Studies of Lossless Compression Algorithms for VQ Index and Their Application to Information Hiding Technique

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ABSTRACT

As far as we know, for the compression of memoryless vector quantization (VQ), most of the lossless index coding algorithms are not suitable for various test images. As a result, we present a hybrid dynamic tree-coding (DTCS) and modified search order coding (MSOC) scheme called HLIC that re-encode the output index map efficiently without causing any extra coding distortion. The main idea behind this scheme is that the adjacent left and upper block around the current processed block usually provide more useful information than its adjacent left-upper and right-upper block, thus we employ two different coding way according to their corresponding left or upper spatial relations. Experimental results show that the newly proposed algorithm achieves significant reduction of bit rate than other lossless index coding schemes for various test images and different codebook sizes. In addition, it is very simple and suitable for hardware implementation because our method is based on DTCS and MSOC. In order to increase the bandwidth efficiency of an image that is used to information hiding, a novel information hiding scheme called IH-HLIC that is based on the HLIC method has also been presented in this Thesis. According to the experimental results, the IH-HLIC method can efficiently hide a larger number of the secret data in the compression code of the indexes without causing extra coding distortion. The decoder can obtain both compressed image and the hidden secret data.

Keywords : vector quantization, dynamic tree-coding, modified search order coding, information hiding

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