DUAL WATERMARKING FOR HIGH SECURITY OF DIGITAL IMAGE USING DWT AND DCT

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ABSTRACT- *In the last many years, watermarking of multimedia content is becoming a very much active area in research field. In the today's internet world data transmission is happening by using digitize way. So security and copyright protection is main concern for a secure transmission in electronic documents and media. Watermarking is a technology which is used for performing the authentication of any such type of document. In other words watermark is a second image, which is coated on the original image, and protects the image. This is same as the digital signature, for authenticity and ownership. In this paper we have reviewed different types of digital watermarks and methods to do watermarking. In the following paper two techniques of watermarking have been discussed. The first one is implementation of watermark using DWT (Discrete wavelet transformation) and second is Discrete Cosine Transformation (DCT) And also a hybrid method of DWT-DCT are also discussed which is more secure and effective in terms of secure copyright protection as compare to others.*

Keywords: Watermarking, Discrete Wavelet Transform, Discrete Cosine Transform, Copyright Protection

I. INTRODUCTION

In the past few years, there has been a huge increment in computer networks and especially in the World Wide Web. Digital watermarks have been proposed in a way to deal with this difficult issue; this digital signature can discourage copyright infringement, and help determine the ownership and authenticity of an image.

The cover image in the digital image watermarking technique includes embedding a permanent watermark in such a way that the watermarked image is available to everyone and after several attacks of watermark image embedded watermarks can be decoded with very little accurately. In this method of watermarking the main task is embedding any secret information in an image or any other multimedia that is invisible to others. To achieve authentication, copyright protection, data identification and proof ownership and data hiding is a very difficult task, before the development of digital watermarking [1,2]. But presently using watermarking techniques is easy to give to these types of goals. In the process of digital watermarking a sample of bits inserted in a digital image, audio or video file that identifies the file's copyright information[7]. These kinds of work in this field have several watermarking techniques such as spatial domain and transform domain. In transform domain basic transforms used are discrete cosine transform (DCT), discrete wavelet transform (DWT), singular value decomposition (SVD) and their cross relation.

There are two processes of watermarking scheme which are embedding and extraction. In the embedding process, the watermark is embedded into the multimedia digital data. And after the modification data is known as watermarked data. Another process of watermarking is extraction in which watermark is extracted from the watermarked data and original data is found. Then for the security checking, the extracted watermark is compared with original watermark. If both are same the resultant data is authentic otherwise there are chances of attack.

There are two main features of digital watermarking. First one is robustness; show the difficulty in destroying watermark from the watermarked image. And second is imperceptibility which shows the similarity between origin image and watermarked image.
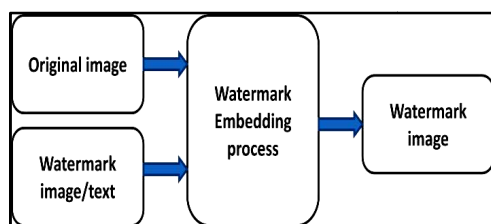

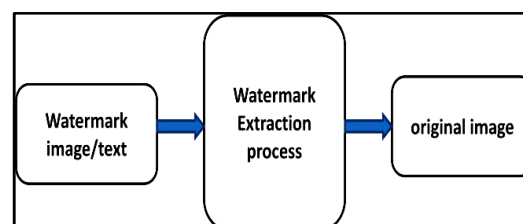
Figure:1 Embedding Method

Figure:2 Embedding Method

In order to achieve success, the watermark should be invisible and strong for the predefined or intuitive transformation of the image. It should be strong like normal image processing operation such as filtering, connecting noise, resizing, crop etc. Watermarking technique can be divided into four categories:

- Text watermarking.
- Audio watermarking.
- Video watermarking.
- Image watermarking.

II. COMBINE APPROACH OF DWT AND DCT FOR WATERMARK EMBEDDING AND EXTRACTION

Due to excellent localization and multi-resolution features, DWT method is used in digital watermarking. Since DWT provides the correct reconstruction of the decomposed image, which is just similar to the theoretical models of the human visual system[3]. In addition, DWT based watermarking technology provides scalability while DCT-based watermarking techniques provides compression. For increasing the performance and security DCT based watermarking algorithm and DWT-based digital image watermarking algorithms can be merged [5]. This type of technique of DCT and DWT combination can overcome the drawbacks of each other
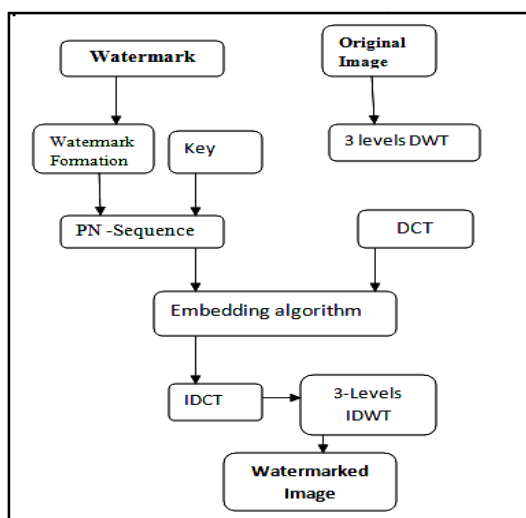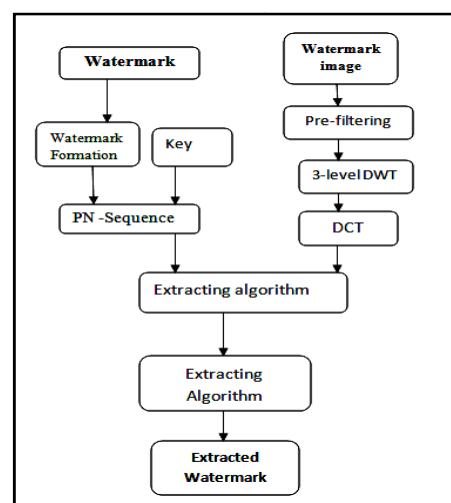
Figure:3 watermark embedding using DWT & DCT

Figure:4 watermark extracting using DWT & DCT

III. THRESHOLDING

Strongly altering an image to thresholding image can be set to a higher level, but more energy is lost, therefore, a balance between the two needs to be found [8], [9]. Many thresholding techniques are present here. Hard thresholding can be described as a normal process to zero that element, which is less than its full value range. The soft thresholding is an extension of hard thresholding, the first set to the zero elements, which is less than its full value range, and then the nonzero coefficient for zero is shrinking. High threshold value also represents the higher compression ratio.

IV. PSNR CALCULATION

Generally in watermarking method after applying the watermark on the image quality of Image is measured by using peak signal to noise ratio (PSNR) and mean square error (MSE). Lower the value of MSE lower the error and better picture quality. [10]

$$MSE = \frac{1}{MN}\sum_{Y=1}^{M}\sum_{X=1}^{N}[I(x,y) - I'(x,y)]^2$$

In Digital Image Watermarking, there are two types of attacks that are classified to geometric and non-geometric attacks.

Geometric attacks

Geometric attacks consist of parameters that can be applied on the image. Geometric attacks are the basic geometric changes in an image. Image   cropping, warping, rotation and translation etc are comes in Geometric attacks.[2]

 Non Geometric Attacks

In Non Geometric attacks, image processing attacks are comes in which compression of image, gamma correction, averaging, filtering, sharpening, printing, brightness, , scanning, addition of noise etc are performed.

V. CONCLUSION

In this survey paper digital watermarking methods DWT and DCT are discussed and their hybrid method for providing more secure and robustness in watermarking is also gets. So, to conclude, Watermarking is adding "ownership" information in multimedia contents to prove the authenticity. In this technology a data or an unperceivable digital code (watermark), carrying information about the copyright status of the work to be protected. Today, digital data security covers such topics as access control, authentication, and copyright protection for still images, audio, video, and multimedia products. The possibilities came into existence when invisibility of QR-code image likely to be occur with the full security feature .Many research were found on Digital watermarking using DWT. Watermarking of gray scale image is researched by many organizations but watermarking of coloured image is still required to be deep research for good quality image.

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