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Assisted Prediction of Hypertension Based on Heart Rate Variability and Improved Residual Networks

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Abstract : Cardiovascular diseases caused by hypertension are extremely threatening to human health, and early diagnosis of hypertension can save a large number of lives. Traditional hypertension detection methods require special equipment and are difficult to detect continuous blood pressure changes. In this regard, this paper first analyzes the principle of heart rate variability (HRV) and introduces sliding window and power spectral density (PSD) to analyze the time domain features and frequency domain features of HRV, and secondly, designs an HRV-based hypertension prediction network by combining Resnet, attention mechanism, and multilayer perceptron, which extracts the frequency domain through the improved ResNet18 features through a modified ResNet18, its fusion with time-domain features through an attention mechanism, and the auxiliary prediction of hypertension through a multilayer perceptron. Finally, the network was trained and tested using the publicly available SHAREE dataset on PhysioNet, and the test results showed that this network achieved 92.06% prediction accuracy for hypertension and outperformed K Near Neighbor(KNN), Bayes, Logistic, and traditional Convolutional Neural Network(CNN) models in prediction performance.

Keywords : feature extraction, heart rate variability, hypertension, residual networks
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