International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-2, Issue-6, January 2014

Digital Watermarking of Text Image

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Abstract- Security Techniques are required due to the illegal access of data without permission. It is necessary to provide secured and robust technology to protect data. We have used various security techniques. Digital watermarking has been proposed for the protection of digital Medias. In this paper we are presenting and investigating the watermarking algorithms for binary images. The algorithms involve a blurring preprocessing and a biased binarization. The algorithm embeds a watermark by directly biasing the binarization threshold of the blurred image. It is controlled by a loop. Experimental results show the imperceptibility and robustness aspects of algorithms. In this paper algorithm is based on binarization method (in spatial domain) only BER performance has estimated for this technique, however there are two other major parameters those are helpful for defining the efficiency of watermarking method. In this project we are doing the proposed method analysis using the three parameters named BER (Bit Error Ratio), PSNR (Peak Signal to Noise Ratio) and MSE (Mean Square Error).

Keywords: Digital Watermarking Technique, Binary Image, Binarization, Watermarks Bit.

I. INTRODUCTION

One of the biggest technological events of the last two decades was the invasion of digital media in an entire range of everyday life aspects. Digital data can be manipulated very easily even though it can be stored efficiently and with a very high quality. With the help of digital watermarking techniques we can insert information into an image or text or audio. It is possible to transmit data in a fast and inexpensive way through data communication networks without losing quality. There are distinct advantages of Digital media over analog media. Digital audio images and video signals offer better quality than that of their analog counterparts. One can access the exact discrete locations that need to be changed and hence this feature makes it easy to edit. Copying is simple with no loss of fidelity and a copy of digital media resembles to the original.

Possibility of unlimited copying has made more threatened than ever due to digital multimedia distribution over World Wide Web, Intellectual Property Right (IPR). Restricting access to the data using some encryption technique is the one solution. However, overall protection cannot be provided by encryption. They can be freely distributed or manipulated once the encrypted data are decrypted. Hiding some ownership data into the multimedia data which can be extracted later to prove the ownership can solve the mentioned problem. The mentioned idea has already been implemented in bank currency notes.

Revised Manuscript Received on 30 January 2014.
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A watermark embedded in bank currency notes is used to check the originality of the note. Multimedia digital contents for checking the authenticity of the original content may use the same "watermarking" concept. For proving the authenticity, a Watermarking add "ownership" information in multimedia contents. This technology carries the information about the copyright status of the work to be protected and it embeds a data, an unperceivable digital code and the watermark. Continuous efforts are being made to device an efficient watermarking schema but techniques proposed so far do not seem to be robust to all possible attacks and multimedia data processing operations. So, there is a need to establish a globally accepted watermarking technique considering the enormous financial implications of copyright protection.

Classification of watermarking schemes can be done either as Spatial Domain based on their embedding domain. Alteration in the main data can be done directly by the watermarking system elements like pixels in an image, to hide the watermark data or Transformed Domain.

More robust watermarks could be embedded in the transform domain of images by modifying the transform domain coefficients. Researchers present spatial domain based techniques too even though spatial domain based techniques cannot sustain most of the common attacks like compression, high pass or low pass filtering etc.

Majority of digital image watermarking technique in the literature are proposed for gray scale/ color images while the digital watermarking method for watermarking method for binary images are quite limited in comparison. One important reason for this difference is that binary image lack rich gray scale information that can be easily modified imperceptibly. The system working on gray level images in which pixels may take on a wide range of values are not directly applicable to binary images in which there are only two pixels value and no small gray level variation. Any modification in a binary image is a flipping from one level to the other. Thus watermark embedding without causing visibly noticeable artifacts becomes more difficult for binary images.

II. DIGITAL WATERMARKING

Digital watermarking is perceptible and imperceptible. Based on the type of document, watermarking can be classified as

1. Image watermarking
2. Video watermarking
3. Audio watermarking
4. Text watermarking

Watermarking can be classified based on processing method used as

1. Spatial domain techniques
2. Transform domain techniques

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III PROCESS OF WATERMARKING

The general watermarking process involves four phases: message coding phase, embedding phase, transmission phase and decoding phase. In the first phase, information is encoded into a digital signal. In the second phase, original image and water mark are combined to produce watermarked image .In the transmission phase, the watermarked image is transferred to receiver side. In the transmission process, the noise can be involved .Noise means any signal interference during transmission and any international attacks such as cropping the image or making the brightness change to the image and so on. In the detection phase all the noise has to be overcome so that the watermark can be correctly extracted and decoded from the received image and compare with the original image.

The watermark message can be embedded in either spatial domain or frequency domain.

Watermarking in spatial domain:

In spatial domain, the values of the image pixels are directly modified based on the watermark that has to be embedded .This method is simple and computational efficient. However most of them are not robust against image modification.

Watermarking in Frequency domain:

In transform domain technique, the host image is first converted into frequency domain by transformation method. Then transform domain coefficients are modified by the watermark. The inverse transform is applied to obtain watermarked image. Due to complicated calculation of forward and inverse transform, these methods are more complex and involved higher computational cost than spatial domain method. But the transformation domain method is more robust than spatial domain method.

IV. PROPOSED WATERMARKING ALGORITHM:

In the proposed method, the watermark embedding without causing visible noticeable artifact becomes more difficult for binary image, a image in which there are only two pixel values and no small level gray variation. Any modification in binary image is flipping from one level to the other. Thus watermark bit stream is added into binary image. From the input binary image the watermarked image is formed. The size of the input binary image is M x N. In this proposed method, the blurring is used for converting the image into various intensities so that we can easily embed the watermark into the pixel. The blurred image is split into overlapped block. In this process for embedding bit into binary image, first find out uniform block and non-uniform block in binary image. After finding, skip the entire uniform block. Uniform block means those blocks contain all white pixel OR all black pixels and non-uniform block means the block contain some white and some black pixel .The only non-uniform block pixels are used for embedding watermark bit into binary image.

V. WATERMARKING BY USING BIASED BINARIZATION THRESHOLD

1. We skip the blocks in original binary image consider g(x,y) corresponding to the uniform (all black/white) blocks in g(x,y)) to preserve the quality of the image after embedding.
2. The watermark is embedded by binarizing the blocks in gb(x,y)that correspond to the nonuniform8 x8 blocks in g(x,y)with biased thresholds.
3. The watermark w is a bit stream of ‘0’s and ‘1’s, instead of a random number sequence.
4. The coded watermark wcis of length Lw.
5. The algorithm requires the original image in Extraction, which may not be possible in practice.

In our proposed algorithm, we eliminate this limitation by extracting a key to be used in extraction. This key, knis extracted as the number of white pixels in each block (both uniform and non-uniform) and it is of length Lkey, where Lkeyis the total number of 8 x8 blocks in g(x,y).

6. For each block the maximum and minimum intensities are Imax k and Imin k, respectively. The bias bkdepends on wc(k) as follows:

$$b_k = \begin{cases} 0.05, & \text{if } w_c(k) = 1 \\ -0.05, & \text{if } w_c(k) = 0. \end{cases}$$

7.For obtaining better quality adjust the value of threshold

VI. ALGORITHM FOR WATERMARK EMBEDDING

In this algorithm, we are using digital binary image as an original image. Now the image is blurred by applying Gaussian filter on that image. The image is called blurred image.Blurring is used for producing pixels with various intensities. After getting blurred image, the watermark bit stream is generated and embed that into the blurred image.In this process first of all, find the uniform block and non-uniform block in image. After finding that, the non-uniform blocks are used for embedding the bitstream which is a random number sequence. Embedding is done by adjusting the intensity of the non-uniform block in the image.

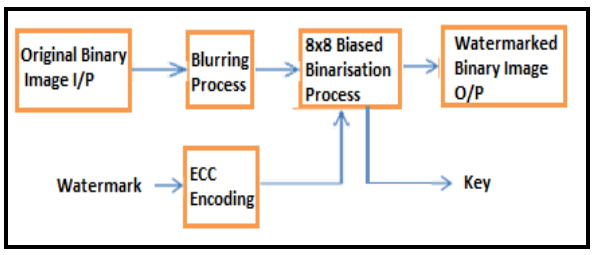

Figure 1: Watermark embedding algorithm flowchart

VII. ALGORITHM FOR WATERMARK EXTRACTION

In the extraction side the reverse procedure is applied for extraction of watermark and original binary image. This process is very simple. The input image is a watermarked image. This image split into 8 by 8 blocks. The watermark bit is not embedded in uniform blocks; so skip the uniform block and only consider non-uniform blocks for extraction of original image as the bits are embedded into only non-uniform blocks.

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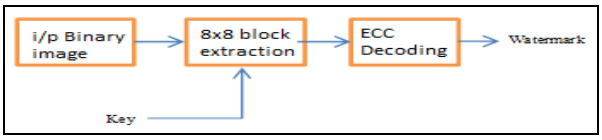

Figure 2: Watermark extraction algorithm flowchart

RESULT

We use the text image as the original image for testing the algorithm. The figure3 shows the original binary image .The original image is blurred figure 4 shows the blurred image .Watermark is embedded into the original binary image The watermarked binary image is shown in figure 5.In the extraction side the original image is extracted from watermarked mage.

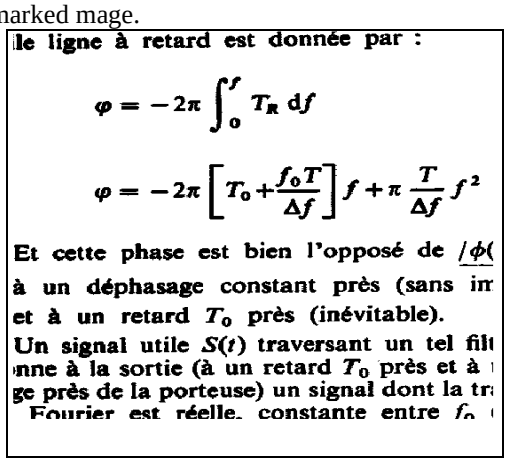

Fig 3: Original image

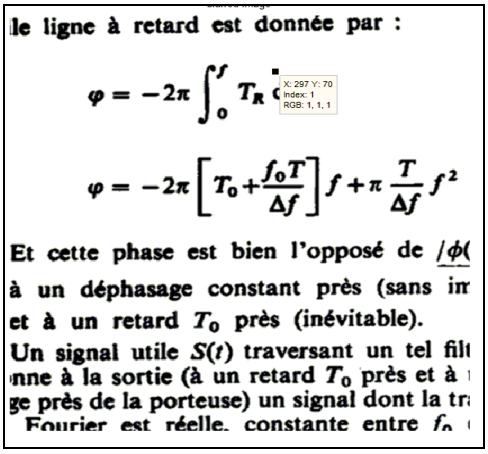

Fig 4 : Blurred image

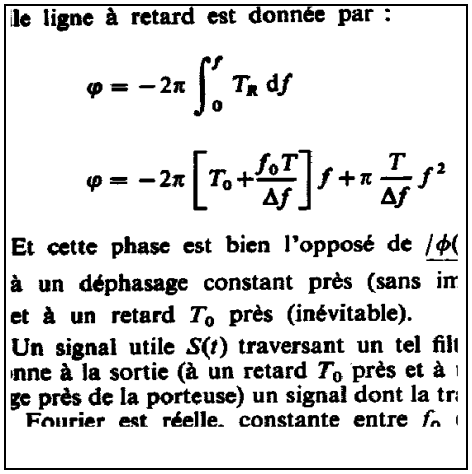

Fig5 : Watermarked Image

Table 1:Results

Name of Images	PSNR of Binary Biased Method
1.tif	20.49
2.tif	22.04
3.tif	20.49
4.tif	19.4
5.tif	21.11
6.tif	23.28
7.tif	19.3
8.tif	18.94
9.tif	23.51
10.tif	21.42

VIII. FUTURE SCOPE

The important aspect that could be taken into account is the security of the watermark itself. For this purpose, different encryption strategies, such as RSA encryption, can be employed on the watermark before embedding. But the drawback of an encryption strategy is the increase in size of the encrypted watermark. This issue can be resolved in future by adding another layer of lossless compression after watermark encryption. Concluding, there are many aspects which still need to be investigated in future; covering them all is beyond the scope of this paper.

IX. CONCLUSIONS

This system is used for watermarking on digital binary image. For that watermarking algorithm is used .The original binary image is used as an input image .The original binary image is blurred to gray level .The output image is called as blurred image after blurring. This blurred image is used for embedding. The watermark is a random bit string which is added into a binary image as a watermark. The embedding is done by adjusting the intensity of pixel in an image. Also one loop is used for adjusting the quality of the original binary image and also the robustness of image. In the watermark extraction side the reverse procedure is applied for extraction of watermark and original binary image separately. PSNR, MSE and NC are used as performance measure to compare original image and extracted watermark image. Experimental results shows the original binary image and the watermarked image and after extraction of watermark image. Also comparison table shows the comparison of PSNR, MSE and NC by applying the same algorithm on different images.

X. ACKNOWLEDGEMENT

We would like to acknowledge the support of the doctors, hospitals, web community and Rajaishri shahu College of Engineering.

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