Using Greywolf Optimized Machine Learning Algorithms to Improve Accuracy for Predicting Hospital Readmission for Diabetes

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Abstract : Machine learning algorithms (ML) can achieve high accuracy in predicting outcomes compared to classical models. Metaheuristic, nature-inspired algorithms can enhance traditional ML algorithms by optimizing them such as by performing feature selection. We compare ten ML algorithms to predict 30-day hospital readmission rates for diabetes patients in the US using a dataset from UCI Machine Learning Repository with feature selection performed by Greywolf nature-inspired algorithm. The baseline accuracy for the initial random forest model was 65%. After performing feature engineering, SMOTE for class balancing, and Greywolf optimization, the machine learning algorithms showed better metrics, including F1 scores, accuracy, and confusion matrix with improvements ranging in 10%-30%, and a best model of XGBoost with an accuracy of 95%. Applying machine learning this way can improve patient outcomes as unnecessary rehospitalizations can be prevented by focusing on patients that are at a higher risk of readmission.

Keywords : diabetes, machine learning, 30-day readmission, metaheuristic

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