Bab 1 - Introduction

PPG signal contains so much information that can be process through our model, for example, heart rate variability, blood pressure, respiration [1], [2]. The PPG signal is taken for us to know the condition of our cardiovascular system by measuring the difference in blood volume from the surface of our skin [3]. Pulse rate estimation can be as well carried out using PPG signals and smartphone cameras [4]. To generate a PPG signal, photodiode can be used for this case. And the convenience of us using PPG signals is it can be used with our smartphones. It's enough only with the rear camera and the flash next to our smartphone's rear camera. Therefore, it is very easy to access this signal because in this era, many of our people already have smartphones that already have a rear camera, and there is a flash next to the rear camera.

Usually, PPG signals are worse than ECG signal because it can produce more noise than ECG [5]. Noise can make the signal difficult to process. Therefore, one solution to this problem is signal denoising/filtering. By denoising, PPG signals can better classify a heart disease [6]. By denoising, the signal's shape will be more excellent and cleaner [7]. The final result for the model will also be better. So it is crucial to do denoising first before further processing. However, in most existing cases, research for the denoising algorithm based on PPG signal is incomperhensive because it is too focused on only single denoising method for example Greeshma only proposed the wavelet denoising [1], [7], [8], Xiangmao only proposed the deep learning denoising [9], and Joonyong only proposed the bidirectional recurrent denoising auto encoder (BRDAE) [10].

In this research, three denoising methods will be carried out Savitzky Golay (Sav Gol), Butterworth, and Finite Impulse Response (FIR). For data collection is done with an android smartphone. For the evaluation matrix, there are SNR, PSNR and MSE .

The rest of this paper is organized as follows: section II is the related knowledge on denoising, section III method to achieve the objectives, section IV talk about the experiment and discussion, and section V is the conclusion and future works.