

Video Watermarking Using Image Processing

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Abstract

In this paper a new approach towards video watermarking is developed, resulting better robustness, data security and higher embedding capacity. Video watermarking is a data hiding technique in which an information or message is hidden inside a signal transparent to the user. Basically digital watermarking involves embedding secret symbols known as watermarks within video data which can be used later for copyright protection, piracy tracing, content authentication, advertisement surveillance, error resilience and so forth. This scheme convert the video into number of frames by using object reader. Select one frame and convert it into RGB to Grey level. Then apply DWT to cover image i.e. selected frame. Similar action will be carried on the text data frame. Using alpha blending technique, cover frame and text frame of their grey format are combined together to get Watermarked Image. Then the IDWT (Inverse discrete wavelet transform) is applied. This Watermarked image is in grey form which will have to be converted into RGB form, by using grey to RGB converter. Lastly recollection of frames takes place by using object reader to obtain a Watermarked Video.

Keywords

Video Watermarking, Digital Image processing, Watermark, DWT (Discrete Wavelet Transform).

I. Introduction

The watermark can be embedded either in image or in video and the process of embedding watermark in video is called video watermarking and the process of embedding watermark in an image is known as image watermarking. Watermark can be embedded and extracted as per requirement. Watermarking is the process to hide some data or label into the original data. Similar video watermarking embeds data in the video for the purpose of identification, annotation and copyright. The difference between video watermarking and image watermarking is the availability of the data. This proper availability of data in video watermarking make this technique more reliable and redundant because information hidden in watermark is more secure and qualitative in nature. Digital video is a sequence or collection of consecutive still images. The amount of information that can be embedded in the video sequence is called payload. Digital video watermarking involves embedding secret symbols known as watermarks within video data which can be used later for copyright detection purposes. Various techniques that are used in video watermarking are described as:

- DWT- Discrete wavelet transform
- DCT- Discrete cosine transform
- SVD- Singular value decomposition
- PCA- Principal component analysis

Copyright protection of information in security systems can be attained by three interlinked methods-

- (a) Steganography
- (b) Cryptography
- (c) Watermarking.

A. Watermarking

It is a technique to embed data in digital audio, images or video. A distinguishing mark impressed on paper during manufacture and is visible when the paper is held up to the light. Physical objects can be watermarked using special dyes and inks or during paper manufacturing.

B. History of Watermarking

The term "Digital Watermark" was coined by Andrew Tirkel and Charles Osborne in December 1992. The first successful embedding and extraction of a steganographic spread spectrum watermark was demonstrated in 1993 by Andrew Tirkel, Charles Osborne and Gerard Rankin. Watermarks are identification marks produced during the paper making process. The first watermarks appeared in Italy during the 13th century, but their use rapidly spread across Europe. They were used as a means to identify the papermaker or the trade guild that manufactured the paper. The marks often were created by a wire sewn onto the paper mold. Watermarks continue to be used today as manufacturer's marks and to prevent forgery.

C. How Watermarking is Different from Steganography and Cryptography

1. Steganography vs. Watermarking

- The word steganography combines the greek words steganos (meaning "covered, concealed, or protected" and graphia (meaning "writing"). The main goal of steganography is to hide a message m in some audio or video (cover) data d , to obtain new data d' , practically indistinguishable from d , by people, in such a way that an eavesdropper cannot detect the presence of m in d' .
- The main goal of watermarking is to hide a message m in some audio or video (cover) data d , to obtain new data d' , practically indistinguishable from d , by people, in such a way that an eavesdropper cannot remove or replace m in d' .
- It is also often said that the goal of steganography is to hide a message in one-to-one communications and the goal of watermarking is to hide message in one-to-many communications.
- Steganography methods usually do not provide strong security against removing or modification of the hidden message. Watermarking methods need to be very robust to attempts to remove or modify a hidden message.

2. Cryptography vs. Watermarking

Watermarking is totally different technique from cryptography. Cryptography is the practice and study of techniques for secure communication in the presence of third parties called adversaries. The data is converted into secret code for transmission over the public network. The original text (plaintext) is turned into a coded equivalent called cipher text using an encryption algorithm. The cipher text is decrypted at the receiving end and turned back into plaintext.

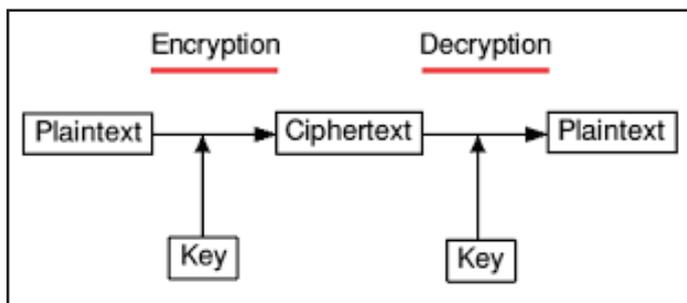


Fig. 1: Cryptography

Cryptography only provides security by encryption and decryption. However, encryption cannot help the seller monitor how a legitimate customer handles the content after decryption. So there is no protection after decryption.

Unlike cryptography, watermarks can protect content even after they are decoded.

Other difference is cryptography is only about protecting the content of the messages. Because watermarks are inseparable from the cover in which they are embedded, so in addition to protecting content they provide many other applications also, like copyright protection, copy protection, ID card security etc.

II. Block Diagram and Description

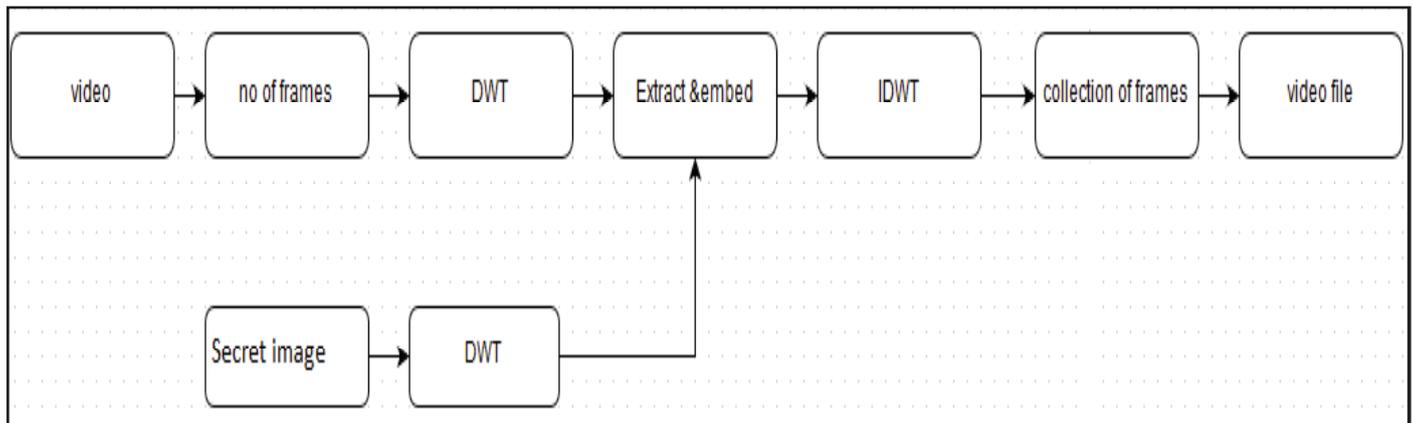


Fig. 2: Block Diagram and Description

A. Block Diagram Description of Video Watermarking

1. The proposed watermarking method embeds secret message into DWT coefficients in low frequency components and restores the original image coefficients after the secret messages have been extracted.
2. Wavelet transform is used to convert an image from time or spatial domain to frequency domain. Decomposition of digital image will be pair of waveform with high frequency corresponds to detailed parts of an image & low frequency to smooth parts of image.
3. The digital message will be embedding in low frequency components & the image will be reconstructed to get cover image with digital message hidden. Embedded image decomposed into inverse discrete wavelet transform.
4. Inverse wavelet transform is used to convert frequency domain to spatial domain. Hence it is frequency-time representation. Embedded image will be extracted in to sub-band frequencies using DWT method.
5. The digital data will be taken from the low frequency components & the extracted digital data will be compared with original message. This system includes these frames 1 frame is selected.
6. By Using RGB to Gray converter, conversion of RGB to Gray of that frame takes place.
7. After that cover image is formed. DWT is applied to cover image because information should be hide in to lowest frequency domain.
8. After that image block is taken. Conversion of that image block in to Gray form by using RGB to Gray converter. DWT is applied to image block to form watermark image. DWT version of both cover image and watermark image are embedded by using alpha binding technique.

9. After this process watermarked image is formed and recollection of frames takes place by using object reader then Gray to RGB conversion takes place.
10. After that IDWT is applied ,at the end we get watermarked video file.

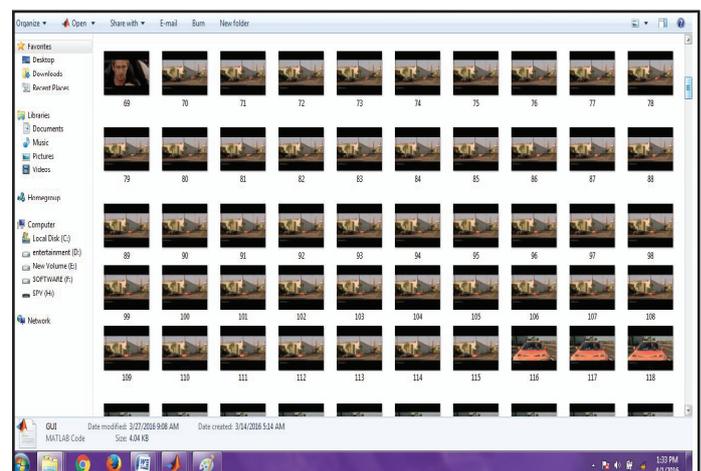


Fig. 3: Converted Frames

B. Software System Design Flowchart

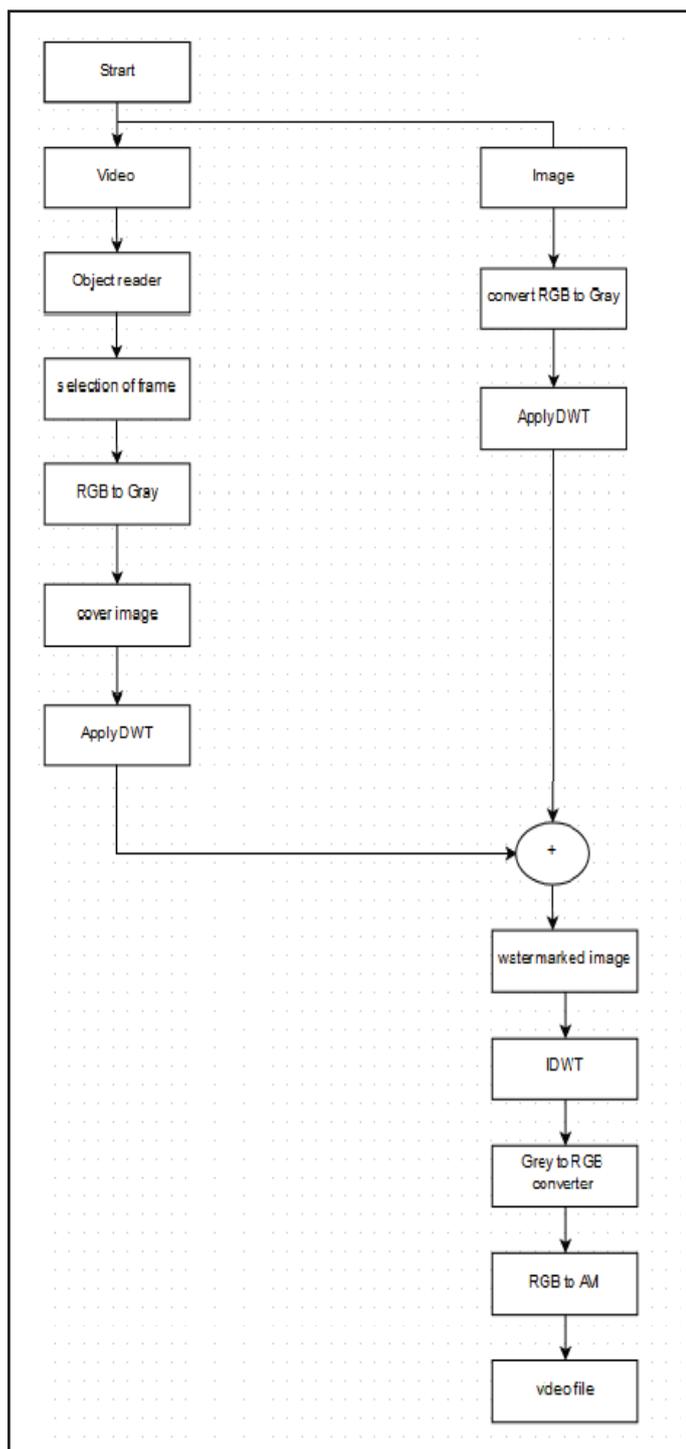


Fig. 4: Software System Design

C. Applications

Digital watermarking may be used for a wide range of applications, such as:

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

III. Conclusion

In this paper video watermarking techniques are discussed. The study indicates that it is possible to hide data in a video file by

using Video Watermarking technique. Video Watermarking is a robust technique which will be able to hide watermark at such place in frames so that it cannot be extracted easily and provide more security . Comparatively video watermarking technique is more achievable than Steganography or Cryptography. Here we used DWT so that Image/Text file can be hidden into lowest frequency domain. Hence we obtain Watermarked Image by combining both cover and Watermark Image by using Alpha Blending technique. Future scope of the video watermarking is very broad. Videowatermarking avoids video piracy in broadcast video monitoring. Previously using SVD watermarking is donewhich is less efficient but recently DWT & DCT techniquesare used which will increase the robustness of the system.Now a day’s data hacking is very serious problem on internet services that can be avoided using different watermarkingtechniques.

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