ISSN: 2278 – 1323
International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)
Volume 2, No 5, May 2013

ENHANCED TECHNIQUE FOR SECURED AND RELIABLE WATERMARKING USING MFHWT

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Abstract: A general watermarking techniques are used for copy right protection. In this watermarking scheme should achieve the features of robustness and imperceptibility. This paper represents the watermarking algorithm in the DWT domain using an Modified Haar Wavelet Transform (MFHWT) evolutionary algorithm to satisfy both of robustness and imperceptibility. The proposed algorithm is to decompose the original image using DWT and WPT according to the size of watermark . The Modified Haar Wavelet Transform (MFHWT) is memory efficient. It is fast and simple.

Index Terms - Digital watermark, Discrete wavelet Transform (DWT), Wavelet Packet Transform (WPT) , MFHWT (Modified Haar Wavelet Transform).

1. INTRODUCION

The wide use of Internet technology and rapid growth in digital techniques have put a serious threat to the owner of the digital medias to place the works in their web pages or in other public places. we widely used digital contents in form of text , images , pictures and music etc. The main challenge is offensive unauthorized copying the contents. Because there are many techniques which enable illegal copies to be used .Therefore we used copy right protection techniques and the most efficient technique is Digital Watermarking. Digital image watermarking is the substitution between image degradation verses ease in removal of the inserted watermark via compression, filtering or cropping. This technique can also provide a substitute solution for image authentication. Digital watermarking provides an inclusive solution that embeds private information into digital signals exist and grow up. As a, there is a need to continue a progress of better scheme for copyright protection.

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Watermarking system that has been studied widely in recent years (for still and moving pictures) is one of the promised methods. The main features which are integrated into watermarking is robustness against various attacks. There are subsequent requirements which evaluate watermarking system.

Security: The watermark should only be access by the authorized person. Unauthorized person never access the watermark.

Imperceptibility: That is the most important requirement for the digital watermarking. The embedding procedure should not initiate any perceptible artifacts into original image and not degrade the distinguish quality of image. When the signal watermarked, it should not influence the quality of original signal.

Robustness: The embedded watermark data should not be distant or eliminated by unauthorized user using frequent signal processing operations and attacks. The watermark can be detected in the extraction method it should be able to survive various attacks.

Capacity : He much information should convey as much as possible enough to identify ownership and copyright protection or how much data embedded into the signal per unit time.

Fidelity: fidelity implies that transparency should be there. When the image is watermarked it doesn't affect the quality of original image .

II WATERMARKING PROCESS:

The consecutive phases of watermarking process are described as follows:

Embedded Process : In this phase the watermarked image is embedded into the original image . In fig 1 suppose the original image is I and the watermark is w , secret key k is come into the process . The output of this process is watermarked image I'. The key is used to protect the watermark and impose security.

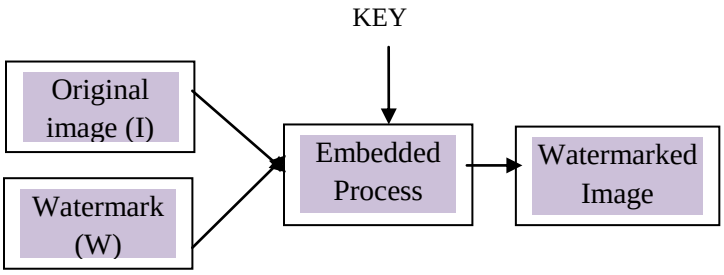

Fig1. Embedded Process

Extraction Process: The embedded watermark will be extracted. There are three types of watermark extraction methods, namely blind, semi-blind and non-blind. The input for extraction is the usual watermarked data and the key related to the embedding key. Two kinds of extraction are available: using the original document and in the absence of the original document.

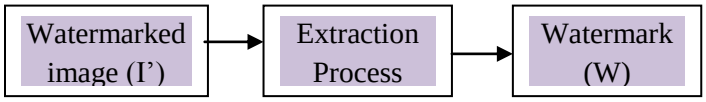

Fig2. Extraction Process

III WATERMARKING TECHNIQUES:

Wavelet function are used for the signal in time is analyzed for its frequency content. Wavelet transform is a multi-scale signal analysis method, which overcomes the weakness of fixed resolution .Digital watermarking can be categorized into following domains: frequency domain and spatial domain. This paper is represented frequency domain based approach which has better image fidelity and robustness than spatial domain. There are many techniques are available which are used different frequency transform domains to embed the watermark such as discrete cosine transforms (DCT) , discrete wavelet transforms (DWT) , and discrete Fourier transforms (DFT).

A. Discrete Wavelet Transform

A wavelet decomposition can be efficiently performed by a pyramidal algorithm, the original image can be decomposed into lower frequency sub band and higher frequency sub band. Each level of decomposition generate four bands of data , one can be low-low (LL), low-high(LH) vertical, high-low(HL) horizontal and high-high(HH)diagonal pass bands. In the lowest resolution low pass band shows approximation image and higher bands shows detail images. The low pass band is further decomposed to attain another level of decomposition. The DWT decomposing the data into a general approximation and detail information at different frequency bands with different resolutions. Watermark image is embedded into low frequencies is more robust in comparative to middle and high frequencies. The low frequencies have low pass characteristics like lossy compression, filtering .The DWT has a fast computation wavelet transform .

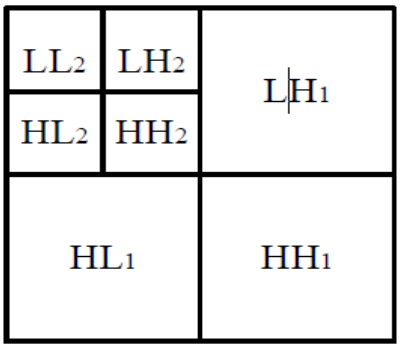

Fig3. Wavelet Decomposition with Two Levels

It is easy to implement and reduces the computation time, less resource required.

B. Wavelet Packet Transform :

Wavelet Packet Transform is a generalization of the dyadic wavelet transform that offers a rich set of decomposition structures. WPT is dealing with the non stationary data better than DWT does. When the filter bank is iterated over all frequency bands at each level ,wavelet packet decomposition is achieved on the other hand. The major difference between the wavelet packets transform and the wavelet transform is that, in the wavelet packets, either over the low-pass branch or the high-pass branch the basic two-channel filter bank can be iterated . This fig4. Represents a full decomposition tree. The best basic selection algorithm is chosen the final decomposition structure which will

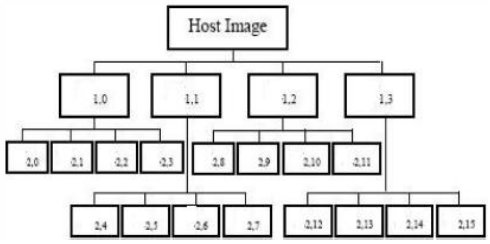

Fig4. WPT Decomposition Tree with two levels

be a subset of that full tree.

IV THE PROPOSED ALGORITHM:

In the proposed work, MFHWT algorithm is used which can reduce the calculation work. MFHWT can be done by following steps.

Step1: Read the image as a matrix.

Step2: Apply MFHWT, on the entire matrix of the image along row and column wise.

Step 3: Wavelet decomposition MFHWT of the input matrices computes the approximation coefficient matrix and details coefficient matrices obtained.

Step 4: In MFHWT, first average sub signal, (a' =a1, a2,….. an/2), at one level for a signal of length N i.e. f = (f1, f2, f3, f4,…,fn) is

$$am = \frac{f4m-3+ f4m-2+ f4m-1+ f4m}{4},$$

m= 1,2,3,4,……..N/4,

and first detail sub signal, (d'= d1, d2,d3….dn)at the same level is given

$$dm = \{ \frac{f4m-3+ f4m-2+ f4m-1+ f4m}{4},$$

m=1,2,3,4,……..N/4,

Step 5: After this MFHWT we get a transformed image matrix of one level of input image.

Step 6: For reconstruction process, applying the inverse.

Step 7: Calculate MSE and PSNR for reconstructed image.

V IMAGE QUALITY MEASUREMENT

The purpose of measures the image quality metrics, some arithmetic indices is calculated to specify the reconstructed image quality. The image quality metrics provide some measure of closeness between two original and watermarked digital images by exploiting the differences in the statistical distribution of pixel values. The most commonly metrics which are used for comparing compression are Mean Square Error (MSE) and Peak Signal to Noise Ratio (PSNR). Between two images, PSNR block computes the peak signal-to-noise ratio, in decibels. This ratio is frequently used as a quality measurement between the original and a watermarked image. If the Higher is PSNR, then better the quality of the watermarked image or reconstructed image. The MSE represents the cumulative squared error between the watermarked and the original image, whereas PSNR represents a measure of the peak error. The lower the value of MSE, then lower the error. To compute the PSNR, the block first calculates the mean-squared error using the following equation:

$$MSE = \frac{\sum_{M,N} [I_1(m,n) - I_2(m,n)]^2}{M * N}$$

In the previous equation, *M* and *N* are the number of rows and columns in the input images, respectively. Then the block computes the PSNR using the following equation:

$$PSNR = 10 \log_{10} \left(\frac{R^2}{MSE} \right)$$

In the previous equation, *R* is the maximum fluctuation in the input image data type. For example, if the input image has a double-precision floating-point data type, then *R* is 1. If it has an 8-bit unsigned integer data type, *R* is 255, etc

VI CONCLUSION:

This paper has presented an imperceptible image watermarking technique for copyright protection. In this technique the embedded process is performed using DWT and WPT. The proposed approach has many advantages. In Modified Haar Wavelet Transform (MFHWT) algorithm is faster and simple. This is the one algorithm which can reduce the tedious work of calculations. The fast transformation is the main benefit of MFHWT. This approach has the potentiality of application in color images.

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