

Digital Watermarking Scheme For Secret Images Using Visual Cryptography

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Abstract— the extreme development of internet has made the transmission, distribution and access to digital media very convenient. So, media producers are more frequently dealing with illegal and unauthorized usage of their productions. Over the last two decades, digital watermarking has been addressed as an effective solution to safeguard copyright laws and an extensive effort has been made to design robust watermarking algorithms. Basically, a digital watermark is an invisible mark that is inserted into a digital media such as audio, image, or video to identify illegal distributions of copyright protected digital media and also law breaking customers. A digital watermark must have special features to achieve functionalities desired. The embedded mark should be robust enough against various watermarking attacks, while keeping the perceived quality of the host signal unchanged (the imperceptibility requirement). Watermarking attacks consist of deliberate attacks made maliciously to remove or change the mark sequence by law-breakers, unintentional modifications caused by coding and compression that are made to the digital media prior to transmission and/or storage, and errors occurred during the transmission of the media through the networks. Digital watermarking using visual cryptography provides improved security for encrypting secret images.

Index Terms— Watermarking, Visual cryptography, Image copyright, Cryptography, Digital Envelopeing

1 INTRODUCTION

A watermarking technology is now providing highly attention as a desired method and technology for protecting copyrights for digital data [1]. A watermarking has been defined as the practice of embedding identification information in an image, audio, video or other digital media element to provide privacy protection from attackers. The identification information is called “watermark pattern” and the original digital image that contains watermark pattern is named “marked image”. The embedding takes place by manipulating the contents of the digital image. Also, a secret key is given to embed “watermark pattern” and to retrieve it as well. **Figure 1** gives summarize of standard watermarking embedding scheme. Basically, if the owner wants to protect his/her image, the owner of an image has to register the image with the copyright office by sending a copy to them. The copyright office archives the image, together with information about the rightful owner. When dispute occurs, the real owner contacts the copyright office to obtain proof that he is the rightful owner. If he did not register the image, then he should at least be able to show the film negative. However, with the rapid acceptance of digital photography, there might never have been a negative. Theoretically, it is possible for the owner to use a watermark embedded in the image to prove that he/she owns it.

A typical image watermark algorithm must satisfy the following two properties: transparency and robustness. Transparency means that the embedded watermark pattern does

not visually spoil the original image fidelity and should be invisible. Robustness means the watermark pattern is not easy to detect and remove illegally. Moreover, any modifications of the image values have to be invisible, and the watermark method has to be robust or fragile in order to provide protection against attackers. method has to be robust or fragile in order to provide protection against attackers.

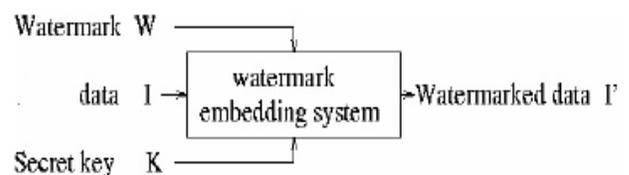


Figure 1. Watermarking embedding scheme.

2 LITERATURE REVIEW

B.surekha [3] suggested The concept of Visual Secret Sharing (VSS) is used to hide a digital watermark into Discrete Wavelet Transform of a host image. The features of the image are used to split the watermark into two random binary images called shares. One share is generated during watermark embedding phase and is kept secret with an arbitrator. The other share is extracted from the controversial image during

watermark extraction phase. Both the shares are combined to extract the original watermark.

Hui-Wen Liao [4] suggested a multiple watermarking scheme for color images by using YCbCr color model, visual cryptography, histogram modification, integer wavelet transform, and the wavelet tree. Under this scheme, all owners will have dual watermark authentication, and the number of owners can be increased. Applying the proposed four points distinguishing law, the owner's dual watermark can be extracted more imperceptibly. Usually, for multiple watermarking, the more embedding watermark will lead to less

quality of watermarked image, however, in proposed procedure,

the increased number of owners does not affect the quality of the watermarked image and the watermarks after extraction.

Adel Hammad Abusitta [1], proposed digital image copyright protection method using watermarking technology. The method does not require that the watermark pattern to be embedded in to the original digital image. Instead, Verification information is generated which will be used to verify the ownership of the image. This leaves the marked image equal to the original image. Advantage of this method is that a watermark pattern can be retrieved easily from marked image even the image is attacked by major changes in pixels bits.

Shyamalendu Kandar et al. [5] proposes a Visual Cryptographic Scheme for color images where the divided shares are enveloped in other images using invisible digital watermarking. The shares are generated using Random Number.

B. Surekha et al. [6] also proposed a spatial domain digital image copyright protection scheme based on Visual Cryptography (VC) and Spatial Correlation of Colors (SCC) is proposed. A binary feature matrix, extracted from the spatial correlation of host image, is used to split the watermark into two noisy binary images called shares. One of them is generated during watermark embedding phase and is registered with a trusted third party. The other is extracted during watermark extraction phase. Both these shares are combined to recover hidden watermark.

Pradosh Bandyopadhyay et al. [7] framework is able to embed the color watermark images to color host images and perceptually the watermark is not visible in the watermarked image. We've used blind method for watermark extraction. With addition to that we also ensure that the extracted watermark remains intact. Security issue is assured with a secret key and a hash function..

Saurabh Maheshwari et al.[8] proposed randomized threshold based visual cryptography scheme is used. Each of the shares generated is embedded into different block through different strategy. The transformations are applied depending

upon the high and low frequency regions of the image after performing statistical analysis. The watermark embedding is done using three frequency transforms, DCT, DWT and DFT simultaneously in different blocks of the image to hide the information as to which transform is used in the block leading to security of watermark. The number of permutations to determine exact watermark locations has been derived mathematically.

Li Lianhuan et al. [9], proposes an adaptive image tamper positioning, detection and recovery fragile watermarking algorithms. Using k-means clustering algorithm and image spatial visual features associated with the establishment of mechanisms to block the image, digital image to achieve a return to the spatial domain fragile watermarking scheme, and the use of encryption technology to enhance the security of watermarking algorithm..

Oclay Duman et al. [10] proposed a binary image is utilized as a watermark which is embedded using the Discrete Wavelet Transform (DWT) and the Fractional Fourier Transform (FrFT). Use of DWT domain to embed the watermark into the original image in such a way that it is imperceptible by the human visual system. The FrFT orders are used as the encryption keys that allow the watermarking method to be more robust against various attacks. It is also shown that the watermark can be extracted from the watermarked image without needing the knowledge of the original image.

HAN Yan-yan [11] et al. Proposed a visual cryptography scheme with meaningful shares. Compared to the previous schemes proposed in the literatures, the scheme does not change the original pixel expansion, and not only applies for black and white binary images, but also for any gray and color images. Meanwhile, the embedded image in a meaningful share is robust. Before and after being extracted the image's quality did not change significantly.

Ching-ling wan et al. [12] proposed two image secret sharing schemes. The first scheme uses two share images to hiding three secret information images, while second scheme uses three share images to hiding four secret information images. By using rotating image and matching block method, the second scheme increase more hiding secret information images.

Young-Chang Hou et al. [13] Proposed a method does not need to alter the original image and can identify the ownership without restoring to the original image. Besides, our method allows multiple watermarks to be registered for a single host image without causing any damage to other hidden watermarks.

Ching-Sheng Hsu [14] suggested a method in which image is split into two shares via a 2-out-of-2 visual secret sharing scheme. Then, one of the shares is embedded into the

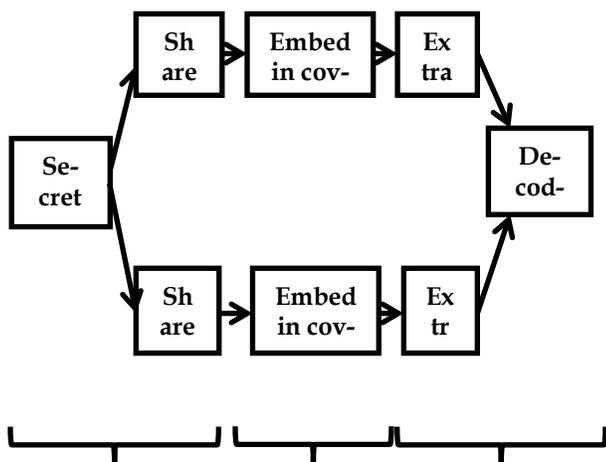
host image, and the other is held by the owner. When proving the ownership, the owner has to extract the embedded share and recover the watermark with his/her own share. Based on the security property of visual cryptography, our scheme can make sure that the two shares cannot leak any information about the watermark.

3.1 Existing Technologies And Methods

Various methods for Digital Watermarking using Visual cryptography are suggested as given below:

- Random selection of pixel for deciding master share for visual cryptography by Young-Chang Hou et al.
- Multiple Secret Sharing Method by Ching-Ling Wang et al.
- Watermarking based visual cryptography with Meaningful Shares by HAN Yan-yan et al.
- Wavelet Domain watermark embedding and extraction using FFT proposed by Olcay Duman et al.
- Digital watermarking using DWT,SLSB and VC by Mrs.D.Mathivadhani et al.
- A Self-adaptive Blind Detection Color Watermarking Algorithm Based on Wavelet Contrast by Liu Dan.

3.2 Proposed Method



VC Encryption Watermarking VC Decryption

Figure 2: Digital Watermarking using visual cryptography

3.3 METHODOLOGY

This research has proposed the Digital watermarking with the concepts of visual cryptography with improvisations. This research uses a digital watermarking with improvisation to generate the watermarked image which is secure and hard to retrieve by intruder . This research aim towards increase in security and reduction of number of shares to be generate when compared to meaningful shares, multiple secret shares etc. so as to make the watermarking process easy using the algorithm in an optimized way.

For this, this research design the encoding and decoding process as shown in fig.2 .

To increase the image security this research will employ the advantages of the VSS scheme to design the proposed technique in embedding the watermark into the image signal and reserve the secret watermark in the copyright holder.

6 PROPOSED SYSTEM AND IMPLICATION

This research has chosen to use the Digital watermarking Technique with visual cryptography for encryption to get the following advantages:

- (1) Transparency: the embedded watermark pattern does not visually spoil the original image fidelity and should be perceptually invisible. Meaningful share image can avoid the aware of active attackers.
- (2) Pixel expansion unchanged: compared to the previous schemes proposed in the literatures, the scheme does not change the original pixel expansion.
- (3) Robustness: the watermark pattern is hard to detect and remove in an illegal way.
- (4) Portability: the scheme not only applies for black and white binary images, but also for any gray and color images.
- (5) Feasibility: what this research chose ,is a class of watermarking, so the scheme is easy to implement and highly feasible.

7 CONCLUSION

There are various innovative ideas and extensions exist for the basic visual cryptographic model introduced till now. In the existing VC schemes no security is provided to the secret

shares and adversaries can alter its bit sequences to create fake shares. And in proposed scheme, the vulnerability of these binary secret shares is overcome by hiding them invisibly into some host images. During the decryption phase, the secret shares are extracted from their cover images without needing any of the cover image characteristics because of watermark extraction technique.

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