

Abstract

Electrocardiogram (EKG) signal is an electrical signal of the heart that describes the activity of the heart in the body. With this signal, doctors can know early symptoms of heart disease. However, the result of measurement using EKG often has unwanted noise and can not be eliminated by simple filter method. In previous research has done a lot of denoising EKG with various techniques, but in the case of Kalman Filter there is no research that examines the performance of the technique. So the performance of the technique is questionable because there is no validation of the performance of the method. To answer that problem, this final project is validated by testing the performance of Kalman Filter denoising method based on different noise levels. The Kalman Filter Validation is performed using Matlab with metrics: Signal to Noise Ratio (SNR), Mean Square Error (MSE) and Peak Signal to Noise Ratio (PSNR). In the test, noise will be added to the ECG signal before applying the denoising technique. Then the SNR, PSNR and MSE values are calculated on the denoising signal. This research has successfully tested three methods on four types of noise, namely noise muscle artifact, baseline wander, electrode movement and AWGN noise with different noise intensity. Kalman Filter produces the best performance for three noise artifacts, namely muscle artifact, baseline wander and electrode movement and AWGN noise. Kalman Filter method has the best noise resistance. The Kalman Filter method can denoise 122 and 123 clean signals on AWGN noise with a noise intensity of 20 db. The Extended Kalman Filter method has the best resistance of any other method on the 123 clean signal on AWGN noise with an intensity of 20 db. The Unscented Kalman Filter method has the best resistance to the 123 clean signal on AWGN noise with an intensity of 20 db.

Keywords: EKG, Kalman Filter, Noise, Denoising, Signal Noise Ratio, Mean Square Error.