International J. of Math. Sci. & Engg. Appls. (IJMSEA)
ISSN 0973-9424, Vol. 3 No. III (2009), pp. 265-277

ADAPTIVE PREDICTION BY SUCCESSIVE ERROR MINIMIZATION TECHNIQUE

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Abstract

Much work has accumulated in the published literature on adaptive signal processing and the relevant algorithms; nevertheless there is some scope for examining new approaches to such algorithms, and this paper attempts such a study. The adaptive system has been modeled in the prediction mode; for the implementation and comparison with the Successive Error Minimization technique. A generic Least Mean Square (LMS) algorithm is employed, as the adaptation method for both the schemes. The LMS algorithm is a steepest-descent type of algorithm primarily applicable to non-recursive linear filters which does not necessarily descend by the most direct route to the Minimum Mean Square Error (MSE) as in Newton's Method. The LMS algorithm is chosen due to its simplicity and it doesn't require any correlation and inverse matrix calculations. The successive error minimization scheme consists of two adaptive filters; one for signal prediction and the other for error prediction. The final output is achieved on summation of predicted signal and predicted error. The performance of this scheme is evaluated by simulation in MATLAB environment. The comparative study is executed in terms of Error performance, Computational Complexity and Signal to Noise Ratio. It is observed that the error performance of adaptive system can be improved by this successive error minimization technique. The study of 'μ' (the step size parameter) that greatly influences the results has also been taken up and an error performance curve of mean square error vs. 'μ' (the step size parameter) is plotted. Moreover the effect of large and small 'μ' value and the effect of average to standard deviation ratio v/s error in prediction have been studied.