

STEGANALYSIS OF MULTILEVEL REVERSIBLE DATA HIDING BASED ON HISTOGRAM MODIFICATION OF DIFFERENCE IMAGES

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ABSTRACT. *Steganalysis detects the possible existence of secret messages embedding in a suspicious media. In general, secret data hiding techniques take the advantage of the weakness of human senses to embed secret messages into a common media and transmit them to the receivers. Because the change of the cover media is insensible to human visual systems, the cover channel is hidden. Therefore, data hiding techniques are suitable for information transference and secure communication. The destructive processes of data hiding make the cover media irrecoverable. In some special applications, it should take the reversibility into account. In 2008, Lin et al. proposed the multilevel reversible data hiding technique based on HMDI (histogram modification of difference images) provides large embedding capacity while keeping distortion low and allows the original media to be completely recovered from marked media without distortion after embedded message has been extracted. In this paper, a steganalytic technique is proposed for Lin et al.'s method. A number of features are identified in the histogram of difference images that show the meaningful alterations when messages are embedded by Lin et al.'s method. The experimental results indicate that the proposed steganalytic algorithms discriminate not only stego-images from original images, but also the level of data hiding.*

Keywords: Data hiding, Information hiding, Digital watermarking, Steganalysis, Reversible data hiding

1. Introduction. Data hiding [1-10,21-24] is an art of embedding messages in a cover media and hides the very existence of secret messages. The main research of data hiding is focused on hiding capacity, stego-media quality, reversibility, and detecting security. One of the popular data hiding schemes is the least-significant bits (LSB) replacement method [4]. If the hiding capacity of LSB replacement method is equal to 1 bpp (bit per pixel), the stego-media quality (PSNR, peak signal-to-noise ratio) can be higher than 50 dB. The embedding processes of many data hiding schemes will erase original data of the cover media. In spatial domain, the pixel values are overwritten. In frequency domain, the coefficients are overwritten. Therefore, when the embedded messages are extracted, the original cover media cannot be rebuilt losslessly. Reversible data hiding schemes [6-10] [21-24] are proposed to solve this problem; it can reconstruct the cover media without loss, which wins its name “lossless steganography”. The hiding capacity of reversible data hiding schemes is still under researching.