Abstract

Baseline Wander (BW) is a common noise in electrocardiogram (ECG). To effectively correct and to preserve more underlying components of an ECG signal, a powerful tool for removal of BW noise from various signals was introduced. This paper presented the discrete wavelet to get rid of that noise. This method is based on comparing signal with discrete multi-rate filter banks. A multi-level decomposition was performed on the noisy signal and then the splitting into low sub-bands and a high pass band sub-bands called detail level was performed. After that, the analysis of the details level and the identifying of a suitable threshold technique were done. Reconstruction of the signal was done through the calculation of the detail coefficients. Finally, the difference between the original signal and the reconstructed signal was calculated. The proposed technique was compared with the previous techniques in this domain of search. The algorithm was tested using Matlab tool. The results showed that the proposed filter could more effectively extract baseline wander from ECG signal and affect the morphological feature of ECG signal considerably less than both the traditional moving average filter and adaptive filter did. The results showed also that this proposed technique achieved excellent results in terms of
Mean Square Error (MSE) and convergence rate rather than the previous approaches. This paper also introduced the efficient realization of the proposed approach using FPGA. The proposed method was verified by FPGA (Xilinx Virtex-7 XC7VX690T) realization, revealing its effectiveness in real-time applications.

References


Index Terms

Computer Science \hspace{1cm} Signal Processing

Keywords

Baseline Wander, Electrocardiogram, Filter, Convergence Rate