific recommendations regarding error reduction through the use of information technology.

RESULTS: General recommendations are to implement clinical decision support judiciously; to consider consequent actions when designing systems; to test existing systems to ensure they actually catch errors that injure patients; to promote adoption of standards for data and systems; to develop systems that communicate with each other; to use systems in new ways; to measure and prevent adverse consequences; to make existing quality structures meaningful; and to improve regulation and remove disincentives for vendors to provide clinical decision support. Specific recommendations are to implement provider order entry systems, especially computerized prescribing; to implement bar-coding for medications, blood, devices, and patients; and to utilize modern electronic systems to communicate key pieces of asynchronous data such as markedly abnormal laboratory values.

CONCLUSIONS: Appropriate increases in the use of information technology in health care—especially the introduction of clinical decision support and better linkages in and among systems, resulting in process simplification—could result in substantial improvement in patient safety. Reprinted from: J Am Med Inform Assoc 2001;8(4):299-308,
abstract = {CONTEXT: Usual drug-prescribing practices may not consider the effects of renal insufficiency on the disposition of certain drugs. Decision aids may help optimize prescribing behavior and reduce medical error.

OBJECTIVE: To determine if a system application for adjusting drug dose and frequency in patients with renal insufficiency, when merged with a computerized order entry system, improves drug prescribing and patient outcomes. DESIGN, SETTING, AND PATIENTS: Four consecutive 2-month intervals consisting of control (usual computerized order entry) alternating with intervention (computerized order entry plus decision support system), conducted in September 1997-April 1998 with outcomes assessed among a consecutive sample of 17,828 adults admitted to an urban tertiary care teaching hospital. INTERVENTION: Real-time computerized decision support system for prescribing drugs in patients with renal insufficiency. During intervention periods, the adjusted dose list, default dose amount, and default frequency were displayed to the order-entry user and a notation was provided that adjustments had been made based on renal insufficiency. During control periods, these recommended adjustments were not revealed to the order-entry user, and the unadjusted parameters were displayed. MAIN OUTCOME MEASURES: Rates of appropriate prescription by dose and frequency, length of stay, hospital and pharmacy costs, and changes in renal function, compared among patients with renal insufficiency who were hospitalized during the intervention vs control periods. RESULTS: A total of 7490 patients were found to have some degree of renal insufficiency. In this group, 97,151 orders were written on renally cleared or nephrotoxic medications, of which 14,440 (15%) had at least 1 dosing parameter modified by the computer based on renal function. The fraction of prescriptions deemed appropriate during the intervention vs control periods by dose was 67% vs 54% (P<.001) and by frequency was 59% vs 35% (P<.001). Mean (SD) length of stay was 4.3 (4.5) days vs 4.5 (4.8) days in the intervention vs control periods, respectively (P =.009). There were no significant differences in estimated hospital and pharmacy costs or in the proportion of patients who experienced a decline in renal function during hospitalization. CONCLUSIONS: Guided medication dosing for inpatients with renal insufficiency appears to result in improved dose and frequency choices. This intervention demonstrates a way in which computer-based decision support systems can improve care. Reprinted from: JAMA 2001;286(22):2839-44,

note = {JAMA 2001;286(22):2839-44}

@article{IMIA2003256,
    author = {Roine R, Ohinmaa A, Hailey D.},
    title = {Assessing telemedicine: a systematic review of the literature},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {256-262},
    abstract = {BACKGROUND: To clarify the current status of telemedicine, we carried out a systematic review of the literature. We identified controlled assessment studies of telemedicine that reported patient outcomes, administrative changes or economic assessments and assessed the quality of that literature. METHODS: We carried out a systematic electronic search for articles published from 1966 to early 2000 using the MEDLINE (1966-April 2000), HEALTHSTAR (1975-January 2000), EMBASE (1988-February 2000) and CINALH (1982-January 2000) databases. In addition, the HSTAT database (Health Services/Technology Assessment Text, US National Library of Medicine), the Database of Abstracts of Reviews of Effectiveness (DARE, NHS Centre for Reviews and Dissemination, United Kingdom), the NHS Economic Evaluation Database and the Cochrane Controlled Trials Register were searched. We consulted experts in the field and did a manual search of the reference lists of review articles. RESULTS: A total of 1124 studies were identified. Based on a review of the abstracts, 133 full-text articles were obtained for closer inspection. Of these, 50 were deemed to represent assessment studies fulfilling the inclusion criteria of the review. Thirty-four of the articles assessed at least some clinical outcomes; the remaining 16 were mainly economic analyses. Most of the available
}
literature referred only to pilot projects and short-term outcomes, and most of the studies were of low quality. Relatively convincing evidence of effectiveness was found only for teleradiology, teleneurosurgery, telepsychiatry, transmission of echocardiographic images, and the use of electronic referrals enabling e-mail consultations and video conferencing between primary and secondary health care providers. Economic analyses suggested that teleradiology, especially transmission of CT images, can be cost-saving. INTERPRETATION: Evidence regarding the effectiveness or cost-effectiveness of telemedicine is still limited. Based on current scientific evidence, only a few telemedicine applications can be recommended for broader use. Reprinted from: Can Med Assoc J 2001 165(6):765-71,

@article{IMIA2003263,
  author = {van’t Riet A, Berg M, Hiddema F, Sol K.},
  title = {Meeting patients’ needs with patient information systems: potential benefits of qualitative research methods},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {263-276},
  abstract = {This article reports on our pilot evaluation of an electronic patient information system for children with amblyopia and their parents. The aim was to investigate whether the information system would be able to improve the quality of care, as indicated by an improvement in the effectiveness and efficiency of care, and in an increase in patient satisfaction. In the pilot evaluation, we used qualitative research methods, exploring the impact of the information system on children and their parents, with the aim to find suitable indicators for a potential further, quantitative study. Yet we found that the system was little used and had marginal effects on the quality of care for children with amblyopia and their parents. It appeared that the main problem underlying this patient information system was that the needs of those people who actually would be using the system had never really been investigated. The designers had built their assumptions about these needs into the system. These appeared to be mistaken at so many levels that the system could not become a success. As a result of this pilot evaluation, the patient information project was thoroughly transformed. This study makes clear that a thorough exploration of user needs before building the system, using qualitative research methods, may be crucial because it can prevent mismatches and maximizes the chance that the eventual information system meets its most important aim: to enhance patient empowerment and improve the quality of care. Reprinted from: Int J Med Inf 2001;64(1):1-14},
  note = {Int J Med Inf 2001;64(1):1-14}
}

@article{IMIA2003277,
  author = {Vassallo DJ, Hoque F, Roberts MF, Patterson V, Swinfen P, Swinfen R.},
  title = {An evaluation of the first year’s experience with a low-cost telemedicine link in Bangladesh},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {277-292},
  abstract = {In July 1999, the Swinfen Charitable Trust in the UK established a telemedicine link in Bangladesh, between the Centre for the Rehabilitation of the Paralysed (CRP) in Dhaka and medical consultants abroad. This low-cost telemedicine system used a digital camera to capture still images, which were then transmitted by email. During the first 12 months, 27 telemedicine referrals were made. The following specialties were consulted: neurology (44%), orthopaedics (40%),
rheumatology (8%), nephrology (4%) and paediatrics (4%). Initial email replies were received at the CRP within a day of referral in 70% of cases and within three days in 100%, which shows that store-and-forward telemedicine can be both fast and reliable. Telemedicine consultation was complete within three days in 14 cases (52%) and within three weeks in 24 cases (89%). Referral was judged to be beneficial in 24 cases (89%), the benefits including establishment of the diagnosis, the provision of reassurance to the patient and referring doctor, and a change of management. Four patients (15% of the total) and their families were spared the considerable expense and unnecessary stress of travelling abroad for a second opinion, and the savings from this alone outweighed the set-up and running costs in Bangladesh. The latter are limited to an email account with an Internet service provider and the local-rate telephone call charges from the CRP. This successful telemedicine system is a model for further telemedicine projects in the developing world. Reprinted from: J Telemed Telecare 2001;7(3):125-38, note = {J Telemed Telecare 2001;7(3):125-38}
AIM OF THE STUDY: To investigate the effect that manipulating the style and content of the nurse change of shift report had on an individual’s ability to plan patient care.

BACKGROUND: The nurse change of shift report occurs on most hospital wards at least two if not three times a day. However, little research exists examining how changing the style and information content of the shift report may affect an individual’s ability to process the information they hear. It is suggested that how individuals structure their knowledge, in the form of schema, is an important consideration when examining how they process information. DESIGN: This was an experimental study where two independent variables, report style (retrospective vs. prospective) and schema information (schema consistent vs. schema inconsistent) were compared in a factorial design. A convenience sample of 48 registered nurses from acute medical and acute surgical wards were randomly allocated to one of the four experimental conditions. Outcome measures included the amount of information that subjects accurately recorded and recalled from the shift report, together with their ability to plan patient care.

RESULTS: Results indicated that the type of report had a significant effect on an individual’s ability to plan patient care, and type of information content on their ability to accurately record and recall the information they heard. CONCLUSIONS: The implications of the results, both for schema theory as an explanation of nursing knowledge, and for the type of report which should be used in acute medical and acute surgical wards are discussed, together with the implications of the study for further research. Reprinted from: J Adv Nurs. 2001;33(6):836-46,
Chemotherapy is an important component of childhood cancer treatment. Due to the intensity of this therapy, an error in calculating the dosage of the cytostatic drugs would have severe consequences. Therefore, a computer-aided therapy planning system in pediatric oncology (CATIPO) was introduced into routine use in approximately 20 clinics across Germany. The system consists of a knowledge acquisition module for acquiring knowledge about chemotherapy protocols and a decision support module for producing a patient-specific therapy plan. The main benefits of the system are the reduction of errors and saving time during the development of a particular therapy plan. CATIPO's success is based on the enormous demand for this kind of decision support and its development in tight cooperation with future users. Reprinted from: Artif Intell Med 2002;24(3):229-42.

BACKGROUND: The authors tested whether clinicians make different decisions if they pursue information than if they receive the same information from the start. METHODS: Three groups of clinicians participated (N=1206): dialysis nurses (n=171), practicing urologists (n=461), and academic physicians (n=574). Surveys were sent to each group containing medical scenarios formulated in 1 of 2 versions. The simple version of each scenario presented a choice between 2 options. The search version presented the same choice but only after some information had been missing and subsequently obtained. The 2 versions otherwise contained identical data and were randomly assigned. RESULTS: In one scenario involving a personal choice about kidney donation, more dialysis nurses were willing to donate when they first decided to be tested for compatibility and were found suitable than when they knew they were suitable from the start (65% vs. 44%, P=0.007). Similar discrepancies were found in decisions made by practicing urologists concerning surgery for a patient with prostate cancer and in decisions of academic physicians considering emergency management for a patient with acute chest pain. CONCLUSIONS: The pursuit of information can increase its salience and cause clinicians to assign more importance to the information than if the same information was immediately available. An awareness of this cognitive bias may lead to improved decision making in difficult medical situations. Reprinted from: Med Decis Making 2001 Sep-Oct;21(5):376-81.VI.
In this study, we demonstrated that when the management of medical information is closely intertwined with the physician's activity, it is necessary to perform a precise analysis of this activity in order to identify the cognitive and organizational constraints that affect the usability and acceptance of the tool. We focused our study on the pre-operative anesthetic consultation. After recording and analyzing 50 consultations, we were able to identify the key points to fulfill in order to meet users' acceptance. From this study, we propose some strong recommendations to handle the constraints imposed by the anesthesiologists' activity in their daily working environment. We applied this method to evaluate an electronic patient record (EPR) for the pre-anesthetic consultation. The results of this evaluation validate our hypotheses and the importance of the activity constraints. In conclusion, human factors, and particularly those linked with the activity of healthcare professionals, have to be carefully studied before any development and installation of an EPR into a specialty domain. Reprinted from: Int J Med Inf 2001;64(2-3):157-71,

note = {Int J Med Inf 2001;64(2-3):157-71}

@article{IMIA2003406,
    author = {Jordan DA, McKeown KR, Concepcion KJ, Feiner SK, Hatzivassiloglou V.},
    title = {Generation and evaluation of intraoperative inferences for automated health care briefings on patient status after bypass surgery},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {406-419},
    abstract = {OBJECTIVE: The authors present a system that scans electronic records from cardiac surgery and uses inference rules to identify and classify abnormal events (e.g., hypertension) that may occur during critical surgical points (e.g., start of bypass). This vital information is used as the content of automatically generated briefings designed by MAGIC, a multimedia system that they are developing to brief intensive care unit clinicians on patient status after cardiac surgery. By recognizing patterns in the patient record, inferences concisely summarize detailed patient data. DESIGN: The authors present the development of inference rules that identify important information about patient status and describe their implementation and an experiment they carried out to},
}
validate their correctness. The data for a set of 24 patients were analyzed independently by the system and by 46 physicians. MEASUREMENTS: The authors measured accuracy, specificity, and sensitivity by comparing system inferences against physician judgments, in cases where all three physicians agreed and against the majority opinion in all cases. RESULTS: For laboratory inferences, evaluation shows that the system has an average accuracy of 98 percent (full agreement) and 96 percent (majority model). An analysis of interrater agreement, however, showed that physicians do not agree on abnormal hemodynamic events and could not serve as a gold standard for evaluating hemodynamic events. Analysis of discrepancies reveals possibilities for system improvement and causes of physician disagreement. CONCLUSIONS: This evaluation shows that the laboratory inferences of the system have high accuracy. The lack of agreement among physicians highlights the need for an objective quality-assurance tool for hemodynamic inferences. The system provides such a tool by implementing inferencing procedures established in the literature. Reprinted from: J Am Med Inform Assoc 2001;8(3):267-80,
   note = {J Am Med Inform Assoc 2001;8(3):267-80}
}

@article{IMIA2003420,
   author = {Masys D, Baker D, Butros A, Cowles KE.},
   title = {Giving patients access to their medical records via the internet: the PCASSO experience},
   journal = {IMA Yearbook of medical informatics},
   volume = {2003},
   year = {2003},
   pages = {420-430},
   abstract = {OBJECTIVE: The Patient-Centered Access to Secure Systems Online (PCASSO) project is designed to apply state-of-the-art-security to the communication of clinical information over the Internet.
   DESIGN: The authors report the legal and regulatory issues associated with deploying the system, and results of its use by providers and patients. Human subject protection concerns raised by the Institutional Review Board focused on three areas-unauthorized access to information by persons other than the patient; the effect of startling or poorly understood information; and the effect of patient access to records on the record-keeping behavior of providers.
   MEASUREMENTS: Objective and subjective measures of security and usability were obtained.
   RESULTS: During its initial deployment phase, the project enrolled 216 physicians and 41 patients; of these, 68 physicians and 26 patients used the system one or more times. The system performed as designed, with no unauthorized information access or intrusions detected. Providers rated the usability of the system low because of the complexity of the secure login and other security features and restrictions limiting their access to those patients with whom they had a professional relationship. In contrast, patients rated the usability and functionality of the system favorably.
   CONCLUSION: High-assurance systems that serve both patients and providers will need to address differing expectations regarding security and ease of use Reprinted from: J Am Med Inform Assoc 2002;9(2):181-91},
   note = {J Am Med Inform Assoc 2002;9(2):181-91}
}

@article{IMIA2003431,
   title = {Strategic information management plans: the basis for systematic information management in hospitals},
   journal = {IMA Yearbook of medical informatics},
   volume = {2003},
}
Information management in hospitals is a complex task. In order to reduce complexity, we distinguish strategic, tactical, and operational information management. This is essential, because each of these information management levels views hospital information systems from different perspectives, and therefore uses other methods and tools. Since all these management activities deal only in part with computers, but mainly with human beings and their social behavior, we define a hospital information system as a sociotechnical subsystem of a hospital. Without proper strategic planning it would be a matter of chance, if a hospital information system would fulfill the information strategies goals. In order to support strategic planning and to reduce efforts for creating strategic plans, we propose a practicable structure.

Reprinted from: Int J Med Inf 2001;64(2-3):99-109,

note = {Int J Med Inf 2001;64(2-3):99-109}

@article{IMIA2003345,
author = {van der Lei J.},
title = {The changing scenery of patient records. Synopsis},
journal = {IMIA Yearbook of medical informatics},
volume = {2003},
year = {2003},
pages = {345-346},
abstract = {},
}

@article{IMIA2003347,
author = {Aubert BA, Hamel G.},
title = {Adoption of smart cards in the medical sector: the Canadian experience},
journal = {IMIA Yearbook of medical informatics},
volume = {2003},
year = {2003},
pages = {347-362},
abstract = {This research evaluates the factors influencing the adoption of smart cards in the medical sector (a smart card has a micro-processor containing information about the patient: identification, emergency data (allergies, blood type, etc.), vaccination, drugs used, and the general medical record). This research was conducted after a pilot study designed to evaluate the use of such smart cards. Two hundred and ninety-nine professionals, along with 7248 clients, used the smart card for a year. The targeted population included mostly elderly people, infants, and pregnant women (the most intensive users of health care services). Following this pilot study, two surveys were conducted, together with numerous interviews, to assess the factors influencing adoption of the technology. A general picture emerged, indicating that although the new card is well-perceived by individuals, tangible benefits must be available to motivate professionals and clients to adopt the technology. Results show that the fundamental dimension that needs to be assessed before massive diffusion is the relative advantage to the professional. The system must provide a direct benefit to its user. The relative advantage of the system for the professional is directly linked to the obligation for the client to use the card. The system is beneficial for the professional only if the information on the card is complete. Technical adequacy is a necessary but not sufficient condition for adoption. Reprinted from: Soc Sci Med 2001;53(7):879-94},


@article{IMIA2003363,
OBJECTIVES: The paper focuses on the problem of adequately coding pathology reports using SNOMED. Both the agreement between pathologists in coding and the quality of a system that supports pathologists in coding pathology reports were evaluated. METHODS: Six sets of three pathologists each received a different set of 40 pathology reports. Five different SNOMED code lines accompanied each pathology report. Three pathologists evaluated the correctness of each of these code lines. Kappa values and values for the reliability coefficients were determined to gain insight in the variance observed when coding pathology reports. The system that is evaluated compares a newly entered report, represented as a multi-dimensional word vector, with reports in a library, represented in the same way. The reports in the library are already coded. The system presents the code lines belonging to the five library reports most similar to the newly entered one to the pathologist in this way supporting the pathologist in determining the correct codes. A high similarity between two reports is indicated by a large value of the inproduct of the vector of the newly entered report and the vector of a report in the library. RESULTS: Agreement between pathologists in coding was fair (average kappa of 0.44). The reliability coefficient varied from 0.81 to 0.89 for the six sets of pathology reports. The system gave correct suggestions in 50% of the reports. In another 30% it was helpful for the pathologists. CONCLUSIONS: On the basis of the level of the reliability coefficients it could be concluded that three pathologists are indeed sufficient for obtaining a gold standard for evaluating the system. The method used for comparing reports is not strong enough to allow fully automatic coding. It could be shown that the system induces a more uniform coding by pathologists. An evaluation of the incorrect suggestions of the system indicates that the performance of the system can still be improved. Reprinted from: Methods Inf Med 2001;40(4):293-7,

note = {Methods Inf Med 2001;40(4):293-7}

@article{IMIA2003368,
author = {Kim MI, Johnson KB.},
title = {Personal health records: evaluation of functionality and utility},
journal = {IMIA Yearbook of medical informatics},
volume = {2003},
year = {2003},
pages = {368-377},
abstract = {OBJECTIVES: Web-based applications have been developed that allow patients to enter their own information into secure personal health records. These applications are being promoted as a means of providing patients and providers with universal access to updated medical information. The authors evaluated the functionality and utility of a selection of personal health records. DESIGN: A targeted search strategy was used to identify eleven Web sites promoting different personal health records. Specific criteria related to the entry and display of data elements were developed to evaluate the functionality of each PHR. Information abstracted from an actual case was used to create a series of representative PHRs. Output generated for review was evaluated to assess the accuracy and completeness of clinical information related to the diagnosis and treatment of specific disorders. RESULTS: The PHRs selected for review employed data entry methods that limited the range and content of patient-entered information related to medical history, medications, laboratory tests, diagnostic studies, and immunizations. Representative PHRs created with information abstracted from an actual case displayed varying amounts of information at basic and comprehensive levels of representation. CONCLUSIONS: Currently available PHRs demonstrate limited functionality. The data entry, validation, and information display methods they
employ may limit their utility as representations of medical information. Reprinted form: J Am Med Inform Assoc 2002;9(2):171-80,

note = {J Am Med Inform Assoc 2002;9(2):171-80}

@article{IMIA2003378,
  author = {Liu Y, Satomura Y.},
  title = {Building a controlled health vocabulary in Japanese},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {378-444},
  abstract = {OBJECTIVES: This study is aimed at developing a controlled clinical vocabulary for use in electronic patient record (EPR) systems. METHODS: In this paper, we propose a model for building the vocabulary. The model is composed of a Canonical Term Dictionary, an Atom Dictionary, a Composite Atom Dictionary, and an Index. Parsing and composing functions are included in this model. Canonical terms were extracted from reference terminologies. Atoms were extracted from the Canonical Term Dictionary and reduced to a set from which the Composite Atom Dictionary can be built. The index was built to link these two dictionaries. For testing the model, we compiled a sample vocabulary and applied the model to a SNOMED translation system (English to Japanese) and a term similarity estimation system. RESULTS: The sample vocabulary consisted of 15,600 atomic terms and 4,450 composite terms. 33,441 SNOMED terms were translated by the SNOMED translation system. The system gave adequate Japanese candidates in 56.3% of cases. The similarity estimation system found an average of 5.4 candidates when the equality ratio was over 50%. CONCLUSIONS: The trial applications produced good results. The model seems promising for building a standard clinical vocabulary system. This system can be applied in certain other Asian countries, such as China and Korea. Reprinted from: Methods Inf Med 2001;40(4):307-14},
  note = {Methods Inf Med 2001;40(4):307-14}
}

@article{IMIA2003445,
  author = {Tilg B.},
  title = {Biomedical signal processing. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {445-447},
  abstract = {},
  note = {} }

@article{IMIA2003448,
  author = {Fan L, Evans DH, Naylor AR.},
  title = {Automated embolus identification using a rule-based expert system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {448-460},
  abstract = {Transcranial Doppler ultrasound (US) can be used to detect microemboli in the cerebral circulation, but is still limited because it usually relies on "human experts" (HEs) to identify signals corresponding to embolic events. The purpose of this study was to develop an automatic system that could replace the HE and, thus, make the technique more widely applicable and, potentially, more reliable. An expert system, based around a digital signal-processing board, analysed


Doppler signal patterns in both the time domain and frequency domain. The system was trained and tested on Doppler signals recorded during the dissection and recovery phases of carotid endarterectomy. It was tested with 74 separate 2.5-min recordings that contained at least 575 artefacts in addition to 253 s of diathermy interference. The results were compared with the results obtained by three HEs. Using a "gold-standard" that classified any event detected by the majority of HEs as an embolus, the automatic system displayed a sensitivity of 94.7% and a specificity of 95.1% for 1151 candidate events 7 dB or more above the clutter (signal-to-clutter ratio, SCR, > or = 7 dB), and 89.6% and 95.3%, respectively, for 2098 candidate events with SCR > or = 5 dB. The system had a very similar performance to individual HEs for SCR > or = 7dB, and was only marginally worse for SCR > or = 5 dB. Reprinted from: Ultrasound Med Biol 2001;27(8):1065-77. 

@article{IMIA2003461,
  author = {Gharieb RR, Cichocki A.},
  title = {Segmentation and tracking of the electro-encephalogram signal using an adaptive recursive bandpass filter},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {461-472},
  abstract = {An adaptive filtering approach for the segmentation and tracking of electro-encephalogram (EEG) signal waves is described. In this approach, an adaptive recursive bandpass filter is employed for estimating and tracking the centre frequency associated with each EEG wave. The main advantage inherent in the approach is that the employed adaptive filter has only one unknown coefficient to be updated. This coefficient, having an absolute value less than 1, represents an efficient distinct feature for each EEG specific wave, and its time function reflects the non-stationarity behaviour of the EEG signal. Therefore the proposed approach is simple and accurate in comparison with existing multivariate adaptive approaches. The approach is examined using extensive computer simulations. It is applied to computer-generated EEG signals composed of different waves. The adaptive filter coefficient (i.e. the segmentation parameter) is -0.492 for the delta wave, -0.360 for the theta wave, -0.191 for the alpha wave, -0.027 for the sigma wave, 0.138 for the beta wave and 0.605 for the gamma wave. This implies that the segmentation parameter increases with the increase in the centre frequency of the EEG waves, which provides fast on-line information about the behaviour of the EEG signal. The approach is also applied to real-world EEG data for the detection of sleep spindles. Reprinted from: Med Biol Eng Comput 2001;39(2):237-48},
}

@article{IMIA2003473,
  author = {Hu Y, Luk KD, Lu WW, Holmes A, Leong JC.},
  title = {Comparison of time-frequency distribution techniques for analysis of spinal somatosensory evoked potential},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {473-478},
  abstract = {Spinal somatosensory evoked potential (SSEP) has been employed to monitor the integrity of the spinal cord during surgery. To detect both temporal and spectral changes in SSEP waveforms, an investigation of the application of time-frequency analysis (TFA) techniques was conducted. SSEP signals from 30 scoliosis patients were analysed using different techniques; short time Fourier transform (STFT), Wigner-Ville distribution (WVD), Choi-Williams distribution (CWD), cone-shaped distribution (CSD) and adaptive spectrogram (ADS). The time-frequency distributions
(TFD) computed using these methods were assessed and compared with each other. WVD, ADS, CSD and CWD showed better resolution than STFT. Comparing normalised peak widths, CSD showed the sharpest peak width (0.13+/−0.1) in the frequency dimension, and a mean peak width of 0.70+/−0.12 in the time dimension. Both WVD and CWD produced cross-term interference, distorting the TFA distribution, but this was not seen with CSD and ADS. CSD appeared to give a lower mean peak power bias (10.3%+/−6.2%) than ADS (41.8%+/−19.6%). Application of the CSD algorithm showed both good resolution and accurate spectrograms, and is therefore recommended as the most appropriate TFA technique for the analysis of SSEP signals.

Note: Med Biol Eng Comput 2001;39:375-80,

@article{IMIA2003479,
  author = {Sekihara K, Nagarajan SS, Poeppel D, Marantz A, Miyashita Y.},
  title = {Reconstructing spatio-temporal activities of neural sources using an MEG vector beamformer technique},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {479-490},
  abstract = {We have developed a method suitable for reconstructing spatio-temporal activities of neural sources by using magnetoencephalogram (MEG) data. The method extends the adaptive beamformer technique originally proposed by Borgiotti and Kaplan to incorporate the vector beamformer formulation in which a set of three weight vectors are used to detect the source activity in three orthogonal directions. The weight vectors of the vector-extended version of the Borgiotti-Kaplan beamformer are then projected onto the signal subspace of the measurement covariance matrix to obtain the final form of the proposed beamformer's weight vectors. Our numerical experiments show that both spatial resolution and output signal-to-noise ratio of the proposed beamformer are significantly higher than those of the minimum-variance-based vector beamformer used in previous investigations. We also applied the proposed beamformer to two sets of auditory-evoked MEG data, and the results clearly demonstrated the method's capability of reconstructing spatio-temporal activities of neural sources. Reprinted from: IEEE Trans Biomed Eng 2001;48(7):760-71},
  note = {IEEE Trans Biomed Eng 2001;48(7):760-71}
}

@article{IMIA2003491,
  author = {Zhang XS, Roy RJ, Jensen EW.},
  title = {EEG complexity as a measure of depth of anesthesia for patients},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {491-502},
  abstract = {A new approach for quantifying the relationship between brain activity patterns and depth of anesthesia (DOA) is presented by analyzing the spatio-temporal patterns in the electroencephalogram (EEG) using Lempel-Ziv complexity analysis. Twenty-seven patients undergoing vascular surgery were studied under general anesthesia with sevoflurane, isoflurane, propofol, or desflurane. The EEG was recorded continuously during the procedure and patients' anesthesia states were assessed according to the responsiveness component of the observer's assessment of alertness/sedation (OAA/S) score. An OAA/S score of zero or one was considered asleep and two or greater was considered awake. Complexity of the EEG was quantitatively estimated by the measure C(n), whose performance in discriminating awake and asleep states was analyzed by statistics for different anesthetic techniques and different patient populations.}
Compared with other measures, such as approximate entropy, spectral entropy, and median frequency, C(n) not only demonstrates better performance (93% accuracy) across all of the patients, but also is an easier algorithm to implement for real-time use. The study shows that C(n) is a very useful and promising EEG-derived parameter for characterizing the (DOA) under clinical situations.

Reprinted from: IEEE Trans Biomed Eng 2001;48(12):1424-33,
    note = {IEEE Trans Biomed Eng 2001;48(12):1424-33}

@article{IMIA2003503,
    author = {Handels H.},
    title = {Medical Image Processing: New Perspectives in Computer Supported Diagnostics, Computer Aided Surgery and Medical Education and Training. Synopsis},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {503-505},
    abstract = {},
    note = {}
}

@article{IMIA2003506,
    title = {Laparoscopic radical prostatectomy with a remote controlled robot},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {506-508},
    abstract = {PURPOSE: Robotics in surgery is a recent innovation. This technology offers a number of attractive features in laparoscopy. It overcomes the difficulties with fixed port sites by restoring all 6 degrees of freedom at the instrument tips, provides new possibilities for miniaturization of surgical tasks and allows remote controlled surgery. We investigated the applicability of remote controlled robotic surgery to laparoscopic radical prostatectomy.
MATERIALS AND METHODS: Our previous experience with laparoscopic prostatectomy served as a basis for adapting robotic surgery to this procedure. A surgeon at a different location who activated the tele-manipulators of the da Vinci* robotic system performed all steps of the intervention. A scrub nurse and second surgeon who stood at patient side had limited roles to port and instrument placement, exposure of the operative field, assistance in hemostasis and removal of the operative specimen. Our patient was a 63-year-old man presenting with a T1c tumor discovered on 1 positive sextant biopsy with a 3+3 Gleason score and 7 ng./ml. preoperative serum prostate specific antigen.
RESULTS: The robot provided an ergonomic surgical environment and remarkable dexterity enhancement. Operating time was 420 minutes, and the hospital stay lasted 4 days. The bladder catheter was removed 3 days postoperatively, and 1 week later the patient was fully continent. Pathological examination showed a pT3a tumor with negative margins. CONCLUSIONS: Robotically assisted laparoscopic radical prostatectomy is feasible. This new technology enhances surgical dexterity. Further developments in this field may have new applications in laparoscopic tele-surgery. Reprinted from: J Urol 2001;165(6 Pt 1):1964-6},
    note = {J Urol 2001;165(6 Pt 1):1964-6}
}

@article{IMIA2003509,
    author = {Gering DT, Nabavi A, Kikinis R, Hata N, O'Donnell LJ, Grimson WE, Jolesz FA, Black PM, Wells WM 3rd.},
    }
A surgical guidance and visualization system is presented, which uniquely integrates capabilities for data analysis and on-line interventional guidance into the setting of interventional MRI. Various pre-operative scans (T1- and T2-weighted MRI, MR angiography, and functional MRI (fMRI)) are fused and automatically aligned with the operating field of the interventional MR system. Both pre-surgical and intra-operative data may be segmented to generate three-dimensional surface models of key anatomical and functional structures. Models are combined in a three-dimensional scene along with reformatted slices that are driven by a tracked surgical device. Thus, pre-operative data augments interventional imaging to expedite tissue characterization and precise localization and targeting. As the surgery progresses, and anatomical changes subsequently reduce the relevance of pre-operative data, interventional data is refreshed for software navigation in true real time. The system has been applied in 45 neurosurgical cases and found to have beneficial utility for planning and guidance. Reprinted from: J Magn Reson Imaging 2001;13(6):967-75;
Computerized three-dimensional models of the human body, based on the Visible Human Project of the National Library of Medicine, so far do not reflect the rich anatomical detail of the original cross-sectional images. In this paper, a spatial/symbolic model of the inner organs is developed, which is based on more than 1000 cryosections and congruent fresh and frozen CT images of the male Visible Human. The spatial description is created using color-space segmentation, graphic modeling, and a matched volume visualization with subvoxel resolution. It is linked to a symbolic knowledge base, providing an ontology of anatomical terms. With over 650 three-dimensional anatomical constituents, this model offers an unsurpassed photorealistic presentation and level of detail. A three-dimensional atlas of anatomy and radiology based on this model is available as a PC-based program. Reprinted from: Med Image Anal 2001 Sep;5(3):221-8.VIII

@article{IMIA2003541,
    author = {Shahar Y.},
    title = {Knowledge-based systems: enhancing the quality of care. Synopsis},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {541-544},
    abstract = {},
    note = {} }

@article{IMIA2003545,
    author = {Dexter PR, Perkins S, Overhage JM, Maharry K, Kohler RB, McDonald CJ.},
    title = {A computerized reminder system to increase the use of preventive care for hospitalized patients},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {545-550},
    abstract = {BACKGROUND: Although they are effective in outpatient settings, computerized reminders have not been proved to increase preventive care in inpatient settings. METHODS: We conducted a randomized, controlled trial to determine the effects of computerized reminders on the rates at which four preventive therapies were ordered for inpatients. During an 18-month study period, a computerized system processed on-line information for all 6371 patients admitted to a general-medicine service (for a total of 10,065 hospitalizations), generating preventive care reminders as appropriate. Physicians who were in the intervention group viewed these reminders when they were using a computerized order-entry system for inpatients. RESULTS: The reminder system identified 3416 patients (53.6 percent) as eligible for preventive measures that had not been ordered by the admitting physician. For patients with at least one indication, computerized reminders resulted in higher adjusted ordering rates for pneumococcal vaccination (35.8 percent of the patients in the intervention group vs. 0.8 percent of those in the control group, P<0.001), influenza vaccination (51.4 percent vs. 1.0 percent, P<0.001), prophylactic heparin (32.2 percent vs. 18.9 percent, P<0.001), and prophylactic aspirin at discharge (36.4 percent vs. 27.6 percent, P<0.001). CONCLUSIONS: A majority of hospitalized patients in this study were eligible for preventive measures, and computerized reminders significantly increased the rate of delivery of such therapies. Reprinted from: N Engl J Med 2001;345(13):965-70},
    note = {N Engl J Med 2001;345(13):965-70} }
}
OBJECTIVES: Predicting the outcome of seriously ill patients is a challenging problem for clinicians. METHODS: One alternative to clinical trials is to analyse existing patient data in an attempt to predict the several outcomes, and to suggest therapies. In this paper we use decision tree techniques to predict the outcome of head injury patients. The work is based on patient data from the Edinburgh Royal Infirmary which contains both background (demographic) data and temporal (physiological) data. RESULTS: The focus of this paper is the discussion of the anomalous cases in the decision trees with the domain experts (the clinicians). CONCLUSIONS: These analyses led to the detection of several situations where both the data analysis and patient data collection should be enhanced, which in turn should lead to improved patient care. Reprinted from: Methods Inf Med 2001;40(5):373-9,

note = {Methods Inf Med 2001;40(5):373-9}

Clinical guidelines are intended to improve the quality and cost effectiveness of patient care. Integration of guidelines into electronic medical records and order-entry systems, in a way that enables delivery of patient-specific advice at the point of care, is likely to encourage guidelines acceptance and effectiveness. Among the methodologies for modeling guidelines and medical decision rules, the Arden Syntax for Medical Logic Modules and the GuideLine Interchange Format version 3 (GLIF3) emphasize the importance of sharing encoded logic across different medical institutions and implementation platforms. These two methodologies have similarities and differences; in this paper we clarify their roles. Both methods can be used to support sharing of medical knowledge, but they do so in complementary situations. The Arden Syntax is suitable for representing individual decision rules in self-contained units called Medical Logic Modules (MLMs), which are usually implemented as event-driven alerts or reminders. In contrast, GLIF3 is designed for encoding complex multistep guidelines that unfold over time. As a consequence, GLIF3 has several mechanisms for complexity management and additional constructs that may require overhead unnecessary for expressing simple alerts and reminders. Unlike the Arden Syntax, GLIF3 encourages a top-down process of guideline modeling consisting of three levels that are created in order: Level 1 comprises a human-readable flowchart of clinical decisions and actions. Level 2 comprises a computable specification that can be verified for logical consistency and completeness; and Level 3 comprises an implementable specification that includes information required for local adaptation of guideline logic as well as for mapping guideline variables onto institutional medical records. A major emphasis of the current GLIF3 development process has been to create the computable specification that formally represents medical decision and eligibility criteria. We based GLIF3’s formal expression language on the Arden Syntax’s logic grammar, making the necessary extensions to the Arden Syntax’s data structures and operators to support GLIF3’s object-oriented data model. We discuss why the process of generating a set of MLMs from a GLIF-encoded guideline cannot be automated,
why it can result in information loss, and why simple medical rules are best represented as individual MLMs. We thus show that the Arden Syntax and GLIF3 play complementary roles in representing medical knowledge for clinical decision support. Reprinted from: J Biomed Inform 2001;34(3):170-81,

note = {J Biomed Inform 2001;34(3):170-81}

@article{IMIA2003570,
    author = {Steiner SH, Cook RJ, Farewell VT.},
    title = {Risk-adjusted monitoring of binary surgical outcomes},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {570-},
    abstract = {A graphical procedure suitable for prospectively monitoring surgical performance is proposed. The approach is based on accumulating evidence from the outcomes of all previous surgical patients in a series using a new type of cumulative sum chart. Cumulative sum procedures are designed to "signal" if sufficient evidence has accumulated that the surgical failure rate has changed substantially. In this way, the chart rapidly detects deterioration (or improvement) in surgical performance while not overreacting to the expected fluctuations due to chance. Through the use of a likelihood-based scoring method, the cumulative sum procedure is adapted so that it adjusts for the surgical risk of each patient estimated preoperatively. The procedure is therefore applicable in situations where it is desirable to adjust for a mix of patients. Signals of the chart lead to investigations of the cause and to the timely introduction of remedial measures designed to avoid unnecessary future failures. Reprinted from: Med Decis Making 2001;21(3):163-9},
    note = {Med Decis Making 2001;21(3):163-9}
}

@article{IMIA2003579,
    author = {Daetwyler C.},
    title = {Computer-supported education. Synopsis},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {579-582},
    abstract = {},
    note = {}
}

@article{IMIA2003583,
    author = {Bernard-Opitz V, Sriram N, Nakhoda-Sapuan S.},
    title = {Enhancing social problem solving in children with autism and normal children through computer-assisted instruction},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {583-590},
    abstract = {Children with autism have difficulty in solving social problems and in generating multiple solutions to problems. They are, however, relatively skilled in responding to visual cues such as pictures and animations. Eight distinct social problems were presented on a computer, along with a choice of possible solutions, and an option to produce alternative solutions. Eight preschool children with autism and eight matched normal children went through 10 training sessions interleaved with 6 probe sessions. Children were asked to provide solutions to animated problem
scenes in all the sessions. Unlike the probe sessions, in the training sessions problem solutions were first explained thoroughly by the trainer. Subsequently these explanations were illustrated using dynamic animations of the solutions. Although children with autism produced significantly fewer alternative solutions compared to their normal peers, a steady increase across probe sessions was observed for the autistic group. The frequency of new ideas was directly predicted by the diagnostic category of autism. Results suggest young children with autism and their normal peers can be taught problem-solving strategies with the aid of computer interfaces. More research is required to establish whether such computer-assisted instruction will generalize to nontrained problem situations in real-life contexts. Reprinted from: J Autism Dev Disord 2001;31(4):377-84,

note = {J Autism Dev Disord 2001;31(4):377-84}

@article{IMIA2003591,
author = {Luque Ruiz I, López Espinosa E, Cerruela García G, Gómez-Nieto MA.},
title = {Design and development of computer-aided chemical systems: virtual labs for teaching chemical experiments in undergraduate and graduate courses},
journal = {IMIA Yearbook of medical informatics},
volume = {2003},
year = {2003},
pages = {591-598},
abstract = {An environment for the construction of virtual chemistry experiments is presented. This environment is based on the E(V) = M + m model-Experiment (Virtual) = Materials + method-proposed and described herein, which allows the representation and subsequent building of chemistry experiments in virtual 3D worlds to any degree of complexity. The object-based nature of the environment not only allows its use on the Internet but also facilitates integration with other systems, while enabling the system to represent and organize knowledge in such a way that it is available to any teaching environment dealing with chemical laboratory experiments. Reprinted from: J Chem Inf Comput Sci 2001;41:1075-82},

note = {J Chem Inf Comput Sci 2001;41:1075-82}
}

@article{IMIA2003599,
author = {Maleck M, Fischer MR, Kammer B, Zeiler C, Mangel E, Schenk F, Pfeifer KJ.},
title = {Do computers teach better? A media comparison study for case-based teaching in radiology},
journal = {IMIA Yearbook of medical informatics},
volume = {2003},
year = {2003},
pages = {599-606},
abstract = {A prospective study was performed to better define the role of computers in teaching radiology to medical students. Two hundred twenty-five 3rd-year students were randomly assigned to one of four groups and exposed to 10 radiology cases as well as to a voluntary weekly radiology lecture. Group A used computer-based cases with interactive elements; group B used computer-based cases without interactive elements; group C used paper-based cases with interactive elements; and group D was not exposed to the cases and served as a control group. On a multiple-choice question test, groups A, B, and C showed significant improvement (+11.2%, +15.1%, and +13.0%, respectively), whereas group D did not (+0.6%). On an image interpretation test, group A showed the most improvement (+15.7% [P <.001]), followed by group B (+15.1% [P <.01]) and group C (+10.2% [P <.05]); group D showed no significant improvement (+8.5%). No significant differences in the learning outcome were found between the two interactive groups (computer based and paper based). Computer-based teaching with case studies (with or without interactivity) improves students’ problem-solving ability in radiology. Reprinted from: Radiographics 2001;21(4):1025-32},

note = {Radiographics 2001;21(4):1025-32}
Intensive diabetes treatment can lead to a substantial reduction of the rate of the complications associated with diabetes. However, a number of patients may have poor control despite specialist care, and this along with devolution of care to non-specialists suggests that alternative interventions should be developed. The present paper describes an Internet based system where more emphasis is put on patient empowerment, the keywords being education and communication. The DiasNet system is based on a well documented decision support system, Dias, designed for use by clinicians. The scope of DiasNet has been widened from being used by clinicians to give advice on insulin dose, to also being used by patients as a tool for education and communication. Patients can experiment with their own data, adjusting insulin doses or meal sizes. In this way different therapeutic and dietary alternatives can be tried out, allowing the patient to gain experience in achieving glycaemic control. DiasNet is implemented in JAVA according to the client/server principle, enabling a new way of communication between patient and clinician: in case of any problems, the patient simply phones the clinician, who immediately, using his or her office PC, can take a look at the data the patient has entered. Reprinted from: Int J Med Inf 2001;64(2-3):319-30

A graph layout algorithm for drawing metabolic pathways

MOTIVATION: A large amount of data on metabolic pathways is available in databases. The ability to visualise the complex data dynamically would be useful for building more powerful research tools to access the databases. Metabolic pathways are typically modelled as graphs in which nodes represent chemical compounds, and edges represent chemical reactions between compounds. Thus, the problem of visualising pathways can be formulated as a graph layout problem. Currently available visual interfaces to biochemical databases either use static images or
cannot cope well with more complex, non-standard pathways. RESULTS: This paper presents a new algorithm for drawing pathways which uses a combination of circular, hierarchic and force-directed graph layout algorithms to compute positions of the graph elements representing main compounds and reactions. The algorithm is particularly designed for cyclic or partially cyclic pathways or for combinations of complex pathways. It has been tested on five sample pathways with promising results. Reprinted from: Bioinformatics 2001;17(5):461-7,

note = {Bioinformatics 2001;17(5):461-7}

@article{IMIA2003632,
  author = {Coppel RL.},
  title = {Bioinformatics and the malaria genome: facilitating access and exploitation of sequence information},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {632-638},
  abstract = {The torrent of sequence information unleashed by the various genome sequencing projects, including that of Plasmodium falciparum, will lead to an unprecedented increase in the data available for research purposes. The scientific community is struggling to develop ways to assimilate this information and ensure that it is fully analysed in a way that enables rapid development of new therapeutic and diagnostic advances. This is particularly so for the field of tropical medicine where many of the scientists have had limited training in the area of Bioinformatics and may be further hampered by poor access to the sequence data. A number of collections of malaria genome sequence are available, each with their own advantages and disadvantages, however further improvements in these information resources are needed. In particular, there would be great benefit in integrating genomic sequence and functional genomics results with the large amount of pre-existing knowledge related to parasite biology and immunological interactions with the host. Attempts to achieve this include the PlasmoDB database, and the lessons learned in this effort could be of great utility to other organism-specific databases. Reprinted from: Mol Biochem Parasitol 2001 Dec;118(2):139-45},
  note = {Mol Biochem Parasitol 2001 Dec;118(2):139-45}
}

@article{IMIA2003639,
  author = {Reis BY, Butte AS, Kohane IS.},
  title = {Extracting Knowledge from Dynamics in Gene Expression},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2003},
  year = {2003},
  pages = {639-651},
  abstract = {Most investigations of coordinated gene expression have focused on identifying correlated expression patterns between genes by examining their normalized static expression levels. In this study, we focus on the dynamics of gene expression by seeking to identify correlated patterns of changes in genetic expression level. In doing so, we build upon methods developed in clinical informatics to detect temporal trends of laboratory and other clinical data. We construct relevance networks from Saccharomyces cerevisiae gene-expression dynamics data and find genes with related functional annotations grouped together. While some of these associations are also found using a standard expression level analysis, many are identified exclusively through the dynamic analysis. These results strongly suggest that the analysis of gene expression dynamics is a necessary and important tool for studying regulatory and other functional relationships among genes. The source code developed for this investigation is freely available to all non-commercial investigators by contacting the authors. Reprinted from: J Biomed Inform 2001;34(1):15-27},

Continuous improvement of specialized protein databases, together with sensitive computational tools, have enhanced the power and reliability of computational prediction of protein function.

Reprinted from: Curr Opin Genet Dev 2001;11(3):247-57,

note = {Curr Opin Genet Dev 2001;11(3):247-57}

@article{IMIA2003663,
    author = {Yates A, Chan CCW, Collard RE, George AJT, Stark J.},
    title = {An approach to modelling in immunology},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2003},
    year = {2003},
    pages = {663-676},
    abstract = {Like most other fields in biology, immunology has been revolutionised by the techniques of molecular biology and the resulting explosion in available experimental data. It is argued that efforts to integrate the data to gain insight into how various subsystems in the immune system interact and function require mathematical modelling and computer simulation in close collaboration with experimentalists. This paper illustrates some of the techniques available for modelling immune systems, and highlights the issues that should be borne in mind by anyone starting down the modelling path. Reprinted from: Briefings in Bioinformatics 2001;2(3):245-57},
    note = {Briefings in Bioinformatics 2001;2(3):245-57}
}
@article{IMIA20041,
    author = {Altman RB.},
    title = {Preface - Towards Clinical Bioinformatics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {1-2},
    abstract = {},
    note = {} }

@article{IMIA20043,
    author = {Kulikowski C, Haux R.},
    title = {Editorial - The Road to Clinical Bioinformatics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {3},
    abstract = {},
    note = {} }

@article{IMIA20047,
    author = {Anonymous},
    title = {Information on IMIA},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {7-10},
    abstract = {},
    note = {} }

@article{IMIA200411,
    author = {Anonymous},
    title = {Progress Report by the President of IMIA},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {11-14},
    abstract = {},
    note = {} }

@article{IMIA200415,
    author = {Anonymous},
    title = {Honorary Fellows},
    journal = {IMIA Yearbook of medical informatics},}
@article{IMIA2004121,
    author = {Englbrecht CC, Han M, Mader MT, Osanger A, Mayer KFX.},
    title = {Curated databases and their role in clinical bioinformatics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {121-136},
    abstract = {},
    note = {}
}

@article{IMIA2004137,
    author = {Maojo V, Martin-Sanchez F.},
    title = {Public health implications of bioinformatics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {137-143},
    abstract = {},
    note = {}
}

@article{IMIA2004144,
    author = {Stefanelli M.},
    title = {Knowledge Management In Health Care Organizations},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {144-155},
    abstract = {},
    note = {}
}

@article{IMIA2004156,
    author = {Dev P.},
    title = {Trends in Health Care Education: Research Opportunities in Teaching and Learning},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {156-164},
    abstract = {},
    note = {}
}

@article{IMIA2004165,
    author = {Aronsky D, Aliferis CF, Johnson KB, Lorenzi N, Miller RA.},
    title = {},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {},
    abstract = {},
    note = {}
}
@article{IMIA2004199,
    author = {Haux R, Kulikowski C.},
    title = {Introduction: A New Section in the IMIA Yearbook},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {199},
    abstract = {},
    note = {}
}

@article{IMIA2004200,
    author = {Moehr J.},
    title = {The Quest for Identity of Health Informatics and for Guidance to Education in it – The
            German Reisensburg Conference of 1973 Revisited},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {200-209},
    abstract = {},
    note = {}
}

@article{IMIA2004210,
    author = {Anonymous},
    title = {English Translation of the Minutes of the Invitational Workshop Goals, Contents and
             Methods for Education in Medical Informatics},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {210-222},
    abstract = {},
    note = {}
}

@article{IMIA2004223,
    author = {de Groen P.},
    title = {Towards Clinical Bioinformatics. Synopsis},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {223-225},
    abstract = {},
    note = {}
}

@article{IMIA2004226,
    author = {Antoniadis A, Lambert-Lacroix A, Leblanc F.},
    title = {Effective dimension reduction methods for tumor classification using gene expression
data},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},

MOTIVATION: One particular application of microarray data, is to uncover the molecular variation among cancers. One feature of microarray studies is the fact that the number \( n \) of samples collected is relatively small compared to the number \( p \) of genes per sample which are usually in the thousands. In statistical terms this very large number of predictors compared to a small number of samples or observations makes the classification problem difficult. An efficient way to solve this problem is by using dimension reduction statistical techniques in conjunction with nonparametric discriminant procedures.

RESULTS: We view the classification problem as a regression problem with few observations and many predictor variables. We use an adaptive dimension reduction method for generalized semi-parametric regression models that allows us to solve the 'curse of dimensionality problem' arising in the context of expression data. The predictive performance of the resulting classification rule is illustrated on two well know data sets in the microarray literature: the leukemia data that is known to contain classes that are easy 'separable' and the colon data set.

Reprinted from: Bioinformatics 2003 Mar 22;19(5):563-70

@article{IMIA2004234,
title = {Diversity and complexity of HIV-1 drug resistance: a bioinformatics approach to predicting phenotype from genotype},
journal = {IMIA Yearbook of medical informatics},
volume = {2004},
year = {2004},
pages = {234-239},
abstract = {Drug resistance testing has been shown to be beneficial for clinical management of HIV type 1 infected patients. Whereas phenotypic assays directly measure drug resistance, the commonly used genotypic assays provide only indirect evidence of drug resistance, the major challenge being the interpretation of the sequence information. We analyzed the significance of sequence variations in the protease and reverse transcriptase genes for drug resistance and derived models that predict phenotypic resistance from genotypes. For 14 antiretroviral drugs, both genotypic and phenotypic resistance data from 471 clinical isolates were analyzed with a machine learning approach. Information profiles were obtained that quantify the statistical significance of each sequence position for drug resistance. For the different drugs, patterns of varying complexity were observed, including between one and nine sequence positions with substantial information content. Based on these information profiles, decision tree classifiers were generated to identify genotypic patterns characteristic of resistance or susceptibility to the different drugs. We obtained concise and easily interpretable models to predict drug resistance from sequence information. The prediction quality of the models was assessed in leave-one-out experiments in terms of the prediction error. We found prediction errors of 9.6-15.5% for all drugs except for zalcitabine, didanosine, and stavudine, with prediction errors between 25.4% and 32.0%. A prediction service is freely available at http://cartan.gmd.de/geno2pheno.html. Reprinted from: Proc Natl Acad Sci USA 2002 Jun 11;99(12):8271-6},
note = {Proc Natl Acad Sci USA 2002 Jun 11;99(12):8271-6}
}

@article{IMIA2004240,
author = {Cariou A, Chiche JD, Charpentier J, Dhainaut JF, Mira JP.},
title = {The era of genomics: impact on sepsis clinical trial design},
journal = {IMIA Yearbook of medical informatics},
volume = {2004},
year = {2004},

OBJECTIVE: This article aims to address the predictable impact of genetics on the design of clinical trials in the field of critical care medicine, with emphasis on the pathophysiology of sepsis and its treatment. DATA SOURCES: Published articles reporting studies on sepsis and septic shock or assessing the influence of genetics and pharmacogenomics in the treatment of critical illnesses. DATA ANALYSIS: Because most common diseases including sepsis have been shown to be influenced by inherited differences in our genes, completion of the Human Genome Project and the concomitant publication of the human single nucleotide polymorphism map both contribute to change our approach to medicine. Advances in genotyping techniques and bioinformatics enabling detection of single nucleotide polymorphisms have caused an explosion in pharmacogenomics—the research dealing with the interactions of an individual’s genotype and the outcome of a drug therapy. Pharmacogenomics will undoubtedly be used to improve future health care and clinical research in different ways. Whereas treatment allocation has been based mainly on phenotype, genetic characterization will help researchers to identify suitable subjects for clinical trials, to facilitate interpretation of the results of clinical trials, and to identify novel targets for future drugs or new markets for current products. As interindividual variability in drug response is a substantial clinical problem, the second major objective of pharmacogenomic research is to decrease adverse responses to therapy through determination of adequate therapeutic targets and genetic polymorphisms that alter drug specificity and toxicity. Ultimately, genetic information will be used to select the most effective therapeutic agent and the optimal dosage to elicit the expected drug response for a given individual. Implementation of genetic criteria for stratification of patient populations and individual assessment of treatment risks and benefits emerges as a major challenge to the pharmaceutical industry. CONCLUSIONS: In the future, technologies such as gene chip array will enhance genetic medicine and provide novel insights into a patient’s susceptibility to disease, enabling a better assessment of prognostic risk factors, quicker diagnosis, and accurate prediction of individual responsiveness to drugs. The predictable consequences of such an approach on the prevention and treatment of diseases could revolutionize medicine. Reprinted from: Crit Care Med 2002 May;30(5 Suppl):S341-8.

@article{IMIA2004248,
  author = {Martin-Sanchez F, Maojo V, Lopez-Campos G.},
  title = {Integrating genomics into health information systems},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {248-253},
  abstract = {OBJECTIVE: To outline the main issues related to the impact of the data generated by the Human Genome Project on health information systems. A major challenge for medical informatics is identified, consisting of adapting traditional systems to new genetic-based diagnostic and therapeutic tools. METHODS: Reviewing and analysing the different health information levels from an organisational complexity point of view. A model is proposed to explain the interactions between health informatics, bioinformatics and molecular medicine. RESULTS: We suggest a new framework that integrates genetic data into health information systems. Using this model, new topics for future research and development are identified. CONCLUSIONS: We are witnessing the birth of a new era (post-genomics). In this era technological advancements in genomics offer new opportunities for clinical applications. Medical informaticians should play an important role in this new endeavour. Reprinted from: Methods Inf Med 2002;41(1):25-30},
}

@article{IMIA2004254,
Biomedical science is currently undergoing an epoch-marking transition from its classical phase to the post-genome era. The outstanding success of world-wide genome sequencing efforts, evidenced by the recent publication of the draft of the human genome, together with the completion of several genomes of eukaryotic model organisms and the availability of microbial genome sequences, is opening up data sources of unprecedented scale for drug discovery. Furthermore, the elucidation of genome expression states through transcriptomic and proteomic techniques is playing a crucial role in the characterisation of disease at the molecular level. At the same time, our still very limited knowledge of the biological functions of genes and proteins at different levels of cellular organisation is preventing full exploitation of the available data. This review will discuss current computational techniques for function prediction based on the sequence-structure-function paradigm. Newly emerging approaches aimed at gaining an expanded understanding of function through integration of data from various sources and modelling of complex cellular systems will also be highlighted. Reprinted from: Curr Drug Targets 2002 Oct;3(5):387-99.
found of computerised evidence based guidelines on the management of asthma or angina in adults in primary care. This was probably due to low levels of use of the software, despite the system being optimised as far as was technically possible. Even if the technical problems of producing a system that fully supports the management of chronic disease were solved, there remains the challenge of integrating the systems into clinical encounters where busy practitioners manage patients with complex, multiple conditions. Reprinted from: BMJ 2002 Oct 26;325(7370):941,
   note = {BMJ 2002 Oct 26;325(7370):941}
}

@article{IMIA2004279,
    author = {Hahn U, Romacker M, Schulz S.},
    title = {MEDSYNDIKATE—a natural language system for the extraction of medical information from findings reports},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {279-290},
    abstract = {MEDSYNDIKATE is a natural language processor, which automatically acquires medical information from findings reports. In the course of text analysis their contents is transferred to conceptual representation structures, which constitute a corresponding text knowledge base. MEDSYNDIKATE is particularly adapted to deal properly with text structures, such as various forms of anaphoric reference relations spanning several sentences. The strong demands MEDSYNDIKATE poses on the availability of expressive knowledge sources are accounted for by two alternative approaches to acquire medical domain knowledge (semi)automatically. We also present data for the information extraction performance of MEDSYNDIKATE in terms of the semantic interpretation of three major syntactic patterns in medical documents. Reprinted from: Int J Med Inf 2002 Dec 4;67(1-3):63-74},
    note = {Int J Med Inf 2002 Dec 4;67(1-3):63-74}
}

@article{IMIA2004291,
    author = {Oniki TA, Clemmer TP, Pryor TA.},
    title = {The effect of computer-generated reminders on charting deficiencies in the ICU},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {291-301},
    abstract = {OBJECTIVE: To examine the effect of computer-generated reminders on nurse charting deficiencies in two intensive care units. DESIGN: Nurses caring for a group of 60 study patients received patient-specific paper reminder reports when charting deficiencies were found at mid-day. Nurses caring for a group of 60 control patients received no reminders. A group of 60 retrospective patients was also formed. MEASUREMENTS: The average numbers of charting deficiencies at the end of the shift in each of the three groups were compared using two planned orthogonal contrasts. RESULTS: The average in the study group patients was 1.02 deficiencies per day per patient, whereas the control group the average was 1.40 deficiencies per day per patient (p = 0.001). The average number of end-of-shift deficiencies in the pooled prospective (study/control) population was 1.21 deficiencies per day per patient, compared with the average in the retrospective group of 1.56 deficiencies per day per patient (p < 0.001). CONCLUSION: The decrease was likely due both to the appropriate response of the nurses to the reminders and to a learned attentiveness to the tasks on the part of the nurses who cared for study patients. Greater gains were hindered by incomplete "coupling" of the reminders to the end-of-shift deficiencies and by inaccuracies in the reminders. Reprinted from: J Am Med Inform Assoc 2003 Mar-Apr;10(2):177-87},
    note = {J Am Med Inform Assoc 2003 Mar-Apr;10(2):177-87}
OBJECTIVE: Clinical information systems typically present patient data in chronologic order, organized by the source of the information (e.g., laboratory, radiology). This study evaluates the functionality and utility of a knowledge-based system that generates concept-oriented views (organized around clinical concepts such as disease or organ system) of clinical data. DESIGN: The authors have developed a system that uses a knowledge base of interrelationships between medical concepts to infer relationships between data in electronic medical records. They use these inferences to produce summaries, or views, of the data that are relevant to a specific concept of interest. They evaluated the ability of the system to select relevant information, reduce information overload, and support physician information retrieval. MEASUREMENTS: The sensitivity and specificity of the system for identifying relevant patient information were calculated. Effect on information overload was assessed by comparing the amount of information in each view with the amount of information in the entire record. Information retrieval accuracy and cost (time) were used to measure the effect of using concept-oriented views on the efficiency and effectiveness of retrievals. RESULTS: The sensitivity and specificity of the system for identifying relevant clinical information were generally in the range of 70 to 80 percent. Concept-oriented views are effective in reducing the amount of information retrieved (over 80 percent reduction) and, compared with source-oriented views, are able to improve physician retrieval accuracy (p=0.04). CONCLUSION: Computer-generated, concept-oriented views can be used to reduce clinician information overload and improve the accuracy of clinical data retrieval. Reprinted from: J Am Med Inform Assoc 2002 May-Jun;9(3):294-305,

note = {J Am Med Inform Assoc 2002 May-Jun;9(3):294-305}
OBJECTIVES: Our objectives were to determine the user-oriented and legal requirements for a Public Key Infrastructure (PKI) for electronic signatures for medical documents, and to translate these requirements into a general model for a signature system. A prototype of this model was then implemented and evaluated in clinical routine use. METHODS: Analyses of documents, processes, interviews, observations, and of the available literature supplied the foundations for the development of the signature system model. Eight participants of the Department of Dermatology of the Heidelberg University Medical Center evaluated the implemented prototype from December 2000 to January 2001, during the course of an intervention study. By means of questionnaires, interviews, observations and database analyses, the usefulness and user acceptance of the electronic signature and its integration into electronic discharge letters were established. RESULTS: Since the major part of medical documents generated in a hospital are signature-relevant, they will require electronic signatures in the future. A PKI must meet the multitude of responsibilities and security needs required in a hospital. Also, the signature functionality must be integrated directly into the workflow surrounding document creation. A developed signature model, fulfilling user-oriented and legal requirements, was implemented using hard and software components that conform to the German Signature Law. It was integrated into the existing hospital information system of the Heidelberg University Medical Center. At the end of the intervention study, the average acceptance scores achieved were mean = 3.90; SD = 0.42 on a scale of 1 (very negative attitude) to 5 (very positive attitude) for the electronic signature procedure. Acceptance of the integration into computer-supported discharge letter writing reached mean = 3.91; SD = 0.47. On average, the discharge letters were completed 7.18 days earlier. CONCLUSION: The electronic signature is indispensable for the further development of electronic patient records. Application-independent hard and software components, in accordance with the signature law, must be integrated into electronic patient records, and provided to certification services using standardized interfaces. Signature-oriented workflow and document management components are essential for user acceptance in routine clinical use. Reprinted from: Methods Inf Med 2002;41(4):321-30,
@article{IMIA2004340,
  author = {Ross SE, Lin CT.},
  title = {The effects of promoting patient access to medical records: a review},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {340-349},
  abstract = {The Health Insurance Privacy and Portability Act (HIPPA) stipulates that patients must be permitted to review and amend their medical records. As information technology makes medical records more accessible to patients, it may become more commonplace for patients to review their records routinely. This article analyzes the potential benefits and drawbacks of facilitating patient access to the medical record by reviewing previously published research. Previous research includes analysis of clinical notes, surveys of patients and practitioners, and studies of patient-accessible medical records. Overall, studies suggest the potential for modest benefits (for instance, in enhancing doctor-patient communication). Risks (for instance, increasing patient worry or confusion) appear to be minimal in medical patients. The studies, however, were of limited quality and low statistical power to detect the variety of outcomes that may result from implementation of a patient-accessible medical record. The data from these studies lay the foundation for future research. Reprinted from: J Am Med Inform Assoc 2003 Mar-Apr;10(2):129-38},
  note = {J Am Med Inform Assoc 2003 Mar-Apr;10(2):129-38}
}

@article{IMIA2004350,
  author = {Weir CR, Hurdle JF, Felga MA, Hoffman JM, Roth B, Nebeker JR.},
  title = {Direct text entry in electronic progress notes. An evaluation of input errors},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {350-358},
  abstract = {OBJECTIVES: It is not uncommon that the introduction of a new technology fixes old problems while introducing new ones. The Veterans Administration recently implemented a comprehensive electronic medical record system (CPRS) to support provider order entry. Progress notes are entered directly by clinicians, primarily through keyboard input. Due to concerns that there may be significant, invisible disruptions to information flow, this study was conducted to formally examine the incidence and characteristics of input errors in the electronic patient record. METHODS: Sixty patient charts were randomly selected from all 2,301 inpatient admissions during a 5-month period. A panel of clinicians with informatics backgrounds developed the review criteria. After establishing inter-rater reliability, two raters independently reviewed 1,891 notes for copying, copying errors, inconsistent text, inappropriate object insertion and signature issues. RESULTS: Overall, 60% of patients reviewed had one or more input-related errors averaging 7.8 errors per patient. About 20% of notes showed evidence of copying, with an average of 1.01 error per copied note. Copying another clinician's note and making changes had the highest risk of error. Templating resulted in large amounts of blank spaces. Overall, MDs make more errors than other clinicians even after controlling for the number of notes. CONCLUSIONS: Moving towards a more progressive model for the electronic medical record, where actions are recorded only once, history and physical information is encoded for use later, and note generation is organized around problems, would greatly minimize the potential for error. Reprinted from: Methods Inf Med 2003;42(1):61-7},
  note = {Methods Inf Med 2003;42(1):61-7}
}
@article{IMIA2004359,
  author = {Winter A.},
  title = {Health Information Systems. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {359-360},
  abstract = {},
  note = {}}

@article{IMIA2004361,
  author = {Doupi P, van der Lei J.},
  title = {Towards personalized Internet health information: the STEPPS architecture},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {361-373},
  abstract = {PRIMARY OBJECTIVE: STEPPS (STructured Evaluated Personalized Patient Support) proposes a strategy for integration of electronic patient records with Internet health-related content and its consequent use in personalized information retrieval for patient education. The application domain is the post-discharge support of burn patients in the Netherlands. MATERIALS AND METHODS: We developed an electronic patient record interface for structured data collection in burn care. The system's thesaurus was projected to UMLS terms and the corresponding codes were incorporated in our software. A list of topics central to burn patient education was identified and a collection of related Web pages was compiled using meta-search software (Copernic2001Pro). The HTML pages were filed into catalogues by the Collexis indexing-matching software, using the UMLS Metathesaurus as indexing vocabulary. RESULTS: The bilingual (English and Dutch) structured data interface is currently used to create a database of retrospective patient data. Each patient’s profile, i.e. set of characteristics employed to personalize information retrieval, can be automatically extracted. We have assembled a collection of more than 2500 Internet pages containing relevant information for burn patients. When patient data is available, the Collexis matching engine will accept the patient’s profile as input and retrieve the most relevant HTML documents available in the catalogues. DISCUSSION: We have addressed some basic issues around the technical feasibility of linking electronic patient record data to online content. Although the functionality of STEPPS is not yet optimal, it contributes to the efforts towards improved relevance of information retrieval. Electronic patient record applications in conjunction with Internet resources can give a significant boost to the availability of tailored health education material. In this context, quality assurance of online health information is an indispensable element. Reprinted from: Med Inform Internet Med 2002 Sep;27(3):139-51},
  note = {Med Inform Internet Med 2002 Sep;27(3):139-51}}

@article{IMIA2004374,
  author = {Fraenkel DJ, Cowie M, Daley P.},
  title = {Quality benefits of an intensive care clinical information system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {374-379},
  abstract = {OBJECTIVE: This study was performed to quantify the quality benefits and staff perceptions of a computerized clinical information system implementation in an intensive care unit. Although clinical information systems have been available and implemented in many intensive care
units for more than a decade, there is little objective evidence of their impact on the quality of care and staff perceptions. DESIGN: A longitudinal observational study before and after clinical information system implementation. SETTING: A 12-bed adult general intensive care unit in a large Australian tertiary referral teaching hospital. INTERVENTION: Implementation of a fully featured clinical information system to replace paper-based charts of patient observations, clinical records, results reporting, and drug prescribing. MEASUREMENTS AND MAIN RESULTS: The frequency of clinical adverse events over a 4-yr period using an established reporting system was examined. Pre- and postimplementation staff questionnaires were distributed and analyzed. There were significant reductions in the rates of medication, intravenous therapy, and ventilator incidents. There was a trend toward a reduction in pressure sores. The survey, utilizing a validated questionnaire, demonstrated a positive perception of the clinical information system by nursing staff, with less time spent in documentation and more time in patient care. Nursing staff recruitment and retention improved after clinical information system implementation. CONCLUSIONS: Implementation of a fully featured clinical information system was associated with significant improvements in key quality indicators, positive nursing staff perceptions, and some positive resource implications. Reprinted from: Crit Care Med 2003 Jan;31(1):120-5,
Inpatient nursing units in an academic health system were the setting for the study. The study comprised before-and-after comparisons between phase 1, pre-implementation of POE (pre-POE) and phase 2, post-implementation of POE (post-POE) and, within phase 2, a comparison of POE and the combination of POE plus eMAR. Length of stay and cost were compared pre- and post-POE for a period of 10 to 12 months across all services in the respective hospitals. MEASUREMENTS: Comparisons were made pre- and post-POE for the time intervals between initiation and completion of pharmacy (pre-POE, n=46; post-POE, n=70), radiology (pre-POE, n=11; post-POE, n=54), and laboratory orders (without POE, n=683; with POE, n=1,142); timeliness of countersignature of verbal order (University Hospitals [OSUH]: pre-POE, n=605; post-POE, n=19,225; James Cancer Hospital (James): pre-POE, n=478; post-POE, n=10,771); volume of nursing transcription errors (POE with manual MAR, n=888; POE with eMAR, n=396); length of stay and total cost (OSUH: pre-POE, n=8,228; post-POE, n=8,154; James: (pre-POE, n=6,471; post-POE, n=6,045). RESULTS: Statistically significant reductions were seen following the implementation of POE for medication turn-around times (64 percent, from 5:28 hr to 1:51 hr; p<0.001), radiology procedure completion times (43 percent, from 7:37 hr to 4:21 hr; p<0.05), and laboratory result reporting times (25 percent, from 31:3 min to 23:4 min; p=0.001). In addition, POE combined with eMAR eliminated all physician and nursing transcription errors. There were 43 and 26 percent improvements in order countersignature by physicians in OSUH and James, respectively. Severity-adjusted length of stay decreased in OSUH (pre-POE, 3.91 days; post-POE, 3.71 days; p=0.002), but not significantly in James (pre-POE, 3.68 days; post-POE, 3.61 days; p=0.356). Although total cost per admission decreased significantly in selected services, it did not change significantly across either institution (OSUH: pre-POE, 5,697 dollars; post-POE, 5,661 dollars; p=0.687; James: pre-POE, 6,427 dollars; post-POE, 6,518 dollars; p=0.502). CONCLUSION: Physician order entry and eMAR provided the framework for improvements in patient safety and in the timeliness of care. The significant cultural and workflow changes that accompany the implementation of POE did not adversely affect acuity-adjusted length of stay or total cost. The reductions in transcription errors, medication turn-around times, and timely reporting of results supports the view that POE and eMAR provide a good return on investment.Reprinted from: J Am Med Inform Assoc 2002 Sep-Oct;9(5):529-39,
overlooked. The developments of a framework and software tools that implement comprehensive data visualization and objective measures of cluster quality are crucial. In this paper, we describe a theoretical framework and formalizations for consistently developing clustering algorithms. A new clustering algorithm was developed within the proposed framework. We demonstrate that a theoretically sound principle can be uniformly applied to the developments of cluster-optimization function, comprehensive data-visualization strategy, and objective cluster-evaluation measures as well as actual implementation of the principle. Cluster consistency and quality measures of the algorithm are rigorously evaluated against those of popular clustering algorithms for gene expression data analysis (K-means and self-organizing maps), in four data sets, yielding promising results.


@article{IMIA2004416,
    author = {Duverney D, Gaspoz JM, Pichot V, Roche F, Brion R, Antoniadis A, Barthelemy JC.},
    title = {High accuracy of automatic detection of atrial fibrillation using wavelet transform of heart rate intervals},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {416-421},
    abstract = {Permanent and paroxysmal AF is a risk factor for the occurrence and the recurrence of stroke, which can occur as its first manifestation. However, its automatic identification is still unsatisfactory. In this study, a new mathematical approach was evaluated to automate AF identification. A derivation set of 30 24-hour Holter recordings, 15 with chronic AF (CAF) and 15 with sinus rhythm (SR), allowed the authors to establish specific RR variability characteristics using wavelet and fractal analysis. Then, a validation set of 50 subjects was studied using these criteria, 19 with CAF, 16 with SR, and 15 with paroxysmal AF (PAF); and each QRS was classified as true or false sinus or AF beat. In the SR group, specificity reached 99.9%; in the CAF group, sensitivity reached 99.2%; in the PAF group, sensitivity reached 96.1%, and specificity 92.6%. However, classification on a patient basis provided a sensitivity of 100%. This new approach showed a high sensitivity and a high specificity for automatic AF detection, and could be used in screening for AF in large populations at risk. Reprinted from: Pacing Clin Electrophysiol 2002 Apr;25(4 Pt 1):457-62},
}

@article{IMIA2004422,
    author = {Signorini MG, Magenes G, Cerutti S, Arduini D.},
    title = {Linear and nonlinear parameters for the analysis of fetal heart rate signal from cardiotocographic recordings},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {422-431},
    abstract = {Antepartum fetal monitoring based on the classical cardiotocography (CTG) is a noninvasive and simple tool for checking fetal status. Its introduction in the clinical routine limited the occurrence of fetal problems leading to a reduction of the precocious child mortality. Nevertheless, very poor indications on fetal pathologies can be inferred from the even automatic CTG analysis methods, which are actually employed. The feeling is that fetal heart rate (FHR) signals and uterine contractions carry much more information on fetal state than is usually extracted by classical analysis methods. In particular, FHR signal contains indications about the neural development of the fetus. However, the methods actually adopted for judging a CTG trace as "abnormal" give weak predictive indications about fetal dangers. We propose a new methodological
approach for the CTG monitoring, based on a multiparametric FHR analysis, which includes spectral parameters from autoregressive models and nonlinear algorithms (approximate entropy). This preliminary study considers 14 normal fetuses, eight cases of gestational (maternal) diabetes, and 13 intrauterine growth retarded fetuses. A comparison with the traditional time domain analysis is also included. This paper shows that the proposed new parameters are able to separate normal from pathological fetuses. Results constitute the first step for realizing a new clinical classification system for the early diagnosis of most common fetal pathologies. Reprinted from: IEEE Trans Biomed Eng. 2003 Mar;50(3):365-74,


@article{IMIA2004432,
  title = {Signal Processing Techniques in Genomic Engineering},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {432-},
  abstract = {Proceedings of the IEEE 2002 Dec; 90(12):1822-33},
  note = {Proceedings of the IEEE 2002 Dec; 90(12):1822-33}
}

@article{IMIA2004447,
  author = {Pullan A.},
  title = {Biomedical Imaging. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {447-449},
  abstract = {},
  note = {}
}

@article{IMIA2004450,
  author = {Frangi AF, Rueckert D, Schnabel JA, Niessen J.},
  title = {Automatic construction of multiple-object three-dimensional statistical shape models: application to cardiac modeling},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {450-465},
  abstract = {A novel method is introduced for the generation of landmarks for three-dimensional (3-D) shapes and the construction of the corresponding 3-D statistical shape models. Automatic landmarking of a set of manual segmentations from a class of shapes is achieved by 1) construction of an atlas of the class, 2) automatic extraction of the landmarks from the atlas, and 3) subsequent propagation of these landmarks to each example shape via a volumetric nonrigid registration technique using multiresolution B-spline deformations. This approach presents some advantages over previously published methods: it can treat multiple-part structures and requires less restrictive assumptions on the structure's topology. In this paper, we address the problem of building a 3-D statistical shape model of the left and right ventricle of the heart from 3-D magnetic resonance images. The average accuracy in landmark propagation is shown to be below 2.2 mm. This application demonstrates the robustness and accuracy of the method in the presence of large shape variability and multiple objects. Reprinted from: IEEE Trans Med Imaging 2002 Sep;21(9):1151-66},
We introduce a new approach to medical image analysis that combines deformable model methodologies with concepts from the field of artificial life. In particular, we propose "deformable organisms", autonomous agents whose task is the automatic segmentation, labeling, and quantitative analysis of anatomical structures in medical images. Analogous to natural organisms capable of voluntary movement, our artificial organisms possess deformable bodies with distributed sensors, as well as (rudimentary) brains with motor, perception, behavior, and cognition centers. Deformable organisms are perceptually aware of the image analysis process. Their behaviors, which manifest themselves in voluntary movement and alteration of body shape, are based upon sensed image features, pre-stored anatomical knowledge, and a deliberate cognitive plan. We demonstrate several prototype deformable organisms based on a multiscale axisymmetric body morphology, including a "corpus callosum worm" that can overcome noise, incomplete edges, considerable anatomical variation, and interference from collateral structures to segment and label the corpus callosum in 2D mid-sagittal MR brain images. Reprinted from: Med Image Anal 2002 Sep;6(3):251-66.

Evidence suggests that some structural brain abnormalities in schizophrenia are neurodevelopmental in origin. There is also growing evidence to suggest that shape deformations in brain structure may reflect abnormalities in neurodevelopment. While many magnetic resonance (MR) imaging studies have investigated brain area and volume measures in schizophrenia, fewer have focused on shape deformations. In this MR study we used a 3D shape representation technique, based on spherical harmonic functions, to analyze left and right amygdala-hippocampus shapes in each of 15 patients with schizophrenia and 15 healthy controls matched for age, gender, handedness and parental socioeconomic status. Left/right asymmetry was also measured for both shape and volume differences. Additionally, shape and volume measurements were combined in a composite analysis. There were no differences between groups in overall volume or shape. Left/right amygdala-hippocampal asymmetry, however, was significantly larger in patients than controls for both relative volume and shape. The local brain regions responsible for the left/right asymmetry differences in patients with schizophrenia were in the tail of the hippocampus (including both the inferior aspect adjacent to parahippocampal gyrus and the superior aspect adjacent to the lateral geniculate nucleus and more anteriorly to the cerebral peduncles) and in portions of the amygdala body (including the anterior-superior aspect adjacent to the basal nucleus). Also, in patients, increased volumetric asymmetry tended to be correlated with increased left/right shape asymmetry. Furthermore, a combined analysis of volume and shape asymmetry resulted in improved differentiation between...
groups. Classification function analyses correctly classified 70% of cases using volume, 73.3% using shape, and 87% using combined volume and shape measures. These findings suggest that shape provides important new information toward characterizing the pathophysiology of schizophrenia, and that combining volume and shape measures provides improved group discrimination in studies investigating brain abnormalities in schizophrenia. An evaluation of shape deformations also suggests local abnormalities in the amygdala-hippocampal complex in schizophrenia. Reprinted from: Psychiatry Res 2002 Aug 20;115(1-2):15-35.

@article{IMIA2004505,
  author = {Kozmann G.},
  title = {Decision Support, Knowledge Representation and Management. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {505-507},
  abstract = {},
  note = {}
}

@article{IMIA2004508,
  title = {Expert system support using a Bayesian belief network for the classification of endometrial hyperplasia},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {508-519},
  abstract = {Accurate morphological classification of endometrial hyperplasia is crucial as treatments vary widely between the different categories of hyperplasia and are dependent, in part, on the histological diagnosis. However, previous studies have shown considerable inter-observer variation in the classification of endometrial hyperplasias. The aim of this study was to develop a decision support system (DSS) for the classification of endometrial hyperplasias. The system used a Bayesian belief network to distinguish proliferative endometrium, simple hyperplasia, complex hyperplasia, atypical hyperplasia and grade 1 endometrioid adenocarcinoma. These diagnostic outcomes were held in the decision node. Four morphological features were selected as diagnostic clues used routinely in the discrimination of endometrial hyperplasias. These represented the evidence nodes and were linked to the decision node by conditional probability matrices. The system was designed with a computer user interface (CytoInform) where reference images for a given clue were displayed to assist the pathologist in entering evidence into the network. Reproducibility of diagnostic classification was tested on 50 cases chosen by a gynaecological pathologist. These comprised ten cases each of proliferative endometrium, simple hyperplasia, complex hyperplasia, atypical hyperplasia and grade 1 endometrioid adenocarcinoma. The DSS was tested by two consultant pathologists, two junior pathologists and two medical students. Intra- and inter-observer agreement was calculated following conventional histological examination of the slides on two occasions by the consultants and junior pathologists without the use of the DSS. All six participants then assessed the slides using the expert system on two occasions, enabling inter- and intra-observer agreement to be calculated. Using unaided conventional diagnosis, weighted kappa values for intra-observer agreement ranged from 0.645 to 0.901. Using the DSS, the results for the four pathologists ranged from 0.650 to 0.845. Both consultant pathologists had slightly worse weighted kappa values using the DSS, while both junior pathologists achieved slightly better values using the system. The
grading of morphological features and the cumulative probability curve provided a quantitative record of the decision route for each case. This allowed a more precise comparison of individuals and identified why discordant diagnoses were made. Taking the original diagnoses of the consultant gynaecological pathologist as the 'gold standard', there was excellent or moderate to good interobserver agreement between the 'gold standard' and the results obtained by the four pathologists using the expert system, with weighted kappa values of 0.586-0.872. The two medical students using the expert system achieved weighted kappa values of 0.771 (excellent) and 0.560 (moderate to good) compared to the 'gold standard'. This study illustrates the potential of expert systems in the classification of endometrial hyperplasias. Reprinted from: J Pathol 2002 Jul;197(3):403-14.

@article{IMIA2004520,
  author = {Peleg M, Yeh I, Altman RB.},
  title = {Modeling biological processes using workflow and Petri Net models},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {520-532},
  abstract = {MOTIVATION: Biological processes can be considered at many levels of detail, ranging from atomic mechanism to general processes such as cell division, cell adhesion or cell invasion. The experimental study of protein function and gene regulation typically provides information at many levels. The representation of hierarchical process knowledge in biology is therefore a major challenge for bioinformatics. To represent high-level processes in the context of their component functions, we have developed a graphical knowledge model for biological processes that supports methods for qualitative reasoning.

  RESULTS: We assessed eleven diverse models that were developed in the fields of software engineering, business, and biology, to evaluate their suitability for representing and simulating biological processes. Based on this assessment, we combined the best aspects of two models: Workflow/Petri Net and a biological concept model. The Workflow model can represent nesting and ordering of processes, the structural components that participate in the processes, and the roles that they play. It also maps to Petri Nets, which allow verification of formal properties and qualitative simulation.

  The biological concept model, TAMBIS, provides a framework for describing biological entities that can be mapped to the workflow model. We tested our model by representing malaria parasites invading host erythrocytes, and composed queries, in five general classes, to discover relationships among processes and structural components. We used reachability analysis to answer queries about the dynamic aspects of the model. Reprinted from: Bioinformatics 2002 Jun;18(6):825-37},
  note = {Bioinformatics 2002 Jun;18(6):825-37}
}

@article{IMIA2004533,
  author = {Peters A, Lausen B, Michelson G, Gefeller O.},
  title = {Diagnosis of glaucoma by indirect classifiers},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {533-537},
  abstract = {OBJECTIVES: Demonstration of the applicability of a framework called indirect classification to the example of glaucoma classification. Indirect classification combines medical a priori knowledge and statistical classification methods. The method is compared to direct
classification approaches with respect to the estimated misclassification error. METHODS: Indirect classification is applied using classification trees and the diagnosis of glaucoma. Misclassification errors are reduced by bootstrap aggregation. As direct classification methods linear discriminant analysis, classification trees and bootstrap aggregated classification trees are utilized in the problem of glaucoma diagnosis. Misclassification rates are estimated via 10-fold cross-validation. RESULTS: Indirect classification techniques reduce the misclassification error in the context of glaucoma classification compared to direct classification methods. CONCLUSIONS: Embedding a priori knowledge into statistical classification techniques can improve misclassification results. Indirect classification offers a framework to realize this combination. Reprinted from: Methods Inf Med 2003;42(1):99-103,

note = {Methods Inf Med 2003;42(1):99-103}

@article{IMIA2004538,
  author = {Prado M, Roa L, Reina-Tosina J, Palma A, Milan JA.},
  title = {Virtual center for renal support: technological approach to patient physiological image},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {538-550},
  abstract = {The patient physiological image (PPI) is a novel concept which manages the knowledge of the virtual center for renal support (VCRS), currently being developed by the Biomedical Engineering Group of the University of Seville. PPI is a virtual "replica" of the patient, built by means of a mathematical model, which represents several physiological subsystems of a renal patient. From a technical point of view, PPI is a component-oriented software module based on cutting-edge modeling and simulation technology. This paper provides a methodological and technological approach to the PPI. Computational architecture of PPI-based VCRS is also described. This is a multi-tier and multi-protocol system. Data are managed by several ORDBMS instances. Communications design is based on the virtual private network (VPN) concept. Renal patients have a minimum reliable access to the VCRS through a public switch telephone network--X.25 gateway. Design complies with the universal access requirement, allowing an efficient and inexpensive connection even in rural environments and reducing computational requirements in the patient's remote access unit. VCRS provides support for renal patients' healthcare, increasing the quality and quantity of monitored biomedical signals, predicting events as hypotension or low dialysis dose, assisting further to avoid them by an online therapy modification and easing diagnostic tasks. An online therapy adjustment experiment simulation is presented. Finally, the presented system serves as a computational aid for research in renal physiology. This is achieved by an open and reusable modeling and simulation architecture which allows the interaction among models and data from different scales and computer platforms, and a faster transference of investigation models toward clinical applications. Reprinted from: IEEE Trans Biomed Eng 2002 Dec;49(12):1420-30},
  note = {IEEE Trans Biomed Eng 2002 Dec;49(12):1420-30}
}

@article{IMIA2004551,
  author = {Safran C.},
  title = {Education and Consumer Informatics - the need for collaborative tools. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2004},
  year = {2004},
  pages = {551-552},
  abstract = {},
  note = {}}
An international virtual medical school (IVIMEDS): the future for medical education?

The introduction of new learning technologies, the exponential growth of Internet usage and the advent of the World Wide Web have the potential of changing the face of higher education. There are also demands in medical education for greater globalization, for the development of a common core curriculum, for improving access to training, for more flexible and student-centred training programmes including programmes with multi-professional elements and for maintaining quality while increasing student numbers and working within financial constraints. An international virtual medical school (IVIMEDS) with a high-quality education programme embodying a hybrid model of a blended curriculum of innovative e-learning approaches and the best of traditional face-to-face teaching is one response to these challenges. Fifty leading international medical schools and institutions are participating in a feasibility study. This is exploring: innovative thinking and approaches to the new learning technologies including e-learning and virtual reality; new approaches to curriculum planning and mapping and advanced instructional design based on the use of 'reusable learning objects'; an international perspective on medical education which takes into account the trend to globalization; a flexible curriculum which meets the needs of different students and has the potential of increasing access to medicine. Reprinted from: Med Teach 2002 May;24(3):261-7.

A comparison of critical thinking in groups of third-year medical students in text, video, and virtual PBL case modalities

PURPOSE: To determine whether critical thinking in problem-based learning (PBL) group discourse differed according to case modality. METHOD: The study was conducted in 2000 in the Department of Pediatrics at the University of Colorado School of Medicine in Denver. Third-year medical students on their pediatrics clerkship were divided into three groups: face-to-face with a text case, face-to-face with a digital video case, and virtual with a digital video case. Twenty-four groups were divided among the three case modalities. Using an existing coding scheme, each distinct codable unit of discourse was placed into one of 35 indicators reflective of five critical-thinking stages. For each group’s discourse, a critical-thinking ratio was calculated for each of the stages. The Kruskal-Wallis test was used to compare the critical-thinking ratios for each stage across the three modalities. Residual conversation to indicate processes occurring within the group was also coded. RESULTS: A content analysis of the transcripts of 13 of the 24 group discussions occurred. The virtual groups had the highest critical-thinking ratio. Except for the problem-identification stage, the video groups had higher ratios that the text groups did. CONCLUSIONS: This exploratory study examined how the mode of case presentation affected the critical thinking of groups using the PBL format. Students who learned in a virtual modality with a digital video case engaged in more critical thinking.
The data suggest that the video enhanced critical thinking in both face-to-face and virtual PBL groups. Reprinted from: Acad Med 2003 Feb;78(2):204-11,

@article{IMIA2004568,
    author = {Neafsey PJ, Strickler Z, Shellman J, Chartier V.},
    title = {An interactive technology approach to educate older adults about drug interactions arising from over-the-counter self-medication practices},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {568-575},
    abstract = {An interactive computer program (Personal Education Program [PEP]) designed for the learning styles and psychomotor skills of older adults was used to teach older adults about potential drug interactions that can result from self-medicating with over-the-counter (OTC) agents and alcohol. Subjects used the PEP on notebook computers equipped with infrared sensitive touchscreens. Subjects were recruited from senior centers. Those who met age, vision, literacy, independence, and medication use criteria were randomly assigned to one of three groups: (1) PEP plus information booklet; (2) information booklet only; or (3) control. A repeated measures (three time periods 2 weeks apart), three-group design was used. Users of PEP had significantly greater knowledge and self-efficacy scores than both the conventional and control groups at all three time points. The PEP group reported fewer adverse self-medication behaviors over time. Reported self-medication behaviors did not change over time for either the conventional or control groups. Subjects indicated a high degree of satisfaction with the PEP and reported their intent to make specific changes in self-medication behaviors. Reprinted from: Public Health Nurs 2002 Jul-Aug;19(4):255-62},
}

@article{IMIA2004576,
    author = {Zeng Q, Kogan S, Ash N, Greenes RA, Boxwala AA.},
    title = {Characteristics of consumer terminology for health information retrieval},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2004},
    year = {2004},
    pages = {576-586},
    abstract = {OBJECTIVE: Clinical information systems typically present patient data in chronologic order, organized by the source of the information (e.g., laboratory, radiology). This study evaluates the functionality and utility of a knowledge-based system that generates concept-oriented views (organized around clinical concepts such as disease or organ system) of clinical data. DESIGN: The authors have developed a system that uses a knowledge base of interrelationships between medical concepts to infer relationships between data in electronic medical records. They use these inferences to produce summaries, or views, of the data that are relevant to a specific concept of interest. They evaluated the ability of the system to select relevant information, reduce information overload, and support physician information retrieval. MEASUREMENTS: The sensitivity and specificity of the system for identifying relevant patient information were calculated. Effect on information overload was assessed by comparing the amount of information in each view with the amount of information in the entire record. Information retrieval accuracy and cost (time) were used to measure the effect of using concept-oriented views on the efficiency and effectiveness of retrievals. RESULTS: The sensitivity and specificity of the system for identifying relevant clinical

information were generally in the range of 70 to 80 percent. Concept-oriented views are effective in reducing the amount of information retrieved (over 80 percent reduction) and, compared with source-oriented views, are able to improve physician retrieval accuracy (p=0.04). CONCLUSION: Computer-generated, concept-oriented views can be used to reduce clinician information overload and improve the accuracy of clinical data retrieval. Reprinted from: J Am Med Inform Assoc 2002 May-Jun;9(3):294-305,

```markdown
note = {J Am Med Inform Assoc 2002 May-Jun;9(3):294-305}
```
year = (2005),
pages = {25-38},
abstract = {},
note = {}
}

@article{IMIA200539,
    author = {Anonymous},
    title = {Information on IMIA Societies},
    journal = {IMIA Yearbook of medical informatics},
    volume = (2005),
    year = (2005),
    pages = {39-64},
    abstract = {},
    note = {}
}

@article{IMIA200565,
    author = {Anonymous},
    title = {Information on IMIA Working Groups and Special Interest Groups},
    journal = {IMIA Yearbook of medical informatics},
    volume = (2005),
    year = (2005),
    pages = {65-84},
    abstract = {},
    note = {}
}

@article{IMIA200585,
    author = {Anonymous},
    title = {Information on IMIA Regional Groups},
    journal = {IMIA Yearbook of medical informatics},
    volume = (2005),
    year = (2005),
    pages = {85-114},
    abstract = {},
    note = {}
}

@article{IMIA2005115,
    author = {Anonymous},
    title = {HIMSS (IMIA Institutional Member)},
    journal = {IMIA Yearbook of medical informatics},
    volume = (2005),
    year = (2005),
    pages = {115-124},
    abstract = {},
    note = {}
}

@article{IMIA2005125,
    author = {Tröster G.},
    title = {The Agenda of Wearable Healthcare},
}
@article{IMIA2005173,
    author = {Jaspers MWM, Gardner RM, Gatewood LC, Haux R, Schmidt D, Wetter T.},
    title = {The International Partnership for Health Informatics Education: Lessons Learned from Six Years of Experience},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {173-182},
    abstract = {},
    note = {} 
}

@article{IMIA2005183,
    author = {Knaup P, Frey W, Haux R, Leven FJ.},
    title = {Medical informatics specialists: what are their job profiles? Results of a study on the first 1024 medical informatics graduates of the Universities of Heidelberg and Heilbronn},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {183-192},
    abstract = {OBJECTIVES: Since 1972, the University of Heidelberg and the University of Applied Sciences Heilbronn have jointly been running a medical informatics program. To continuously provide high quality education, the curriculum is regularly evaluated among its graduates. The objectives of this study were to assess the job situation of the graduates and to evaluate the curriculum from their viewpoint. METHOD: Anonymous inquiry of all medical informatics graduates, having finished their studies before March 31, 2001 (n=1024) using a structured questionnaire. RESULTS: The questionnaire was answered by 446 (compliance: 45.5%) graduates. About one third (146 of 444 valid cases) are working in software/hardware companies. 179 (43.0% of 416 valid cases) graduates are working within medical informatics, 214 (51.4%) are working outside of medical informatics, but within other informatics. 23 (5.5%) graduates are working neither in medical nor in other informatics. 15 percent of the responding graduates have received a doctor's degree. Software engineering, database and information systems are regarded as most important parts of the education. The majority of the graduates are satisfied with their education as well as with their personal career. CONCLUSIONS: The variety of jobs, the job profiles, and the high level of our graduates' satisfaction with their education indicate the relevance of specialized medical informatics programs with a curricular profile like the one in Heidelberg/Heilbronn. Investigations like this can help to adjust the contents of the curriculum to professional needs. Reprinted from: Methods Inf Med 2003;42(5):578-87},
    note = {Methods Inf Med 2003;42(5):578-87} 
}

@article{IMIA2005193,
    author = {Okada M, Yamamoto K, Kawamura T.},
    title = {Kawasaki University of Medical Welfare},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {193-198},
    abstract = {},
    note = {} 
}
@article{IMIA2005199,
    author = {Pinciroli F, Masseroli M, Bonacina S.},
    title = {New e-Health Tracks in the Engineering Education of the Politecnico di Milano},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {199-205},
    abstract = {},
    note = {}
}

@article{IMIA2005206,
    author = {Wright G, Betts H, Murray P.},
    title = {Health Informatics Masters Education, Online Learning and Student Support},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {206-212},
    abstract = {},
    note = {}
}

@article{IMIA2005213,
    author = {Bott O.},
    title = {Ubiquitous Health Care Systems: a New Paradigm for Medical Informatics? Synopsis.},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {213-218},
    abstract = {},
    note = {}
}

@article{IMIA2005219,
    author = {Carroll AE, Tarczy-Hornoch P, O’Reilly E, Christakis DA.},
    title = {The effect of point-of-care personal digital assistant use on resident documentation discrepancies},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {219-223},
    abstract = {BACKGROUND: We recently found documentation discrepancies in 60% of resident daily-progress notes with respect to patient weight, medications, or vascular lines. To what extent information systems can decrease such discrepancies is unknown. OBJECTIVE: To determine whether a point-of-care personal digital assistant (PDA)-based patient record and charting system could reduce the number of resident progress-note documentation discrepancies in a neonatal intensive care unit (NICU). DESIGN/METHODS: We conducted a before-and-after trial in an academic NICU. Our intervention was a PDA-based patient record and charting system used by all NICU resident physicians over the study period. We analyzed all resident daily-progress notes from 40 randomly selected days over 4 months in both the baseline and intervention periods. Using predefined reference standards, we determined the accuracy of recorded information for patient weights, medications, and vascular lines. Logistic and Poisson regression were used in analyses to}
control for potential confounding factors. RESULTS: A total of 339 progress notes in the baseline period and 432 progress notes in the intervention period were reviewed. When controlling for covariates in the regression, there were significantly fewer documentation discrepancies of patient weights in notes written by using the PDA system (14.4%-4.4% of notes; odds ratio [OR]: 0.29; 95% confidence interval [CI]: 0.15-0.56). When using the PDA system, there were no significant changes in the numbers of notes with documentation discrepancies of medications (27.7%-17.1% of notes; OR: 0.63; 95% CI: 0.35-1.13) or vascular lines (33.6%-36.1% of notes; OR: 1.11; 95% CI: 0.66-1.87).

CONCLUSIONS: The use of our PDA-based point-of-care patient record and charting system showed a modest benefit in reducing the number of documentation discrepancies in resident daily-progress notes. Further study of PDAs in information systems is warranted before they are widely adopted.

Reprinted from: Pediatrics 2004 Mar;113(3 Pt 1):450-4,

@article{IMIA2005224,
    author = {Coiera E, Clarke R.},
    title = {e-Consent: The design and implementation of consumer consent mechanisms in an electronic environment},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {224-235},
    abstract = {The effective coordination of health care relies on communication of confidential information about consumers between different health and community care services. However, consumers must be able to give or withhold "e-Consent" to those who wish to access their electronic health information. There are several possible forms for e-Consent. In the general consent model, a patient provides blanket consent for access to his or her information by an organization for all future information requests. Conversely, general denial explicitly denies consent for information to be used in future circumstances, and in each new episode of care, a new consent would be needed to obtain information. In the general consent with specific denial model, a patient attaches specific exclusion conditions to his or her general approval to future accesses. In contrast, in the general denial with explicit consent model, a patient issues a blanket block on all future accesses but allows the inclusion of future use under specified conditions. There also are several alternative functions for an e-Consent system. Consent could be captured as a matter of legal record. E-Consent systems could be more active by prompting clinicians to indicate that they have noted consent conditions before they access a record. Finally, the record of patient consent could be fully active and used as a gatekeeper in a distributed information environment. There probably will need to be some form of data object that is associated with patient information. This e-Consent object (or e-Co) will contain the specific conditions under which the data to which it is attached can be retrieved. Given the complexity of clinical work and the substantial variation we can expect in an individual's desire to make his or her personal medical details available, it is unlikely a "one size fits all" approach to e-Consent will work. Consequently, with a well-chosen consent design, it should be possible to balance the specific need for privacy of some of the population against the desire by others to err on the side of clinical safety, and clinicians desire to minimize the burden that an electronic consent mechanism would impose.
    Reprinted from: J Am Med Inform Assoc 2004 Mar-Apr;11(2):129-40},

@article{IMIA2005236,
    author = {Lukowicz P, Kirstein T, Troster G.},
    title = {Wearable systems for health care applications},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {224-235},
    abstract = {The wearable systems are of growing interest in the field of health care applications. They offer the possibility for direct measurement of physiological parameters in the body and the ability to monitor those parameters continuously or intermittently. Wearable systems can be used in various areas of health care, such as in the prevention, treatment, and monitoring of diseases. They can also be used for emergency medical care and for rehabilitation. Wearable systems can be classified into two main categories: wearable sensors and wearable computers. Wearable sensors are devices that measure physiological parameters and transmit the data to a wearable computer. Wearable computers are devices that collect and process data from wearable sensors. Wearable systems are an emerging technology that is being increasingly used in clinical and research settings.
    Reprinted from: J Am Med Inform Assoc 2004 Mar-Apr;11(2):129-40}
OBJECTIVES: Wearable systems can be broadly defined as mobile electronic devices that can be unobtrusively embedded in the user’s outfit as part of the clothing or an accessory. In particular, unlike conventional mobile systems, they can be operational and accessed without or with very little hindrance to user activity. To this end they are able to model and recognize user activity, state, and the surrounding situation: a property, referred to as context sensitivity. Wearable systems range from micro sensors seamlessly integrated in textiles through consumer electronics embedded in fashionable clothes and computerized watches to belt worn PCs with a head mounted display. The wearable computing concept is part of a broader framework of ubiquitous computing that aims at invisibly enhancing our environment with smart electronic devices. The goal of the paper is to provide a broad overview of wearable technology and its implications for health related applications. METHODS: We begin by summarizing the vision behind wearable computing. We then describe a framework for wearable computing architecture and the main technological aspects. Finally we show how specific properties of wearable systems can be used in different health related application domains. RESULTS: Wearable computing is an emerging concept building upon the success of today's mobile computing and communication devices. Due to rapid technological progress it is currently making a transition from a pure research stage to practical applications. Many of those applications are in health related domains, in particular, health monitoring, mobile treatment and nursing. CONCLUSIONS: Within the next couple of years wearable systems and more general ubiquitous computing will introduce profound changes and new application types to health related systems. In particular they will prove useful in improving the quality and reducing the cost of caring for the aging population. Reprinted from: Methods Inf Med 2004;43(3):232-8.

@article{IMIA2005243,
  author = {Maiolo C, Mohamed EI, Fiorani CM, de Lorenzo A.},
  title = {Home telemonitoring for patients with severe respiratory illness: the Italian experience},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {243-247},
  abstract = {We investigated the feasibility of telemonitoring services for patients with severe respiratory illness. In the first phase of the study, patients were observed and treated using face-to-face medical visits for 12 months. In the second phase of the study, the patients were monitored at home for 12 months, during which time determinations of arterial oxygen saturation and heart rate were performed twice a week, and the data were automatically transmitted to the hospital's processing centre via a normal telephone line. Thirty patients on long-term oxygen therapy were enrolled in the study; 23 completed the 12 months of home telemonitoring. The numbers of hospital admissions and of acute home exacerbations during the telemonitoring phase of the study decreased by 50% and 55%, respectively, in comparison with the first phase. Estimates of hospitalization costs for the patients during the second phase were approximately 17% lower than those for the first phase. Patients were satisfied with the quality of the personal telemonitoring process in 96% of cases. We believe that telemedicine can enable the provision of high-quality home care for patients with severe respiratory illness. Reprinted from: J Telemed Telecare 2003;9:67-71},
  note = {J Telemed Telecare 2003;9:67-71}
}

@article{IMIA2005248,
  author = {Marks IM, Mataix-Cols D, Kenwright M, Cameron R, Hirsch S, Gega L.},
  title = {Home telemonitoring for patients with severe respiratory illness: the Italian experience},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {243-247},
  abstract = {We investigated the feasibility of telemonitoring services for patients with severe respiratory illness. In the first phase of the study, patients were observed and treated using face-to-face medical visits for 12 months. In the second phase of the study, the patients were monitored at home for 12 months, during which time determinations of arterial oxygen saturation and heart rate were performed twice a week, and the data were automatically transmitted to the hospital's processing centre via a normal telephone line. Thirty patients on long-term oxygen therapy were enrolled in the study; 23 completed the 12 months of home telemonitoring. The numbers of hospital admissions and of acute home exacerbations during the telemonitoring phase of the study decreased by 50% and 55%, respectively, in comparison with the first phase. Estimates of hospitalization costs for the patients during the second phase were approximately 17% lower than those for the first phase. Patients were satisfied with the quality of the personal telemonitoring process in 96% of cases. We believe that telemedicine can enable the provision of high-quality home care for patients with severe respiratory illness. Reprinted from: J Telemed Telecare 2003;9:67-71},
  note = {J Telemed Telecare 2003;9:67-71}
}
BACKGROUND: Most anxiety/depression is not effectively treated. Aims Open evaluation of a free clinic giving immediate computer-aided cognitive-behavioural therapy (CBT) self-help plus brief advice from a therapist. METHOD: Test of outcome of self-referrals who used one of four computer-aided CBT systems for depression, phobia/panic, general anxiety or obsessive-compulsive disorder. RESULTS: The equivalent of one full-time clinician managed 355 referrals over a year. Of the 266 who had a screening interview 79% were suitable. Completers and non-completers of computer-aided CBT had similar pre-treatment features, with very chronic, moderately severe problems. Completers of the computer-aided self-help had a mean total of an hour's live therapist support over 12 weeks. They improved significantly and clinically meaningfully with three of the four systems and felt 'fairly satisfied'. Improvement resembled that in controlled and other trials of computer-aided CBT. CONCLUSIONS: Computer-aided self-help is a 'clinician extender' that greatly cuts per-patient therapist time without impairing improvement. It could reduce the per-patient cost of CBT. Reprinted from: Br J Psychiatry 2003 Jul;183:57-65,

Br J Psychiatry 2003 Jul;183:57-65
OBJECTIVE: The purpose of this study was to examine whether the physician order-entry system (POE) could increase the outpatient and inpatient revenue of hospitals. METHOD: We analyzed the inpatient and outpatient revenue data of all general hospitals (212) in South Korea obtained from the Korean National Health Insurance Corporation (KNHIC) during the period from 1996 to 1999 using the mixed model for repeated measure data. RESULTS: Analysis of the 4-years' panel data showed that both outpatient and inpatient revenues increased significantly after POE introduction. The hospital characteristics significantly influencing inpatient revenue were the number of beds, number of physicians and the tertiary status of a hospital; whereas those for outpatient revenue were the number of beds, number of physicians, the private status of a hospital, the tertiary status of a hospital and the urban status of a hospital. CONCLUSION: The revenues from both outpatients and inpatients were found to be increased after the introduction of the POE, while controlling for population size, competition, income, hospital location, hospital size, tertiary status and public status. Reprinted from: Int J Med Inform 2003;71(1):25-32,

Usefulness and effects on costs and staff management of a nursing resource management information system,

While administrative information systems can assist nurse managers to improve cost containment and resource management of their units, such effects cannot be known without rigorous evaluations. This article presents evaluation results of CLASSICA, an information system designed to provide decision support for nurse managers in financial management, resource allocation, and activity planning. CLASSICA demonstrated a 41% reduction in expenditures for overtime and extra hours during the evaluation period as compared with a 1.8% reduction in control units that did not use the system. Nurse managers reported a substantial improvement in management information and stated that they had gained control over costs. The system helped them analyse the relationships between patient activity, staffing and costs of nursing care. Nurse managers also reported high satisfaction with the system, the information and decision support provided, and its ease of use. These results suggest that CLASSICA is a decision support system that can successfully assist nurse managers in effectively managing their units. Reprinted from: J Nurs Manag 2003;11(3):208-15,
title = {Surveillance of medical device-related hazards and adverse events in hospitalized patients},
journal = {IMIA Yearbook of medical informatics},
volume = {2005},
year = {2005},
pages = {288-300},
abstract = {CONTEXT: Although adverse drug events have been extensively evaluated by computer-based surveillance, medical device errors have no comparable surveillance techniques.

OBJECTIVES: To determine whether computer-based surveillance can reliably identify medical device-related hazards (no known harm to patient) and adverse medical device events (AMDEs; patient experienced harm) and to compare alternative methods of detection of device-related problems.

DESIGN, SETTING, AND PARTICIPANTS: This descriptive study was conducted from January through September 2000 at a 520-bed tertiary teaching institution in the United States with experience in using computer tools to detect and prevent adverse drug events. All 20 441 regular and short-stay patients (excluding obstetric and newborn patients) were included.

MAIN OUTCOME MEASURES: Medical device events as detected by computer-based flags, telemetry problem checklists, International Classification of Diseases, Ninth Revision (ICD-9) discharge code (which could include AMDEs present at admission), clinical engineering work logs, and patient survey results were compared with each other and with routine voluntary incident reports to determine frequencies, proportions, positive predictive values, and incidence rates by each technique.

RESULTS: Of the 7059 flags triggered, 552 (7.8%) indicate a device-related hazard or AMDE. The estimated 9-month incidence rates (number per 1000 admissions [95% confidence intervals]) for AMDEs were 1.6 (0.9-2.5) for incident reports, 27.7 (24.9-30.7) for computer flags, and 64.6 (60.4-69.1) for ICD-9 discharge codes. Few of these events were detected by more than 1 surveillance method, giving an overall incidence of AMDE detected by at least 1 of these methods of 83.7 per 1000 (95% confidence interval, 78.8-88.6) admissions. The positive predictive value of computer flags for detecting device-related hazards and AMDEs ranged from 0% to 38%.

CONCLUSIONS: More intensive surveillance methods yielded higher rates of medical device problems than found with traditional voluntary reporting, with little overlap between methods. Several detection methods had low efficiency in detecting AMDEs. The high rate of AMDEs suggests that AMDEs are an important patient safety issue, but additional research is necessary to identify optimal AMDE detection strategies. Reprinted from: JAMA 2004;291(3):325-34},
note = {JAMA 2004;291(3):325-34}
OBJECTIVES: To determine whether paperless medical records contained less information than paper based medical records and whether that information was harder to retrieve. DESIGN: Cross sectional study with review of medical records and interviews with general practitioners. SETTING: 25 general practices in Trent region. PARTICIPANTS: 53 British general practitioners (25 using paperless records and 28 using paper based records) who each provided records of 10 consultations. MAIN OUTCOME MEASURES: Content of a sample of records and doctor recall of consultations for which paperless or paper based records had been made. RESULTS: Compared with paper based records, more paperless records were fully understandable (89.2% vs 69.9%, P=0.0001) and fully legible (100% vs 64.3%, P < 0.0001). Paperless records were significantly more likely to have at least one diagnosis recorded (48.2% vs 33.2%, P=0.05), to record that advice had been given (23.7% vs 10.7%, P=0.017), and, when a referral had been made, were more likely to contain details of the specialty (77.4% vs 59.5%, P=0.03). When a prescription had been issued, paperless records were more likely to specify the drug dose (86.6% vs 66.2%, P=0.005). Paperless records contained significantly more words, abbreviations, and symbols (P < 0.01 for all). At doctor interview, there was no difference between the groups for the proportion of patients or consultations that could be recalled. Doctors using paperless records were able to recall more advice given to patients (38.6% vs 26.8%, P=0.03). CONCLUSION: We found no evidence to support our hypotheses that paperless records would be truncated and contain more local abbreviations; and that the absence of writing would decrease subsequent recall. Conversely we found that the paperless records compared favourably with manual records. Reprinted from: BMJ 2003;326(7404):1439-43.

NOTE: BMJ 2003;326(7404):1439-43

OBJECTIVE: To investigate textual content, health problems and diagnostic codes in electronic patient records in general practice. DESIGN: Retrospective and observational database study. SETTING: Primary health care in Stockholm. SUBJECTS: Twenty randomly selected general practitioners with 20 records each. MAIN OUTCOME MEASURES: The frequency of use of problem-oriented medical records. The number of words, problems and diagnostic codes. The completeness and correctness of the diagnostic codes. RESULTS: About 14.5% of 400 studied records were problem-oriented. The mean number of words per record was 99.4, and the mean number of problems managed per record was 1.2. On average, there were 1.1 diagnostic codes per record and this differed widely among GPs and also among the electronic patient record systems. The mean number of codes per problem was 0.9, and the proportion of correct codes was 97.4%. CONCLUSIONS: The electronic patient records in general practice in Stockholm have an extensive textual content. A vast majority of the problems are coded and the completeness and correctness of diagnostic codes are high. It seems that problem-oriented electronic patient record systems enforce coding activities. It is feasible to establish a database of diagnostic data for research and health care planning based on electronic patient records. Reprinted from: Scand J Prim Health Care 2003;21(1):33-6.

@article{IMIA2005,
    author = {Rotich JK, Hannan TJ, Smith FE, Bii J, Odero WW, Vu N, Mamlin BW, Mamlin JJ, Einterz RM, Tierney WM.},
    title = {Installing and implementing a computer-based patient record system in sub-Saharan Africa: the Mosoriot Medical Record System},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {314-321},
    abstract = {The authors implemented an electronic medical record system in a rural Kenyan health center. Visit data are recorded on a paper encounter form, eliminating duplicate documentation in multiple clinic logbooks. Data are entered into an MS-Access database supported by redundant power systems. The system was initiated in February 2001, and 10,000 visit records were entered for 6,190 patients in six months. The authors present a summary of the clinics visited, diagnoses made, drugs prescribed, and tests performed. After system implementation, patient visits were 22% shorter. They spent 58% less time with providers (p < 0.001) and 38% less time waiting (p = 0.06). Clinic personnel spent 50% less time interacting with patients, two thirds less time interacting with each other, and more time in personal activities. This simple electronic medical record system has bridged the "digital divide." Financial and technical sustainability by Kenyans will be key to its future use and development. Reprinted from: J Am Med Inform Assoc 2003;10(4):295-303},
    note = {J Am Med Inform Assoc 2003;10(4):295-303}
}

@article{IMIA2005323,
    title = {A cost-benefit analysis of electronic medical records in primary care},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {323-332},
    abstract = {Electronic medical record systems improve the quality of patient care and decrease medical errors, but their financial effects have not been as well documented. The purpose of this study was to estimate the net financial benefit or cost of implementing electronic medical record systems in primary care. We performed a cost-benefit study to analyze the financial effects of electronic medical record systems in ambulatory primary care settings from the perspective of the health care organization. Data were obtained from studies at our institution and from the published literature. The reference strategy for comparisons was the traditional paper-based medical record. The primary outcome measure was the net financial benefit or cost per primary care physician for a 5-year period. The estimated net benefit from using an electronic medical record for a 5-year period was 86,400 US dollars per provider. Benefits accrue primarily from savings in drug expenditures, improved utilization of radiology tests, better capture of charges, and decreased billing errors. In one-way sensitivity analyses, the model was most sensitive to the proportion of patients whose care was capitated; the net benefit varied from a low of 8400 US dollars to a high of 140,100 US dollars . A five-way sensitivity analysis with the most pessimistic and optimistic assumptions showed results ranging from a 2300 US dollars net cost to a 330,900 US dollars net benefit. Implementation of an electronic medical record system in primary care can result in a positive financial return on investment to the health care organization. The magnitude of the return is sensitive to several key factors. Reprinted from: Am J Med 2003;114(5):397-403},
    note = {Am J Med 2003;114(5):397-403}
}

@article{IMIA2005333,
@article{IMIA2005336,
  title = {Virtual outreach: economic evaluation of joint teleconsultations for patients referred by their general practitioner for a specialist opinion},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {336-343},
  abstract = {OBJECTIVES: To test the hypotheses that, compared with conventional outpatient consultations, joint teleconsultation (virtual outreach) would incur no increased costs to the NHS, reduce costs to patients, and reduce absences from work by patients and their carers. DESIGN: Cost consequences study alongside randomised controlled trial. SETTING: Two hospitals in London and Shrewsbury and 29 general practices in inner London and Wales. PARTICIPANTS: 3170 patients identified; 2094 eligible for inclusion and willing to participate. 1051 randomised to virtual outreach and 1043 to standard outpatient appointments. MAIN OUTCOME MEASURES: NHS costs, patient costs, health status (SF-12), time spent attending index consultation, patient satisfaction. RESULTS: Overall six months costs were greater for the virtual outreach consultations (£724 per patient) than for conventional outpatient appointments (£625): difference in means £99 ($162; 138) (95% confidence interval £10 to £187, P=0.03). If the analysis is restricted to resource items deemed “attributable” to the index consultation, six month costs were still greater for virtual outreach: difference in means £108 (£73 to £142, P < 0.0001). In both analyses the index consultation accounted for the excess cost. Savings to patients in terms of costs and time occurred in both centres: difference in mean total patient cost £8 (£5 to £10, P < 0.0001). Loss of productive time was less in the virtual outreach group: difference in mean cost £11 (£10 to £12, P < 0.0001). CONCLUSION: The main hypothesis that virtual outreach would be cost neutral is rejected, but the hypotheses that costs to patients and losses in productivity would be lower are supported. Reprinted from: BMJ 2003;327(7406):84},
  note = {BMJ 2003;327(7406):84}
}

@article{IMIA2005344,
  author = {Tsui FC, Espino JU, Dato VM, Gesteland PH, Hutman J, Wagner MM.},
  title = {Technical description of RODS: a real-time public health surveillance system},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {344-353},
  abstract = {This report describes the design and implementation of the Real-time Outbreak and Disease Surveillance (RODS) system, a computer-based public health surveillance system for early detection of disease outbreaks. Hospitals send RODS data from clinical encounters over virtual private networks and leased lines using the Health Level 7 (HL7) message protocol. The data are sent in real time. RODS automatically classifies the registration chief complaint from the visit into one of
seven syndrome categories using Bayesian classifiers. It stores the data in a relational database, aggregates the data for analysis using data warehousing techniques, applies univariate and multivariate statistical detection algorithms to the data, and alerts users of when the algorithms identify anomalous patterns in the syndrome counts. RODS also has a Web-based user interface that supports temporal and spatial analyses. RODS processes sales of over-the-counter health care products in a similar manner but receives such data in batch mode on a daily basis. RODS was used during the 2002 Winter Olympics and currently operates in two states—Pennsylvania and Utah. It has been and continues to be a resource for implementing, evaluating, and applying new methods of public health surveillance. Reprinted from: J Am Med Inform Assoc 2003;10(5):399-408.

@article{IMIA2005354,
  author = {van Der Meijden MJ, Tange HJ, Troost J, Hasman A.},
  title = {Determinants of success of inpatient clinical information systems: a literature review},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {354-362},
  abstract = {We reviewed the English and Dutch literature on evaluations of patient care information systems that require data entry by health care professionals published from 1991 to 2001. Our objectives were to identify attributes that were used to assess the success of such systems and to test the ability of a framework developed by Delone and McLean for management information systems(1) to categorize these attributes correctly. The framework includes six dimensions or success factors: system quality, information quality, usage, user satisfaction, individual impact, and organizational impact. Thirty-three papers were selected for complete review. Types of study design included descriptive, correlational, comparative, and case studies. A variety of relevant attributes could be assigned to the six dimensions in the Delone and McLean framework, but some attributes, predominantly in cases of failure, did not fit any of the categories. They related to contingent factors, such as organizational culture. Our review points out the need for more thorough evaluations of patient care information systems that look at a wide range of factors that can affect the relative success or failure of these systems. Reprinted from: J Am Med Inform Assoc 2003;10(3):235-43},
  note = {J Am Med Inform Assoc 2003;10(3):235-43}
}

@article{IMIA2005363,
  author = {Winter A, Brigl B, Wendt T.},
  title = {Modeling hospital information systems. Part 1: The revised three-layer graph-based meta model 3LGM 2},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {363-372},
  abstract = {OBJECTIVES: Not only architects but also information managers need models and modeling tools for their subject of work. Especially for supporting strategic information management in hospitals, the meta model 3LGM2 is presented as an ontological basis for modeling the comprehensive information system of a hospital (HIS). METHODS: In a case study, requirements for modeling HIS have been deduced. Accordingly 3LGM2 has been designed to describe HIS by concepts on three layers. The domain layer consists of enterprise functions and entity types, the logical tool layer focuses on application components and the physical tool layer describes physical data processing components. In contrast to other approaches a lot of inter-layer-relationships exist. 3LGM2 is defined using the Unified Modeling Language (UML). RESULTS: Models of HIS can be
created which comprise not only technical and semantic aspects but also computer-based and paper-based information processing. A software tool supporting the creation of LGM2 compliant models in a graphical way has been developed. The tool supports in detecting those shortcomings at the logical or the physical tool layers which make it impossible to satisfy the information needs at the domain layer. 3LGM2 can also be used as an ontology for describing HIS in natural language. CONCLUSIONS: Strategic information management even in large hospitals should be and can be supported by dedicated methods and tools. Although there have been good experiences with 3LGM2 concerning digital document archiving at the Leipzig University Hospital, which are presented in part 2, the benefit of the proposed method and tool has to be further evaluated. Reprinted from: Methods Inf Med 2003;42(5):544-51

@article{IMIA2005373,
  author = {Barillot C.},
  title = {Medical Signal Processing and Biomedical Imaging. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {373-376},
  abstract = {},
  note = {} }

@article{IMIA2005377,
  author = {Armoundas AA, Feldman AB, Mukkamala R, He B, Mullen TJ, Belk PA, Lee YZ, Cohen RJ.},
  title = {Statistical accuracy of a moving equivalent dipole method to identify sites of origin of cardiac electrical activation},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {377-387},
  abstract = {While radio frequency (RF) catheter ablation (RCA) procedures for treating ventricular arrhythmias have evolved significantly over the past several years, the use of RCA has been limited to treating slow ventricular tachycardias (VTs). In this paper, we present preliminary results from computer and animal studies to evaluate the accuracy of an algorithm that uses the single equivalent moving dipole (SEMD) model in an infinite homogeneous volume conductor to guide the RF catheter to the site of origin of the arrhythmia. Our method involves measuring body surface electrocardiographic (ECG) signals generated by arrhythmic activity and by bipolar current pulses emanating from a catheter tip, and representing each of them by a SEMD model source at each instant of the cardiac cycle, thus enabling rapid repositioning of the catheter tip requiring only a few cycles of the arrhythmia. We found that the SEMD model accurately reproduced body surface ECG signals with a correlation coefficients > 0.95. We used a variety of methods to estimate the uncertainty of the SEMD parameters due to measurement noise and found that at the time when the arrhythmia is mostly localized during the cardiac cycle, the estimates of the uncertainty of the spatial SEMD parameters (from ECG signals) are between 1 and 3 mm. We used pacing data from spatially separated epicardial sites in a swine model as surrogates for focal ventricular arrhythmic sources and found that the spatial SEMD estimates of the two pacing sites agreed with both their physical separation and orientation with respect to each other. In conclusion, our algorithm to estimate the SEMD parameters from body surface ECG can potentially be a useful method for rapidly positioning the catheter tip to the arrhythmic focus during an RCA procedure. Reprinted from: IEEE Trans Biomed Eng 2003 Dec;50(12):1360-70},
@article{IMIA2005388,
    title = {A primal sketch of the cortex mean curvature: a morphogenesis based approach to study the variability of the folding patterns},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {388-399},
    abstract = {In this paper, we propose a new representation of the cortical surface that may be used to study the cortex folding process and to recover some putative stable anatomical landmarks called sulcal roots usually buried in the depth of adult brains. This representation is a primal sketch derived from a scale space computed for the mean curvature of the cortical surface. This scale-space stems from a diffusion equation geodesic to the cortical surface. The primal sketch is made up of objects defined from mean curvature minima and saddle points. The resulting sketch aims first at highlighting significant elementary cortical folds, second at representing the fold merging process during brain growth. The relevance of the framework is illustrated by the study of central sulcus sulcal roots from antenatal to adult age. Some results are proposed for ten different brains. Some preliminary results are also provided for superior temporal sulcus. Reprinted from: IEEE Trans Med Imaging 2003;22(6):754-65},
    note = {IEEE Trans Med Imaging 2003;22(6):754-65}
}

@article{IMIA2005400,
    author = {Chabanas M, Luboz V, Payan Y.},
    title = {Patient specific finite element model of the face soft tissues for computer-assisted maxillofacial surgery},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {400-420},
    abstract = {This paper addresses the prediction of face soft tissue deformations resulting from bone repositioning in maxillofacial surgery. A generic 3D Finite Element model of the face soft tissues was developed. Face muscles are defined in the mesh as embedded structures, with different mechanical properties (transverse isotropy, stiffness depending on muscle contraction). Simulations of face deformations under muscle actions can thus be performed. In the context of maxillofacial surgery, this generic soft-tissue model is automatically conformed to patient morphology by elastic registration, using skin and skull surfaces segmented from a CT scan. Some elements of the patient mesh could be geometrically distorted during the registration, which disables Finite Element analysis. Irregular elements are thus detected and automatically regularized. This semi-automatic patient model generation is robust, fast and easy to use. Therefore it seems compatible with clinical use. Six patient models were successfully built, and simulations of soft tissue deformations resulting from bone displacements performed on two patient models. Both the adequation of the models to the patient morphologies and the simulations of post-operative aspects were qualitatively validated by five surgeons. Their conclusions are that the models fit the morphologies of the patients, and that the predicted soft tissue modifications are coherent with what they would expect. Reprinted from: Med Image Anal 2003 Jun;7(2):131-51},
    note = {Med Image Anal 2003 Jun;7(2):131-51}
}
@article{IMIA2005421,
    author = {Ganser KA, Dickhaus H, Metzner R, Wirtz CR.},
    title = {A deformable digital brain atlas system according to Talairach and Tournoux},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {421-440},
    abstract = {Brain atlases are valuable tools which assist neurosurgeons during the planning of an intervention. Since a printed atlas book has several disadvantages-among them the difficulty to map the information onto a patient’s individual anatomy-we have developed a digital version of the well-established stereotaxic brain atlas of Talairach and Tournoux. Our atlas system is mainly dedicated to assist neurosurgical planning, and its benefits are: (i) a three-dimensional (3D) representation of most brain structures contained in the Talairach atlas; (ii) a nonrigid matching capability which warps the standard atlas anatomy to an individual brain magnetic resonance imaging (MRI) dataset in a few minutes and which is able to take deformations due to tumors into account; (iii) the integration of several sources of neuroanatomical knowledge; (iv) an interface to a navigation system which allows utilization of atlas information intraoperatively. In this paper we outline the algorithm we have developed to achieve 3D surface models of the brain structures. Moreover, we describe the nonrigid matching method which consists of two tasks: firstly, point correspondences between the atlas and the patient are established in an automatic fashion, and secondly these displacement vectors are interpolated using a radial basis function approach to form a continuous transformation function. To generate appropriate target structures for the first of these tasks, we implemented a quick segmentation tool which is capable to segment the cortex and ventricles in less than 5 min. An evaluation shows that our nonrigid approach is more precise than the conventional piecewise linear matching, though it should be further improved for the region around the deep grey nuclei. Summarizing, we developed a Win32 program which permits the convenient and fast application of standardized anatomy to individual brains which potentially contain tumors. Reprinted from: Med Image Anal 2004 Mar;8(1):3-22},
    note = {Med Image Anal 2004 Mar;8(1):3-22}
}

@article{IMIA2005441,
    author = {Tilg B, Fischer G, Modre R, Hanser F, Messnarz B, Roithinger FX},
    title = {Electrocardiographic imaging of atrial and ventricular electrical activation},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {441-450},
    abstract = {Inverse electrocardiography has been developing for several years. By combining measurements obtained by electrocardiographic body surface mapping with three-dimensional anatomical data, one can non-invasively image the electrical activation sequence in the human heart. In this study, an imaging approach that uses a bidomain theory-based surface heart model was applied to single-beat data of atrial and ventricular activation. We found that for sinus and paced rhythms, the sites of early activation and the areas with late activation were estimated with sufficient accuracy. In particular, for focal arrhythmias, this model-based imaging approach might allow the guidance and evaluation of antiarrhythmic interventions, for instance, in case of catheter ablation or drug therapy. Reprinted from: Med Image Anal 2003 Sep;7(3):391-8},
    note = {Med Image Anal 2003 Sep;7(3):391-8}
}

@article{IMIA2005451,
    author = {Hripcsak G.},
    title = {Decision Support, Knowledge Representation and Management. Synopsis},
}

Health care effectiveness and efficiency are under constant scrutiny especially when treatment is quite costly as in the Intensive Care (IC). Currently, there are various international quality of care programs for the evaluation of IC. At the heart of such quality of care programs lie prognostic models whose prediction of patient mortality can be used as a norm to which actual mortality is compared. The current generation of prognostic models in IC are statistical parametric models based on logistic regression. Given a description of a patient at admission, these models predict the probability of his or her survival. Typically, this patient description relies on an aggregate variable, called a score, that quantifies the severity of illness of the patient. The use of a parametric model and an aggregate score form adequate means to develop models when data is relatively scarce but it introduces the risk of bias. This paper motivates and suggests a method for studying and improving the performance behavior of current state-of-the-art IC prognostic models. Our method is based on machine learning and statistical ideas and relies on exploiting information that underlies a score variable. In particular, this underlying information is used to construct a classification tree whose nodes denote patient sub-populations. For these sub-populations, local models, most notably logistic regression ones, are developed using only the total score variable. We compare the performance of this hybrid model to that of a traditional global logistic regression model. We show that the hybrid model not only provides more insight into the data but also has a better performance. We pay special attention to the precision aspect of model performance and argue why precision is more important than discrimination ability. Reprinted from: Artif Intell Med 2003;29(1-2):5-23.

OBJECTIVES: Artificial neural networks have proved to be accurate predictive instruments in several medical domains, but have been criticized for failing to specify the information upon which their predictions are based. We used methods of relevance analysis and sensitivity analysis to determine the most important predictor variables for a validated neural network for community-acquired pneumonia. METHODS: We studied a feed-forward, back-propagation neural network trained to predict pneumonia among patients presenting to an emergency department with fever or respiratory complaints. We used the methods of full retraining, weight elimination, constant
substitution, linear substitution, and data permutation to identify a consensus set of important demographic, symptom, sign, and comorbidity predictors that influenced network output for pneumonia. We compared predictors identified by these methods to those identified by a weight propagation analysis based on the matrices of the network, and by logistic regression. RESULTS: Predictors identified by these methods were clinically plausible, and were concordant with those identified by weight analysis, and by logistic regression using the same data. The methods were highly correlated in network error, and led to variable sets with errors below bootstrap 95% confidence intervals for networks with similar numbers of inputs. Scores for variable relevance tended to be higher with methods that precluded network retraining (weight elimination) or that permuted variable values (data permutation), compared with methods that permitted retraining (full retraining) or that approximated its effects (constant and linear substitution). CONCLUSION: Methods of relevance analysis and sensitivity analysis are useful for identifying important predictor variables used by artificial neural networks. Reprinted from: Methods Inf Med 2003;42(3):287-96, note = {Methods Inf Med 2003;42(3):287-96}

@article{iMIA2005483,
    author = {Plougmann S, Hejlesen O, Turner B, Kerr D, Cavan D.},
    title = {The effect of alcohol on blood glucose in Type 1 diabetes—metabolic modelling and integration in a decision support system},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {483-490},
    abstract = {INTRODUCTION: We have recently shown, in studies with patients with Type 1 (insulin dependent) diabetes, that alcohol intake at 21:00 h significantly reduced blood glucose values after 10-12 h, compared with control studies with no alcohol. HYPOTHESIS: We hypothesised that this was due to the following effects of alcohol: (1) alcohol metabolism increases NADH, leading to a reduction in hepatic gluconeogenesis; (2) increased glycogen phosphorylase activity depletes hepatic glycogen stores; (3) after the alcohol is metabolised, hepatic insulin sensitivity is increased, leading to the restoration of glycogen stores and reduction in blood glucose levels; and (4) consequently, after several hours, glycogen stores and insulin sensitivity return to normal. RESULTS: A model describing these changes (DiasNet-Alcohol) was implemented into the DiasNet model of human glucose metabolism. Our study suggests that the DiasNet-Alcohol model gives a reasonable approximation of these effects of alcohol on blood glucose concentration observed in our study and supports our hypothesis for the mechanism behind these effects in Type 1 diabetes. Reprinted from: Int J Med Inform 2003;70(2-3):337-44},
    note = {Int J Med Inform 2003;70(2-3):337-44}
}

@article{iMIA2005491,
    title = {The medical office of the 21st century (MOXXI): effectiveness of computerized decision-making support in reducing inappropriate prescribing in primary care},
    journal = {IMIA Yearbook of medical informatics},
    volume = {2005},
    year = {2005},
    pages = {491-500},
    abstract = {BACKGROUND: Adverse drug-related events are common in the elderly, and inappropriate prescribing is a preventable risk factor. Our objective was to determine whether inappropriate prescribing could be reduced when primary care physicians had computer-based access to information on all prescriptions dispensed and automated alerts for potential prescribing problems. METHODS: We randomly assigned 107 primary care physicians with at least 100 patients
aged 66 years and older (total 12,560) to a group receiving computerized decision-making support (CDS) or a control group. Physicians in the CDS group had access to information on current and past prescriptions through a dedicated computer link to the provincial seniors’ drug-insurance program. When any of 159 clinically relevant prescribing problems were identified by the CDS software, the physician received an alert that identified the nature of the problem, possible consequences and alternative therapy. The rate of initiation and discontinuation of potentially inappropriate prescriptions was assessed over a 13-month period. RESULTS: In the 2 months before the study, 31.8% of the patients in the CDS group and 33.3% of those in the control group had at least 1 potentially inappropriate prescription. During the study the number of new potentially inappropriate prescriptions per 1000 visits was significantly lower (18%) in the CDS group than in the control group (relative rate [RR] 0.82, 95% confidence interval [CI] 0.69-0.98), but differences between the groups in the rate of discontinuation of potentially inappropriate prescriptions were significant only for therapeutic duplication by the study physician and another physician (RR 1.66, 95% CI 0.99-2.79) and drug interactions caused by prescriptions written by the study physician (RR 2.15, 95% CI 0.98-4.70).

INTERPRETATION: Computer-based access to complete drug profiles and alerts about potential prescribing problems reduces the rate of initiation of potentially inappropriate prescriptions but has a more selective effect on the discontinuation of such prescriptions. Reprinted from: CMAJ 2003 Sep 16;169(6):549-56,

note = {CMAJ 2003 Sep 16;169(6):549-56}

@article{IMIA2005501,
  author = {Gammon D.},
  title = {Education and Consumer Informatics – patient involvement and health outcomes. Synopsis},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {501-502},
  abstract = {},
  note = {}}

@article{IMIA2005503,
  author = {Bearman M.},
  title = {Is virtual the same as real? Medical students’ experiences of a virtual patient.},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {503-510},
  abstract = {PURPOSE: Narrative and problem-solving versions of the same virtual patient’s case were created for teaching communication skills to medical students. This qualitative study explored how students experienced the virtual patient. METHOD: In 1998-1999 in-depth, free-form interviews and follow-ups were conducted with 12 third-year medical students at Monash University in Australia. Students were asked about their experiences with the virtual patient. The interviews were qualitatively analyzed using psychological phenomenology. RESULTS: Results were in the form of a description of the students’ lived experiences with the virtual patient. Findings indicated that students responded to the virtual patient as if she were real but they felt a simultaneous sense of prefabrication, which often led to frustration. Students’ experiences of both versions were similar, but the narrative version permitted better rapport with the virtual patient. CONCLUSION: This phenomenological study indicated that a constructed, computer-based virtual patient can have substantial emotional effects on medical students. Reprinted from: Acad Med 2003;78(5):538-45},
The current study sought to evaluate a novel kind of interactive computer-based cognitive training (ICT) in Alzheimer's disease (AD). AD patients ($N = 9$), age- and gender-matched patients with a major depressive episode ($N = 9$), and healthy control subjects ($N = 10$) were trained to use an ICT program that relates to activities of daily living (ADL). Digital photographs of a shopping route were implemented in a close-to-reality simulation on a computer touch-screen. The task was to find a predefined shopping route, to buy three items, and to answer correctly 10 multiple-choice questions addressing knowledge related to the virtual tasks. Training performance was rated using the number of mistakes (wrong way), time needed for the tasks, number of correct multiple-choice answers, and of repeat of instruction. Compared to normal controls and depressed patients, AD patients performed significantly worse with regard to all variables. Within a 4-week training period including 12 sessions, however, substantial training gains were observed, including a significant reduction of mistakes. Training effects were sustained until follow-up 3 weeks later. The performance of the depressed patients and the normal controls improved as well, with no difference between the two groups. Self-reported effects revealed that the training was well perceived. Thus, the task performance of AD patients improved substantially and subjects appeared to have liked this approach to ICT. New interactive media, therefore, may yield interesting opportunities for rehabilitation and (psycho)therapeutic interventions.

Reprinted from: Compr Psychiatry 2003;44(3):213-9,

Note = {Compr Psychiatry 2003;44(3):213-9}

We describe an integrated pharmaceutical information system (IPIS) in which a patient's profile including his/her medication records and prescriptions are collected from physician order entry systems and pharmaceutical systems along with the history of patient care in the hospital. Based on an individual patient's profile the IPIS can provide pharmaceutical education information specifically to meet the patient's needs. The IPIS has been developed and installed at Taipei Medical University Wanfang Hospital (TMUWFH) since July 2002. Evaluation of the system showed that it can help patients to effectively acquire drug information. This enables them to have a much better understanding of the pharmacological properties of the medicines they are taking, including adverse drug reactions and side-effects. In our opinion the system has the potential to improve both patient safety and treatment outcomes. Reprinted from: Int J Med Inform 2004;73(4):383-9,

A randomized trial of electronic versus paper pain diaries in children: impact on compliance, accuracy, and acceptability

Sixty children, ages 8-16 (M=12.3) with headaches or juvenile idiopathic arthritis, were randomized to receive either e-diaries administered via home visits (n=30) or p-diaries (n=30) handed out during clinic visits for return by mail. Results demonstrated significant mean differences in diary entries completed between groups, with children with e-diaries completing more days (M=6.6) compared to children with p-diaries (M=3.8), P<0.001. Diaries returned by children in the p-diary group contained significantly more errors and omissions compared to diaries returned by children in the e-diary group (which contained none), P<0.001. Children rated both diary formats as highly acceptable and easy to use. A significant gender x diary format interaction (P<0.01) was found for compliance where boys demonstrated greater compliance with the e-diary format. Findings demonstrated that the e-diary was feasible to use with children and showed significantly greater compliance and accuracy in diary recording compared to traditional paper diaries in a population of children with recurrent pain.

Reprinted from: Pain 2004;107(3):213-9,
Bioinformatics, we decided to develop a robust infrastructure for data management and integration that supports advanced biomedical applications. RESULTS: We have developed an interconnected set of software and services called caCORE. Enterprise Vocabulary Services (EVS) provide controlled vocabulary, dictionary and thesaurus services. The Cancer Data Standards Repository (caDSR) provides a metadata registry for common data elements. Cancer Bioinformatics Infrastructure Objects (caBIO) implements an object-oriented model of the biomedical domain and provides Java, Simple Object Access Protocol and HTTP-XML application programming interfaces. caCORE has been used to develop scientific applications that bring together data from distinct genomic and clinical science sources. AVAILABILITY: caCORE downloads and web interfaces can be accessed from links on the caCORE web site (http://ncicb.nci.nih.gov/core). caBIO software is distributed under an open source license that permits unrestricted academic and commercial use. Vocabulary and metadata content in the EVS and caDSR, respectively, is similarly unrestricted, and is available through web applications and FTP downloads. SUPPLEMENTARY INFORMATION: http://ncicb.nci.nih.gov/core/publications contains links to the caBIO 1.0 class diagram and the caCORE 1.0 Technical Guide, which provide detailed information on the present caCORE architecture, data sources and APIs. Updated information appears on a regular basis on the caCORE web site (http://ncicb.nci.nih.gov/core). Reprinted from: Bioinformatics 2003;19(18):2404-12.

@article{IMIA2005547,
  author = {Lambrix P, Habbouche M, Perez M.},
  title = {Evaluation of ontology development tools for bioinformatics},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {547-554},
  abstract = {Ontologies are being used nowadays in many areas, including bioinformatics. To assist users in developing and maintaining ontologies a number of tools have been developed. In this paper we compare four such tools, Protégé-2000, Chimaera, DAG-Edit and OilEd. As test ontologies we have used ontologies from the Gene Ontology Consortium. No system is preferred in all situations, but each system has its own strengths and weaknesses. Reprinted from: Bioinformatics 2003;19(12):1564-71},
  note = {Bioinformatics 2003;19(12):1564-71}
}

@article{IMIA2005555,
  title = {Synergy between medical informatics and bioinformatics: facilitating genomic medicine for future health care},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {555-567},
  abstract = {In this paper, we review the results of BIOINFOMED, a study funded by the European Commission (EC) with the purpose to analyse the different issues and challenges in the area where Medical Informatics and Bioinformatics meet. Traditionally, Medical Informatics has been focused on the intersection between computer science and clinical medicine, whereas Bioinformatics have been predominantly centered on the intersection between computer science and biological
}
Although researchers from both areas have occasionally collaborated, their training, objectives and interests have been quite different. The results of the Human Genome and related projects have attracted the interest of many professionals, and introduced new challenges that will transform biomedical research and health care. A characteristic of the ‘post genomic’ era will be to correlate essential genotypic information with expressed phenotypic information. In this context, Biomedical Informatics (BMI) has emerged to describe the technology that brings both disciplines (BI and MI) together to support genomic medicine. In recognition of the dynamic nature of BMI, institutions such as the EC have launched several initiatives in support of a research agenda, including the BIOINFOMED study. Reprinted from: J Biomed Inform 2004;37(1):30-42,

@article{IMIA2005568,
  author = {Mitchell JA, McCray AT, Bodenreider O.},
  title = {From phenotype to genotype: issues in navigating the available information resources},
  journal = {IMIA Yearbook of medical informatics},
  volume = {2005},
  year = {2005},
  pages = {568-574},
  abstract = {Reprinted from: OBJECTIVES: As part of an investigation of connecting health professionals and the lay public to both disease and genomic information, we assessed the availability and nature of the data from the Human Genome Project relating to human genetic diseases. METHODS: We focused on a set of single gene diseases selected from main topics in MEDLINEplus, the NLM’s principal resource focused on consumers. We used publicly available websites to investigate specific questions about the genes and gene products associated with the diseases. We also investigated questions of knowledge and data representation for the information resources and navigational issues. RESULTS: Many online resources are available but they are complex and technical. The major challenges encountered when navigating from phenotype to genotype were (1) complexity of the data, (2) dynamic nature of the data, (3) diversity of foci and number of information resources, and (4) lack of use of standard data and knowledge representation methods. CONCLUSIONS: Three major informatics issues arise from the navigational challenges. First, the official gene names are insufficient for navigation of these web resources. Second, navigational inconsistencies arise from difficulties in determining the number and function of alternate forms of the gene or gene product and maintaining currency with this information. Third, synonymy and polysemy cause much confusion. These are severe obstacles to computational navigation from phenotype to genotype, especially for individuals who are novices in the underlying science. Tools and standards to facilitate this navigation are sorely needed. Methods Inf Med 2003;42(5):557-63},
  note = {Methods Inf Med 2003;42(5):557-63}
}