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Abstract

During the acquisition of Electrocardiogram Signals (ECG), various interferences distort the signal. Adaptive filters have been widely used as noise cancellers. Traditional optimization techniques have been very popular because of their advantages. Least Mean Square (LMS) is a traditional optimization technique which is gradient based. This method converges very quickly to an optimal solution and is easy to understand. But this technique does not provide

solutions for non-differentiable and discontinuous problems. Bio-inspired optimization algorithms such as genetic algorithm (GA) and Memetic algorithm (MA) can optimize complex and hard problems. In this paper, the adaptive noise canceller has been optimized with Modified Memetic Algorithm (MMA) to remove power line interference in the ECG signals. The performance of these algorithms has been analyzed on the basis of parameters viz., improvement in signal to noise ratio, normalized correlation coefficient (NCC) and root mean square error (RMSE). The results show that (MMA) outperforms both LMS and GA algorithms. Simulation results of GA and MA on benchmark functions viz. Greiwank and Rastrigin show that MMA is more effective for the optimization process.

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Index Terms

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Key words

Genetic algorithm
Empirical Mode Decomposition
Least Mean Square Algorithm
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Benchmark Functions