

Non Blind Watermarking Process using RSA Encryption Method

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Abstract

With the growth of technology and continuous rapid improvement in this field, the digital content took an important role in this current era of time. Online transactions keep growing in many parts of the world. As a result it becomes the prime target for hackers and intruders. Consequently security of data has become a critical issue for experts. In this paper a robust algorithm is proposed in watermarking image to secure the digital data. The proposed algorithm is based on SVDDWT with Harr Wavelet Transform (HWT) for embedding and extracting a digital watermark in an image. The experimental result shows that this technique is robust against few attacks like Gaussian, average and JPEG compression.

Index terms— watermarking, HWT, SVD-DWT, digital image processing, embedding, extracting, PSNR, intruder. The perceptibility of the image should be good after embedding. It also should be robust under different types of attack [4] and if it is altered then watermark should be recovered.

The Discrete Wavelet Transformation (DWT) combined with Singular Value Decomposition (SVD) is one of many effective methods that researchers use for signal processing for the purpose of watermarking technique. The Harr Wavelet Transform (HWT) is simple and widely used for signal processing.

In this paper a non-blind watermarking algorithm is used for embedding and extracting image in the frequency domain. The proposed method used RSA algorithm to encrypt the secret message before embedding it into the cover image. The cover and the secret images are decomposed using the Harr DWT and encrypted secret image into four sub band (, , &) and (, , &). After that Apply SVD to (,) . (, ,) = SVD () (, ,) = SVD ()

This paper has been organized as follows: section 2 explains the Haar Wavelet Transform (HWT), section 3 is the review of related works, section 4 is the proposed method used in this paper, section 5 is the analysis of the result and conclusion is drawn in section 6. (Hwt) Haar wavelet transformation (HWT) is used to decompose signal. When it decomposes a signal it does it into two components [5].

II. Haar Wavelet Transform

The Haar wavelet's mother wavelet function $\psi(t)$ can be denoted as: $\psi(t) = \begin{cases} 1 & 0 \leq t < 1 \\ 0 & \text{elsewhere} \end{cases}$, (1)

Its scaling function $\phi(t)$ can be described as:

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2 I. Introduction

igital content become more available than ever in the daily use of our life due to the increase and easy access of internet. E-commerce becomes more popular in the recent time as trading habit of people has changed. As a result cyber security becomes important factor to protect the digital content from unauthorized access and temperament. Digital watermarking has an important role in this context. In digital watermarking process secret information is embedded in the original content without or insignificant distortion of cover data to identify the authentication and protect the copyright of the author and tracing back the distribution.

There are two techniques available for watermarking process. One is spatial domain approach and other is frequency domain schemes [1]. Though the later one is more robust than the prior one against image processing attacks like compression or cropping [1] [2]. The frequency domain approach mainly use discrete Fourier transform (DFT), discrete cosine transform (DCT), discrete wavelet transformation (DWT) and others. The discrete wavelet transformation (DWT) based on singular value decomposition (SVD). In this approach the image is embedded into the transformed coefficients.

On the other hand in spatial domain approach the image is processed in the form of matrix. These techniques are comparatively easier to implement. Though there is a tradeoff between robustness and easier implementation. A good watermark should be invisible into the cover image so that it does not attract

3 III. Review Literature

Jing and Jen-Ho used a halftone watermarking method with kernels-alternated error diffusion and haar wavelets transform [7]. Mais and Hassan proposed phase-shifting 2-D no separable Haar wavelet coefficients [8]. Chen and Jiun proposed watermarking scheme for 3d models using haar discrete wavelet transform [5].

4 Experiment Result

The proposed algorithm has been tested to check its robustness against some image attacks. The watermarked image went through few attacks to experiment the result. The obtained results are measured to observe its performance with the peak signal to noise ratio (PSNR) and normalized correlation (NC) criteria. The table1 illustrates the PSNR values for correlation between watermarked image and compromised image. Higher PSNR ratio indicates the better quality of the image. It also shows the NC values between original watermark and extracted watermark after being attacked. Higher the NC values better is the robustness of watermark. The higher ratio also indicates the better perceptibility of the image which is extracted after being attacked. The proposed algorithm performs better under the attack of Gaussian, average and JPEG compression.

5 V. Conclusion

In the proposed algorithm of this paper we have used the DWT-SVD with Haar Wavelet Transform (HWT) technique for watermarking procedure. We have tested the algorithm by analyzing the result received from experiment. The obtained data clearly indicates the better perceptibility of the extracted image which went through different attacks. It also proves the robustness of the proposed algorithm used in this paper. In future experiment we will focus our concentrate for different methods to improve the robustness of the algorithm. ¹

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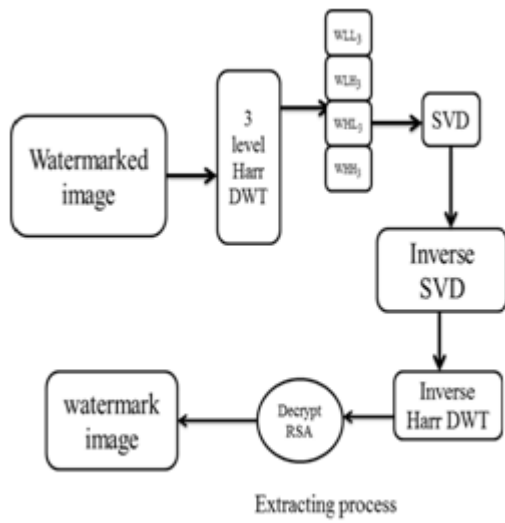


Figure 1: a) Algorithm for Embedding Formula 1 . 3 .

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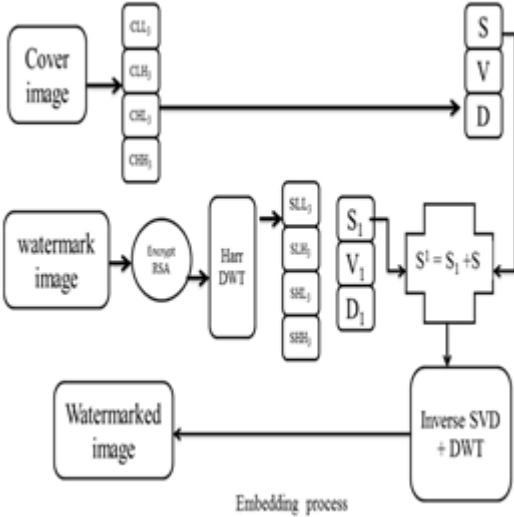
$$\phi(t) = \begin{cases} 1 & 0 \leq t < 1, \\ 0 & \text{otherwise.} \end{cases}$$

Figure 2: Figure 2 :



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Figure 3: Figure 1 :



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Figure 4: Figure 3 Figure 4 :



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Figure 5: Figure 4 :

78 [Najih et al. ()] *A New Color Watermark technique using special Domain*, A M A Najih , S A Rahman , A R
79 Ramli , S J Hashim . 2015. IEEE.

80 [Prasad and Koliwad ()] ‘A Robust Wavelet-Based Watermarking Scheme For Copyright Protection Of Digital
81 Images’. M Prasad , S Koliwad . *2010 Second International conference on Computing, Communication and*
82 *Networking Technologies*, 2010. IEEE.

83 [Liu and Chen ()] ‘A Watermarking Scheme for 3D Models Using Haar Discrete Wavelet Transform’. C , Chung
84 Liu , J Y Chen . *2010 International Symposium on Computer, Communication, Control and Automation*,
85 2010. IEEE.

86 [Alnasser and Foroosh ()] *Phase-Shifting for Non separable 2-D Haar Wavelets*, M Alnasser , Hassan Foroosh .
87 2008. IEEE.

88 [References Références Referencias] *References Références Referencias*,

89 [Ghosh et al. (2008)] ‘Single Spin Logic Realization of Robust Image Watermarking in Spatial Domain’. , A
90 Ghosh , D Basu , Samanta . *IEEE Region 10 Colloquium and the Third ICIS*, (Kharagpur, INDIA) 2008.
91 December 2008. p. 269.

92 [Hussein (2010)] ‘Spatial Domain Watermarking Scheme for Colored Images Based on Log-average Luminance’.
93 J A Hussein . *Journal of computing* January 2010. 2 (1) .

94 [Sami and Baba Lala (2010)] ‘Water marking of Digital Images in Frequency Domain’. E I Sami , Z Baba Lala .
95 *International Journal of Automation and Computing* February 2010. p. . (Krikor Thawar Arif Zyad Shaaban)

96 [Jing-Ming ()] *Watermarking in Halftone Images with Kernels-Alternated Error Diffusion and Haar Wavelet*
97 *Transform*, Jen-Ho Jing-Ming . 2007. IEEE.