Performance Evaluation of Wavelet SVD-Based Watermarking Schemes for Color Images

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Abstract

Digital image watermarking techniques have enabled imperceptible information in images to be hidden to ensure the information can be extracted later from those images. For any watermarking scheme, there are four main requirements which are imperceptibility, Robustness, capacity and security. Recently, hybrid Singular Value Decomposition (SVD) based watermarking schemes in the transform domain have significantly gained a lot of attention. This is due to the characteristics of SVD and the wavelet. Most of these schemes were tested under different conditions using grey images only. However, due to the growth of digital technology and the huge use of the colour images, it is important to consider the colour images in the watermarking area. Three different SVD-based image watermarking schemes with different wavelet transforms are selected in this paper to be tested and evaluated for colour images. Two colour models are used to represent the colour images to perform the embedding and the extraction watermarking process to study these colour models' performances and effectiveness in the watermarking area. These colour models are RGB and YCbCr. All these colour models' channels are used as an embedding channel and then are evaluated under different attacks types. The experimental results of the selected Wavelet SVD-based watermarking schemes proved that the embedding in the RGB and YCbCr colour channels are achieved high imperceptibility. These colour channels also showed good robustness against different attacks such as cropping, cutting, rotation and JPEG compression.

Keywords

Image watermarking; Wavelet transform; Singular value decomposition; Colour models