

Summary of Best Papers Selected for the 2018 Edition of the IMA Yearbook, Special Section

Humbert M, Ayday E, Hubaux JP, Telenti A
Quantifying Interdependent Risks in Genomic Privacy

ACM Transactions on Privacy and Security 2017;20(1):3

Genomic data and information are often especially sensitive, and research using genomic data poses risks of disclosure without consent of the people from whom the data were derived. This study examines how heritability influences what information can be predicted about a person given genomic data about family members. Investigators show how a belief propagation algorithm can be used to design successful attacks based on the assumption that a targeted person might be hiding some genomic information.

Yuan J, Malin B, Modave F, Guo Y, Hogan WR, Shenkman E, Bian J

Towards a privacy preserving cohort discovery framework for clinical research networks

J Biomed Inform 2017;66:42-51

This article reports on the development of a privacy-preserving cohort discovery system for clinical research networks. Elliptic curve

cryptography is used to compare individual patient records against queries without disclosing statistically relevant evidence of associations between such things as demographic data and drug response. The protocol uses a blocking mechanism that selectively reveals provably limited information that is disclosed. Three oncology cohorts are defined and the definitions are tested on an encrypted database of 7.1 million records.

Ohno-Machado L, Sansone SA, Alter G, Fore I, Grethe J, Xu H, Gonzalez-Beltran A, Rocca-Serra P, Guraraj AE, Bell E, Soysal E, Zong N, Kim HE

Finding useful data across multiple biomedical data repositories using DataMed
Nat Genet 2017;49(6):816-9

Patient data is often stored and processed in isolation and across several platforms. This makes it difficult to find out what data is available and how to access it. This innovative study includes the creation of a data index and search engine in which metadata is extracted from a collection of repositories. With these tools, users can build natural language and structured queries to search for datasets to inform their investigations.

Wan Z, Vorobeychik Y, Xia W, Clayton EW, Kantarcioglu M, Malin B

Expanding access to large-scale genomic data while promoting privacy: a game theoretic approach

Am J Hum Genet 2017;100(2):316-22

In “presence detection attacks” one compares a record to published summary statistics of some reference population. If the targeted record is similar enough to a resource of interest, the attacker has evidence to claim that he or she contributed to and therefore is a member of the resource. This report describes a project in which a presence detection attack is mapped into a game theoretic framework, and demonstrates ways protection can be achieved. Applications lead to improved data sharing.

Gilbert M, Bonnell A, Farrell J, Haag D, Bondyra M, Unger D, Elliot E

Click yes to consent: incorporating informed consent into an internet-based testing program for sexually transmitted and blood-borne infections

Int J Med Inform 2017;105:38-48

The valid consent process is traditionally undertaken in clinical settings, but this is increasingly inadequate as more people interact online with health professionals and as more research takes place online. This interesting report examines Internet-based services associated with testing for sexually-transmitted and blood-borne infections, specifically the acceptability of various designs for a mandatory consent page. Findings include that individuals with greater testing experience had better understanding of the consent page and that cultural history influences acceptability of the online process.