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STEGANOGRAPHY FOR BLOCK TRUNCATION CODING COMPRESSED IMAGES USING HYBRID EMBEDDING SCHEME

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Abstract. *In this paper, we proposed a hybrid data hiding scheme to embed secret data into block truncation coding codes. The hybrid scheme is a combined lossless and lossy hiding with considerations on acceptable distortions. The secret data was first embedded lossless in the complex image blocks and any amounts exceeding would be lossy embedded based on optimal bitmap replacement on the smooth image blocks. The amount of hiding is adjustable based on the acceptable PSNRs. The embedded secret bits can be extracted directly from the compressed domain without the original cover image. Experimental results showed that the visual quality of reconstructed images had significantly higher PSNRs. Test results from eight images showed an average gain of 0.05 bpp in payloads. Furthermore, the recovered images showed significantly higher PSNRs for the same amount of payloads. For example, Lena showed a gain of 3.9 dB and 1.4 dB under the embedding capacity 0.2 bpp and 0.8 bpp, respectively.*
Keywords: Data hiding, Block truncation coding (BTC), Lossless, Lossy

1. **Introduction.** Data hiding in the compressed domain is a difficult problem. Much work had been done on payloads and distortions issues [1-3,11,12,14]. The block truncation coding (BTC) is a fast and simple method used for compressing images at moderate compression ratios [5]. Although the performance of BTC is lower than the well known JPEG coding [6] and most image coders [7], BTC requires significantly lower computational costs [8-10]. Due to its practical usefulness for low-cost and real-time applications, much research have been done to hide data into BTC compressed codes [1,4,13-15]. Chuang et al. [13] proposed a data hiding scheme where the bitmaps of smooth blocks were replaced with the secret data. The smoothness of a block was determined by comparing the absolute difference of two corresponding quantization levels. However, the bitmap replacement resulted in distortions which increased proportionately as the number of bits difference between bitmaps and secret bits gets larger. On the other hand, Hong et al. [1] proposed a lossless data hiding scheme by swapping the quantization values and flipping the bitmap. However, this scheme has low payload.