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Paper Authors

*** CH.SURESH, M.VENKATARAO, SURESH.BOJJA.**

* Dept of ECE, Amrita sai Institute of Science and Technology.

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DIGITAL VIDEO WATERMARKING BY PAC AND DISCRETE COSINE TRANSFORM

CH.SURESH[1], M.VENKATARAO[2], SURESH.BOJJA[3]
[1]Assistant Professor, Dept of ECE, Amrita Sai Institute of Science and Technology, Paritala,Krishna,Andrapradesh,India
[2]Assistant Professor, Dept of ECE, Amrita Sai Institute of Science and Technology, Paritala,Krishna,Andrapradesh,India
[3]Associate Professor, Dept of ECE, Amrita Sai Institute of Science and Technology, Paritala,Krishna,Andrapradesh,India
suresh.chaparala89@gmail.com m.venkatrao1185@gmail.com surem9@gmail.com

1.ABSTRACT

Due to the extensive use of digital media applications, multimedia security and copyright protection has gained tremendous importance. Digital Watermarking is a technology used for the copyright protection of digital applications.In this paper, a comprehensive approach for watermarking digital video is introduced. We propose a hybrid digital video watermarking scheme based on Discreet Cosine Transform (DCT) and Principal Component Analysis (PCA). PCA helps in reducing correlation among the wavelet coefficients obtained from wavelet decomposition of each video frame thereby dispersing the watermark bits into the uncorrelated coefficients. The video frames are first decomposed using DCT and the binary watermark is embedded in the principal components of the low frequency wavelet coefficients. The imperceptible high bit rate watermark embedded is robust against various attacks that can be carried out on the watermarked video, such as filtering, contrast adjustment, noise addition and geometric attacks

I. INTRODUCTION

The popularity of digital video based applications is accompanied by the need for copyright protection to prevent illicit copying and distribution of digital video. Copyright protection inserts authentication data such as ownership information and logo in the digital media without affecting its perceptual quality. In case of any dispute, authentication data is extracted from the media and can be used as an authoritative proof to prove the ownership. As a method of copyright protection, digital video watermarking has recently emerged as a significant field of interest and a very active area of research. Watermarking is the process that embeds data called a watermark or digital signature into a multimedia object such that watermark can be detected or extracted later to make an assertion about the object. The object may be an image or audio or video. For the purpose of copyright protection digital watermarking techniques must meet the criteria of imperceptibility as well as robustness against all attacks for removal of the watermark. Many digital watermarking

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schemes have been proposed for still images and videos . Most of them operate on uncompressed videos, while others embed watermarks directly into compressed videos . The work on video specific watermarking can be further found in. Video watermarking introduces a number of issues not present in image watermarking. Due to inherent redundancy between video frames, video signals are highly susceptible to attacks such as frame averaging, frame dropping, frame swapping and statistical analysis.

2. PRINCIPAL COMPONENT ANALYSIS

Principal component analysis (PCA) is a mathematical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of uncorrelated variables called principal components. The number of principal components is less than or equal to the number of original variables.

PCA is a method of identifying patterns in data, and expressing the data in such a way so as to highlight their similarities and differences. Since patterns in data can be hard to find in data of high dimension, where the advantage of graphical representation is not available, PCA is a powerful tool for analyzing data. The other main advantage of PCA is that once these patterns in the data have been identified, the data can be compressed by reducing the number of dimensions, without much loss of information. It plots the data into a new coordinate system where the data with maximum covariance are plotted together and is known as the first principal component. Similarly, there are the second and third principal

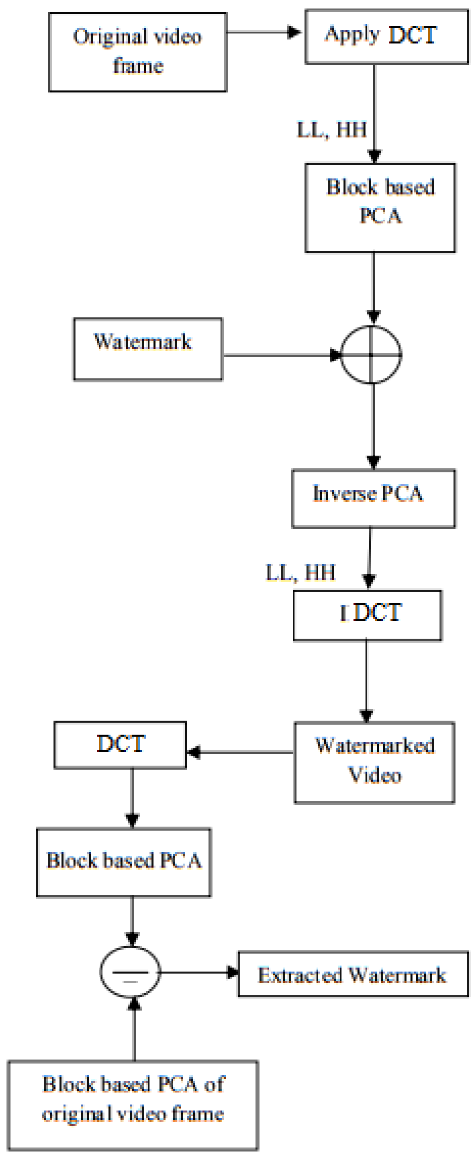

Fig 1:Shows the implementing Method

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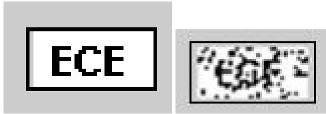
3. EXPERIMENTAL RESULTS

The proposed algorithm is applied to a sample video sequence 'Lake.wmv' using a 32 × 32 watermark logo. The grayscale watermark is converted to binary before embedding. Fig. 2(a) and 2(b) show the original and the watermarked video frames respectively. Fig. 4(a) is the embedded watermark and Fig. 4(b) is the extracted binary watermark image. The performance of the algorithm has been measured in terms of its imperceptibility and robustness against the possible attacks like noise addition, filtering, geometric attacks etc.

(a)

(b)

Fig2:(a)Original Image (b)water marked Image



(a) (b)

Figure 3. (a) Original watermark (b) Extracted binary watermark

Figure 4. Video frame after addition of Gaussian noise

Figure 5. Video frame after addition of 'salt and pepper' noise

Figure 7.Video frame after rotation by 35 degrees.

TABLE I. RESULT ANALYSIS

Attack	PSNR	NC
GAUSSIAN NOISE	32.1564	0.7161
SALT & PEPPER NOISE	26.4592	0.6848
CROPPING	30.3373	0.6841
ROTATION	29.8256	0.751

5. CONCLUSION

The algorithm implemented using DCT-PCA is robust and imperceptible in nature and embedding the binary watermark in the low LL sub band helps in increasing the robustness of the embedding procedure without much degradation in the video quality. As a future work the video frames can be subject to scene change analysis to embed an independent watermark in the sequence of frames forming a scene, and repeating this procedure for all the scenes within a video.

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