A Detailed Survey of Digital Watermarking Applications and Its Techniques

G. Jansirani  
Research Scholar, Dept. of Computer Science  
Tamil University, Thanjavur, Tamilnadu, India

A. Senthilkumar  
Asst. Professor, Dept. of Computer Science,  
Tamil University, Thanjavur, Tamilnadu, India

DOI: 10.23956/ijarcsse/V7I7/0171

Abstract—this paper describes the significance of digital water marking process. Watermarking is a process of hiding information in multimedia content like images and videos. Now a day it is major research area. Digital watermarking is one of the best solutions to protect content in web, content authentication and managing copyright information. Watermarking has been proposed for a long while to embed the secret information with images to stop reduces unauthorized access of the content. Watermarking and image compression is quiet different area. Rest of this paper we are going to elaborate what are all techniques that are exist so far in watermarking technology and subsequent sections classifies from the different perspectives. Watermarking is not only protecting the content, it increases the value of the content. There are numerous algorithms and procedures available for watermarking of images and videos etc., although this paper limits watermarking with images only.

Keywords—Digital watermarking, water marking schemes, watermarking techniques

I. INTRODUCTION

The increasing multimedia digital world owners of the content has been urged or needed in some ways to highly protect their content. Now, everywhere with modern computers digital content are easy to produce. Digital watermarking is the process of data hiding within the content’s representation, called information hiding. According from the literature survey, mainly there are two categories existing in watermarking technique, namely visible and invisible. The idea of visible watermarking is simple and quite familiar to all people. In this process the content digitally marked by stamping a mark. Like watermarking images on web, if you download an image, owner the image details are superimposed. And another example TV channels shows their logo or some other identity is superimposed in the content. In contrast the invisible watermarking is more tedious and hard one. It is mostly depends on the copyright details of the information like author, seller etc. Watermarking is still has some problems like geometrical attacks. There is some malicious attacks are possible in a watermarked object. Some of them discussed briefly. This journal mainly focuses the key techniques of digital watermarking technology. It is vital to point out that all the digital multimedia content is not suitable for watermarking. Remaining of this paper organized as follows. In section 2 describes watermarking technology and its salient features. 3 describe the major watermarking techniques used in current trends DCT, DWT and DFT. 4 describes the watermarking applications.

II. WATERMARKING TECHNIQUE AND ITS FEATURES

The technology digital watermarking ensures the security and privacy of the digital multimedia information. It is considered as like as a signature that reveals the contents of owner. The process of watermarking consist algorithms. A simple watermarking process is a method which has secret information for the digital media applying efficient and appropriate algorithm. The hacker can only find or damage the key if he knows the certain algorithm otherwise it is hard to find the key.

A. Techniques

Watermarking has some general characters based on their usage. Those are Robust, Fragile and semi fragile. Robustness character mainly used in copyright process, Secondly fragile watermarking used for content integrity protection and the semi fragile is the capable of measuring change of degree in the image. Based on the content we can able to classify the watermarking process. Image watermarking, it is the process of hiding important information in the image and that will be detected and extracted from the ownership. Video watermarking helps adding and extracting watermarking in videos. It is derived from image watermarking. Audio watermarking is providing watermark for internet music and MP3 song. Text watermarking adds watermark to the PDF, documents and other text files. Graphics watermarking embeds the watermark for 2D and 3D graphics. According to domain there are two types. Spatial and frequency are used in recent days. Spatial domain, this domain mainly focuses subset of image that randomly selected one or two pixel. LSB and SSM are the algorithms which are based on modulation technique based. Another one is frequency domain and often may call as transform domain. In this case original content are altered into certain frequency and there are some common frequency domains are DFT, DWT and DCT and this will be discussed in subsequent section. According to watermarking detection process it may classified into some categories like visual watermarking, Semi blind watermarking and blind watermarking. Visual watermarking, it needs the original content and has stronger robustness and the application is limited. The semi blind watermark doesn’t need the original content for the detection.
process. And blind semi watermark also doesn’t the original content and this has wide application field, but it needs stronger technology. According to the keys used in watermarking process it can be classified. Asymmetric watermarking process used different keys, one for the process of embedding and another one for detection process, while the symmetric watermarking has single key for embedding and detection process.

B. Features

There are some certain features of digital watermarking will be discussed in this chapter. One of the primary features is robustness that refers the ability of watermarking, where the embedded content will survive from the variety of malicious attacks. Watermark information should not be viewed and heard by humans. It can be detected only owners of the content by using special process, this is called imperceptibility. Usually, watermarking process achieved by cryptographic keys. Watermarking must be provided with security. Owners or the authorized agent can able to do embedding, detecting or modifying the secret information. Then only the watermarking process will be secured and the purpose of watermarking will be achieved. Full and reliable information should be provided to the owner while the watermarking process. It is very useful from the owner’s perspective to identify or monitor whether the content is protected or it is being pirated. A watermark may have low data pay load but heavy data capacity. Some application needs more than 10,000 bits data payload. Watermark capacity defined as maximum replication of data payload inside the image and the number of bits of watermark in content in data payload. And the cost of the watermarking process, in order to minimize the cost the algorithm used must be less complex. Simplicity reduces the cost as well as limited resource environments. Another major feature is the detection reliability of watermarked image. There are two possible result of watermark detection. Successful detection is called true positive and the unsuccessful detection is called false negative. If the watermark is absence in the content is called true negative. A very basic idea of watermarking is to utilize redundancy in images for embedding information. Normally watermark requires more distortions and increased redundancy. This may cause lack of imperceptibility.

III. DCT, DWT AND DFT

In recent days these transformations are being used in digital watermarking. Generally Discrete Cosine Transform (DCT), used for the signal processing. This type of watermarking is efficient then spatial domain transform and it is used in the areas like image processing, image compression and pattern recognition. However this type of watermarking is very hard to implement. But it is not strong in geometric attacks and this type can be classified Global DCT and Block based DCT. There are five process in the in the transformation. Host picture is separated into non overlapping 8X8 dimension and calculating DCT for each non overlapping block. Uses HVS selection criteria for blocks and uses highest coefficient for selection criteria. Watermark will be embedding for selected coefficient and take inverse DCT for each block. The Discrete Wavelet Transform (DWT) is recently used in many signal processing areas like videos and audio compression, noise removal in audio, wireless simulation antenna distribution etc. It is a mathematical solution for de-composing a image by hierarchically and it provides both spatial description and frequency. Wavelets are created by mother wavelet, a fixed function. It decomposes the image into three spatial directions, i.e. diagonal, vertical and horizontal. But in real the signals varying in nature and DWT perfectly suits in many applications. It gives multi resolution representation of images and it analyses the signal in multiple resolution. DWT divides two frequency quadrants of an image, one is high and another one is low. Discrete Fourier Transform (DFT) gives best robustness against geometric attacks like rotation, cropping, scaling and translation etc., Direct embedding and template based embedding are the two ways in this transform. Direct embedding which is modifying the DFT magnitude and phase coefficients before watermark is embedded. But the template based embedding uses the templates for embedding. During the embedding process in DFT the template used for find the factor of transformation and then detector is used to extract the embedded watermark.

IV. WATERMARKING APPLICATIONS

This section elaborates the various digital watermarking applications. Copyright protection is one of the major applications of digital watermarking. Copyright is used to protect and identify the owner of the content. For example Digimarc Corporation added its watermarking embedder and detector with Adobe’s image processing system, Photoshop. This type of watermarking is useful whenever a new content is launched. In case ambiguities of ownership, it provides identity. Broadcast monitoring application helps to monitor whether the content is really broadcasting. This is the commercial application in TV channels for advertising agency, which wants to monitor whether the content advertised at the right time and right duration. Fingerprints watermarking is another useful application which tells the owner when the content illegally appeared. This type of watermarking is also called transactional watermarks. If illegal copies are found later, owner can trace where it is originally from. Digital watermarking highly useful in medical application and helps to avoid ambiguities in patient records such as MRI scan and X-Ray reports. Another major watermarking application is fragile that helps tamper detection i.e., whether the watermark is deleted or degraded.

V. CONCLUSION

This paper presents a detailed discussion techniques and applications in watermarking technology. Due to literature nature we can’t provide all the things about digital watermarking, although we tried to cover as much as possible and major pros and cons of the domain. We elaborated digital watermarking from its techniques and application existing. Features of the digital watermarking are also exhibited. The revolution in digital communication and the pirates
abusing challenges the users in protection of content while passing information. Digital watermarking provides protection for data communication and it is one of the crucial research areas for researchers. And we conclude users may choose which type of watermarking is best for their content.

REFERENCE