

Iterative Source-Channel Decoding for Error-Resilient Image Transmission Using a Markov Random Field Source Model

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ABSTRACT

In this paper, we propose a joint source-channel decoding approach for the robust image transmission over wireless channels. In addition to the explicit redundancy coming from channel codes, we also use implicit residual source redundancy for error protection. The source redundancy is modeled by a Markov random field (MRF) source model, which considers the residual spatial correlation after source encoding. Due to the link between MRFs and the Gibbs distribution, the source decoder can be implemented with low complexity. At the decoder we use an iterative source-channel decoder which can be obtained in the same manner as for serially concatenated channel codes. As a novel result we show that this iterative decoding scheme in combination with a simplified joint allocation of source and channel coding rates can be successfully employed for recovering the image data, especially when the channel is highly corrupted.