Thesis Title	Classification Model for Hypertension with Diabetes Using Gradient Boosting and Feature Engineering
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ABSTRACT

Hypertension and diabetes present significant global health challenges, impacting individual well-being and economies. Early detection and prevention are pivotal in mitigating their adverse effects. Machine learning is widely applied in various industries and has shown promise in healthcare. While machine learning has shown promise in predicting these conditions separately, limited research has focused on their co-occurrence. This study proposes a novel multiclass-classification approach to predict the coexistence of hypertension and diabetes. The methodology encompasses data collection, preprocessing, model construction, validation, and comparison. Various classifiers were employed, including Decision Tree, Support Vector Machines, Random Forests, Extra Trees, Gradient Boosting, and Long Short-Term Memory. Additionally, CTGAN was utilized to address imbalanced datasets. Results demonstrate the effectiveness of the proposed approach. Gradient Boosting emerged as the most successful among the classifiers, achieving an impressive accuracy of 92.21% and an average AUC-ROC of 96.46%. These findings underscore the potential of machine learning in accurately predicting the concurrent presence of hypertension and diabetes. This study's significance lies in its contribution to understanding and diabetes.

This study's significance lies in its contribution to understanding and predicting complex health conditions, facilitating early intervention and personalized care strategies. The outcomes suggest a promising avenue for healthcare practitioners to enhance proactive management approaches for individuals with both hypertension and diabetes

Keywords: Multiclass Classification, Machine Learning, Feature Engineering, CTGAN