

CHAMELEON-SPARROW SEARCH APPROACH-BASED 1D CNN FOR ARRHYTHMIA CLASSIFICATION

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Arrhythmia represents an inherited disorder of disordered heartbeats, which could be abnormal or irregular. If the electrical impulses controlling heartbeats do not work properly, then disturbances in heartbeats could occur and the heartbeats could become too slow, too irregular, or too fast. Early detection of diseases like arrhythmia, is crucial for monitoring of Electrocardiogram (ECG) signals for this purpose. In view of the rapid advancement in computer technology, improvements in computer-aided diagnostic methods and models for data collection have also been made. Recent research has demonstrated that deep learning-based approaches are more competent in classifying beats as arrhythmic as their counterparts in conventional machine learning (ML). Deep learning is fast becoming a powerful tool in the processing of ECG signals. Therefore, this research is aimed at optimizing the 1D Convolutional Neural Network (1D-CNN) for classifying arrhythmias from ECG signals. The processes include the first denoising by median filtering and normalization for pre-processing. A Chameleon-Sparrow Search Algorithm-based 1D CNN (CsSA-based 1D CNN) is proposed for arrhythmia classification, where the Chameleon-Sparrow Search Algorithm (CsSA) optimizes the training of the 1D-CNN. CsSA is a hybrid algorithm that integrates Sparrow Search Algorithm (SSA) and Chameleon Swarm Algorithm (CSA) to improve search efficiency of SSA. The experimental results show that proposed method gave 93.3% accuracy, 92.8% specificity, and 94.2% sensitivity, which is a testament to its effectiveness for arrhythmia classification.