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Predicting proximity to death: How accurate can we get?

Topic: DS applications and challenges in Medicine, Natural Sciences, and Engineering

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Abstract

Background

Predicting whether an individual is experiencing their last six months of life is important because of the substantial cost, as well as extra-ordinary palliative services required during this time period. Scholars have been trying to predict time to death from electronic or survey databases using a series of methods including logistic regression and proportional hazards regression models. In this work, we apply machine learning techniques in an attempt to find out whether the accuracy of predicting clinical outcomes, such as mortality, can be improved further.

Method

We use the Survey of Health, Ageing and Retirement in Europe (SHARE) containing data from 28 European countries and Israel from 2004 to 2017 (380,000 observations from 140,000 individuals). The SHARE dataset contains individual-level panel data encompassing a range of socio-economic and biological indicators. To predict six-month mortality, we apply machine learning techniques such as the least absolute shrinkage and selection operator (lasso).

Expected Results

We expect to find a set of socio-economic (e.g., income) and biological indicators (e.g., age, comorbidities, performance-based tests) which is as informative *and* as parsimonious as possible.

Discussion

Albeit predicting time to death has serious ethical implications, we argue that by knowing more about this issue we can help policymakers improve the allocative efficiency within a health system (1), and—more importantly—give people the chance to bid farewell to their closest persons (2), and support health care professionals in providing high-quality palliative care to patients, which would allow these to die in dignity (3).