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Prediction of Coronary Artery Disease Using Artificial Neural Network

GK Dhananjaya[1#], JACA Perera[1], GRA Senarathne[1], JADI Priyashan[1], and B Hettige[2]

[1,]Faculty of Engineering, General Sir John Kotelawala Defence University, Sri Lanka
[2]Faculty of Computing, General Sir John Kotelawala Defence University, Sri Lanka

[#]kaveeshadhananjaya2002@gmail.com

Machine learning techniques offer powerful tools for early prediction and diagnosis of Coronary Artery Disease , a major cause of global mortality, by analyzing complex medical data to recognize patterns that conventional methods might miss, potentially leading to timely interventions and reduced death rates. The objective of this study was to model an Artificial Neural Network for Coronary Artery Disease diagnosis, achieving an accuracy of roughly 90 Synthetic Minority Over-sampling Technique (SMOTE) was employed to address the problem of data imbalance. Leveraging the expertise of a cardiologist, we tuned the feature search to include key clinical characteristics only, such as basic demographics, clinical history, and diagnostic test results. This approach made the interpretations more feasible, and at the same time, improved the predictive efficiency of the model. Optimized tuning of the hyperparameters was done while designing the Artificial Neural Network and the use of dropout layers as an anti-over-fitting technique and batch normalization technique for stabilishing the training phase. To support the created model cross-validation at a lower level named stratified k-fold cross-validation was done. The model was accurate and reliable compared to conventional machine learning methods. Moreover, it was beneficial to combine clinical knowledge in qualitative feature reduction with the presented technical approach because it led to a more clinically pertinent and accurate model.

Keywords: *coronary artery disease , artificial neural network, machine learning, SMOTE, EDA*