A Study of Sensitivity of a Least Mean Square Filter on its Tap Weight Vector Length and Step Size in Adaptively Cancelling Noise in an Electrocardiogram Signal

Electrocardiogram (ECG) is a procedure that records the activity of the heart and presents it as an electrical signal. It is an immensely important diagnostic tool since any deviation from the characteristic shape of an ECG may point to a cardiac anomaly, making it important for instrument and processing to be very accurate. Since the nature of noise that could corrupt the ECG is non-stationary, Adaptive Noise Cancellation (ANC) filters are required. In this paper, the Adaptive Noise Cancellation algorithm Least Mean Squares (LMS) has been implemented to reduce the noise in a corrupted ECG signal. The parameter sensitivity of the filter on its result had been studied, how the values of tap weight vector length and step size of the filter influence the quality of the resultant signal of the filter. This has been done through simulations in MATLAB, the noise have been simulated in MATLAB and the ECG signals have been collected from the ECG-ID database at PhysioNet. For various values of tap weight vector length and step size the performance of the LMS filter is analyzed in terms of PRD and MSE and the observations are tabulated. At the end of this study parameter values are suggested that render the most optimum results.
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GENERAL TERMS

Adaptive Noise Cancellation, Parameter Sensitivity.

References


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