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Title: Predicting Myocardial Infarction Relapse in Patients

Abstract:

Acute myocardial infarction (MI), more commonly known as a heart attack, is a condition that occurs when one or more areas of the heart muscle does not get enough oxygen, leading to tissue death and bodily dysfunction. MI has a high incidence, affecting 800,000 people just in the United States. 25% of those patients end up having a relapse of MI, with one in three of those patients dying within a year of their relapse. Even an experienced specialist cannot always foresee the development of these complications. In this vein, predicting future relapses of MI in an attempt to curtail subsequent adverse events in advance is an important task. Thus, my research project is aimed at analyzing a dataset collected from the National Blood Lung and Heart Institute consisting of 1700 cardiac patients' data from Krasnoyarsk Interdistrict Clinical Hospital in 1992-1995. Over 100 covariates were analyzed including age, sex, drug usage, days of admission, whether or not the patient was admitted to the ICU, blood cell counts and more. The data which were missing were imputed using Multivariate Imputation by Chained Equations and predictive mean matching. Then, forward and backward selections were conducted to find the most important covariates. The resulting covariates were cross referenced by Principal Component Analysis and a removal of multicollinear factors, including symptomatic hypertension and ECG rhythm at time of admission (sinus). Then, after the intersection of all of these analyses only the most important 22 predictive risk factors of MI relapse remained. Finally, a 10-fold cross-validation lasso regression analysis was run on these factors with a 50/50 train test split to find a predictive accuracy of over 90% and AUC of 0.74.