ABSTRACT

This research discusses the implementation of four Deep Learning architectures—CNN, LSTM, RNN, and GRU—for electrocardiogram (ECG) signal classification in detecting types of cardiac arrhythmia. The dataset used is the MIT-BIH Arrhythmia dataset, consisting of five classes: Normal, Atrial Premature, Premature Ventricular Contraction, Fusion of Ventricular and Normal, and Fusion of Paced and Normal. Each model is evaluated using accuracy, precision, recall, and F1-Score metrics. The results show that the CNN model achieved the highest performance with an accuracy of 0.98, precision of 0.92, recall of 0.90, and F1-Score of 0.91. The GRU model also performed well with an accuracy of 0.98 and F1-Score of 0.90. The LSTM model showed decent results but struggled in classifying certain classes, while the RNN model had the lowest performance. These findings indicate that CNN and GRU are the most effective and consistent models for ECG signal classification in arrhythmia detection.

Keywords: *Deep Learning, CNN, LSTM, GRU, RNN, Classification*