Abstract

Cardiac arrhythmia is one of the cardiovascular diseases caused by irregularities in the heart rhythm, leading to the heart beating too fast or too slow. Arrhythmia is often considered a mild condition, but it can affect the overall performance of the heart and lead to more severe illnesses, including sudden death. Generally, arrhythmia detection involves three stages: pre-processing, feature extraction, and classification. Current arrhythmia detection methods have failed to demonstrate significant improvement despite multiple attempts using various techniques. Therefore, there is a need to enhance arrhythmia identification. Among the many proposed methods for arrhythmia detection, deep learning algorithms still provide low detection accuracy. Hence, an optimal method is required to improve the accuracy of arrhythmia detection. Furthermore, the development of deep learning algorithm models is rarely conducted. To address the aforementioned issues, this final project proposes the development of a deep learning algorithm to support improved arrhythmia detection accuracy. Deep learning is the most promising method for arrhythmia detection using extracted features. This final project also includes an analysis of the proposed algorithm models. The methods employed in this research are as follows: 1. Literature review on arrhythmia classification. 2. Design and development of classification algorithms. 3. Performance testing and analysis of deep learning algorithms. The results demonstrate the proposed method achieving 98.49% accuracy on Convolutional Neural Network, 95.36% accuracy on Long Short Term Memory, and 96.07% on Gated Recurrent Unit.

Keywords: Arrhythmia, deep learning, electrocardiogram, feature extraction