Reversible Data Hiding in Image Based on Wavelet Transform

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ABSTRACT

This paper represents a new approach to reversible data-hiding using discrete wavelet transform in frequency domain.The continuous set of zero coefficient produced by quantization of the coefficients of the wavelet is used to conceal the data. Most of time, the amount of hidden data and the quality of the image are contradictive. As an advantage, our method can give consideration to both of the two issues. We first transform the cover-image with 3-order wavelet and then do quantization procedure. After doing FDWT & quantization procedures the cover-image were consists of several 64-pixel blocks, and the method presented in this paper is used to insert the secret information into the continuous zero coefficient in the blocks, and then apply wavelet reverse transformation to compose the stego-image. To extract the secret information, we first calculate the quantized wavelet transform coefficients from the stego-image. Compose each 64-pixel block by combining and permuting due to the extraction method, then using the extraction rules of the combination and permutation of each block to recover the secret information. Besides, the experiments of alternatively using Haar function for discrete wavelet transform and using 9/7 convolution discrete wavelet transform prove that our method offers expectable and acceptable quality and reversibility of the stego-image. The experiments use a general gray-level image as the cover-image and hide the randomly produced secret bits into this gray-level image, and the evaluation is done by calculating and comparing the amount of hidden data and the quality of the stego-image. Our method is improved from the method of Chang et al. in 2007 and the results of PSNR value and the amount of hidden data are 1.1 times higher than that of the results of Chang et al., respectively. The experiments show that not only the amount of the hidden data but also the quality of the stego-image are both improved in our method.

Keywords : descrete wavelet transformation ; reversible data hiding ; stego-image ; cover-image

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