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DEVELOPMENT OF DATA HIDINGIMAGE ON QR CODES

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ABSTRACT

Today detectability of Intellectual Property in the digital world is a major issue. With the recent spate of cases involving fake currency, no one needs to be reminded of the importance of watermarking. Watermarking is one of them process to secure intellectual rights of digital assets. Digital watermarking is an extension of this concept in the digital world. In recent years the phenomenal growth of the Internet has highlighted the need for mechanisms to protect ownership of digital media. Exactly identical copies of digital information, be it images, text or audio, can be produced and distributed easily. In such a scenario, in our paper we propose a method to insert multiple watermark in spatial and frequency domain to make our assets secure and undetectable by dividing our host image into two regions, called region-A and region-B. In a region-A, owner information is inserted with the help of LSB technique and in another, region-B, a circular watermarks are inserted with additive watermarking technique in DWTDFT domain with QR codes.

DESCRIPTION

We are proposing a multiple watermarking technique to insert more than one watermark into the host image with the features benefit of spatial and frequency domain. This overcomes each other's drawback. In our propose work we, insert three watermarks, one is by using any spatial domain technique which contains the information about the host image and owner. And other two watermarks are inserting in the DFT domain with the help of DWT. DFT having an undetectably property and DWT have a robustness property. A host image is divided into two regions called A and B. In these two regions watermarks are inserted. Watermark inserted into region-A with the help of spatial domain and in Region-B with the help of frequency domain following with Parts-A, B and C. Figures show the embedding and Extracting process of ourpropose work.

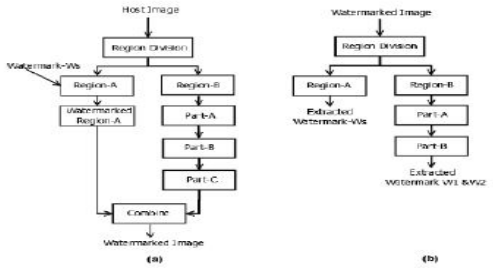

Fig: 7.0: (a) Watermark Embedding Process of our Propose Method; (b)Watermark Extraction Process from the Watermarked Image.

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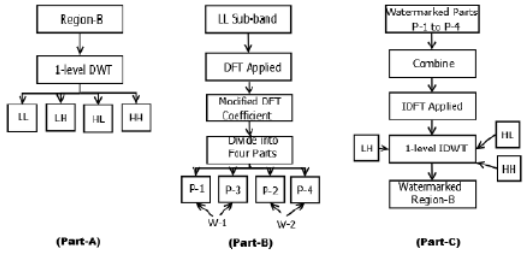

Fig: 7.1: shows parts which used in watermark embedding and extractingprocess.

A. Watermark Embedding Algorithm:

Insertion of watermarks is divided into three parts called Part-A, Part-B and Part- C.

Step 1:A host image of size M x M divided into two regions called Region-A and Region-B. Division of regions must be in such a way that the size of Region-B is 2(n+1) x 2(n+1).Where, 2<=n<=M.

Step 2: Watermark Insertion process into the regions A and B, shown in figure.

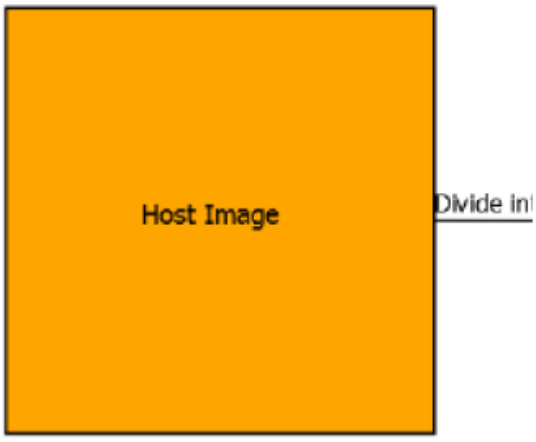

Fig: 7.2 Division of Host Image into Region-A and Region-B.

Step 3: Watermark Insertion in Region-A: In this step a watermark's information Ws is inserting in a region-A using a spatial domain technique of Least Significant Bit, at 6th bit plane. It contains atleast valuable information of host image and owner.

Step 4: Watermark Insertion in Region-B:

Step 4.1: Part A:

i. Apply one level of DWT on the Region-B.

ii. We got four sub-bands LL, LH, HL and HH with four different frequencies called an approximation, vertical, horizontal and diagonal respectively.Details division of regions and bands shown in below figures.

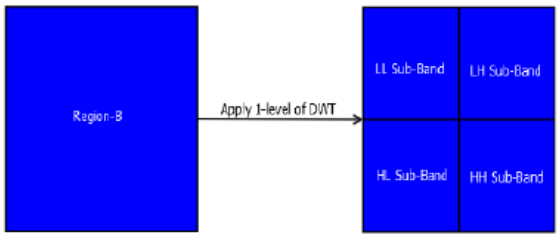

Fig: 7.3:Division of Region-B into sub band using DWT.

Step 4.2: Part B:

i. Select LL sub-band whose size is 2n x 2n. Apply DFT on it. Through this we got modified coefficients of LL whose size is same as LL subband Shown in figure.

ii. Coefficients of LL sub-bands divided into fourparts of each size is

$$\frac{2^n}{2} - 1 \text{ x } \frac{2^n}{2} - 1.$$

iii. Watermark Insertion for P-1.

a. Select a high and low DFT coefficient ofP-1.

b. Select a block size 'b' and a pseudo random number (PRN-1) of length 'l', where b*l = sizeof P-1.

c. Creation of Watermark W-1: Each frequency band is replaced by one component of PRN-1 in every block. A replacement location is selected randomly.

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d. Select two scaling factor, ll and hh for low frequencies and high frequencies respectively. Where ll >= hh.

e. Add W-1 in P-1 by additive scaling method.

iv. Copy P-1 into P-4 because of DFT symmetricalfeature.

v. Watermark Insertion in P-2.

a. Select same frequencies bands for P-2, asselected in P-1.

b. Select a block size 'b' and a different pseudorandom number (PRN-2) of length 'l', where b*l= size of P-1.

c. Watermark Insertion for P-2.

d. Creation of Watermark W-2: Watermark W-2is created same as step 4.2.iii.c with PRN-2.

e. Use same scaling factor to insert W-2 in P-2 asin step 4.2.iii.e.

vi. Copy P-2 into P-4 because of DFT symmetricalfeature.

Step 4.2: Part C:

i. Combine all Watermarked parts P-1, P- 2, P-3, P-4 and 2n/2 th row and col. And apply reverse DFT on Combined image.

ii. Apply reverse DWT on watermarked LL and its respective sub-bands. This gives us a watermarkedRegion-B.

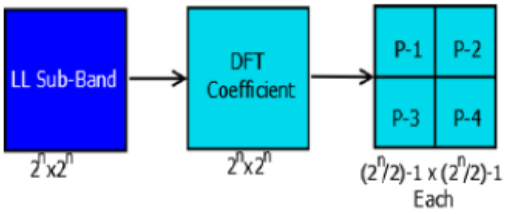

Fig: 7.4 Division of DFT coefficients into parts P-1 to P-4, where P-1 issymmetric to P-4 and P-2 is symmetric to P-3

Step 5: Combine Watermarked Region-A and Watermarked Region-B to get a Watermarked Image.

A. Watermark Extraction Algorithm:

To extract a Watermarks a reverse process of embedding is applied.

Step 1:Divide Watermarked Image into Regions A and B.

Step 2:Extract Watermark Ws from Region-A, by selecting LSB's values from 6th bit plane.

Step 3:Apply part-A and part-B on Region-B, and extract Watermark W1 and W2 from it. For the detection of watermark from the watermarked image reference is followed.

EXPERIMENTAL RESULTS

Experimental results of the performed tests demonstrate the efficiency of the proposed scheme in terms of robustness, transparency, and integrity control capability. In our propose work we,insert three watermarks, one is by using any spatial domaintechnique which contains the information about the host imageand owner. And other two watermarks are inserting in the DFTdomain with the help of DWT. DFT having an undetectablityproperty and DWT have arobustness property. A host image isdivided into two regions called A and B. In these two regionswatermarks are inserted. Watermark inserted into region- Awith the help of spatial domain and in Region-B with the help of frequency domain.

Fig: qr code at TX,fig: original information

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FIG:water marked image at TX

FIG:water marked image at Rx
fig:original information with gaussian noise

CONCLUSION

We propose a multiple watermarking technique with taking benefits of spatial and frequency domain. Our target is to make our watermarks secure and undetectable with the help of inserting watermarks into different regions. Semi fragile watermark inserted into region-A and a robust one into region-B, with the help of LSB and circular watermark insertion method respectively. Our propose method can we widely used in the field of medical to insert patients sensitive diseases information. It can also be used in covert channel for communication purpose where the insertion of watermark is undetectable.

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Mr. Syed Samiuddin Received the B.Tech. degree from Hyderabad Institute of Technology And Management. He awarded M.tech Degree in Embedded systems from Gokaraju Rangaraju institute of engineering and technology, Hyderabad. Present working as associate professor and Head dept of ece in Alhabeeb college of engineering and technology, chevella,Ranga Reddy District