

Comparative Study of SWT-SVD and DWT-SVD Digital Image Watermarking Technique

Neha R. Sawant

Department of Electronics
SSVPS's B.S.D COE, Dhule
Maharashtra, India

Pravin S. Patil

Department of Electronics
SSVPS's B.S.D COE, Dhule
Maharashtra, India

ABSTRACT

Due to use of the latest computer technology in early days with wide available tools with various advance application, it is very easy for the unknown users to produce illegal copies of multimedia data which are floating across the Internet. To protect multimedia data such as images, videos, etc. on the Internet many techniques are available including various encryption techniques, steganography techniques, watermarking techniques and information hiding techniques. Digital watermarking is a technique in which a piece of digital information is embedded into a cover image and extracted later for ownership verification. Secret digital data which is hidden can be embedded either in spatial domain or in frequency domain of the cover data. In this paper frequency domain technique is used by using singular value decomposition (SVD) with existing method DWT (Discrete Wavelet transform) that is DWT-SVD Combine watermarking technique and proposed method includes stationary wavelet transformation (SWT) with SVD that is SWT-SVD based water marking technique is proposed for hiding watermark. The quality of the watermarked image and extracted watermark is measured using peak signal to noise ratio (PSNR). A user defined or predefined watermark can be embedded within the image without disturbing quality of the image. It is observed that the quality of the watermarked image is maintained of proposed method results are tested for various attacks which include Salt and Pepper noise, Gaussian noise, cropping and compression, rotation etc. for both DWT and SWT for high Robustness. A large payload can also be embedded in this proposed algorithm. SWT-SVD result PSNR is get improved as compare to DWT-SVD. In this paper Both the Methods are Implemented by Using MATLAB and Comparative Experimental Results are Reported.

Keywords

Watermarking, Stationary wavelet transformation (SWT), Singular Value Decomposition (SVD), Discrete Wavelet Transform (DWT), MSE (mean square error), PSNR (peak signal to noise ratio), large payload, Robustness

1. INTRODUCTION

In this paper, digital watermarking is process of an Embedding piece of code in digital data image and in the cover data image which is to be protected from duplication and extracted later for ownership verification in security aspects these are the main important applications of digital watermarking. The major point of digital watermarking is to find the balance among the aspects such as robustness to various attacks, security and invisibility. Property of Robustness and Fragility are important for ownership verification and image authentication respectively. In this paper by using DWT-SVD and SWT-SVD with the help of PSNR. Values comparative analysis is done. SVD along with

DWT is existing method and SVD along with SWT is the proposed method, after study analysis with different cover and logo images for both methods it founds that SWT-SVD gives better PSNR values result than DWT-SVD domain digital image watermarking. The increasing perceptibility will also decrease the quality of watermarked image. Generally watermark could not directly hidden, it is done by modifying the intensity value or pixel value of an image (spatial domain) or its frequency components. The former technique which is used for watermarking is spatial domain technique and frequency domain technique. After applying transforms it is converted into different sub-components as HH, HL, LH, and LL, in which high frequency components HH are affected by most of the signal processing techniques such as lossy compression, so in order to increase the robustness, ideally the watermark is preferred to be placed in the low frequency components. But our human visual system is very sensitive to changes in low frequency range. So, in DWT-based watermarking techniques, the DWT coefficients LH, HL, and HH are modified to watermark data. Because of the conflict between robustness and transparency, the modification is usually made in HL, LH and HH sub-bands to maintain better image quality as HH band contains finer details and contribute insignificantly towards signal energy. Hence, watermarking embedding in this region will not affect the perceptual fidelity of the cover image. By considering SWT-SVD combined full band watermarking is possible in DWT-SVD technique to embed watermark image into the main or cover image, which proves robust to various kind of attacks which are mentioned as SWT helps to increase the payload i.e., large size watermark, which is an advantage over DWT-SVD techniques. In this paper with the help of PSNR Values [4] Comparative analysis is done. SWT-SVD gives better result than DWT-SVD domain digital image watermarking.

2. OVERVIEW OF DWT-SVD

2.1 DWT (Discrete Wavelet Transform)

The DWT decomposes input image into four components namely LL (low pass frequency) operation to the rows, LH (vertical high), HL (horizontal high) and HH (high pass frequency) operation to the columns. which is shown in Fig. 1.

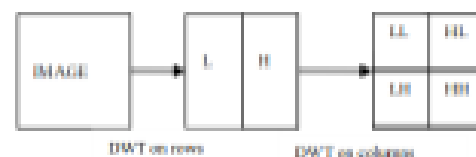


Fig 1. DWT Decomposition of Image