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Comparative Analysis of MLP and RBF Neural Networks for Heart Disease Diagnosis: The Impact of Feature Selection on Model Performance

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Abstract

In this study, we investigate the impact of feature selection and the number of features on the performance of learning models for heart disease diagnosis, focusing on two neural network architectures: Multilayer Perceptron (MLP) and Radial Basis Function (RBF). The research aims to assess the performance of these models using feature sets of 5, 10, and 13 features, selected based on their correlation with the target variable. Our results show that the MLP model consistently outperforms the RBF model, achieving the highest accuracy of 98.3 when utilizing 13 features. However, we found that merely increasing the number of features does not always guarantee improved performance, as irrelevant features can introduce noise and hinder model optimization. This was particularly evident in the RBF network, where the model trained on 10 features outperformed the one using all 13. The use of advanced feature selection techniques, such as correlation-based selection, contributed to enhancing the model's accuracy and reducing overfitting. This study highlights the importance of balancing feature quantity with feature relevance and optimizing model architecture for improved heart disease diagnosis. The findings suggest that while MLP demonstrates better performance across different feature sets, careful feature selection and complexity management are key to achieving optimal results in medical data analysis.

Keywords: Heart Disease Diagnosis, Multilayer Perceptron Neural Network (MLP), Radial Basis Function Neural Network (RBF)

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