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Forecasting Cardiovascular Disease Using Deep Learning and Machine Learning Paradigms

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Abstract: The global risk of cardiovascular and chronic respiratory diseases claims over 19 million lives annually. The significant death rate from these diseases makes it imperative to address their causes. The analysis revealed a number of explanations, but the inability to predict the signs of these diseases is by far the most important. In this work, we created a system to undertake the important symptoms of various diseases, which will help in early disease diagnosis and allow patients to start treatment at an early stage of the disease. This work provides innovative computational medicine research that predicts cardiovascular disease (CVD) using machine learning and deep learning methodologies.

Data were processed sequentially using ML and DL techniques with varying parameters. On the basis of each person's age, gender, ethnicity, body mass, etc., and lifestyle factors, various models have been developed to predict CVD risk. This study's main objective is to compare ML and DL techniques for comparative analysis of disease prediction. We use a variety of machine learning based algorithms, including Support Vector Machines, Decision Trees, K-Nearest Neighbors, Naive Bayes, Logistic Regression, and Neural Networks, and evaluate these models based on training and testing accuracy. We also compute Precision, Recall, and F1-Score for each model. We employ Principal Component Analysis (PCA) to determine the significance and correlation of each feature used in the dataset in order to increase the models' accuracy. One feature from the dataset that is less crucial for the model training is reduced as a result of PCA. The study's findings indicate that the deep learning based neural network model performs better than the comparative machine learning models.

Keywords: Cardiovascular Disease; Machine Learning; Deep Learning; Principal Component Analysis; Disease Detection.