ROBUST DIGITAL IMAGE-ADAPTIVE WATERMARKING USING WAVELET DOMAIN EMBEDDING AND BSS BASED EXTRACTION TECHNIQUE

SANGEETA JADHAV AND ANJALI BHALCHANDRA

Abstract

In a digital watermarking scheme, it is not convenient to carry the original image all the time in order to detect the owner's signature from the watermarked image. Moreover, for those applications that require different watermark for different copies, it is preferred to utilize some kind of watermark-independent algorithm for extraction process i.e. dewatermarking. Watermark embedding is performed in the blue channel, as it is less sensitive to human visual system .This paper proposes a color image watermarking method, which adopts Blind Source Separation (BSS) technique for watermark extraction. Single level Discrete Wavelet Transform (DWT) using two functions namely 'Haar' and 'Daubenchies 4' are used for embedding and their performance is compared w.r.t. spatial domain embedding and for various attacks. The novelty of our scheme lies in determining the mixing matrix for BSS model during embedding. The determination of mixing matrix using Quasi-Newton's (BFGS) technique is   based on texture analysis which uses energy as metric. This makes our method image adaptive to embed the watermark into original image so as not to bring about a perceptible change in the marked image. BSS based on Joint diagonalization of the time delayed covariance matrices algorithm is used for the extraction of watermark. The proposed method, undergoing different experiments, has shown its robustness against many attacks including rotation, wiener filtering, low pass filtering, salt n pepper noise addition and compression. The robustness evaluation is also carried out with respect to the spatial domain embedding.

Keywords : DWT, BSS, BFGS, Mixing matrix, attacks, Haar,Daubenchies 4, etc.