Hiding Textual Information Using Random Permutation Based Spread Spectrum Watermarking

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***Abstract*—**Nowadays, the success of web technology, created our life a great deal simple and convenient. However the key drawback is to secure the info from duplication and unauthorized use. Therefore the digital watermarking is employed. With this technology, we tend to enter the key data into the particular information for shielding it from unauthorized use. Here, we tend to propose 2 dimensional spread spectrum watermarking framework supported frequency hopping spread Spectrum theory. Wherever, level of watermark will increase by increasing the number of channels used for data transfer. Additionally we are proposing the use of random permutation methodology for the generation of watermark in place of fixed watermark. This improves the efficiency and strength of spread spectrum technique. Low intensity and mid-band regions are chosen to insert the information so as to ensure an invisible watermark in addition because the strength to JPEG compression. Finally quality of watermark is compared between input cover and watermarked image and between input and extracted watermark on the basis of various parameters like PSNR, MSE, normalized correlation etc. Also we are comparing the effect of noise on embedded watermark during transmission. Experiments show that the proposed watermarking scheme can take full advantage of the distortion hurdle and can improve strength in turn.

Keywords*—Spread Spectrum, Watermarking, Random Permutation, PSNR.*

I. INTRODUCTION

The term "Digital Watermark" was coined by Saint Andrew the Apostle Tirkel and Charles dramatist in Gregorian calendar month 1992. The primary successful embedding and extraction of a stenographic unfold spectrum watermark was incontestable in 1993 by Saint Andrew the Apostle Tirkel, Charles dramatist and Gerard Rankin [1]. A digital watermark could be a reasonably marker covertly embedded during a noise-tolerant signal like audio, video or image information. It's sometimes wont to establish possession of the copyright of such signal. In digital information we can hide some carrier signal through the watermarking technique. It is depending on the application where it can be visible or invisible in digital information. Digital watermarks could also be used to verify the genuineness or integrity of the carrier signal or to point out the identity of its homeowners. It's conspicuously used for tracing copyright infringements and for greenback authentication.

A digital watermark is also a quite marker covertly embedded throughout a noise-tolerant signal like audio, video or image data. It's generally accustomed establish possession of the copyright of such signal. Digital watermarks is additionally accustomed verify the quality or integrity of the carrier signal or to entails the identity of its owners. It's prominently used for tracing copyright infringements and for bill authentication [2].

Watermarking encompasses ways of transmittal secret messages through innocuous cowl carriers in such a way that the terribly existence of the embedded messages is undetectable. Artistic ways are devised within the activity method to scale back the visible detection of the embedded messages [3].

II. LITERATURE REVIEW

One of the most striking techniques used for water marking is spread spectrum [1]. For convenience, we use the same image outlined in [1]. Consistent with [1], to introduce a touch sequence of m bits, the image is equally segmented to m reciprocally exclusive regions. Every region is responses to store one bit data. To enter the watermark information within the log-2-spatio domain by suggests that of spread spectrum technique is planned by Peter H. W. Wong, Au , Justy W. Oscar C. C. Wong in their article Image Watermarking victimization unfold Spectrum Technique in Log-2-Spatio Domain . In log-2-spatio domain, the variance of the data is reduced significantly. This improves the potency and robustness of unfold spectrum technique. Low intensity and mid-band regions are elite to enter the information so as to ensure Associate in Nursing invisible watermark additionally because the hardiness to JPEG compression. Simulation results show that the embedded data still survive up to the JPEG compression quantitative relation of 14.7 [1]. Efficient image watermarking concerns full exploitation of the sensory activity distortion constraint. Second-order statistics of visual stimuli are thought to be crucial options for perception is planned by Fan Zhang, et.al. , In their paper Spread Spectrum Image Watermarking based on sensory activity Quality Metric. Another paper proposes a second-order statistics (SOS)-based image quality metric that considers the feel masking result and the distinction sensitivity in Karhunen Loève remodel domain. Compared with the progressive metrics, the standard prediction by SOS higher correlates with many subjectively rated image

databases, within which the pictures are impaired by the everyday cryptography and watermarking artifacts [4]. In the paper unfold Spectrum Watermarking For Real Images: Is Everything Thus Hopeless is proposed by O. Koval et.al. Perform the capability analysis of known host-statitistics watermarking strategies supported unfold spectrum (SS) below Additive White Gaussian noise (AWGN) attack. The explanation of our analysis is predicated on the contradiction that is being on non-effective in theory SS-based sensible watermarking systems crush known-host-state strategies once a usually accepted benchmarking strategy (Stirmark benchmark) is employed. we have a tendency to show that the gap in capability of SS-based techniques with relevancy quantization-based techniques at high WNR regime may well be considerably reduced, if the embedding state of affairs is intended employing a correct stochastic model of the host image at the encoder[5]. The technique is quite successful for one dimensional encoding with binary patterns, as shown for a variety of gray scale test images is proposed by Anatol.Z.Tirkel*(Senior Member), Charles F Osborne, Ron G. van Schynde in their article Image Watermarking- A Spread Spectrum Application. The discussion of extension of the method for two dimensions, RGB format and non-binary characters is presented. A critical review of other watermarking techniques is included [6]. Sonam Tyagi1, et.al. Digital Watermarking Techniques for Security Applications, they concisely discussed regarding these technologies and their execs and cons [7].

Spread Spectrum Watermark Framework for Multimedia Copyright Protection is planned by Vladimír Bánoci et.al. Here, 2 dimensional spread spectrum watermarking framework supported Direct unfold Spectrum theory victimization PN sequences. The presenting schema allows feat a high level of hardiness with desired imperceptibility. The aim of this paper was to gift sturdy and adaptive watermarking system for transmission protection, where hidden watermark provides a desired requisition against copyright infringement. Media content delivery system incorporated by crypto logical public-key was planned within the paper as a part of. The framework construct was applied to digital video content to simulate 2D-level spreading technique of hidden watermark information [8]. Spread Spectrum Watermarking Technique for Information System Securing is proposed by Todor Todorov, a computer information system and a way to realize the security of the data in it with digital watermarking. A technique for spread spectrum watermarking is presented and its realization with MATLAB 6.5 is shown [9]. The paper Improved spread spectrum: a new modulation technique for robust watermarking is proposed by H. S. Malvar, D.A.F. Florencio , introduces a new watermarking modulation technique, which we call improved spread spectrum (ISS).The proposed method achieves roughly the same noise robustness gain as quantization index modulation (QIM) but without the amplitude scale sensitivity of QIM. Our proposed ISS is as robust in practice as traditional SS. [10]. In the article Digital Image Watermarking using Spread Spectrum Technique under DWT Domain is proposed by Jobenjit Singh Chahal, Shivani Khurana, recent few years, it has become a daily need to distribute digital images as a part of widespread multimedia technology by means of the World Wide Web. Moreover, the experimental results showed that the proposed scheme provides better quality of watermarked images in terms of watermark invisibility to human eyes and low data payload during embedding and extraction process. In addition, some possible attacks on watermarked images are discussed [11]. The developed method embeds several binary images in a different sequence of video sequences, separated by a single watermark image. The spread spectrum watermark is fixed directly into the compressed bit streams by modifying discrete cosine transform (DCT) coefficients. To embed watermarks with minimum loss in image integrity, a visual mask is included based on local image attributes. This algorithm cannot achieve the requirement of the random detection in real-time [12].

III. METHDOLOGY

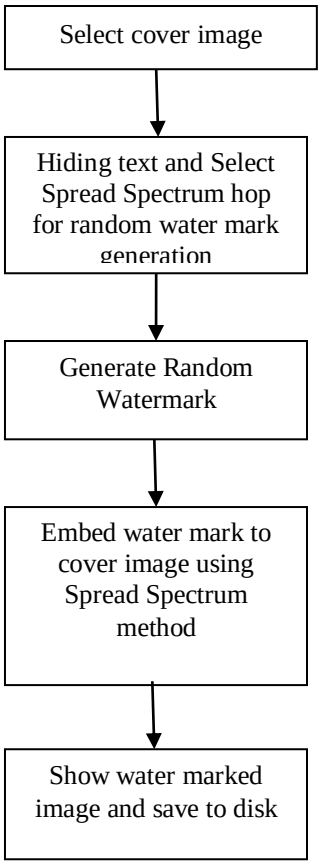

Figure1: Generation of watermarked image using Spread Spectrum

A. Algorithm for embedding watermark to input image:

Step1: Read cover Image I and get Number of Channels C from user

Step2: J= imresize (I, [256,256]);

Step3: Set M=N=256 (size of row and column)

Step4: calculate Mb= M/C

And Nb = N/C

Step5: Generate a random permutation based watermark

For i=1 to Mb

For j=1 to Nb

Watermark ((i-1)*C+1 to i*C, (j-1)* C + 1: j*C) = random (i*j);

End

End

Step6: Add noise to watermark

Noise= RandomNoise * Watermark;

Step7: embed water mark to cover image

Watermark image = α * watermark + (1-α) * cover Image

Step 8: show Noise and Water mark image.

B. Algorithm for Decoding watermark from received image:

Step1: Read watermarked image A and channels C.

Step2: Remove Noise

Noise_Demodulation = imfilter (A);

Step3: Extract Watermark

For i=1 to Mb

For j= 1 to Nb

Sign ((i-1)*C + 1: i*C, (j-1)*C+1: j*C) = Noise_D ((i-1)*C+1: i*C, (j-1) i*j)

End

End

Step4: De watermark image = A- sign

Step5: show (De watermarked image)

IV. RESULT ANALYSIS

Result showed that when we hide text for watermark in four ways of hopping then it is cleared that it properly works on channels. Here figure a, b, c and d showed output of hiding text.

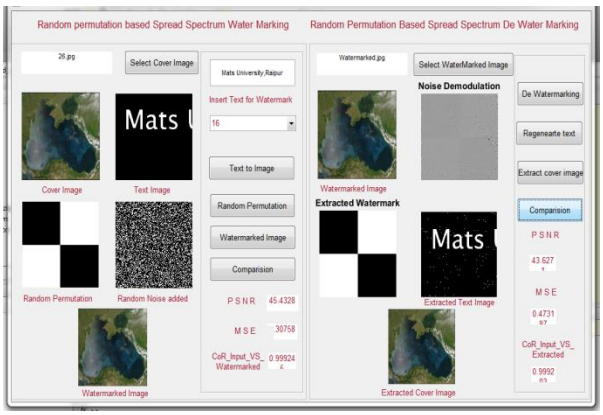

Figure (a)

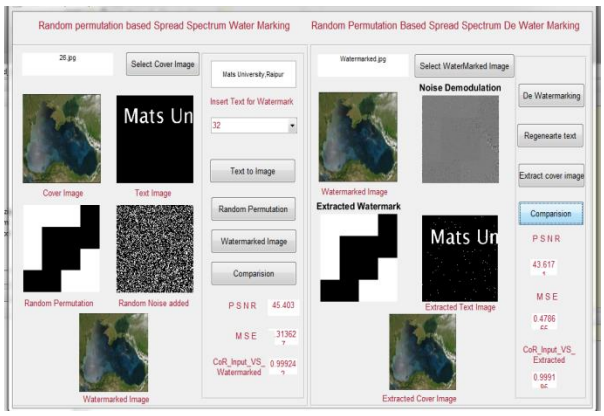

Figure (b)

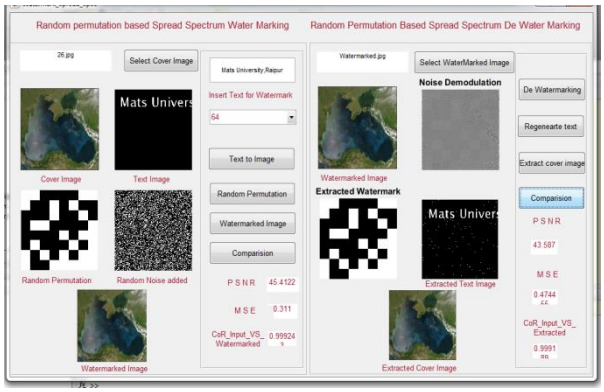

Figure (c)

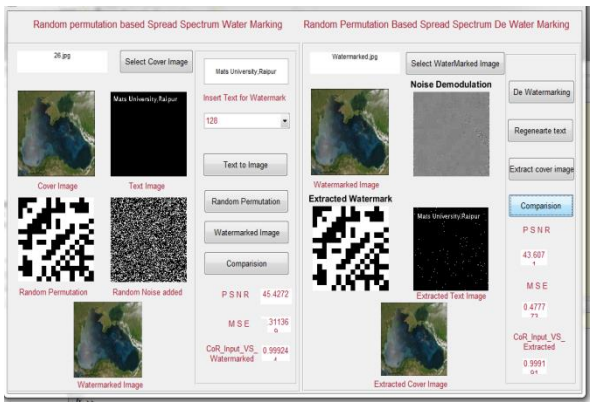

Figure (d)

Proposed algorithm worked properly on 128 channels.

A. Comparison of Input and Watermarked Image

Table1 and Figure 2 shows the PSNR values comparison of different images while varying number of channels i.e. 16, 32, 64 and 128 channels for transferring the information. Here, x-axis shows the number of channels (hops) and y axis shows the calculated value of PSNR between input image and watermarked image.

Table1 comparison of input image and watermarked image

No. of Hops	Parameter	1.jpg	4.jpg	5.jpg	8.jpg
16	PSNR	45.47	45.39	45.43	45.422
	MSE	0.303	0.312	0.306	0.3120
	NCR	0.999	0.998	0.999	0.999
32	PSNR	45.47	45.40	45.44	45.424
	MSE	0.299	0.312	0.309	0.312
	NCR	0.999	0.998	0.999	0.999
64	PSNR	45.46	45.46	45.43	45.399
	MSE	0.304	0.308	0.309	0.310
	NCR	0.999	0.998	0.999	0.999
128	PSNR	45.448	45.378	45.419	45.432
	MSE	0.306	0.312	0.311	0.305
	NCR	0.999	0.998	0.999	0.999

The PSNR value is good when number of channels are less, because when information will transferred through less number of channels then it will become easier to collect all the information at receiver's end. Also here we can see that, overall average PSNR value for all the channels is near about 45.427 which shows that input image and watermarked image is almost same. So quality of watermarking is very high and it is almost impossible to visualize the watermark form watermarked image.

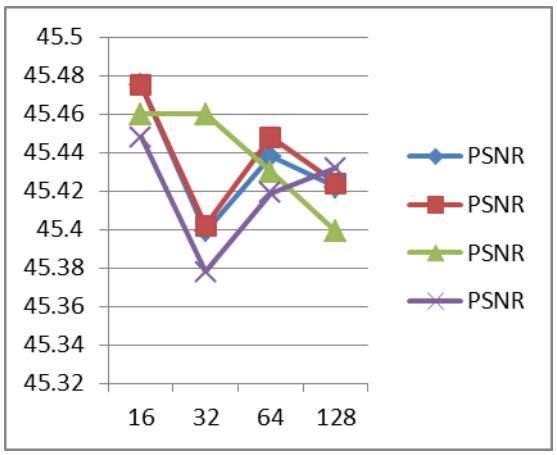

Figure 2 PSNR value comparisons between input and watermarked image

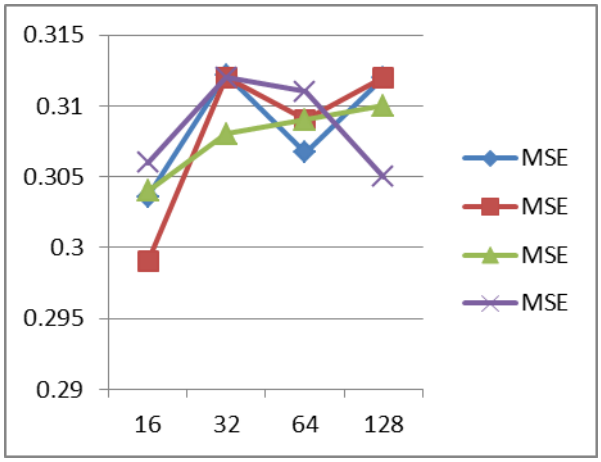

Figure 3 MSE value comparisons between input and watermarked image

Figure 3 shows the MSE values comparison of different images while varying number of channels i.e. 16, 32, 64 and 128 channels for transferring the information. Here, x-axis shows the number of channels (hops) and y axis shows the calculated value of MSE between input image and watermarked image. The MSE value is very less when numbers of channels are less, because when information will transferred through less number of channels then it will become easier to collect all the information at receiver's end so no error will occurs in such case. Also here we can see that, overall average MSE value for all the channels is near about 0.3082 which shows that input image and watermarked image is almost same. So quality of watermarking is very high and it is almost impossible to visualize the difference between input image and watermarked image.

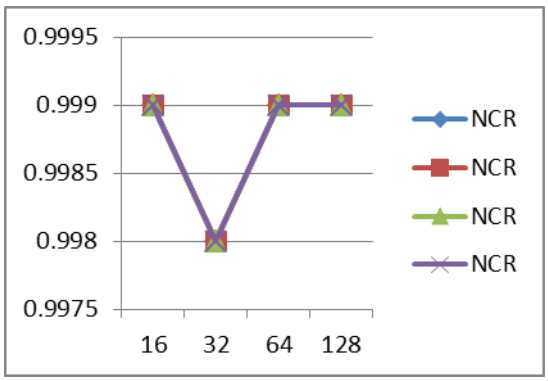

Figure 4 NCR value comparisons between input and watermarked image

From figure 4 we can observe that Normalized correlation between input and water marked image is near to 0.999 in all cases, which shows that the input image and watermarked image both are 99.99% similar to each other.

V. CONCLUSION AND FUTURE SCOPE

The MSE value is very less when numbers of channels are less, because when information will transferred through less number of channels then it will become easier to collect all the information at receiver's end so no error will occurs in such case. Also here we can see that, overall average MSE value for all the channels is near about 0.3082 which shows that input image and watermarked image is almost same. So quality of watermarking is very high and it is almost impossible to visualize the difference between input image and watermarked image. The PSNR value is good when number of channels are less, because when information will transferred through less number of channels then it will become easier to collect all the information at receiver's end. Also here we can see that, overall average PSNR value for all the channels is near about 45.427 which shows that input image and watermarked image is almost same. So quality of watermarking is very high and it is almost impossible to visualize the watermark form watermarked image.

In future some more complex model can be used to perform random permutation used for instant watermark generation. Also this method can be applied to video sequence to watermark large amount of data.

a.

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