Prediction of In-Hospital Mortality among Heart Failure patients: An Automated Machine Learning Analysis of MIMIC-III database

Our novel approach to developing in-hospital mortality predictive models for Heart Failure patients by exploring automated machine learning provides optimal predictions which, when incorporated into the respective prognosticative protocols, shall translate into a decrease in the morbidity and mortality associated with this ailment by assisting in risk stratification and complication triaging.

INTRODUCTION: MIMIC-III database has been explored to develop predictive risk models for heart failure outcomes.[1]

METHODOLOGY: The study population comprised 1,177 patients suffering from heart failure being managed intensively. Variables included BMI, comorbidities along with cardiac, renal and blood parameters.[1] The current state of the art (SOTA) for automated Machine Learning (aML)[2] was adopted with superimposition of ensemble approach and macro-weighted average area under the receiver operating curve (mWA-AUROC) was adopted to gauge the discriminative ability of the developed models.

RESULTS: A stacked ensemble of Neigherest Neighbours, eXtreme Gradiant Boosting, Light Gradiant Boosting Machine, Random Forest, CatBoost, Extra Trees and Neural Network algorithmic models predicted in-hospital mortality among HF patients with an mWA-AUROC of 0.85 and a log loss of 0.28. A specificity of 98.43% (95% CI: 97.28%-99.19%) and a positive likelihood ratio of 19.81 (95% CI: 10.62-36.95) was achieved. Anion gap, along with renal failure and atrial fibrillation, was recognized as the most influential predictor. **(Figure 1)**

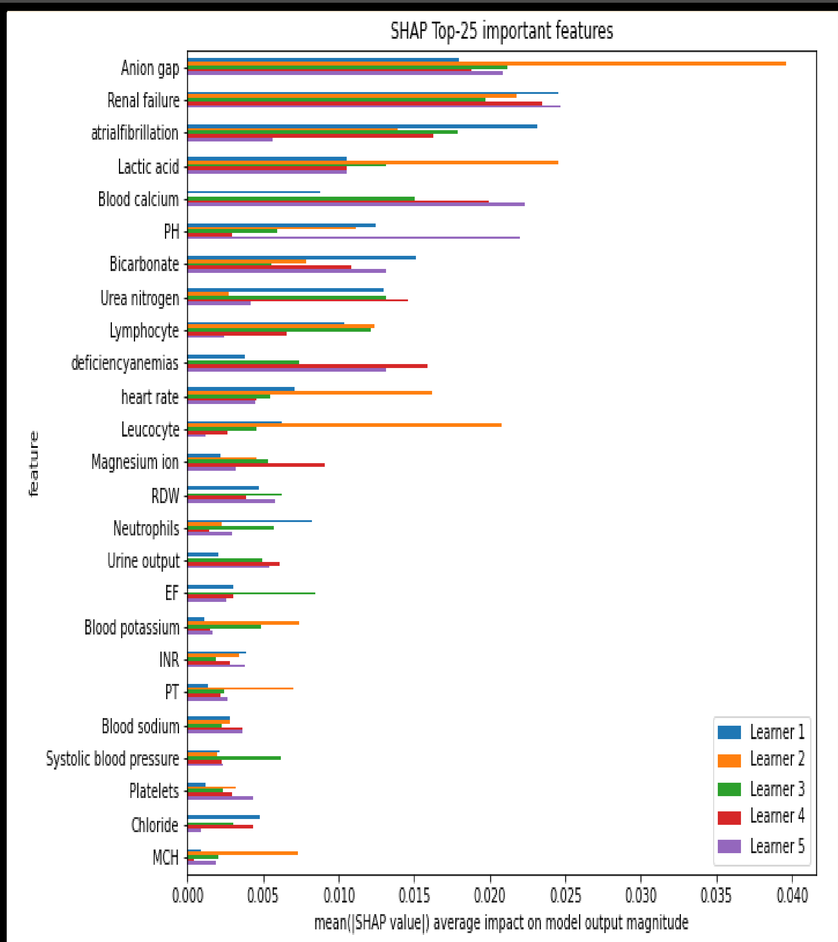

Figure 1: The most influential predictors for in-hospital mortality among HF patients

References

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[1]STMU Shifa College of Medicine, Islamabad, Pakistan

Aliya Ali(1)§, Saleha Yurf Asghar(1)§, Ali Danish Khan Yousafzai(1)§ *et al.*