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PREVENTIVE HEALTH IN A CHANGING WORLD

COMPARISON OF PREDICTIVE MODEL USING REGRESSION AND MACHINE LEARNING IN SPECIALIST OUTPATIENT CLINIC (SOC) NO SHOW PREDICTION

Siang Li Chua¹, Hong Choon Oh¹

¹ Changi General Hospital, 2 Simei St 3, Singapore 529889

Background

This study aimed to compare the accuracy and utility of using Logistic Regression (LR) or machine learning to predict SOC no-shows of new subsidized patients of a tertiary hospital. eXtreme Gradient Boosting Training (xgboost) which implemented gradient boost decision trees was the machine learning technique evaluated in this study..

Methods

Administrative records of 2016 new SOC appointments for subsidized patients, comprising 31 variables describing patient demographics, appointment and visit characteristics were used. The cleaned data set was randomly split 50-50 into training and testing sets. The predictive ability of both models were tested using area under receiver operating characteristic curve (AUC). In LR, forward feeding algorithm was chosen with probability for stepwise variable entry, removal and maximum iterations set at 0.01, 0.1 and 20 respectively. In xgboost, logistic regression for binary classification algorithm was selected with a tree depth of 3 and maximum boosting iterations of 1200.

Results

Both algorithms identified 8 predictors, of which 7 were common. These 7 predictors were previous visit status, appointment hour and lead time, sub-specialty, race, age of patient, and doctor rank. The eighth predictor in LR was patient's residential zone while xgboost was referral source. AUC of LR and xgboost were 75.9% and 81.9% respectively. Compared to xgboost which could only provide the order of importance among the predictors, LR offered odds ratios of individual predictors.

Conclusion

xgboost outperformed LR in terms of no show prediction accuracy while LR offered more details for interpretation of predictors.