EMBEDDING WATERMARK IN VIDEO RECORDS

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***Abstract*— Multimedia data is easily copied and modified, so necessity for Copyright protection is growing. To provide such protection to the data we are going for watermarking. This is a lifesaver option for the video files in medical field. The goal of this work is to make the patients video records protected and identifiable from other patients records. For this purpose we are going for the methodology(DWT and PCA) to find the best location for hiding the watermark in the video file. Also to ensure that the given data is adaptive to the fps of different cameras. This work is done on live recording and the data are encrypted on the spot. Along with this the adaptive as per camera technique is also used, as the cameras available to the users will not all be the same.**

***Keywords*— Discrete Wavelet Transform,Principal Component Analysis,Encryption,Decryption,Blind Watermarking.**

I. INTRODUCTION

This project gives you an introduction about the image processing and its real time applications. The main idea behind this project is to improve the watermarks and to identify who the owner of the digital data is, but it can also identify the intended recipient. A Watermark on a bank note has a different transparency than the rest of the note when a light is shined on it. However, this method is useless in the digital world. Currently there are a number of techniques for embedding digital watermarks. Basically they all digitally write desired information directly onto images or audio data in such a manner that they are not damaged. Embedding a watermark should not result in a substantial increase or reduction in the original data. Digital watermarks are added to images or audio data in such a way that they are invisible or inaudible or unidentifiable by human eye or ear. Furthermore, they can be embedded in content with a variety of file formats. Digital Watermarking is the content protection method for the multimedia. Visible watermark appears in the video frames either continuously or randomly. It should be partially visible in the video frames, so that the quality of the video is not degraded and also should be difficult and perhaps to remove from the video frames. If someone captures the video using a camera, then the visible watermarks should randomly appear on the frames which the attacker cannot remove easily. Invisible watermark is already been discussed in the previous chapter. Usage of visible and invisible watermark together in a video enhances protection, but a randomly appearing visible watermark scheme disturbs the medical video. So we use only invisible watermark. The medical information is inserted into a text file .This text file is then converted into binary form, according to text file generate a watermark image and then convert the binary image into vector of zeros and ones.

II. PROPOSED SCHEME

A. DCT (DISCRETE COSINE TRANSFORM)

- X= DCT (video/audio input)
- Returns the discrete cosine transform of 'video/audio input'
- Can be referred to as the even part of the Fourier series
- Converts an image or audio block into it's equivalent frequency coefficients
- The DCT transform of an image brings out a set of numbers called coefficients.
- A coefficient's usefulness is dogged by its variance over a set of images as in video's case.
- If a coefficient has a lot of variance over a set, then it cannot be removed without affecting the picture quality

- One-Dimensional DCT Equation

$$Xc(k) = (1/N) \sum_{n=0}^{N-1} Xn \cos(k2\pi n/N),$$

where

k = 0, 1, 2, …, N-1

- Two-Dimensional DCT Equation

$$F[u, v] = 1/N2 \sum_{m=0}^{N-1} \sum_{n=0}^{N-1} f[m, n] \cos[(2m + 1)u\pi/ 2N] \cos[(2n + 1)v\pi/2N]$$

where

u, v = discrete frequency variables (0, 1, 2, …, N - 1),
f[m, n] = N by N image pixels(0, 1, 2, …, N - 1), and
F[u, v] = the DCT result

B. DWT (DISCRETE WAVELET THEOREM)

The wavelet transform (WT) has gained widespread acceptance in signal processing and image compression Because of their inherent multi-resolution nature, wavelet-coding schemes are especially suitable for applications where scalability and tolerable degradation are vital.

Recently the JPEG committee has unconstrained its new image coding standard, JPEG-2000, which has been based upon DWT

Wavelet transform decays a signal into a set of basis functions .These basis functions are called wavelets. Wavelets are obtained from a single prototype wavelet y(t) called mother wavelet by dilations and shifting:

1-D WAVELET TRANSFORM

$$W_f(a,b) = \int_{-\infty}^{\infty} x(t)\psi_{a,b}(t)dt$$

2-D WAVELET TRANSFORM

Converts an input series x_0, x_1, ..x_m, into one high-pass wavelet coefficient series and one low-pass wavelet coefficient series (of length n/2 each)

$$\mathbf{H_i} = \sum_{\mathbf{m=0}}^{\mathbf{k-1}} \mathbf{x_{2i-m}} \cdot \mathbf{s_m(z)} \qquad (1)$$

$$\mathbf{L_i} = \sum_{\mathbf{m=0}}^{\mathbf{k-1}} \mathbf{x_{2i-m}} \cdot \mathbf{t_m(z)} \qquad (2)$$

where $s_m(Z)$ and $t_m(Z)$ are called wavelet filters, K is the length of the filter, and i=0, ..., [n/2]-1. In practice, such transformation will be applied recursively on the low-pass series until the preferred number of iterations is reached

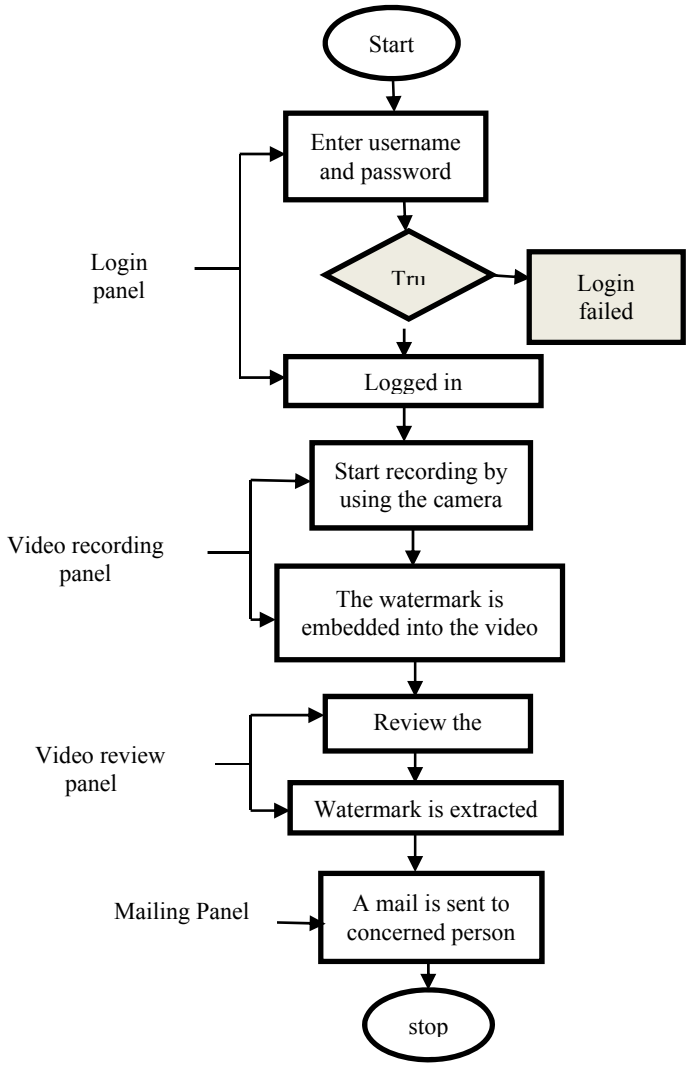

Fig 1. Flow chart representation for embedding watermark in video records

C. PRINCIPLE COMPONENT ANALYSIS

Principle Component Analysis is the process by which the exact location for embedding the watermark is found. More specifically we use the concept of block based PCA, where each frame is divided into blocks and then PCA is applied so that finding the exact location becomes and easier process.

D. PSNR CALCULATION

PSNR stands for Peak Signal to Noise Ratio. This is used in the checking the quality of the video before and after embedding the watermark into it. Since the existing work is based on the techniques of matlab, there are straight formulae that can be implemented for the calculation of PSNR. For PSNR the Mean Square Error (MSE) should be initially calculated. The formula is given as

$$MSE = \frac{1}{MN}\sum_{i=1}^{M}\sum_{j=1}^{N}[I(i,j) - I'(i,j)]^2$$

Where,
M,N = size of the frame
I(i,j) , I'(i,j)= pixel values at the location (i,j) of the original and watermarked frames.

The PSNR is defined as:

$$PSNR = 10\log_{10}\frac{255^2}{MSE}$$

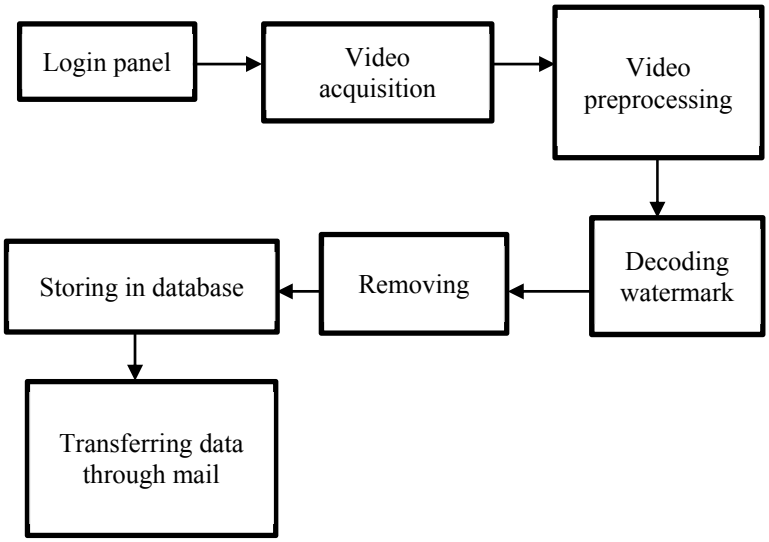

Fig. 2. Flow Process for Removing and transfer the watermark Templates

III. RESULT

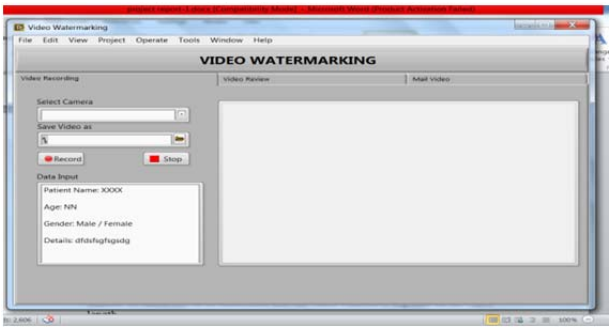

Fig. 3. Video Recording Panel

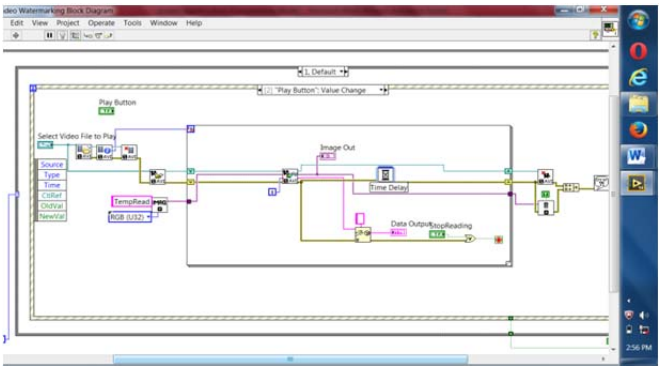

Fig. 4. Video Acquisition

Fig. 5. Watermark embedded in video

IV. CONCLUSION

The algorithm being used is discrete wavelet transform in conjunction with principle component analysis transform.

The resultant video is obtained without any rendering loss and any loss in clarity.

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