

## A Chronological Review on Digital Watermarking

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### Abstract

In the age of modern technology protecting software copyright is a big issue, so information hiding became an important research area since last few decades. These hiding techniques help to protect the data when transmitted via internet as the person who knows the process which way the data is hidden can only retrieve the data. Today's information hiding techniques involve various schemes such as cryptography, steganography and digital watermarking. Digital watermarking is more prominent in many vital areas including military purposes. This paper, briefly describes the chronological upcoming of digital watermarking techniques.

**Keywords:** Chronological, digital watermarking, segmentation, wavelet domain.

### INTRODUCTION

In today's digital era digital watermarking is very useful and dominant in present internet age, as information transfer over internet have no limitation, copyright protection [1]. Digital watermarking came out as a new technique at the end of the 20<sup>th</sup> century which is used for information hiding in many applications [2-4]. Many researcher suggests and justifies that digital image, audio, video and text, if transmitted via digital media may be copyright protected by digital watermarking [4-6]. Digital watermark is used for hiding audio, video, image or text is a sign of credibility without losing the quality of content. Many researcher do agree and accept DWM as expansion of cryptography. There is a massive need of protecting the data audio, video, image and text sent over internet.

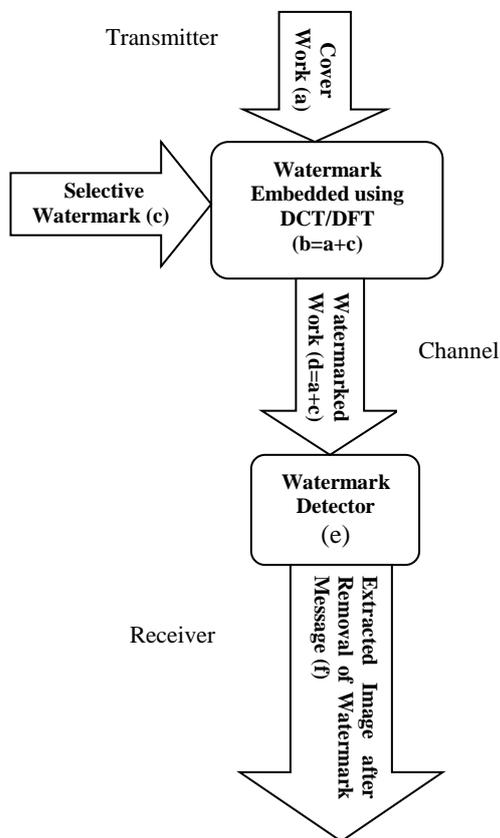
Digital watermarking is a technique which helps the creators to identify the facilitate misuse, unlicensed copy and handling ("piracy"), plagiarism and mishandling of his own created data may be audio, video, text and image. This further helps the creator to resolve the issue of mass distribution of data keeping the quality and copyright well projected. This paper briefly discuss the chronological aspects of DWM, which is the need of the day.

This Paper is divided into five sections. Section I describes the brief introduction. Section II consists of review in DWT. Literature survey is presented in section III. Paper is concluded in section IV.

### REVIEW ON DWT

Digital watermarking is a technique which embedded the watermark using some algorithm involving Discrete Cosine Transform, Discrete Fourier Transform etc. Using the DCT and DFT makes the messages sent over the network most robust towards copyright.

At the end of receiver watermark is extracted using extraction algorithm to get back the data. At the end we may compare the original and extracted image after watermark extraction for quality check [3, 6].



**Fig1.** Flow of Watermarking System

- (a) Cover work : Original data + watermark
- (b) Selective watermark + data
- (c) Selective watermark: In the form of Audio, Video, Text and Image.
- (d) Watermarked work: Watermark is inserted into image.
- (e) Watermark detector: It can detect the image.

(f) Detected Watermarked Message: It converted into original image.

**A. Requirements of watermarking** – Major requirements of watermarking are as follows;

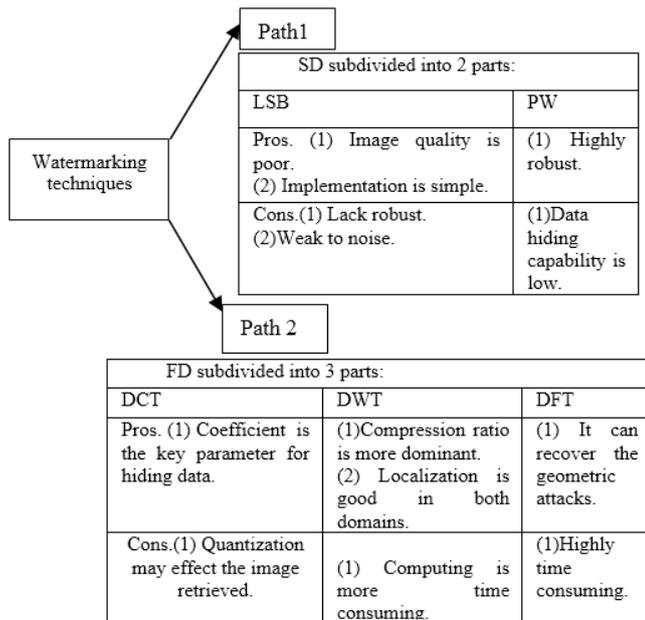
- I. **Transparency**- Watermarking should not effect in quality of image. There should not be any change obsessed comparing original and watermarking image [1-4].
- II. **Security**- Only authentic person should detect the data/image [1-5].
- III. **Robustness**-Rotation, scaling, translation, compression should not deform the watermarked image [2-6].
- IV. **Capacity**- Data should be confined to lower side for reliable transmission [2-6].

**B. Classifications of watermark** –

- I. **Visible watermark**-Watermark is visible directly on digital media such as logo on any institutes notes, bank notes [3].
- II. **Invisible watermark**- This watermark is hidden inside cover images. So this could not seen in host data [3].

**C. Categorization of watermarking techniques** –

There are 2 types of categories for watermarking as projected in various journal. Flow diagram projected in fig2 elaborates the categorization.



**Figure 2.** Watermarking Techniques [4]

- SD-Spatial Domain
- FD-Frequency Domain
- PW- Patchwork
- LSB- Least Significant Bit

DCT- Discrete Cosine Transform

DWT- Discrete Wavelet Transform

DFT- Discrete Fourier Transform

**Spatial Domain**- In spatial domain algorithm the raw data is directly superimposed on original image. This technique is equally applicable on various color band. The only drawback is while adopting this technique for watermark the pixel configuration changes became of which recovering the image is little bit complex.

**Frequency Domain**- In this technique, watermark is inserted into the spectral coefficients of the image which is very simple to adopt because of which frequency domain methods are more applied than spatial domain.

**D. Applications of Watermarking** –

Now a days watermarking is used in most of the digital transmission. Some of the important uses of digital watermarking are fingerprinting, verification of users, authentication in digitalization, preventing the data copy, broadcasting, medical safety etc.

**LITERATURE SURVEY**

Some of the reviews more prominent various international journals are used for different sections of digital media.

Anu (2017) presented review of digital watermarking and its techniques. She defined the different factors such as PSNR, MSE, NC, SNR and BER. These factors provide safety and robustness against attacks [1]. Vinetraj singh (2016) proposed a review study on digital watermarking techniques. He not only explained watermarking techniques used for audio, text, image and video but also elaborated useful information [2]. In (2015), Kiran presented digital watermarking: potential challenges and issues. In her paper she defined digital watermarking classifications according to domain, extraction, human perception, data, vision and importance of key. She described many issues which are useful in next research like human vision system, payload size, computational cost and maintain balance between imperceptibility, robustness and capacity [3]. Mohan dubey (2014) evaluated on a review on digital watermarking. He elaborated the difference between cryptography and watermarking. He further described the whole information about the watermark, attacks and typical applications [4]. Y. Shanti kumar singh (2013) introduced an Audit for different systems with respect to advanced picture watermarking scheme. His work on spatial domain and frequency domain techniques classifies any aspects of watermarking. Many algorithms useful and employed in watermarking is explained in this paper which shows advantages in system using wavelets transforms with SVD [5]. Nisreen I. Yassin (2012) proposed watermarking scheme which is block based involving principle component analysis (PCA) and wavelet transform. In this paper a noteworthy methodology to advanced feature watermarking the place

binary watermark may be installed under video frames. Transformation is connected to every block in LL and HH band. Result show high PSNR and imperceptibility where no difference between original and watermarked video frames [6]. Sanjana Sinha (2011) assessed advanced feature watermarking utilizing DWT and PCA. She demonstrates the hybrid video watermarking plan dependent upon DWT and PCA which reduces correlation among the wavelet coefficients. PCA take part into decreasing correlation around coefficients. She got high robustness against attacks such as noise addition, filtering and geometric attacks [7]. R. Reyes (2010) presented paper on video watermarking (digital) in Discrete Wavelet Transform domain employing chaotic mixtures. He used the public video watermarking algorithm, whose robustness depends upon the embedding energy, which must be limited due to the degradation of video sequences. His result outcome of shows that extracted watermark is clear as compare the watermarked video sequence may suffered attacks [8]. Jih Pin Yeh (2010) evaluated watermarking technique based on DWT associated with embedding rule. In this paper performed the DWT on the original image and embedded the watermarking HL and LH blocks. The outcome of result is much better as compare to quality of stego image and time efficiency [9]. M. Natrajan (2009), Safeguarding the digital contents. This paper deals with different aspects of digital watermarking. It discussed the tools and techniques for images, text and other applications. He also elaborated the organizations which is involved in developing standards. He advocated that protection is an individual rights of every person so digital watermarking will help to get reliable system authentication [10]. Saeed K. Amirgholipour (2009) explained on robust digital image watermarking based on joint DWT (Discrete Wavelet Transform) - DCT (Discrete Cosine Transform). He explained the algorithm based on joint DWT (Discrete Wavelet Transform) - DCT (Discrete Cosine Transform). A binary watermarked logo is performed by Arnold cat map, which provided higher robustness against common signal processing attacks [11]. Xiangui Kang (2008) presented paper on a multi-band wavelet watermarking scheme. In multi band watermarking scheme based on parameters. So it has very strong robustness. If anybody not knowing about the parameters, can not extract watermark. He impacted on threshold value of watermark detected on the basis of false positive rate of the proposed watermarking scheme which future helps for robust watermarking scheme [12].

## CONCLUSION

After surveying different technologies discussed by researchers in various journals, we may conclude that watermarking is a vast field and good one for hiding the data. As per user's requirements and security level, an algorithm and technique of watermarking can be selected. In this paper we discussed basic information required for digital watermarking with applications. The watermarking used to protect copyright justifies that techniques maintains the owner's identity as well as protect the data.

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