Our aim in this paper is to show how simple adaptive IIR filter can be used in system identification. The main objective of our research is to study the LMS algorithm and its improvement by the genetic search approach, namely, LMS-GA, to search the multi-modal error surface of the adaptive IIR filter to avoid local minima and finding the optimal weight vector when only measured or estimated data are available. Convergence analysis of the LMS algorithm in the case of colored input signal, i.e., correlated input signal is demonstrated via the input’s power spectral density and the Fourier transform of the autocorrelation matrix of the input signal. Simulations have been carried out on adaptive filtering of IIR filter and tested on white and colored input signals to validate the powerfulness of the genetic-based LMS algorithm.

References


**Index Terms**

Computer Science

Algorithms

**Keywords**

IIR filter, LMS algorithm, genetic algorithm, colored signals, power spectral density, multi-modal error surface, autocorrelation matrix.