An EM-Based Forward-Backward Kalman Filter For The Estimation Of Time-Variant Channels In OFDM

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Summary

Orthogonal frequency division multiplexing (OFDM) combines the advantages of high achievable rates and relatively easy implementation. However, for proper recovery of the input, the OFDM receiver needs accurate channel information. In this paper, we propose an expectation-maximization algorithm for joint channel and data recovery in fast fading environments. The algorithm makes a collective use of the data and channel constraints inherent in the communication problem. This comes in contrast to other works which have employed these constraints selectively. The data constraints include pilots, the cyclic prefix, and the finite alphabet restriction, while the channel constraints include sparsity, finite delay spread, and the statistical properties of the channel (frequency and time correlation). The algorithm boils down to a forward-backward Kalman filter. We also suggest a suboptimal modification that is able to track the channel and recover the data with no latency. Simulations show the favorable behavior of both algorithms compared to other channel estimation techniques.

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