Improving Diabetes Prediction Using a Hybrid Approach with MLP and Deep Learning Models

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Abstract

Diabetes is a universal global condition that requires early prediction in a reliable manner in order to be treated. Machine learning methods have historically struggled with extracting high-order structures from patient data, leading to poor prediction. In work, we propose a hybrid approach that utilizes MLP, ANN, and RNN in combination in order to enhance prediction in diabetes. Applying MLP in feature extraction alongside ANN and RNN in improved learning from structured as well as sequential data, our approach is likely to improve classification accuracy.Our approach incorporates extensive pre-processing in terms of data normalization, imputation of missing values, and feature subset selection in order to train reliable models. The hybrid models are assessed on a publicly available diabetic database with performances evaluated in terms of important measures like accuracy, precision, recall, and F1-measure. The experimental outcomes clearly depict that our suggested models outshine traditional machine learning approaches with improved prediction accuracy and reliability in diagnosing diabetes. Furthermore, we also examine the effects on model performances with varying network structures as well as hyperparameter optimization.

Keywords

Artificial Neural Networks (ANN), Deep Learning, MLP (Multi-Layer Perceptron), Recurrent Neural Networks (RNN).