Abstract

Arrhythmia is a heart disease that occurs due to a disturbance in the heartbeat that causes the heart rhythm to become irregular. In some cases, arrhythmias can be life-threatening if not detected immediately. The method used to detect is electrocardiogram (ECG) signal analysis. To avoid misdiagnosis by cardiologists and to ease the workload, methods are proposed to detect and classify arrhythmias by utilizing Artificial Intelligence (AI). In recent years, there has been a lot of research on the detection of this disease. However, many of such studies are more likely to use machine learning algorithms in the classification process, and most of their accuracy results still do not reach optimal levels in general. Therefore, this study aims to optimize arrhythmia classification using deep learning algorithms. There are several stages in detecting arrhythmias, namely preprocessing, feature extraction, and classification. The focus of this research is only at the classification stage, in this study the author proposes deep learning algorithms Convolutional Neural Network (CNN), Long Short Term Memory (LSTM), and Deep Neural Network (DNN). Tuning hyperparameters to optimize the model with values for each parameter, namely Epoch 50, 80, 100, Learning Rate 0.01, 0.001, 0.0001, Batch Size 32, 64, 128, Optimizer Adam, SGD, RMSprop. Next, analyze the performance of the three proposed algorithms, selecting the best algorithm that has the highest accuracy, specificity, and sensitivity results for the classification of AF, PAC, and PVC arrhythmias. Based on the results of the study, it shows that the Convolutional Neural Network (CNN) algorithm is superior to other deep learning algorithms with accuracy, specificity, and sensitivity results of 98.70%, 99.36%, and 98.28% respectively. While the Long Short Term Memory (LSTM) algorithm is 98.47%, 99.24% respectively. and 97.67%. and Deep Neural Network (DNN) algorithms of 98.53%, 99.30%, and 97.45%, respectively.

Keywords: arrhythmia, electrocardiogram (ECG), classificaton, deep learning.