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Secured Video Watermarking Based On DWT

Mrs.S.Kavitha[1], Dr.N.Subhash Chandra[2]
[1]*Professorand HOD in CSE ,HolyMary Institute of Technology,Hyd*
[2]*Professorand HOD in CSE ,Vignan Bharathi Institute of Technology,Hyd*

Abstract: Copy right protection and Claiming the digital rights is the major problem for the content developers. Content like video, images, audio, etc., are prone to violation of protection under many circumstances in the digital world. In this paper we propose a method that proves copyright of the video by embedding watermarking on selected frames and ensures that the frames is not modified by performing hashing and then modifying the frame based on Discrete Wavelet Transformations . This method protects the video from many types of attacks like frame-edit etc.,
Keywords: Copy right protection, digital watermarking, DWT

I .INTRODUCTION

In the recent decade due to growth in the internet usage the multimedia content like videos, images, audios etc., are digitized and easily transmitted in the network. Due to this change the content owner faces a threat of proving his ownership rights. Digital rights management systems emerged since then to solve such problems for content developers by protecting the multimedia data from forgery, changing and distributing illegally.

Law enforcement also came into existence for violating the digitals rights but proving the ownership is the major problem for the owners.

The video is the collection of frames when visualized with respect to time domain a movement is seen. Each frame can be thought of one single image. Frames are of two types one is base frames other is constructed frames. To store the video the base frames are only stored completely and constructed frames are partially stored i.e., only the differences with respect to base frame are stored. When a video is displayed base frame is displayed and rest of the constructed frames are constructed from the base frames with respect to time domain. When these frames are displayed one after the other movement is visualized. No two frames are similar when compared pixel-to-pixel. We say that two frames are similar only if their distance matches. The distance between two frames can be measured using different types of metrics like Euclidean distance or hamming distance.

In this paper we introduce a techniques that calculates the distance between two frames and selected only base frames to embed watermark and We perform hashing on the Watermark image to provide integrity to watermark. To ensure that Watermark image is not modified we use the hashed code as a key to encrypt the watermark image. The result is used as embedded watermart. and apply DWT (Discrete Wavelet Transformation) on the frame of video to make it Blind Watermark. Blind Watermark technique is a technique which does not need the original data to compare the watermarked data.

Watermarking Should Satisfy The Following Charecteristics:

a) Time complexity should be less. i.e., the time taken to embed or de-embed the watermark should be less.
b) It should sustain to frame-edit attacks[1] like frame exchange, frame addition, frame cut and so on.
c) It should be blind i.e., original frames are not needed to detect the watermark[2].

d) It should work faster in performing copyright authentication[3].

II .EXISTING SYSTEM

In existing system Blind watermarking is embedded in the random frames[4] but it is prone to common attacks. The other algorithms based on DCT that directly embed the watermark to the MPEG compression encoding and decoding video images but ensuring integrity of such video was difficult[5] .

By considering disadvantages in the existing techniques we propose a method that ensures integrity ,authentication and copy right protection on video .

III. PROPOSED SYSTEM

In proposed system Discrete Wavelet Transformation are performed on the base frames when DWT is applied in frame images the frame is decomposed into high frequency and low frequency components there is a similarity between these similarity components horizontally, diagonally and vertically. If frame is expressed as $f(x,y)$ then through filter we can define $\sigma(x,y) = \sigma(x)\,\sigma(y)$, then the discrete form of $f(x,y)$ can be expressed as $A_{2j}f = (< f(x,y), \sigma_{2j}(x-2^{-j}n.\ y-2^{-j}m) >)(n,m)\epsilon\ z^2$ then orthogonal projections of $f(x,y)$ using wavelet functions $\Phi_1(x,y)$, $\Phi_2(x,y)$, $\Phi_3(x,y)$ is given as

$2^{-j}\varphi^1_{2j}(x-2^{-j}n, y-2^{-j}m)$

$2^{-j}\varphi^2_{2j}(x-2^{-j}n, y-2^{-j}m)$

$2^{-j}\varphi^3_{2j}(x-2^{-j}n, y-2^{-j}m), (n,m)\epsilon\ z^2$

then the information difference between A_{2j+1} and A_{2j} is expressed as

$D^1_{2j}f = (< f(x,y), \varphi^1_{2j}(x-2^{-j}n.\ y-2^{-j}m) >)(n,m)\epsilon\ z^2, (i=1,2,3)$

Then D^1_{2j} denotes high frequency in vertical direction(HL)

D^2_{2j} denotes high frequency in Horizontal direction(LH)

D^3_{2j} denotes high frequency in both vertical and horizontal direction(HH)

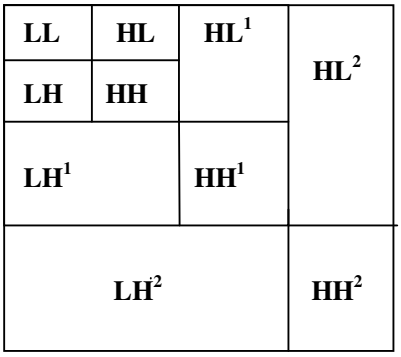

Fig 1

Using the above orthogonal transformations shown in figure 1 the original frame can be decomposed into several frames with different frequencies.

Algorithm For Video Watermark Embedding

As shown in fig 2(a) Watermarking is used for proving ownership rights on the multimedia data but it does not protect it from modification. To ensure the integrity of the watermark we generate hash code on the watermark. The hash code is a fixed size code that satisfies following properties

a) It provides unique code on the given data W as H(W)
b) Hash function is one way i.e., we can generate hash code from data but cannot generate data from hash code
c) For any two different data w1 and w2 the hash code is not same i.e., H(W1)≠H(W2)

Step1:. watermark image W(x ,y) of size p x q generate a 56 bit hash code on the watermark image. G=H(W)

Step 2: Now G is used as the secret key to encrypt the watermark using DES algorithm $E_G(W)$ to generate a binary sequence S.

Step 3: Now generate a secret watermark using $W^1 = W \oplus S$ where $\oplus$ is exclusive OR.

Step 4: Let the base frame be f(x, y) of size m x n , Use the 3-level DWT shown in fig 1 To decompose the frame F into 10 sub bands (LL ,HL,LH, HH, HL^1 ,LH^1 ,HH^1 ,HHL^2,LH^2,HH^2)

Step 5: Assign an initial threshold T to each subbands except LL subbands.

Step 6: Compare all the coefficients with the current threshold and choose those coefficients whose value is greater than the threshold.

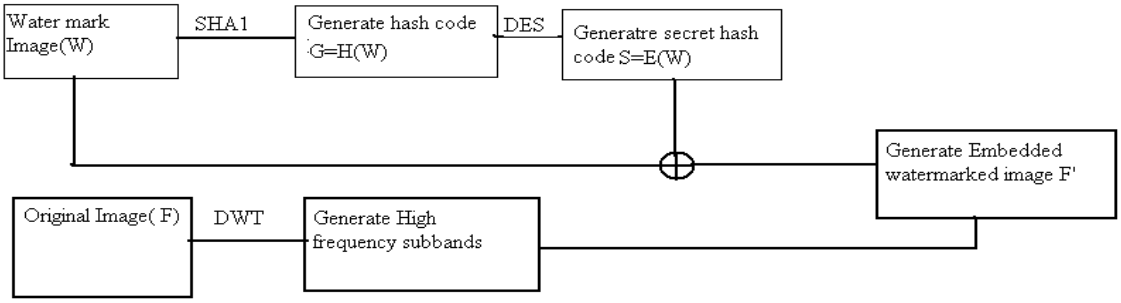

Fig 2(a)

Step 7: if total number of coefficients are less than K where K= p * q (matrix order of secret watermark W^1) update the threshold T

Step 8: Repeat steps 6 and 7 until K coefficients are selected C_1, C_2,… C_k,.

Step 9: Now embed the watermark in the selected coefficients.

$C_i = C_i(1-\acute{\alpha} W^1)$, if $W^1{}_i=0$

$C_i = C_i(1+\acute{\alpha} W^1)$, if $W^1{}_i=1$;

Where ά is scaling factor.

Algorithm for video watermark detecting

As shown in Fig 2(b)To detect the watermark we should have the original watermark .

Step1:. watermark image w(x ,y) of size p x q generate a 56 bit hash code on the watermark image. G=H(W)

Step 2: Now G is used as the secret key to encrypt the watermark using DES algorithm $E_G(W)$ to generate a binary sequence S.

Step 3: Now generate a secret watermark using $W^1 = W \oplus S$ where $\oplus$ is exclusive OR.

Step 4: The inverse 3-level DWT is used to reconstruct the watermarked image W^2 now compare W^1 if they are similar then copy right is proved

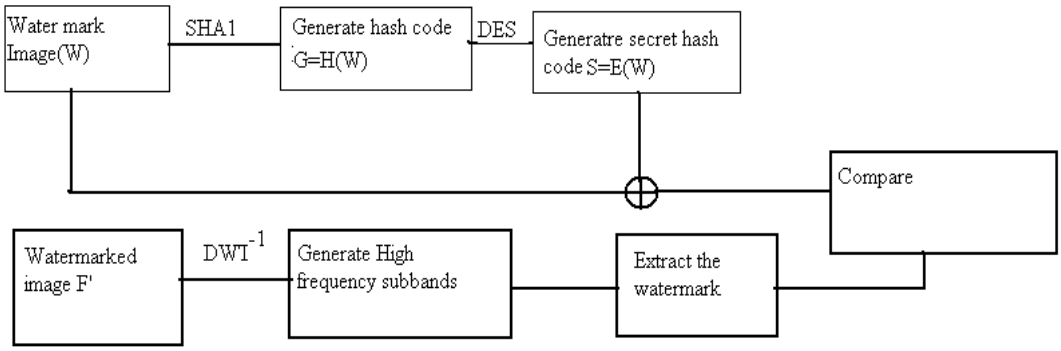

Fig 2(b)

IV . EXPERIMENT AND RESULTS

The Algorithm can be implemented using MATLAB dwt2() method and inverse is done through idwt2()

Fig 3(a) Original frame set

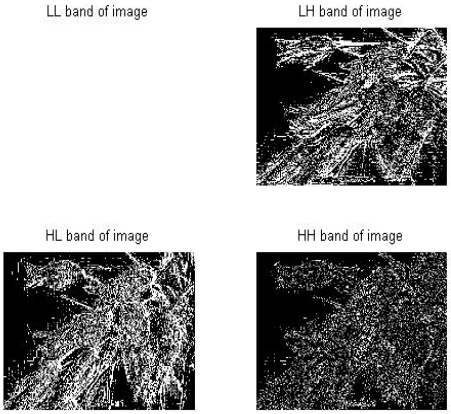

Fig 3(b) Result of DWT on base frame

Fig 3(c) water marked base Frame

V .CONCLUSION

In this paper we proposed a new technique to secure videos and ensure copy right protection on the video. Our technique ensures integrity of the video so that it detects if any modifications are done by unauthorized user. The algorithm used is prone to noise as High subbands are used further enhancement can be done in finding a algorithm that does not allow noise in the base frames. Further, the method need original watermark to verify the watermark that is not desirable.

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