

ABSTRACT

Premature Atrial Contractions (PAC) represent a type of arrhythmia characterized by an early depolarization of the atrial signal compared to normal conditions. Although this condition is generally classified as benign, without further medical attention, individuals with PAC have a higher risk of developing complications that may lead to mortality. To detect this condition can be detected by examining cardiac signals using an electrocardiograph (ECG). However, the large dimensionality of the ECG device and the limited public understanding of ECG signals that indicate the presence of PAC remain significant challenges for laypersons in conducting routine cardiac monitoring.

In response to these challenges, this study focuses on the development of a portable ECG system capable of detecting PAC in ECG signals. Detection is carried out by recording the electrical activity of the human heart using a portable ECG device. The recorded signals are then processed and analysed based on the features of the P-wave and RR intervals, utilizing an ensemble model comprising Support Vector Machine (SVM) and Random Forest (RF). The trained model, which has demonstrated reliable classification capability, can be monitored and evaluated through an application interface.

The results of this study indicate that the portable ECG device can operate up to 18 hours with 3 to 4 hours time to charge. This system achieved an accuracy of 98.4% compared to a reference device. Furthermore, the ensemble model reached an accuracy of 96.24%. These levels of accuracy demonstrate that the proposed system performs effectively and can be implemented as an early detection tool for PAC.

Key Words: Premature Atrial Contractions, Portable ECG, Support Vector Machine, Random Forest