IMAGE WATERMARKING TECHNIQUE USING FEATURE CLASSIFICATION

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ABSTRACT
Nowadays, digital documents can be distributed through the World Wide Web to a large number of people in a cost-efficient way. The increasing importance of digital media, however, brings also new challenges as multimedia content is effortlessly duplicated and even manipulated. There is a strong need for security services. Applications of copyright information or watermarking techniques in the digital data transmission are must for ownership protection. Additional information (watermark) such as a symbol or a text can be added to the original image and this process is called watermarking, data embedding or information hiding. The image watermarking using SVD (Singular Value Decomposition) and DWT (Discrete Wavelet Transform) is the quite well-developed technique to maintain the scheme robustness to attacks. The features of digital image watermarking are the capacity, robustness, and imperceptibility. This paper presents an algorithm for improving the features by SVD. This achieves the improved watermark imperceptibility of higher embedding capacity in high-noise regions, but also more robust to a wide range of attacks. Simulation and experimental numerical values such as performance, robustness and image quality and detector response are obtained by using the image processing tool in MATLAB 7.6.

Keyword-Digital Watermarking, Feature Classification, Discrete Wavelet Transform, Singular Value Decomposition.

1. INTRODUCTION

Digital images are widely used in communications throughout the internet. There are many problems occur (e.g.) the unauthorized use and transmissions. The security of the digital information is an important factor in the digital multimedia. To protect the owners from these illegal actions, the most common technique in this field is the digital watermarking [1].As authors using some specific algorithms like the digital watermark is the sign to represent a copyright [4], e.g., a logo or trademark, has successfully embedded and extracted as an identification to prove the originality of the watermark. Watermark is classified based on the domain, type of document, human perception, and application.

Depending on the domain, in which the watermark is embedded, can be classified into spatial domain [2]-[3], transform domain [4]-[5], hybrid of those two domains [6]. In the spatial domain, we directly use the pixels of the host images to hide the information in the watermark, while in the transform domain (DCT, DWT, SVD) the information is hidden within the transform coefficients. In the hybrid method, the watermark might be hidden in either the pixels or transform coefficients.

The JPEG and Gaussian noise are the usual image processing steps that involve between the embedded and extraction phases [7].An image processing attacks that could be involved in watermarking techniques [8].The ability to survive these attacks is called robustness. The robustness is the important criteria for digital image watermarking techniques [9]. While the Capacity is the important criteria for image watermarking technique. In general, the watermark size is smaller than the host image so some techniques that to sacrifice the size of the watermark to boost up the robustness by embedding some duplicate information's into the host image, making the watermark even smaller. Other than the above specified three criteria, the security and blind characteristics are the two criteria that are frequently involved.

The proposed scheme is the model, namely, that will improve the capacity robustness of digital images by evolving the two algorithms called Discrete Wavelet Transform (DWT) and Singular

Value Decomposition [10].The SVD scheme applies to the 4×4 sized block into the U, S and V matrices, but embedding takes place at the first singular value of elements in the U matrix. The next section will clearly elaborate the image features and image analysis.

2. PROPOSED SYSTEM

The techniques we are using to extract the features of the image are the DWT and SVD techniques. The proposed system will improve the BER and imperceptibility (PSNR) values in the frequency domain compare to the existing system. In the existing system, they use the DCT technique. The input image is taken then noise can be added to improve the image quality. Then image sharpening can be performed for the image with 256×256 pixel values. We use the same block size of 4×4 to partition the host image, and do the appropriate transform and decomposition techniques. After the block partitioning we perform the feature classification by the GLCM technique. Our main technique of DWT and SVD can embedded at the final stage to extract the embedded watermark.

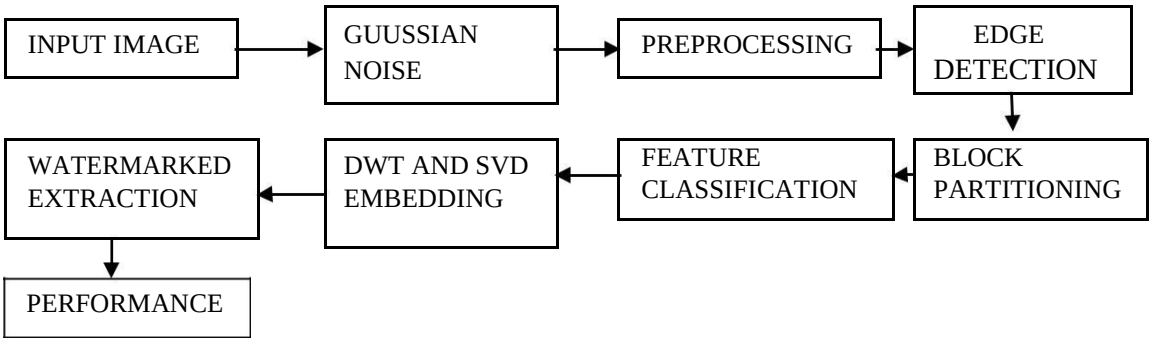


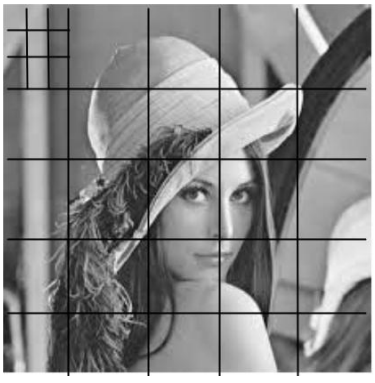
Fig.1.Block Diagram

IMAGE ANALYSIS:

1) Block partitioning:

A digital image has large no of pixels. Each pixel shows the intensity. Combine the pixels together lead to a variety of combinations. In this section, several formulas can be used to measure the different features of images. Here, we use the size of a block to be 3×3 squares and the size of an image to be 120×120, which can be divided. As shown in the following Fig.3.The order can be shown on the right side. This shows that there is no overflow.

Fig.2.Input image



1	6	11		
2	7	12		
3		8.....		
4	9			
5	10			

Fig.3.Block partitioning

2)Sobel mask:

The Sobel mask is the technique which is mainly used for edge detection for grayscale or a color images[9].first As shown in the fig.2.The given block is an example of a block from P_1 to P_9.Another two diagram shows that the X and Y direction Sobel mask respectively.The gradient of the blocks can be calculated for x and y directions respectively.The feature angle is one of the main factors for analyzing the images.

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P_1	P_2	P_3
P_4	P_5	P_6
P_7	P_8	P_9

-1	-2	-3
0	0	0
1	2	1

-1	0	1
-2	0	2
-1	0	1

Fig.3.Example Block for sobel mask

$G_x=-P_1-2P_2-P_3+P_7+2P_8+P_9$.

$G_y=-P_1-2P_4-P_7+P_3+2P_6+P_9$.

$Angle=\tan^{-1}(G_Y/G_X)$.

The edge detection can be performed the output is given for sobal mask technique is as shown in the figure 4,

Fig.4.Edge Detected sobal-mask image

3)Gray-level co-occurrrence matrix:

The gray-level co-occurrence matrix(GLCM) [13],which can be applied to the image segmentation field.The gray-level co-occurrence matrix,which can be used to derive the c_{ij} as shown on the figure.The elements that is located in the row i,column j in matrix C.The i and j are reffered as the pixel blocks.The pixel pair in the block can be checked, once it occurs in the block the element at row i column j shoud have one added to it.The matrix can be divided by number of relationships N

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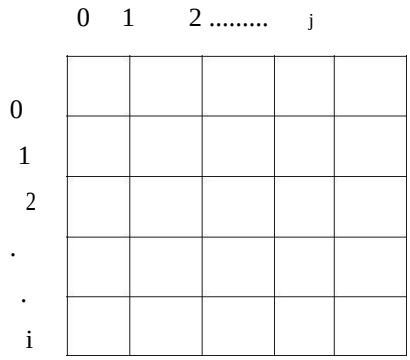


= C Matrix

Fig. 4.Gray-level co-occurrence matrix

C_{ij}=1/N*Number (pixel pair (i, j)), N=20.

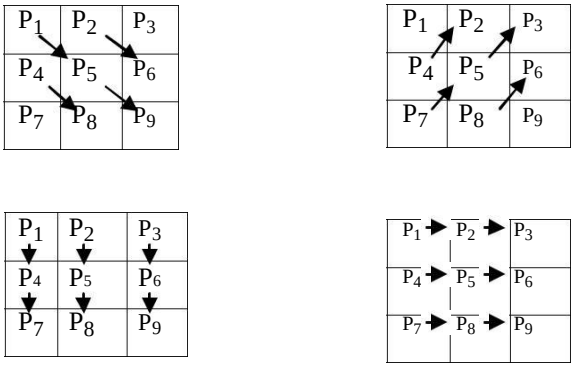
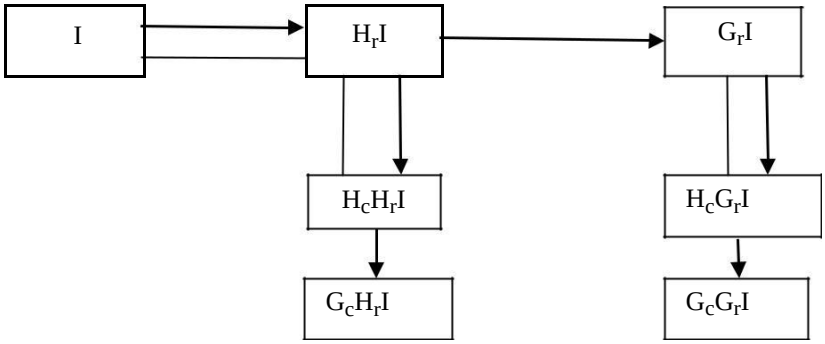


Fig.5.Pixel pair relationships

4) DWT (Discrete Wavelet Transform):

The DWT is also a simple and fast transformation approach that translates an image from the spatial domain to the frequency domain. Unlike the DFT and DCT, which represent a signal either in the spatial or the frequency domain, the DWT is able to represent both interpretations simultaneously [10].

$$\Psi_{t,\,s}(x) = \{\psi\,((x-t)/s),\,(t,\,s)\,\epsilon\,R^{*}R^{+}$$



The main idea of our paper is watermarking in the frequency domain by embedding the watermarking technique such as DWT and SVD.

5) Extraction phase of watermarked image

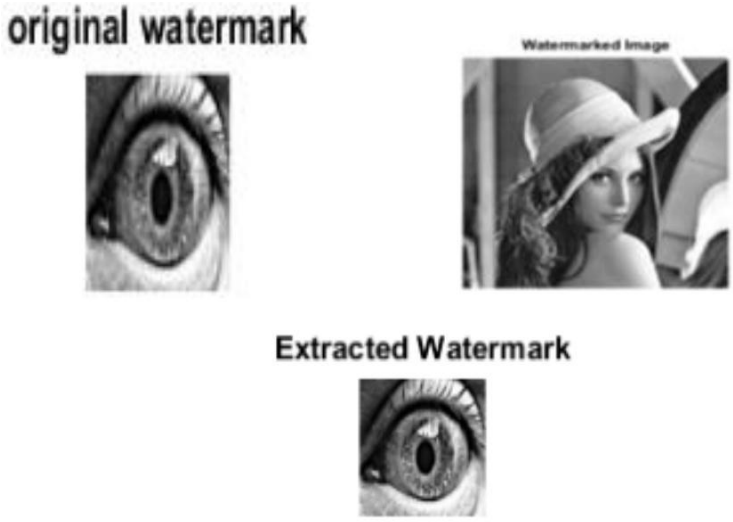


Fig.6.Extraction of watermarked image

RESULTS AND DISCUSSION:

In this section, we use two different measures first one is the peak-signal to noise ratio and another one is the signal to noise ratio. The PSNR of an image A with respect to an image B is defined by,

$$PSNR=20\times\log_{10}\{MAX_1/\sqrt{MSE}\}$$

Where MAX_1 is the maximum gray value of the images A and B. MSE is the mean square error defined by,

$$MSE=1/m\times n\sum \quad ( ) \quad (\quad)^2$$

RESULT	LEENA	BABOON	BARBARA	CAMERAMAN	APPLE LOGO
PSNR	19.9634	20.0870	19.9609	20.2955	22.6889

CONCLUSION:

In this paper describes the better watermarking algorithm for grayscale images. The imperceptibility and PSNR and SNR values of different images can be performed and resulted. In addition to using the DWT technique with the SVD by this, the image can be watermarked with the better quality.

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