

NONPARAMETRIC ADAPTIVE DETECTION IN FADING CHANNELS BASED ON SEQUENTIAL MONTE CARLO AND BAYESIAN MODEL AVERAGING*

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Abstract. Recently, a Bayesian receiver for blind detection in fading channels has been proposed by Chen, Wang and Liu (2000, *IEEE Trans. Inform. Theory*, **46**, 2079–2094), based on the sequential Monte Carlo methodology. That work is built on a parametric modelling of the fading process in the form of a state-space model, and assumes the knowledge of the second-order statistics of the fading channel. In this paper, we develop a nonparametric approach to the problem of blind detection in fading channels, without assuming any knowledge of the channel statistics. The basic idea is to decompose the fading process using a wavelet basis, and to use the sequential Monte Carlo technique to track both the wavelet coefficients and the transmitted symbols. Moreover, the algorithm is adaptive to time varying speed/smoothness in the fading process and the uncertainty on the number of wavelet coefficients (shrinkage order) needed. Simulation results are provided to demonstrate the excellent performance of the proposed blind adaptive receivers.

Key words and phrases: Fading channel, wavelet, adaptive shrinkage, Bayesian model averaging, sequential Monte Carlo, resampling.

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