ABSTRACT

Reversible Data Hiding Techniques in the VQ-Compressed Domain

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This thesis proposes three steganographic methods for vector quantized compressed images. These methods successfully sought to improve on both the compression rate and hiding capacity of previous methods in the locally adaptive and joint neighboring coding areas.

In chapter three a reversible steganographic scheme based on a locally adaptive data compression method is presented. The proposed method embeds *n* secret bits into one VQ index of an index table in Hilbert-curve scan order. The experimental results show that the proposed method achieves the different average embedding rates of 0.99, 1.68, 2.28, and 3.04 bits per index (bpi) and average compression rates of 0.45, 0.46, 0.5, and 0.56 bit per pixel (bpp) for n = 1, 2, 3, and 4, respectively. These results confirm that the proposed scheme improves upon previous locally adaptive (LAS) based techniques.

In chapter four a lossless steganographic scheme based on the joint neighboring coding (JNC) technique (Chang, Kieu, and Wu 2009, 1597–1603) is presented. The proposed method uses the difference values between a current VQ index and its left and upper neighboring VQ indexes to embed *n* secret bits into one VQ index, where n = 1, 2, 3, or 4. The experimental results show that the proposed scheme achieves the embedding rates of 1, 2, 3, and 4 bits per index (bpi) with the corresponding average compression rates of 0.420, 0.483, 0.545, and 0.608 bits per pixel (bpp) for a 256 sized codebook. This scheme is further improved in chapter five by using predictive coding. The use of the predictor function optimizes the choice of the neighboring index. This leads to further improvements in both the compression rate and embedding capacity. The results of these schemes confirm that they perform better than previous JNC based methods.

Keywords: Steganography; Information Hiding; Vector Quantization; Joint Neighboring Coding.