A NOVEL APPROACHES IN BLIND MULTIPLE WATERMARKING FOR COLOR IMAGE USING DCT EMBEDING TECHNIQUES

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Abstract*—Image-watermarking is known as a process of embedding copyright and protected information in image bit components. It had been already proposed in last recent years to solve the issue of unauthorized manipulation and distribution of digital images. In this research study, the algorithm is based on cascade of powerful logical transforms. In this paper we proposes a novel method of blind multiple watermarking technique for color images. To protect the image copyright authentication and help to validate the copyright ownership of multiple owners. The cover image information is converted to Red, Green and Blue components image in first step. Green and Blue component of image is transformed in wavelet domain Discrete Cosine Transform (DCT) for decomposition techniques. A binary watermark of 64x64 pixel is embedded into the green and blue component's of cover image, is transformed block by modifying the some-middle bands significant with AC coefficients using the repetition code. We select sub bands using repetition code and zigzag techniques. The watermark is modified by the scrambling use of Arnold transform. In the proposed paper, robustness and quality is tested with image parameter like Peak Signal to Noise Ratio (PSNR), Mean Square Error (MSE),and Normalized Correlation Coefficient (NCC). Further, the proposed paper have comparison with related watermarking schemes.

***Keywords*- Discrete Cosine Transform (DCT), watermarking techniques, Arnold transform, dual tree complex wavelets transform, image parameters, PSNR, SSIM.**

I. INTRODUCTION

Technological up-gradation in both hardware and software are making communication easier and cheap, which in turn, is help to producing huge volume of digital data information being transmitted through the communication medium and internet. This enhancement, in recent years, has created awareness on the risk of piracy and on the importance of protection of data being shared. Several researches have been focused on the providing solutions to copyright protection and authentication. These techniques mainly fall into three categories, namely, Steganography, Cryptography and Watermarking. Out of these, watermarking techniques have gained more popularity for proving integrity and authenticity of the owner [1, 2, and 3].Digital watermarking is defined as an algorithm that can be used to hide secret signal into digital audio, video, image or documents in a manner that does reduce the overall quality of the original signal. The secret signal, identified as the watermark, can be copyright notices or authentication information or secret text. The original signal is called as, cover signal" or „host signal". The process of inserting the secret signal is called embedding and the image after embedding is called watermarked image". Extraction or detection is a process retrieves the stored watermark. Thus the two main components of digital watermarking systems are (i) Embedding and (ii)Extraction. Digital watermark is used in many applications including copyright protection, fingerprinting, copy protection, broadcast monitoring and data authentication. The watermarking techniques are grouped as text-based watermarking [4], image watermarking [5], video watermarking [6], audio watermarking[7] and 3D watermarking [8]. As almost 90% of the content being transmitted in image and video [9, 10], more number of techniques have been developed for these two groups. Regardless of the application, all these techniques have the common goal of protecting digital signal.

II. LITREATURE SURVEY

In recent years, watermarking has been an exciting topic and there have been many watermarking schemes proposed. Among these schemes, those requiring both the original data and the secret keys for the watermark bit decoding are called private watermark schemes. Those requiring the secret keys but not the original data are called public or blind watermark schemes [2], While in most of the cases, multiple watermarking is used in multimedia applications, it has also been used in other applications like protection in wireless sensor networks [15]. A review of the various methods used for multiple watermarking is given by [16].The initial

contribution to the field of multiple watermarking was proposed by [17], where methods to recover multiple watermarks from the same image was first shown. This work
was followed several contributions. According to [18], the insertion of multiple watermarks can be exploited to convey
multiple sets of information. Most of the works focus on extending single watermarking algorithms to use multiple watermarks [11, 12]. Proposed the use of virtual border, where extra line of pixels was added around the image as borders and watermarks were embedded within these borders. [13] Used the concept of multiple watermarking to protect relational database using images. [3] Employed pair-coupled maps to improve the security of watermarked image, and to encrypt the embedding position of the host image. [4] used Discrete Cosine Transformation for multiple-watermarking still images.

III. PROPOSED METHODOLOGY

In this system, we design a customized GUI using the Matlab platform. Here users can easily embed the watermark in the image. In this system, different sections are involved.

i) Embedding Process

A. Cover Image Acquisition

In first stage we take an input a color image. We resize the image into 512x512 pixel size. After receiving the image we decompose the image for better enhancement. After decomposition we separated the layers of color image in R,G and B layers. Each layers have important characteristic and features. We take G (Green) and B(Blue) layers for watermark embedding. We first apply the DCT(Discrete Cosine transform). Here we used 2D-DCT (Discrete Cosine Transformation) is apply in each 8X8 block in 512x512 size images. After apply 2D-DCT transformation we apply zigzag for choosing mid-band frequency.

DCT (*Discrete Cosine transform*):The discrete cosine transform (DCT) is a technique for converting a signal into elementary frequency components. It is widely used in image compression. Here we develop some simple functions to compute the DCT and to compress images.

Zig-Zag Scanning: The zig-zag scanning pattern for run-length coding of the quantized DCT coefficients was established in the original MPEG standard. The same pattern is used for luminance and for chrominance. Zigzag scan is a part of JPEG compression process that holds important role in grouping DCT process result and quantization values into DC low frequency and AC high frequency components. Zigzag scan contributes to the increase in picture and video compression ratio.

B. Watermark Image Acquisition

In watermark acquisition we need a binary image, if image have a color layer then we need to convert color image to binary image. Binary image have to element 0 and 1. After acquisition we need to resize the watermark in 64x64 pixel. We used scrambling process for more secure the system. We will we use Arnold Scrambling process in this system.

Arnold Scrambling: Arnold transformation is applied widely in digital image encryption now. It has been one of the most important image technologies in safety transmission and secrecy storage. Arnold transformation has new application lately because of arisen watermarking. The following is Arnold transformation expression in digital image:

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} mod\ N$$

$$x, y \in \{0.1, \dots, N-1\} \qquad (1)$$

X and y are the pixel's coordinates in original image, X' and Y' are the pixel's coordinates in scrambled image after transformation. N is the size of image.

C. Watermarked Embedding Process in green and blue layer

In here scrambled watermark bits with use repetition code for comparison of mid band frequency of cover image. We make a comparison in each layer with new watermark. Now we use inverse zigzag scanning then after we apply IDCT (Inverse discrete cosine transform).

D. Layer Combination

Now we will merge all three layers R,G and B. we get watermarked image (See in figure 1).

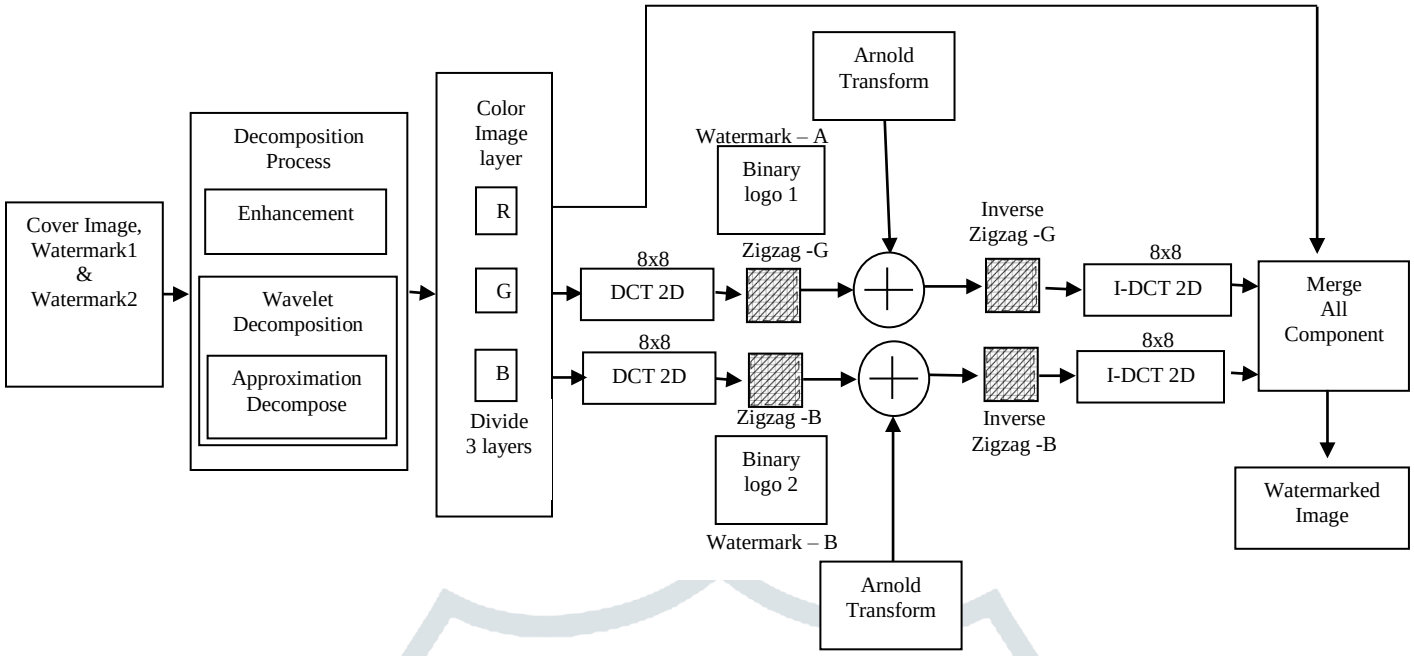

Figure 1. Watermark Embedding process of the proposed system

ii) Extraction Process

In extracting system we same as convert watermarked image into 3 color component red, green and blue. Now choose green and red layer only for extracting watermark logo, we apply 2D-DCT in each layer and apply zigzag. And select the mid frequency and compare the data.

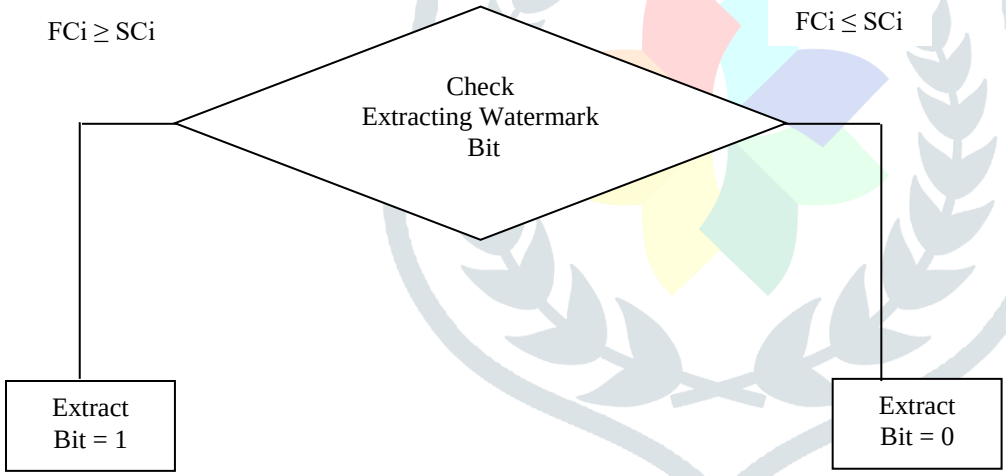

Figure 2: Comparisons of watermarked bits in cover image mid band frequency

Where FCi = 1st Coefficient SCi = 2nd coefficient in the i-th coefficient pair. After then recovered scrambled data using Inverse Arnold transform and now you get your recovered watermarked logo.

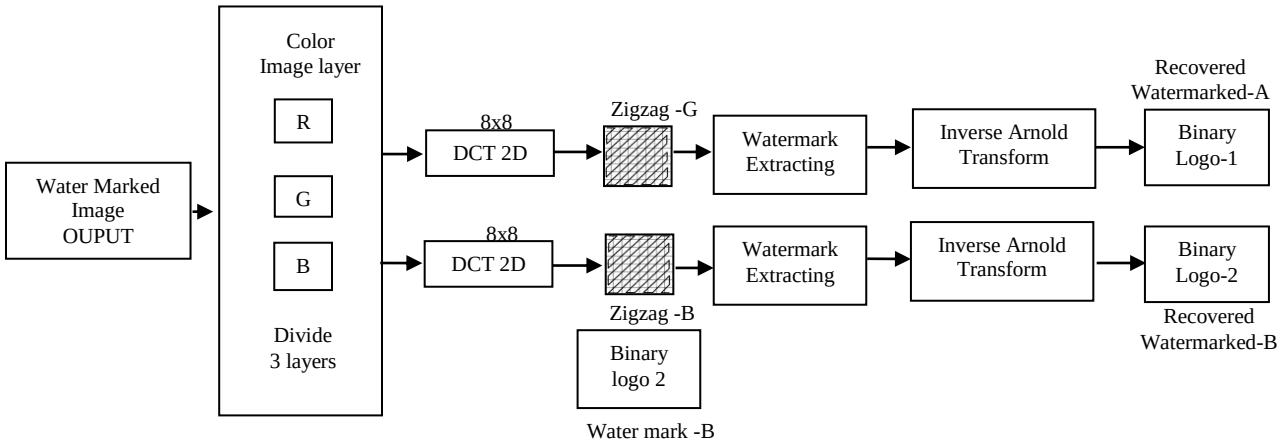

Figure 3: Watermark extraction process of the proposed system

IV. Disscuision and Conclusion

In this paper, a detailed investigation of image watermarking process by handling it as an optimization procedure based on DCT and Arnold is presented. The watermarking technique of spatial domain by using Arnold is introduced to determine the positions embedded with watermark. Then, one can make full use of the scrambling feature of scrambling to evenly distribute the watermark into the whole space of carrier image. Through increasing the secret key parameters, the security degree is improved efficiently. It not only realizes the imperceptibility of watermark, but also deduces the quantitative extraction rules reversely. So the process will realizes the blind extraction of watermark without depending on the original carrier image.

V. Expected Outcomes

In this paper, the proposed DCT and repetition code based multiple image scrambled watermarking scheme shows imperceptibility property. Better PSNR and high robustness are beneficial point of the proposed method at a cost of higher computational complexity. The incorporation of the repetition code in the proposed scheme increase robustness by resisting several image processing attacks. Two embedding watermarks are scrambled in the preprocessing stage and distributed in all space of the host image at the time of embedding.

VI. Acknowledgement

Expression of giving thanks is just a part of those feelings which are too large for words but shall remain as memories of beautiful people with whom I have got the pleasure of working during the completion of this work. I am grateful to Rungta College of Engineering and Technology, Raipur, (C.G.), which helped me to complete my work by giving an encouraging environment. I want to express my deep and sincere gratitude to HOD(CSE) Dr. Toran Verma. Their comprehensive knowledge and their logical way of thinking have been of great value to me. Their understanding, encouraging, and personal guidance has provided a sound basis for the present work.

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