



## A Study: Analysis of various Digital Watermarking Techniques

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**ABSTRACT:** The digital asset handles the data in a compressed and encrypted form. It is sometimes necessary to watermark these compressed encrypted media items in the compressed-encrypted domain itself for tamper detection or ownership declaration or copyright management purposes. It is a challenge to watermark these compressed encrypted streams as the compression process would have packed the information of raw media into a low number of bits and encryption would have randomized the compressed bit stream. Attempting to watermark such a randomized bit stream can cause a dramatic degradation of the media quality. Thus it is necessary to choose an encryption scheme that is both secure and will allow watermarking in a predictable manner in the compressed encrypted domain. In this paper, we have investigated various researches done before, and found good comparison results of the previous research. So in our proposed work, we will develop a robust watermarking algorithm to watermark JPEG2000 compressed and encrypted images. The encryption algorithm to be use is a stream cipher.

### I. INTRODUCTION

Digital Watermarking Techniques is an important means of copyright protection or to protect information from unauthorized users [1]. Any kind of data like image, video, audio and text are embedded with another multimedia content is known as Digital Watermark. One which is embedded is watermark and the other one

is an asset data or original image [2]. In this modern era everyone is completely dependent on the internet. So authentication is necessary to protect the data. Information hiding is a golden area of research in the field of electronics & communication engineering and computer aided manufacturing system [3].

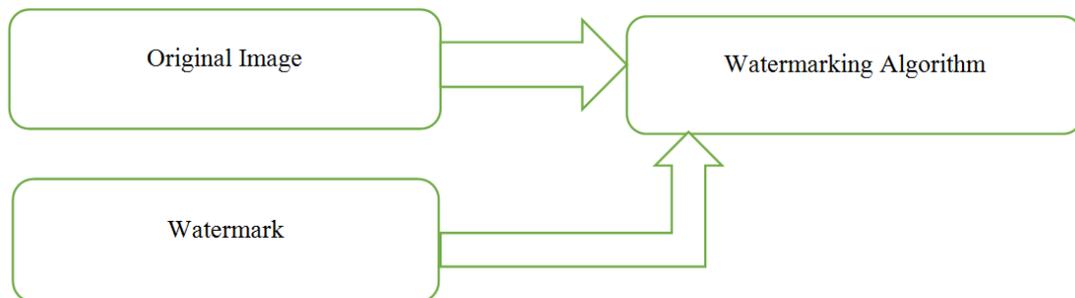


Fig. 1. Watermarking Procedure.

Many researches are done and still going on in the field of watermarking to find out the best watermarking algorithm. [4] Sometimes watermarked image get corrupted. Robust watermark are necessary from both intentional and unintentional distortions. These distortions are attacks. Attacks sometimes remove or destroy the watermark. Such types of distortions introduce degradation of the system [5].

### II. LITERATURE SURVEY

1. Yong Zhu *et al.* [1] proposed an image authentication technology based on Digital Watermarking. An image authentication technique by embedding digital watermark into image is proposed in this paper.

Watermark is embedded with visually recognizable patterns into the image by selectively modifying the frequency and is useful for cropping, JPEG (Joint Photographic Expert Group), image shearing.

The Watermark extraction without distortion can be achieved by the participation of the original image.

2. Narayan Sruthi *et al.* [2] presented spatial and spectral digital watermarking with Robustness Evaluation. Digital Watermarking has been implemented in spatial domain using LSB method in frequency domain using Discrete Cosine Transform with Gaussian noise as watermark.

3. Mahendra Kumar *et al.* [3] proposed a digital image watermarking using Fractional Fourier Transform via image compression. This paper present discussion of watermarking process in two frequency domain FFT and FRFT, obtain that FRFT is more robust than FFT.

4. Aparna JR *et al.* [4] proposed the comparison of digital watermarking techniques. The watermarking techniques comparison based on DCT and SVD, DWT and SVD and a combination of DCT and DWT is implemented. DCT is a spread spectrum communication method. Wavelet Theory based on the concept of multi resolution wavelet function.

5. KetaRaval *et al.* [5] proposed a digital watermarking with copyright authentication for image communication .In this technique recombining the DCT-DWT joint transform algorithm improved the performance of the watermarking. EBCOT algorithm helps us store and transmit the watermarked image.

6. Arun *et al.* [6] proposed an enhanced digital watermarking scheme using fractal images in wavelets. Fractals are irregular and fragmented shapes surrounding us. The term “fractal” was first used by mathematician Benoit Mandelbrot in 1975. Self-

reference and self-similarity are two main properties of fractals. DWT is commonly used technique for transformation of the digital image into the frequency domain. DWT divides the signal into two type of frequency that is high and low. DWT is applied column wise first in the image, then by row wise to form different sub bands.

7. Mohamed Radouane *et al.* [7] proposed robust method of digital image watermarking using SVD Transform on DWT coefficients with optimal block selected by the level value entropy then modification in SVD is done. SVD is a numerical analysis tool used to diagonalize matrices. DWT is a method used for analysing multi-level signal.

8. Vineet Mehan *et al.* [8] did a survey on joint watermarking and fingerprinting approach in Double DCT Domain. This paper presented a joint approach for watermarking and fingerprinting in Double DCT Domain. Different size watermark and fingerprint are inserted into the host image in a non-overlapping way. The approach retains quality of the image as the simulation results show the output PSNR which lies in the range of 58-73 dB.

9. Sergey Anfinogenov [9] proposed design of digital watermarking system robust to the number of removal attacks. This paper explain the watermarking system can survive after image distortion .In spite of the one the amplitude spectra the most part of local maxima survives.

10. Amarjeet Kaur *et al.* [10] proposed performance analysis of digital watermarking using Neural Network model to overcome the drawbacks.

### III. TECHNIQUES

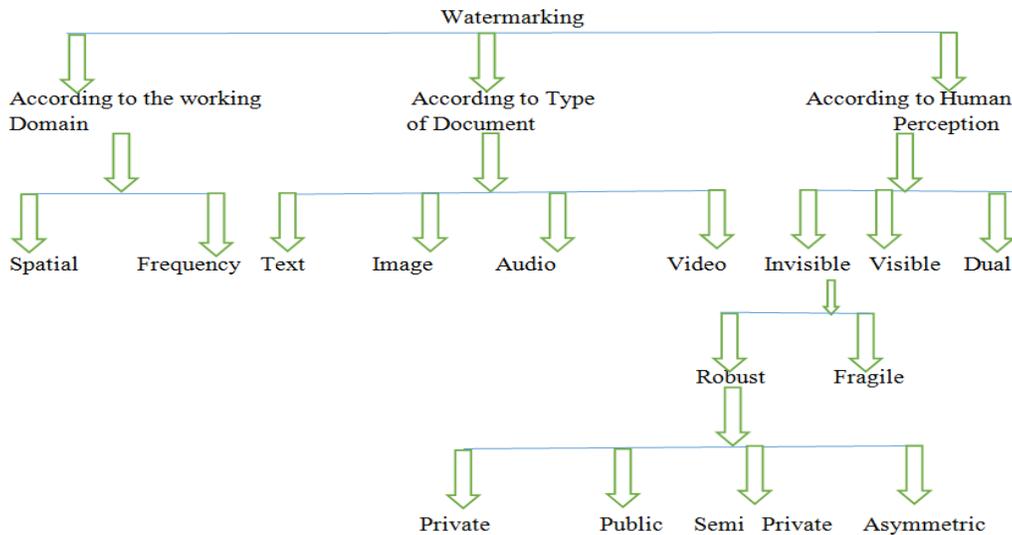


Fig. 2. Types of Watermarking Methods.

**Spatial Domain Technique:** It have low computational complexity, faster speed, low robustness of the watermark and reduced perceptible quality.

**Frequency Domain Technique:** It is more robust than spatial domain technique. Mainly used frequency domain transforms are: Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT), Discrete Wavelet Transform (DWT),

**DFT:** DFT Decomposes image in to two form sine and cosine .DFT gives output in complex value. DFT is not used today.

**DCT:** DCT changes a signal from the spatial domain to frequency domain by using cosine waveform. DCT breaks the image into different frequency band,

**DWT:** Wavelet is a small wave, its amplitude starting from 0 and then after decreases. Wavelet Transform is Time-frequency transformation. It gives the frequency and time associated with the signal. DWT uses HAAR wavelet for decomposition. [5]

Different watermarking Schemes: Blind, Semi-Blind and Non-Blind.

**Blind Watermarking:** It is known as public watermarking scheme. This is the most challenging type of watermarking system as it required neither the original data nor the embedded watermark.

**Semi-Blind Watermarking:** This watermarking scheme is also known as semi-private watermarking scheme. It does not require the original data for detection.

**Non-Blind Watermarking:** This scheme is also known as private watermarking scheme.

**IV. APPLICATION OF WATERMARKING**

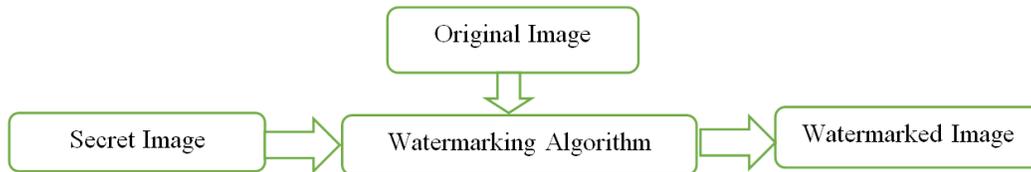
- Broadcast monitoring
- Transaction Tracking
- Content Authentication
- Photograph galleries
- Digital Libraries
- Real Time Information Delivery

**V. PROPOSED METHOD**

In this approach two process are proposed: Embedding Process, Extraction Process.

**Embedding Process:** In this process colour digital image is taken, divide the cover image into three colour components R, G and B. RGB colour space is converted to YUV space for better human perceives.

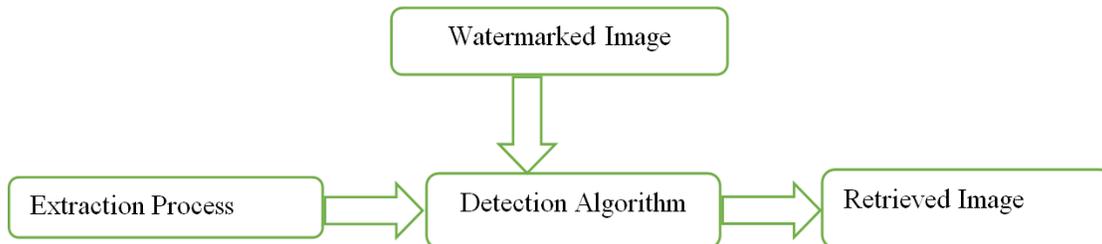
To transform image from spatial domain to frequency domain 2-dimensional DCT is applied. Then whole of the image is divided into 4x4 block each. Image is disjointed into 3-frequency component-low, middle and high. Distortion introduced by altering the quantisation index will not be visible. The YUV space is now converted back to RGB space. Partial inverse DCT is used to convert the frequency domain back to spatial domain. At last recombine the divided parts to get the watermarked image.



**Fig. 3.** Watermark Embedding Process.

**Extraction Process:** Watermarked image act as input to extract the hidden contents. In the extracting process original image is not required to retrieve the contents, only watermark sequence are needed. This process is semi-blind. RGB colour space is converted to YUV colour space for watermarked image. Divide the

watermarked image into four equal parts. Blocks of 4x4 are determined. DCT transform is applied to each block to generate the frequency coefficients. Extract the portions of watermarks which are embedded from the portions of the divided watermarked image. At last recombine the extracted portions to get the watermark.



**Fig. 4.** Watermark Extraction Process.

## VII. CONCLUSION

In this study different types of digital watermarking are done like spatial, spectral, frequency domain, recombining the DCT-DWT joint transform algorithm improved the performance of the watermarking. Among all frequency domain technique is more robust further work is based to increase robustness.

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