Article published online: 2022-12-04

Appendix: Content Summaries of Selected Best Papers for the IMIA Yearbook 2022, Section Public Health and Epidemiology Informatics

Moncada-Torres A, van Maaren MC, Hendriks MP, Siesling S, Geleijnse G

Explainable machine learning can outperform Cox regression predictions and provide insights in breast cancer survival

Sci Rep 2021 Mar 26;11(1):6968

In this work, the authors present a comprehensive comparison of classical statistical approaches with machine learning approaches on a large, real-world dataset with a focus on explainability. Their aim is to compare the performance of the widely used Cox Proportional Hazards (CPH) model with machine learning models such as Random Survival Forests, Survival Support Vector Machines, and Extreme Gradient Boosting (XGB) when predicting breast cancer survival. In addition, the Shapley Additive Explanation values as well as an impact analysis of specific features are used to explain the predictions of the machine learning models. The dataset used comes from the Netherlands Cancer Registry of 36,658 non-metastatic breast cancer patients. Results show that machine learning models can perform at least as good as the classical CPH regression (c-index ~ 0.63), and in the case of XGB even better (c-index ~ 0.73). The main contribution of this work is to address the limited explainability of innovative ML techniques and increase trust and adoption in oncology and healthcare in general.

Xiao W, Huang X, Wang JH, Lin DR, Zhu Y, Chen C, Yang YH, Xiao J, Zhao LQ, Li JO, Cheung CY, Mise Y, Guo ZY, Du YF, Chen BB, Hu JX, Zhang K, Lin XS, Wen W, Liu YZ, Chen WR, Zhong YS, Lin HT

Screening and identifying hepatobiliary diseases through deep learning using ocular images: a prospective, multicentre study

Lancet Digit Health 2021 Feb;3(2):e88-e97

This paper aims to engineer deep learning models to establish associations between ocular features and major hepatobiliary diseases to advance automated screening and identification of hepatobiliary diseases. Their approach is based on a multicentre, prospective study of slit-lamp or retinal fundus images from participants in three hepatobiliary departments and two medical examination centers. Seven slit-lamp models and seven fundus models are considered with visual explanation and an occlusion test. The development dataset covers 1,252 participants while the test dataset includes 537 participants recruited from different hospital departments in Guangzhou, China. Results show that for the identification of hepatobiliary diseases, the AUROCs were 0.93 (0.91-0.94; slit-lamp) and 0.84 (0.81-0.86; fundus) for liver cancer, 0.90 (0.88-0.91; slit-lamp) and 0.83 (0.81-0.86; fundus) for liver cirrhosis. This work establishes qualitative associations between ocular features and major hepatobiliary diseases, providing a non-invasive, convenient, and complementary method for hepatobiliary disease screening and identification, which could be applied as an opportunistic screening tool.