Enhancement of ECG Signal

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Abstract

An Electrocardiogram (ECG) signal is a recording of the electrical activity of heart. It considered as an important source of vital diagnostic information. ECG signal is exposed to different types of noise. These noises change the nature of the ECG signal and provide difficulties on its analysis.

The one long Least Mean Squares (LMS) adaptive filter is an algorithm used to reduce the noise effect on the ECG signal. This algorithm is widely used in adaptive filter applications due to its simplicity and low computational complexity, but it suffers from low convergence speed.

This paper proposes to improve the one long LMS adaptive filter convergence speed using the multiple sub-adaptive filters proposed algorithm where simulations show that at MSE of 0.04 the required number of iterations are saved by about 4.3*10^4 times compared to the one long LMS
adaptive filter. Also comparison between them is performed in terms of Signal to Noise Ratio (SNR) against the step size ($\mu$). It is found that the proposed algorithm provides improvement in the SNR by 5 dB at $\mu=0.2$.

The ECG samples are recorded from MIT-BIH database and an additive white Gaussian noise (AWGN) is added to the signal to examine the proposed technique and 2011a Mat lab platform is used to simulate these results.

General terms

ECG, Adaptive filter, one long LMS

References

Keywords

ECG, Adaptive filter, Noise reduction, one long LMS, multiple sub-filter, SNR and MSE