ABSTRACT

Arrhythmias are disorders of the heart's electrical rhythm in the form of abnormalities in speed, regularity, place of origin of impulses, or sequence of activation, with or without the underlying structural heart disease, one of which is Premature Atrial Contractions (PAC) and Premature Ventricular Contractions (PVC). In recent years there have been many methods for detecting diseases detecting PAC and PVC using ECG signals but PPG signals, but existing research uses more ECG signals when compared to PPG signals. The stages of arrhythmia detection are divided into three, namely pre-processing, feature extraction, and classification. The value of accuracy obtained is strongly influenced by the type of classification algorithm used. Besides this, the development of a prototype to detect PPG signal-based arrhythmias is still rare. Therefore, the selection of the right classification algorithm is very important to do. To solve the problems mentioned above, this final project proposes a study of classification algorithms to detect non-malignant arrhythmias (PAC and PVC) based on PPG signals. In addition to conducting algorithm studies, this final project also develops prototypes of PAC and PVC detection using PPG signals and analyzes the detection results of the proposed prototype. The method used in this final project is the classification of PAC and PVC detection signals using artificial neural network algorithms, k-Nearest Neighbors, and Logistic Regression. The results of performance testing show that the best classification algorithm of the three proposed algorithms is k-Nearest Neighbors with a value of k = 3. The algorithm gets the value of accuracy and specificity reaching 97.84% and 97.82%. In addition, the prototype developed can also do real-time PAC and PVC detection.

Keywords: arrhythmia, PAC, PVC, algorithm, classification, PPG