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A Transform Domain Function Controlled VSSLMS Algorithm for Sparse System Identification

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Abstract : The convergence rate of the least-mean-square (LMS) algorithm deteriorates if the input signal to the filter is correlated. In a system identification problem, this convergence rate can be improved if the signal is white and/or if the system is sparse. We recently proposed a sparse transform domain LMS-type algorithm that uses a variable step-size for a sparse system identification. The proposed algorithm provided high performance even if the input signal is highly correlated. In this work, we investigate the performance of the proposed TD-LMS algorithm for a large number of filter tap which is also a critical issue for standard LMS algorithm. Additionally, the optimum value of the most important parameter is calculated for all experiments. Moreover, the convergence analysis of the proposed algorithm is provided. The performance of the proposed algorithm has been compared to different algorithms in a sparse system identification setting of different sparsity levels and different number of filter taps. Simulations have shown that the proposed algorithm has prominent performance compared to the other algorithms.

Keywords : adaptive filtering, sparse system identification, TD-LMS algorithm, VSSLMS algorithm
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