MULTI-WAVELET TRANSFORM-VIDEO ENCODING FOR CONTENT PROTECTION WITH SECRET KEY

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Abstract : With rapid growth in communication, Security is one of the important issue for privacy and authentication purpose. Also for military applications data encryption plays a vital role & to achieve such encryption Watermarking Technology is used. For Digital Media, Digital watermarking is one technology is used to ensure and facilitate for data authentication, copyright protection and security etc. Digital watermarking techniques are more robust, transparent, secure, invert ability (reversible) and complex for decryption and verification as compared to other watermarking methods. Due to transparent watermarking no artifacts or quality loss happens in original image. The success of the Internet, cost-effective and popular digital recording, storage devices and the promise of higher bandwidth, quality of service for both wired and wireless networks have made it possible to create, transmit, replicate, and distribute digital content in an effortless way. Digital video watermarking technique was introduced by Hembrooke in 1954. Watermarking is a concept of embedding special symbol or logo or pattern watermark, in to video so that some copyright information is fed into it. This information can inform users about authority to permit the use of data, it can later prove for ownership, identify misappropriate persons, tracking of the video [1]. In this paper, we proposed a digital video watermarking with authentication for tutorial video using Multi-wavelet. In first host video is separated into video shots. Then from each video shot one video frame is selected for embedding watermark. Each identical frame of video is decomposed into 3-level DWT, then select higher sub-band coefficients to insert the watermark and the watermark are embedded to these coefficients and thus guarantee perceptual unobtrusive of watermark . The paper represents the complete software implementation of 3-Level DWT algorithms and to have more secure data a secret key is used. The secret key is given to watermark image during embedding process and while extracting the watermark image the same secret key is used.

IndexTerms - **DCT, DWT, MSE, Multi-wavelet Transform, PSNR, Watermark.**

I. INTRODUCTION

The term “digital watermarking” was first coined by Tirkel in 1993, when presented two watermarking techniques to hide the watermark data in the images [2] . It refers to embedding of signal, secret information (i.e. watermark) into the digital media such as image, audio and video . This is the first of the two process of the watermarking process, termed as watermark embedding . In the second process, the embedded information is detected and extracted out to reveal the real owner/identity of the digital media, termed as extraction module [3]. Digital watermark can be used for copyright protection and authenticate the authorized of the video [4] . Its applications include copying prevention, broadcast monitoring, authentication and data hiding [3]. Among various forms of data, multimedia contents, especially videos are prone to different forms of copyright infringements [5]. Hence, video watermarking has become one of the most popular watermarking techniques in recent years. The video watermarking techniques can be categorized into three groups: compressed domain methods, transform domain methods and spatial domain methods. Spatial domain schemes [6] usually embed the watermark signals into the chrominance and/or luminance components of the host video data . Though these methods are fast and simple, they cannot resist the attacks effectively . Compared with the characteristics of the spatial domain, those of the transform frequency domain are more robust, stable and invisible. Hence, more and more video watermarking schemes concentrate on the transform domain [7]. In recent years, there are many researchers have proposed watermarking image techniques [8]. now in this paper I proposed for video . In a typical authentication watermark technique an authentication signature (AS) is computed from the whole image data and inserted into the image itself In cryptography, AS is called message authentication code (using secret-key) or digital signature (using public/private-key) . Secret key contains information about the image that may be checked to verify its integrity . However, inserting the AS into the image alters the image itself, hence modifying its AS and invalidating the watermark AWT for binary images that has good visual quality when applied to a generic binary image . It can be used in conjunction with secret-key or public/private key . In these our prime concern is video only.

II. RELATED WORK

a) Comparisons of Different Watermarking Techniques:

Table 1

Algorithm	Advantages	Disadvantages
LSB	1. Easy to implementation 2. Low degradation of image quality as compared to other 3. High perceptual transparency	1. It lacks in basic robustness 2. Harmed to noise 3. Harmed to cropping, scaling
Correlation	1. Gain factor can be increased resulting in increased robustness	1. Image quality gets Decreases due to very high increase in gain factor.
Patchwork	1. High level of robustness is present against most type of attacks	1. It can hide/encrypt only a very small amount of information.
Texture mapping coding	1. Texture mapping coding method hides data within the continuous random texture patterns of a picture.	1. This algorithm is only suitable for such areas with large number of arbitrary texture images
DCT	1. The watermark is embedded into the coefficients of the middle frequency, so the visibility of image will not get affected and the watermark will not be removed by any kind of attack.	1. Block wise DCT operation destroys the invariance properties of the system. 2. Certain higher frequency components which tend to be suppressed during the quantization step.
DWT	1. It allows good localization both in time and spatial frequency domain 2. Higher compression ratio as compared to other techniques which is relevant to human perception.	1. Cost of computing is higher than other techniques. 2. Requires Longer compression time. 3. Noise or blur occur near edges of images or video frames.

b) Requirements for video watermarking:

There are no of important Characteristics that a watermark can exhibit Jalil and Mirza (2010), Bandyopadhyay and Paul (2010)

1. Video require large bandwidth that is why it is mostly carried in compressed domain. So Watermarking algorithm is also adaptable for compress area processing .

2.Video compression algorithms are computationally rigorous .

3. Video content is sensitive to distortions and Watermarking may degrade the quality .

4. Video data is subject to increased attacks than any other media .

c) In the proposed method:

1. For more security of video a secret key is used .

2.Watermarking using 3-level DWT .

3. Improve the quality of watermark video .

4. Less error that is MSE value should be as low as possible .

5. Host video may be of any size .

d) Watermarking Attack:

A brief introduction to various types of watermarking attacks is as under,

a) Removal Attack**:** These attacks exploit the fact that the watermark is usually an additive noise signal present in the host signal . Removal attacks intend to remove the watermark data from the watermarked object .

b) Interference attack: Lossy compression, quantization, collusion, de-noising, demodulation, averaging, and noise storm are some examples of this category of attacks. Interference attacks are those which adds additional noise to the watermarked objects.

c) Geometric attack: All manipulations which affect the geometry of the image such as flipping, rotation, cropping, etc. should be detectable .

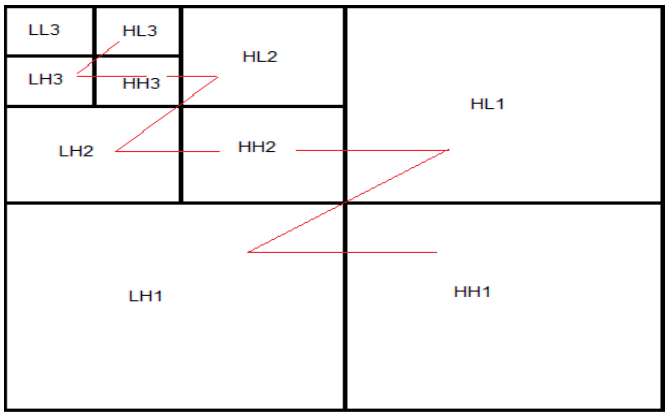
d) Low pass filtering attack**:** A low pass filtering is done over the watermarked image to remove high frequency components and it results in a difference map composed of noise .

e) Forgery attack: The forgery attacks that result in object insertion and deletion, scene background changes are all tantamount to substitution .

f) Security Attack- The watermarking algorithm is considered secure if the embedded information cannot be destroyed or detected by attacker. If the watermarking algorithm is known, an attacker can further try to perform modifications to render the watermark invalid or to estimate and modify the watermark content.

III. SURVEY OF DISCRETE WAVELET TRANSFORM

Discrete Wavelet Transform



IV.

Fig. 1. Watermark embedding order in 3-Level DWT

The four bands obtained are LL, LH, HL, and HH which is shown in Fig 1 . The LL band is called as approximation band, which consist of low frequency wavelet coefficients, and contains significant part of the spatial domain image . The other bands are called as detail bands which consist of high frequency coefficients and contain the edge details of the spatial domain image. The use of Wavelet transform will mainly address the capacity and robustness of the Information- Hiding system features .

Step 1. Column wise processing to get H and L

H = (Co-Ce) ……..(1)

L = (Ce-[H/2]) ……...(2)

Where Co is odd column and Ce is even column

Step 2.Row wise processing to get LL, LH, HL and HH,Separate odd and even rows of H and L.

H odd – odd row of H,

L odd – odd row of L,

H even – even row of H,

L even – even row of L.

LH = Lodd-Leven ……(3)

LL =Leven -[L[H/2] ……(4)

HL =Hodd -Heven ……(5)

HH =Heven-[H[L/2] ……(6)

After applying 1st level DWT of decomposition, there are 4 sub-bands: LL1, LH1, HL1, and HH1 . For each successive level of decomposition, the LL sub-band of the previous level is used as the input . To perform second level decomposition,the DWT is applied to LL1 band which decomposes the LL1band into the four sub-bands LL2, LH2, HL2, and HH2 . To perform third level decomposition, the DWT is applied to LL2 band which decompose this band into the four sub-bands:LL3, LH3, HL3, HH3 [1, 3] .

V. Survey of digital watermarking techniques

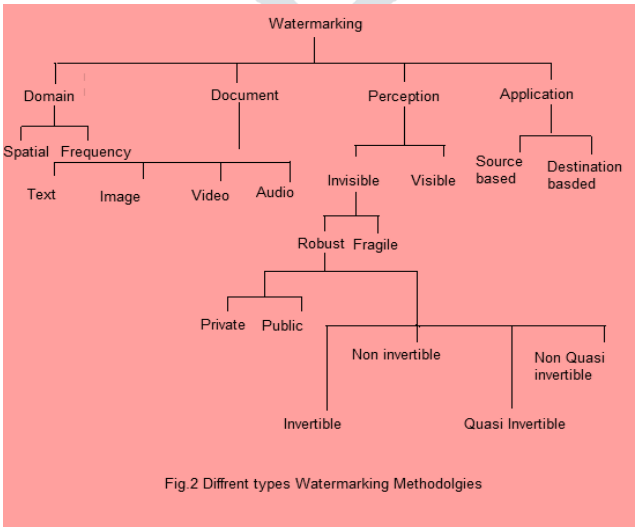


Fig.2 Diffrent types Watermarking Methodolgies

Fig.2 provides an overview of different types of watermarking methodologies depending on their working domains, cover media perceptibility and application areas . After embedding watermark, the watermarked media are sent over Internet or some other transmission channels . Whenever the copyright of the digital media is under question,the embedded information is decoded to identify copyright owner . The decoding process can extract the watermark from the watermarked media (watermark extraction) or can detect the existence of watermark in it (watermark detection) .

a) According to attached media:

Image :Add watermark into image to hide special information . detect and extract special information with authentication

Video: Add watermark in video stream for making Video secure .

Audio: Add watermark in audio because of these hot issues internet music and MP3.

Text: Add watermark in PDF And other text file to avoiding change made to text

b) According to perception:

Invisible: Insert watermark into image which is invisible means we cannot seen these information (water-mark)

Visible: insert information into image which can be seen. for example: university Question paper .

Robust: It is Characteristics of Watermark because of these it resist various attacks geometrical or non-geometrical without affecting embedded watermark.

Fragile: These watermarking mainly used for integrity protection.

c) According to domain:

Spatial:

1) Low computation cost
2) Low computation time
3) High capacity
4) Application :Authentication

Frequency :

1) High computation cost
2) High computation time
3) More high capacity
4)) Application :copy rights

WATERMARK EMBEDDING PROCESS

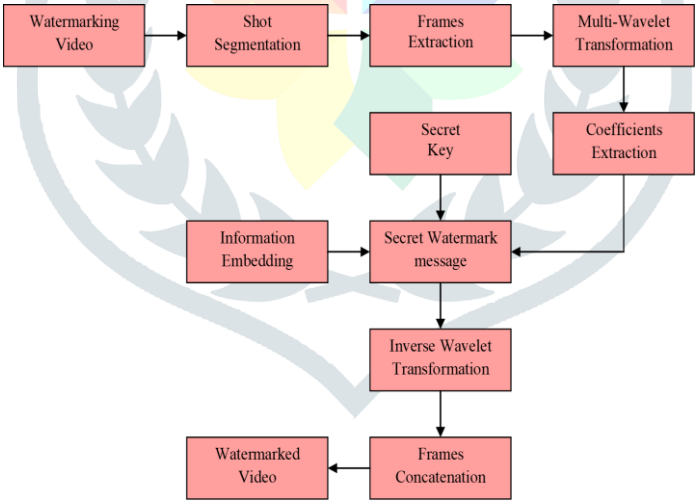


Fig 3 Information Embedding in Multi-wavelet domain

The proposed embedding process (see Fig 3), from the block diagram we see that, after separating the video shots from watermarking video . frame Extraction from each video shots . Then the system will apply 3L-DWT on the blue channel of RGB frame . In the 3L-DWT coefficients, we embed pre-processed watermark image from the HL3 to
HH1 sub-band consecutively and Insert private key then it is transformed into 3-level inverse DWT form . At this stage, for RGB video frame we get the watermarked blue channel which is then combined to other two channels to obtain the watermarked video frame . A dialog will open “enter secret key”. After entering secret key pop up message shows secret key inserted successfully .

SURVEY OF WATERMARK EXTRACTION PROCESS

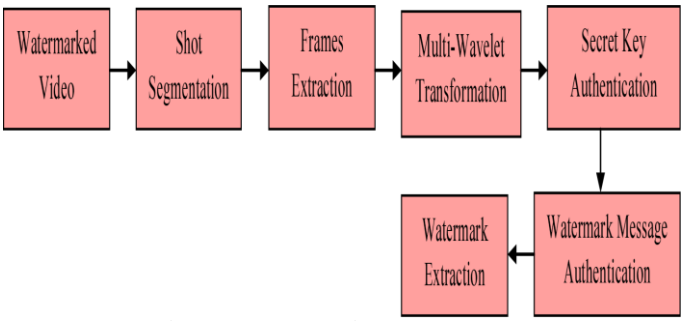


Fig 4 Information Extraction from Multi-wavelet domain

The proposed Extraction process (see Fig 4), from the block diagram we see that, after separating the video shots from watermarked video frame Extraction from each video shots .Then the system will apply 3L-DWT on the blue channel of RGB frame .In the information extract phase, two level authentications are included. The first level authentication performs secret key extraction and the extracted secret key is matched with the audience's key. The Receiver is considered as the intended Receiver only if both the keys are similar. Else, the Receiver cannot extract the information embedded in the video. An intended Receiver can extract the credentials of the tutors or students of the lecture or presentation, respectively, only if their secret key matches.

CONCLUSION

In this paper, we proposed a digital video watermarking with authentication for tutorial video using Multi-wavelet .Finally we conclude video watermarking with Multilevel DWT can be an efficient, robust and secure Transform domain technique that can protected from overall attacks. Also use of secret key for making more security on video

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