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HAAR WAVELET DOMAIN BASED INVISIBLE EMBEDDING OF BINARY IMAGES

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Abstract: In this work we are proposing the new technique of digital watermarking for targeted invisible watermarking. By deploying Haar wavelet functions, an insensible watermark or message embedded into original information. Before that, image segmentation approach is employed here to extract the item of interest in message and covert an eight bit or sixteen bit message data to at least one bit binary message. Once blocks of LH and HL bands in odd and even then performance of embedding by nature is investigated on the corresponding band, worth on the premise of planned embedding rule set.
Keywords: Image processing, watermarking, segmentation, wavelet domain.

I. INTRODUCTION

Digital watermarking could be a technique that may solve process of. an oversized variety of watermarking theme came to resolve the matter of copyright protection and different enlightenment in digital pictures, video, audio and several different transmission objects. A watermark may be a sort of image or text that's the paper provides demonstration of its credibleness, however affected[3]. In digital World thought of cryptography is an increased by digital watermarking. In previous couple of years for miraculous growth the web has counseled for defend the possession of digital media by mechanism of digital watermarking completely similar copies of digital message, be it pictures, audio or text, will be composed and share simply[8]. Whereas the preceding blessings provide huge opportunities for creators, the power to create foolproof copies and repose by that those copies are scattered conjointly promote misuse, unauthorized duplicate and transportation ("piracy"), falsification, and misappropriation. It leads designer and businessman regarding the residue of unauthorized repeating and distribution on an amazing scale.

II. LITERATURE SURVEY

Continuous efforts are applied to device an economical watermarking rule however techniques projected upto don't proves to be sturdy to all or any potential attacks and transmission process operations. Watermarking unexpected increase in interest is most seemingly by reason for the increase in concern over IPR. Generally, watermarking of static image, video, and audio incontestable sure common basic ideas. According many watermarking applications inliterature depends on services we would like to support. so watermarking techniques looks to be relevant in varied utilization field accommodate Copyright protection, duplicate preservation, quality revealing, marking etc [1-3]. supported their embedding speciality, watermarking pattern square measure classified either as spatial Domain[5,7] (watermarking system directly changes main knowledge like pixels in a picture, to suppress watermark information) or remodeled Domain[5,6] (here system alters the frequency transforms of information components to cover the watermark information)[2,3,4]. Latter had incontestable to be lusty than the spatial domain watermarking process[1], [4]. To transpose a picture to frequency illustration, researchers used many conversion like distinct trigonometric function rework (DCT)[7], distinct riffle rework (DWT), or distinct Fourier rework (DFT)[1]. Although spatial domain based mostly methodologies cannot assist most of general irruption like confining, filtering high pass or low pass etc., researchers can contribute the spatial domain techniques too [1], [4].

III. HAAR BASED INVISIBLE EMBEDDING

Discrete wavelet transform possesa enormous number of uses in new technology, and mathematics and information technology. Mostly, it is used for signal coding, represent a discrete signal in a more often as a prerequisite for data compression is unnecessary. Applications of practical use can also be found in signal processing of accelerations for gait analysis, [6] in digital communications and so on[7] [8][9]. There exists a vast range of utilization for wavelet transform. They are applied in various area ranging from signal processing biometrics, and the list is still growing. One prominent applications is in the FBI mark compression standard[6]. Wavelet transform is used to epitomize the fingerprint portrait for depot in their data bank. Chosen first discrete cosine transforms (DCT) did not implement well at high compression ratio. This blocking effect which produced severe made it beyond to follow the ridge lines in the fingerprints after reconstruction. It did not happen with Wavelet Transform by reason of its property of preserving the details present in the data[5]. In DWT, prominent information of signal appears in huge magnitude and the less outstanding information appears in very low magnitude. Data confining can achieved by eliminate these low magnitude[7]. The wavelet transforms implement high compression ratios with good trait of reconstruction. Presently, the application of wavelets for image compression is one the hottest areas of analysis. For most compression applications, data processing involves entropy coding and quantization to yield compressed image. In while of this process, all the wavelet coordinate that are below a elect gate are reject. These rejected coordinate are replaced with zeros during reconstruction at other end. To reconstruct the signal, the

entropy coding, and then finally back then decodes the sanitized Wavelet Transformed.

IV. METHODOLOGY

A. ALGORITHM FOR WATERMARKING USING DWT

a) Embedding strategy

Step 1.Decompose 1-Level DWT on an M*N host image.
Step2.Divide the HL and LH sub band into non-touching segments of 2*2 length and segments are chosenin odd columns of LH and segments in even columns of HL for watermark embedding.
Step 3.Retreive each selected segmentB(m, n) and a bit w from watermark. Calculate mean value M(m, n) of four coefficients in B(m, n)

$$M(m,n) = \frac{\sum_{i=0}^{1}\sum_{j=0}^{1}(x_{m+i,n+j})}{4}$$

Embed bit w of watermark
R :=M(m, n)mod 6;
fori := 0 to 1
forj := 0 to 1
if0 ≤ *R* < 3 then
if*w*= 1 then *xm+i,n+j*:= *xm+i,n+j*+ (3-*R*);
if*w*= 0 then *xm+i,n+j*:= *xm+i,n+j*- *R*;
if3 ≤ *R* < 6 then
if*w*= 1 then *xm+i,n+j*:= *xm+i,n+j*+ (3-*R*);
if*w*= 0 then *xm+i,n+j*:= *xm+i,n+j*+ (6-*R*);
Step 4.Apply IDWT on embedded image to obtain an invisible hided image.

b) Extractionstrategy

Step 1.Apply one-Level DWT to M*N stego image.
Step2.Segregate HL and LHsubband into non-touching segments of 2*2 length and chosen segments in odd columns of LH and segments in even columns of HL for extracting watermark.
Step 3.For each segmentB(m, n) . Calculate average value M(m, n) of retreived four coefficients in B(m, n)

$$M(m,n) = \frac{\sum_{i=0}^{1}\sum_{j=0}^{1}(x_{m+i,n+j})}{4}$$

Extract bit w of watermark
R :=*M*(*m, n*) mod 6 ;
if0 ≤ *R* < 1.5 then*w*:= 0;
if1.5 ≤ *R* < 4.5then *w*:=1;
if4.5 ≤ *R* < 6 then*w*:= 0;

V. RESULTS

The watermarked images resulted from embedding algorithm applied individually on six messages is represented by below figure, where binary message bits are embedded into LH and HL band of cover images.

Fig.1 Cover image set

Hided Message Image Watermarked Cover Image

Fig.2 Hided message image and watermarked cover image

VI. CONCLUSION

As future scope concept we can combined Digital Watermarking and Cryptography to promote more assure watermarking system. We can apply the watermarking technique in the frequency domain for different applications. We can also implement in other spatial domain techniques and cryptography algorithms for ultimate progressive encryption technique to encode the messages. From this article can be concluded that promisable watermarking can be achieved using suggested methodology.

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