

DATA HIDING BASED ON VQ COMPRESSED IMAGES USING HAMMING CODES AND DECLUSTERING

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ABSTRACT. *Data hiding involves conveying secret messages under the cover digital media such as images. It is the science of concealed communication. The term hiding can refer to keeping the very existence of the embedded messages imperceptible. Intuitively, a technique that introduces less embedding distortion to the cover object will generally cause changes that are more difficult to detect, and will therefore provide more security. In this paper, we propose a data hiding method based on VQ compressed images. To improve communication security, Hamming codes are applied for increasing the embedding efficiency (the number of bits embedded per embedding change). Experimental results indicate that our proposed scheme provides improved steganographic security and better image quality compared with existing schemes based on VQ compressed images.*

Keywords: Data hiding, VQ, Embedding efficiency

1. Introduction. Data hiding [1-3] involves hiding secret messages into the cover object with a slight distortion. It represents various applications, for example, copyright protection (watermarking), secret communication (steganography), image authentication, and so on. Though various applications have different requirements, data hiding has two fundamentals. First, the embedding distortion should be minimized. As far as security is concerned, the embedding changes in cover object should not be conspicuous. Secondly, the hiding capacity should suffice to embed a reasonable amount of embedded messages. However, a tradeoff between the embedding distortion and the hiding capacity is inevitable. Obviously, the goal of data hiding is to design schemes with high hiding capacity but low embedding distortion.

To speed up the browse of multimedia, many compression algorithms have been proposed to reduce the amount of data stored in multimedia. Therefore, lots of recent data hiding techniques were concentrated on compression domains, such as JPEG [4,5], GIF [6], VQ [7-13], etc. One of the most popular compression algorithms is vector quantization (VQ) [14], which has been successfully applied in encoding images and audio. VQ exploits the high correlation between neighboring pixels by quantizing blocks to achieve very low bit rates, and to enable simple encoding/decoding. Moreover, VQ relies on Shannon's rate distortion theory, which has shown that it is always possible to obtain better performance by coding vectors instead of scalars. However, embedding messages into VQ compression codes may greatly reduce the resolution of VQ since the index value is the only value required to transmit.