OPTIMIZATION OF SCALABLE JOINT SOURCE/CHANNEL CODER (SJSCC) FOR WIRELESS DATA TRANSMISSION THROUGH RAYLEIGH AND RICEAN FADING CHANNELS

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Abstract

We propose the model of Scalable Joint Source/Channel Coding for wireless data transmission where channel is inherently time varying and subject to Rayleigh and Ricean fading nature. We consider the problem of still image data transmission over time varying channels with two Channel State Information's (CSI) and three bit rates (1, ½ and ¼) for effective transmission of data. In this scheme we analyze the effect of CSI availability on the optimal performance analysis of proposed scheme. Our source model is based on two level wavelet image decomposition using Haar and daubechies mother wavelets with Set Partition In Hierarchical Tree (SPIHT) for significant coefficients for dynamic thresholding and channel coding will be Rate-Compatible Punctured Convolutional (RCPC) Codes. We simulated the new scheme of SJSCC and tried for optimal performance for wireless channels. Further, we show how our optimized SJSCC scheme out performs over Optimized Joint Source/Channel Coder (OJSCC) for channel states as well for various bit rates [2] [3][5]. In our optimization of SJSCC Scheme, marginal improvement in PSNR of 0.16dB is obtained for both average and worst channels and significant improvements of PSNR values in the order of 2.5dB is also obtained for all three bit rates over existing OJSCC system. Finally, our proposed SJSCC system performance is compared with RCPC and RCPT for wide range of SNRs and noticed the marginal improvement over existing scalable systems.

Keyword : Wavelet, SPIHT, RCPC, RCPT, OJSCC and SJSCC.