Distributed Joint Source-Channel Coding for Relay Systems Exploiting Spatial and Temporal Correlations

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Abstract:

In this paper, we propose a distributed joint source-channel coding (DJSCC) strategy to exploit spatial and temporal correlations simultaneously for transmitting binary Markov sources over relay channels. The relay only extracts and forwards the source message to the destination, which means imperfect decoding at the relay. The probability of errors occurring in the source-relay link can be regarded as spatial correlation between source and relay nodes. This spatial correlation can be estimated at the destination node and utilized in the iterative processing. In addition, the temporal correlation of Markov source is also utilized at the destination. A modified version of the BCJR algorithm is derived to exploit the temporal correlation. Furthermore, extrinsic information transfer (EXIT) chart analysis is performed to investigate convergence property of the proposed technique with the aim of searching for suitable codes. Simulation results for bit error rate (BER) performance and EXIT chart analysis show that, by exploiting the spatial and temporal correlations simultaneously, our proposed technique achieves significant performance gain, compared with the case that correlation knowledge is not used.