

Enhance AI-Based Parameter Analysis for Prediction of Heart Attack

Fernando KMHD¹, Lakmali HWN¹, Upamali RKI¹, Sooriyaarachchi PMHM¹, Priyashantha ALU¹,
Jayawardhana SMMS¹

¹*Department of Information Communication Technology, Faculty of Technology, Rajarata University of Sri Lanka*

Background: One of the main causes of mortality worldwide is heart attacks, and early identification is essential. To enhance prediction, this study combines clinical, lifestyle, and demographic data with AI, particularly machine learning, as traditional diagnostics sometimes overlook early indicators.

Objective: To compare XGBoost, Random Forest, and Logistic Regression for heart attack prediction, aiming to optimize performance, identify key risk factors, and propose an AI-based detection framework.

Methods: Using a Kaggle dataset of 8,763 patient records with 27 clinical, lifestyle, and demographic characteristics, the study applied supervised machine learning for predictive analytics using Google Colab. Python was used for data preparation, which included managing missing values, encoding, and scaling. After dividing the dataset into training (80%) and testing (20%), the models were assessed using the confusion matrix, F1-score, accuracy, precision, and recall. This strategy is warranted since the dataset is sizable and includes important heart attack risk variables, allowing for accurate prediction modeling.

Results: The investigation analyzed 8,763. Important risk factors were smoking (89.7%), family history (49.3%), diabetes (65.2%), obesity (50.1%), and prior heart issues (49.6%). Machine learning models Random Forest (63%), XGBoost (62%), SVM (58%), and Logistic Regression (56%) demonstrated moderate accuracy, despite the fact that 35.8% were at risk of a heart attack. The results show that more clinical variables and better feature engineering are needed, even if ensemble models performed better.

Conclusion: The study demonstrates how ML, particularly XGBoost, may be used to predict the likelihood of a heart attack based on clinical and lifestyle data.

Keywords: Artificial Intelligence, Heart Attack, Machine Learning