



Review Paper on Video Watermarking

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Abstract— As the digital data is transferred over the internet, which may harm the digital data like tampering of data etc. Technological advancements are taking place every day and so the need to secure data is also increasing. Hiding data in text or image was one of the ways of transmitting data securely over distance through internet. Steganography and watermarking are the two techniques of encrypting data and transmitting it. Earlier image watermarking was done, in which the data or image or text was hidden in the image and it could be decrypted at other end by authorized user. To increase the level of security, video watermarking was introduced. It is done by choosing some frames from the video and then hiding data in that particular video frame. Many techniques are available for video watermarking like Discrete Wavelet Transform, Least Significant Bit Technique etc. [2].

Keywords— Data hiding; Audio; Video; Text; Security; LSB; Encryption

I. INTRODUCTION

Security is a prime concern in this digital world. Thousands of bits are being transmitted from one place to another through internet. The only concern for the sender is that the data is being transmitted reliably and securely. Data should be decrypted only by the authorized person. Various ways were invented for transmission of data.

Steganography and watermarking are two techniques which data transmit data by hiding it in any other digital media. In steganography, only text or data is hidden in any other data file that could be image, audio or video. When comes to hiding images it is referred to as watermarking.. Digital watermarking is a type of steganography. Digital watermarking follows the steganography and hide the digital data behind other data but in this source image and hidden image both has the highest preference.

Watermarking is a technique of hiding image or data in any other image, data or video. It is more secure as now the data is encrypted more precisely in image form. The watermarks can be of type visible and invisible. Image watermarking is a process of hiding data or image in the image. Then was introduced video watermarking. The concept of video watermarking comes from the concept of image watermarking where the copyright identification is appended on the host image for the purpose of security of image[2]. A video is a collection of number of digital images, so video watermarking is hiding data in the frames of video. Any frame from the frames of video is selected and the data is embed in it, it is called video watermarking.

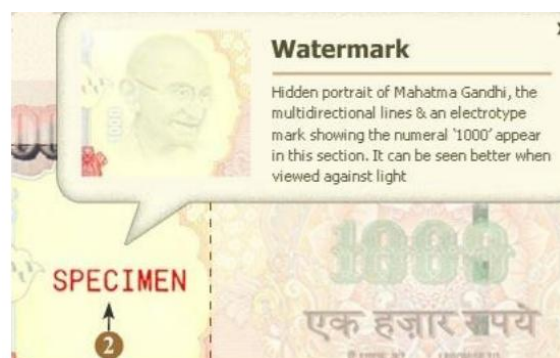


Figure 1 Invisible Image watermark

II. PROCESSES OF WATERMARK

Once a watermark is embedded on digital data it can be removed anytime according to the need. The process of image watermarking is different from digital watermarking. The process of Digital watermarking has two main principles:

1. Embedding process
2. Extraction Process

Embedding Process

This contains the selection of watermark which is going to embed on the digital data. The selection of watermark depends upon the kind of data it is, whether it is original data or compressed data and whether the watermark is visible or not [3].

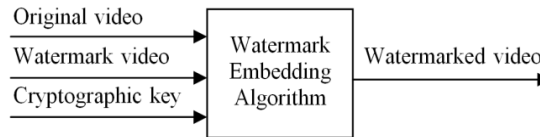


Figure 2 Embedding process in watermarking

Extraction Process

In this process to demonstrate or show the concern of copyright on the data and to make sure that the purpose of watermarking has been achieved the watermark is extracted from the watermarked digital data. The extracted watermark may vary from the original watermark [3].

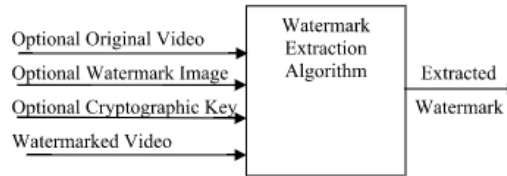


Figure 3 Extracting process in watermarking

Digital Watermarking has a large area of application where it is used like:

- Copyright protection
- Source tracking (different recipients get differently watermarked content)
- Broadcast monitoring (television news often contains watermarked video from international agencies)
- Video authentication

III. TECHNIQUES OF DIGITAL WATERMARKING

Digital watermarking can be done by using algorithms. These techniques are based on certain criteria [4].

According to Document:

1. **Image Watermarking:** It is the Process of data hiding behind an image
2. **Video Watermarking:** This is the process of adding watermark to an video to proves the concern of owner.
3. **Audio Watermarking:** The process of hiding data behind audio data.
4. **Text watermarking:** The process of adding watermark to the documents in order to prevent them for being copied by others.

According to Working Domain:

A. Spatial Domain

This is the process of adding watermark to the data . It modifies the pixels of randomly selected data. In this the raw data is directly loaded to image pixels. It uses LSB (Least Significant Bit) algorithm and Patchwork technique.

- **Least Significant Bit Algorithm:** This algorithm is easy to implement and understand. It adds the watermark to the lowest order bit of each pixel of the image. As the watermark is embedded at the lowest bit of the pixel similarly the extraction is done by detecting the lowest bit of the pixel in the image and then the watermark is extracted from the data.
- **Patchwork Technique:** Patchwork technique is based on some statistical result because it embed the watermark in the data with a specific statistics by using Gaussian distribution. The extraction of watermark can be done by combining the received signals with expected form.

B. Frequency Domain:

It is also known as Transform domain. It uses several frequencies to insert the watermark in the data. It uses domain methods to implement the watermark as:

- **DCT (Discrete Cosine Transformation):** It adds watermarks to a still digital image. In this the image is presented in the form of frequencies of cosine.

Then 8*8 blocks of the image s considered calculating the DCT of the image.

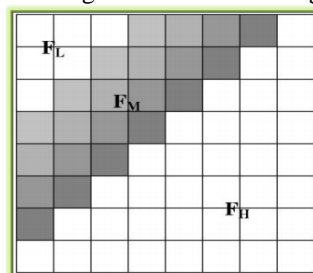


Figure 4 Frequency bands generated in DCT

- **DWT (Discrete Wavelet Transform):** It generates a time frequency of particular signals at a given time. It converts the image into three dimensions Horizontal, vertical, diagonal respectively. The transformations are base4d on small waves namely wavelet.

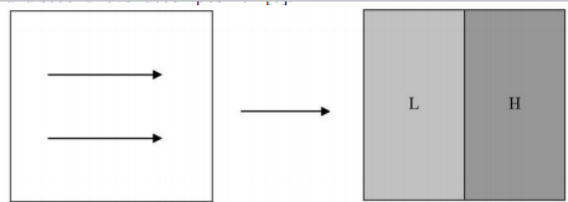


Figure 5 Horizontal Transformation

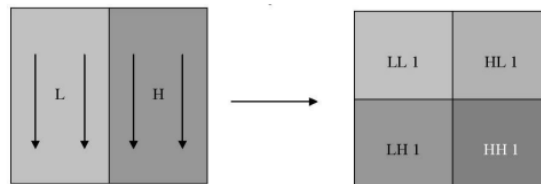


Figure 6 Vertical Transformation

- **DFT (Discrete Fourier Transform):** It converts the Unique functions into frequency components. In case of digital image, the even functions are considered as the frequency of sine or cosine and multiplied with the weighing function. It generates the coefficient of Fourier transform in the signal.

According to Human Perception:

1. **Visible watermarking:** In this technique the embedded watermark is visible to the end user. It is the earlier technique of watermarking. The watermark is embedded on the cover page of the image.



Figure 7 Visible Watermark

2. **Invisible Watermarking:** Invisible Watermarking is that kind of watermarking technique in which embedded watermark is not visible to the viewer.
3. **Dual watermarking:** It is a combination of both visible and invisible watermarking technique embedded on the cover page of the image.[5]

IV. RELATED WORK

Antonio Cedillo-Hernandez [1], in this author explains that earlier the video watermarking was difficult to perform because of LSB algorithm. It is necessary to add watermark in the data to prevent it from unauthorized access. In this various techniques of watermarking is used based on several criteria like DCT, HVS, QIM, PSNR, SSIM.

Mahima Jacob, Saurabh Mitra [2], in this author describes that digital watermarking becomes popular among users because it secures the digital data like audio, video from unauthorized access during the transmission over the network. Watermarking is a technique to protect digital data like audio, videos and textual data like documents from irrelevant access.

Lalit Kumar Saini, Vishal Shrivastava [3], in his author defines that it is the Era of internet over which the data is transferred. The data may be text, audio, video, image etc. In order to protect the data from tampering while transmission the technique of watermarking is developed. Watermarking use various algorithms to embed a watermark on the data.

Rakesh Ahuja, S. S. Bedi [4], in this author defines the techniques of video watermarking. As it is the important issue concerned with security of digital data while transmission over the network. Watermarking is defined by two principles. Classification of digital data watermarking is based on various schemes. Various algorithms are used for digital data watermarking.

Monika Patel, Priti Srinivas Sajja [5], In this author describes that the digital data is easy to tamper and alter when it is transmitted over the internet. To resolve this problem the concept of watermarking is developed. In watermarking the information related to the copyright or authentication is embedded on the original data which prevents the data from unauthorized access. Various algorithms can be used for embedding the watermark on the data. The selection of algorithm depends upon the nature of the data.

V. CONCLUSION

This paper presents a review on watermarking and its various techniques. Watermarking is hiding digital data or image in image itself or any other digital media like video or audio. Watermarking is different from steganography as in steganography only text or data is hidden whereas in watermarking either text or data or image can be hidden in other digital media. The security and reliability of the hidden data was improved by switching to video watermarking from image watermarking. Various techniques were developed for video watermarking like DWT, DCT, LDA etc. Various papers have been reviewed on the basis of techniques used in them for video watermarking. The property that each technique developed for video watermarking is that it should be robust against attacks and should transmit data with high security and reliability. The drawbacks of the techniques are overcome by developing a new technique that possess different properties and have overcome the disadvantages of conventional technique. From the papers studied it is seen that the techniques of Discrete Wavelet Transform and Singular Vector Decomposition are most robust and suitable for video watermarking.

REFERENCES

- [1] Antonio Cedillo-Hernandez, "Transcoding resilient video watermarking scheme based on spatio-temporal HVS and DCT", ELSEVIER, Vol 97, Pp 40-54, 2014
- [2] Mahima Jacob, Saurabh Mitra, "Video Watermarking Techniques", IJRTE, Vol 4, Pp 1-4, 2015.
- [3] Lalit Kumar Saini, Vishal Shrivastava, "A Survey of Digital Watermarking Techniques and its Applications", IJCST, Vol 2, Pp 70-73, 2014
- [4] Rakesh Ahuja, S. S. Bedi, "All Aspects of Digital Video Watermarking Under an Umbrella", Ijigsp, Vol 12, Pp 54-73, 2015
- [5] Monika Patel, Priti Srinivas Sajja, "Analysis and Survey of Digital Watermarking Techniques", ijarcse, Vol 3, Pp 203-210, 2013
- [6] Puneet Kr Sharma (2012), "Analysis of image watermarking using least significant bit algorithm "International Journal of Information Sciences and Techniques (IJIST) Vol.2, No.4, Pp 95 -101
- [7] Md. Selim Reza (2012), "An Approach of Digital Image Copyright Protection by Using Watermarking Technology" IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 2, No 2, Pp 280 -286
- [8] Shruti Porwal (2013), "Data Compression Methodologies for Lossless Data and Comparison between Algorithms" International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 2, Issue 2, Pp 142- 147
- [9] Debashis Chakraborty, "Efficient Lossless Color Image Compression Using Run Length Encoding and Special Character Replacement"
- [10] M. Baritha Begum, December 2013, "A New Compression Scheme for Secure Transmission" International Journal of Automation and Computing 10(6), Pp 578-586
- [11] Amrita Jyoti, February 2014, "An Advanced Comparison Approach with RLE for Image Compression" International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 2, Pp 95- 99
- [12] M. Vidya Sagar, (2013), "Modified Run Length Encoding Scheme for High Data Compression Rate" International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 2, Issue 12, Pp 3238- 3242
- [13] Alka N. Potkar (2015), "Implementation and Performance Analysis of DWT Based Video Watermarking Algorithms on FPGA" International Journal of Advanced Research in Computer Science and Software Engineering, February 2015, Volume 5, Issue 2, PP 683- 689
- [14] Rajni Bala, "A Brief Survey on Robust Video Watermarking Techniques" The International Journal Of Engineering And Science (IJES), Volume 4, Issue 2, 2015, Pp 41-45
- [15] Li, Chen. "The study on digital watermarking based on word document" In Mechatronic Sciences, Electric Engineering and Computer (MEC), Proceedings 2013 International Conference on, IEEE, 2013 Pp. 2265-2268