Abstract

Cardiovascular Disease (CVD) is the most common cause of death worldwide. One of the most common types of cardiovascular disease is cardiac arrhythmia. Cardiac arrhythmia is a condition in which the heart rhythm changes faster or slower in an irregular pattern. Many systems have been made using electrodiagram (ECG) sensors to monitor cardiac activity which are placed beside the hospital patient's bed. In many cases, these systems often provide false warnings of possible cardiac arrhythmias in patients. In addition, there is a Photoplethysmography (PPG) sensor which can be an alternative to electrodiagram (ECG) because of its small physical form and easy to carry. However, the Photoplethysmography (PPG) sensor can experience disturbances caused by the movement of the subject or patient intentionally or unintentionally, which is called motion artifact (MA). As a result, the PPG signal experiences noise. For this reason, it is necessary to carry out a denoising process so that the signal affected by noise becomes a clear signal that can be utilized by the detection system for arrhythmia disease. This study analyzes photoplethysmograph signal denoising using Discrete Wavelet Transform (DWT) and Empirical Mode Decomposition (EMD) to remove motion artifact (MA) noise in PPG signals. The results of denoising will be used for the detection of arrhythmia disease. The experimental results show the performance of each denoising method on the PVC and AF arrhythmia disease detection systems. The highest SNR value generated from the DWT method is 46.109 and for the EMD method is 53.974. After being applied to the detection system, the signal from the DWT method denoising obtained an accuracy value of 89.3% and 82.1% for the EMD method.

Keywords: Photoplethysmography (PPG), Aritmia, Denoising.