Multilayer Perceptron-Based DFE With Lattice Structure

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Summary

The severely distorting channels limit the use of linear equalizers and the use of the nonlinear equalizers then becomes justifiable. Neural-network-based equalizers, especially the multilayer perceptron (MLP)-based equalizers, are computationally efficient alternative to currently used nonlinear filter realizations, e.g., the Volterra type. The drawback of the MLP-based equalizers is, however, their slow rate of convergence, which limit their use in practical systems. In this work, the effect of whitening the input data in a multilayer perceptron-based decision feedback equalizer (DFE) is evaluated. It is shown from computer simulations that whitening the received data employing adaptive lattice channel equalization algorithms improves the convergence rate and bit error rate performances of multilayer perceptron-based DFE. The adaptive lattice algorithm is a modification to the one developed by Ling and Proakis (1985). The consistency in performance is observed in both time-invariant and time-varying channels. Finally, it is found in this work that, for time-invariant channels, the MLP DFE outperforms the least mean squares (LMS)-based DFE. However, for time-varying channels comparable performance is obtained for the two configurations