

Title: Improving Prediction Efficiency of Machine Learning Models for Cardiovascular Disease in IoST-Based Systems through Hyperparameter Optimization

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Abstract: This study explores the impact of hyperparameter optimization on machine learning models for predicting cardiovascular disease using data from an IoST (Internet of Sensing Things) device. Ten distinct machine learning approaches were implemented and systematically evaluated before and after hyperparameter tuning. Significant improvements were observed across various models, with SVM and Neural Networks consistently showing enhanced performance metrics such as F1-Score, recall, and precision. The study underscores the critical role of tailored hyperparameter tuning in optimizing these models, revealing diverse outcomes among algorithms. Decision Trees and Random Forests exhibited stable performance throughout the evaluation. While enhancing accuracy, hyperparameter optimization also led to increased execution time. Visual representations and comprehensive results support the findings, confirming the hypothesis that optimizing parameters can effectively enhance predictive capabilities in cardiovascular disease. This research contributes to advancing the understanding and application of machine learning in healthcare, particularly in improving predictive accuracy for cardiovascular disease management and intervention strategies.

Keywords: Internet of sensing things (IoST); Machine learning; Hyperparameter optimization; Cardiovascular disease prediction; Execution time analysis; Performance analysis; Wilcoxon signed-rank test

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