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Video watermarking Algorithm Using K-harris feature point detection

Upasna Garg

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ABSTRACT
This paper represents watermarking technique to conceal a secret and personal message to protect a product's copyright or to demonstrate its data integrity.Here,we propose two blind,imperceptible and robust video watermarking algorithms based on K harris point detection-Singular Value Decomposition (SVD) .Watermarking is done on the original video frame. As a result, the watermark is robust to a wide variety of attacks. To evaluate the performance of the proposed watermarking scheme, experiments have been conducted on various standard 8-bit grayscale frames of size 3*3 matrices .Video-watermarking method with results is applied with original video and prepared video from original video for water-marking. . The experimental results (show that the proposed scheme preserves not only the high perceptual quality, but also is robust against various attacks. This research can be continuous by applying the new developed watermarking scheme to specific environment or application and examine its usefulness.

I. INTRODUCTION

In today technology, Internet and compression technology permit the widespread use of multimedia applications. In these days, digital documents can be sent via the World Wide Web to a large number of people in a cost-effective way. security of multimedia data, especially its copyright, attracts more and more attention. There is a strong need to keep the distribution of digital multimedia works both profitable for the owner and reliable for the customer. A watermark technique is a digital based code fixedly embedded into a cover content, in case of this thesis, into a video sequence. A watermark can pick any data or information you can consider but the amount of the data or information is limited. The more data or information a watermark pick, the more vulnerable that information or data is. Anyway, the amount is not absolutely un-limited by the size of particular video sequence. Watermarking prefers for robustness to capacity, thus a watermark especially carries tens to thousands of hidden information bits per one video frame.

VIDEO WATERMARKING

Video watermarking is relatively a new technology that has been proposed to solve the problem of illegal manipulation and distribution of digital video. It is the process of embedding copyright information in video bit streams. Video watermarking approaches can be classified into two main categories based on the method of hiding watermark information bits in the host video. The two categories are: Spatial domain watermarking, and transform-domain watermarking. In spatial-domain watermarking techniques, embedding and detection are performed on spatial pixels values or on the overall video frame.

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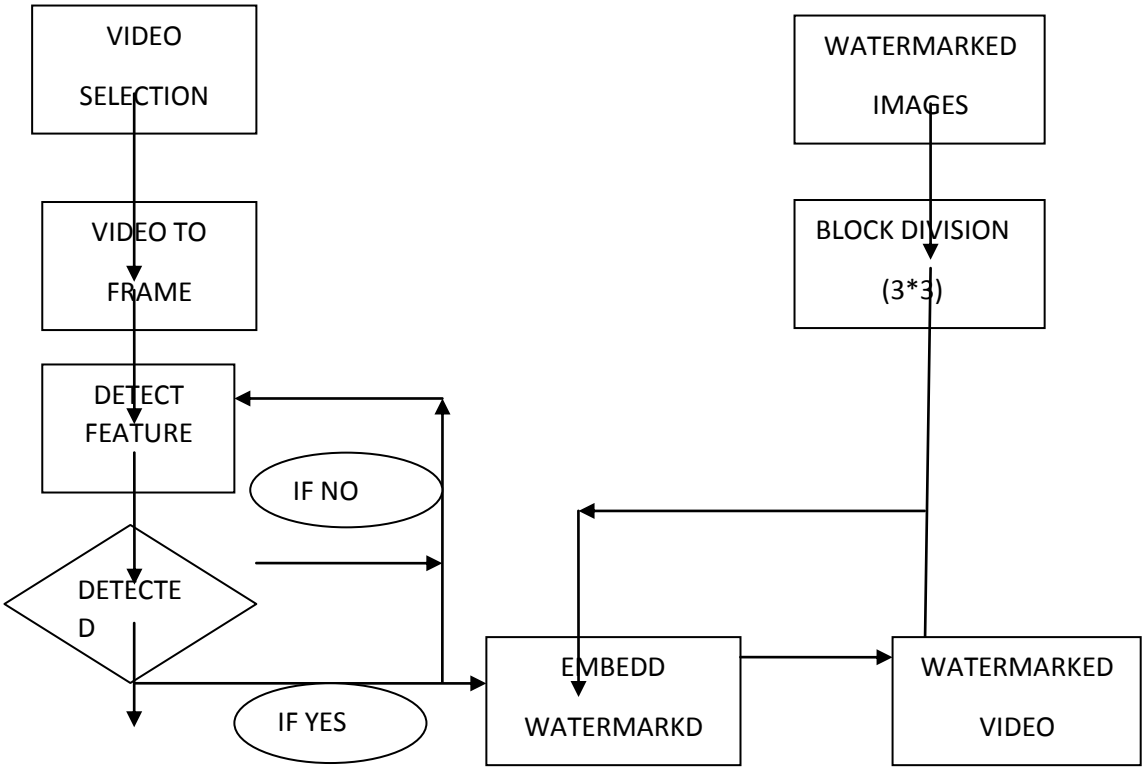

Figure 3.1:Block diagram for video watermark Embedding Algorithm

K-Harries Point Detector

The results of these studies prove the Harris detector is the most stable. The commonly used Harris corner detector refines the detection function by using the following shape factor-based matrix.

$$M(x,y)= \begin{pmatrix} A_{x,y} & C_{x,y} \\ C_{x,y} & B_{x,y} \end{pmatrix} = \begin{pmatrix} \left[\frac{\partial I(x,y)}{\partial x}\right]^2 & \left[\frac{\partial I(x,y)}{\partial x}\right]\left[\frac{\partial I(x,y)}{\partial y}\right] \\ \left[\frac{\partial I(x,y)}{\partial x}\right]\left[\frac{\partial I(x,y)}{\partial y}\right] & \left[\frac{\partial I(x,y)}{\partial y}\right]^2 \end{pmatrix}$$

where I(x, y) is the gray level intensity in x-axis and y-axis,The corner points are located at the positions with large corner response values, which are determined by the corner response function R(x, y):

$R(x, y)=(\det(M(x,y))-k[\text{trace}M(x,y)]^2 = (A_{x,y}B_{x,y} - C_{x,y}{}^2) - k\,[A_{x,y} + B_{x,y}]^2$ where k is a constant that is set to be 0.04.

RESULTS DERIVED

Mean Square Error (MSE)

Mean Square Error between original video and watermarked video is calculated as follows:

$$\text{MSE} = \frac{1}{\text{size of image}} \sum_{i,j} [\text{Original Image} - \text{Watermarked Image}]^2$$

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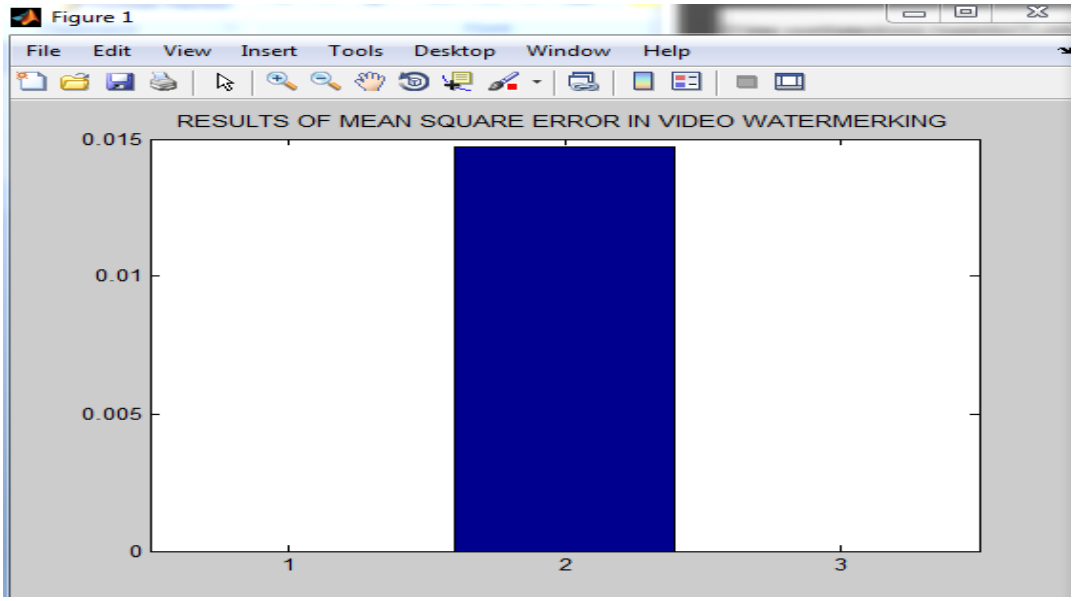
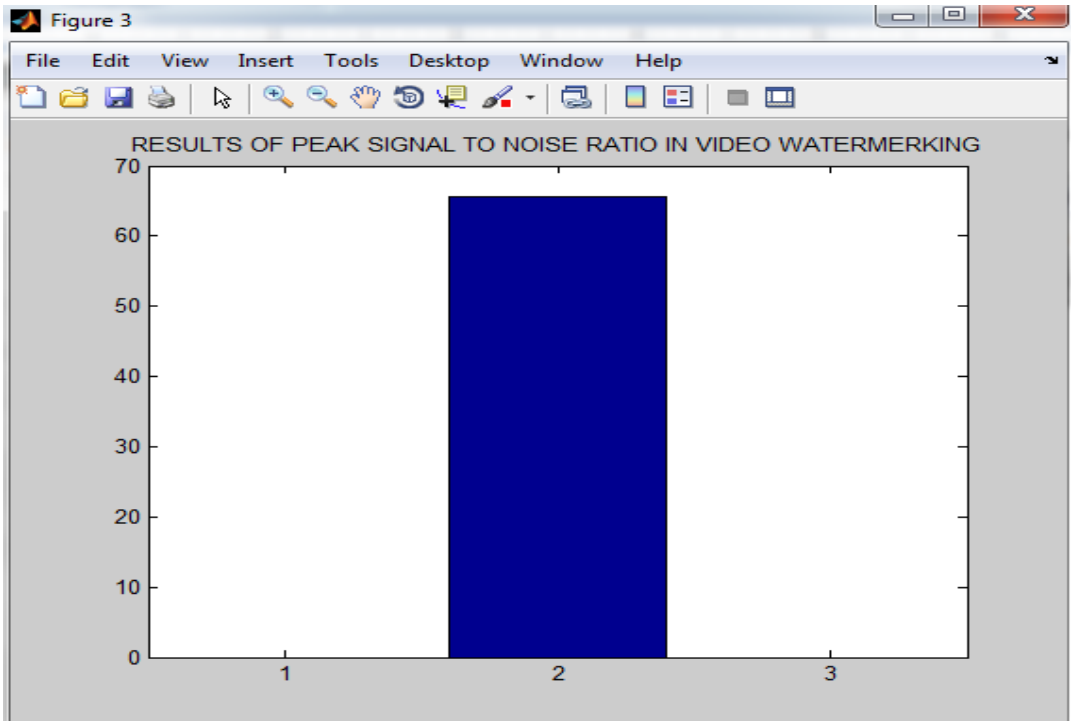


Peak Signal to Noise Ratio (PSNR)

PSNR is calculated between the original and watermarked video. Larger the PSNR value, more similar is watermarked video to the original video. The video quality metric is defined in decibels as:

$$PSNR = 10 \log_{10} \frac{255*255}{MSE}$$



Bit Error Rate (BER)

The performance metric is suitable for random binary sequence watermark. The parameter is defined as ratio between numbers of incorrectly decode bits and length of the binary sequence. BER indicates probability of incorrectly decoded binary patterns. It is defined as follows:

$$BER = \frac{\text{No.of incorrectly decoded bits}}{\text{Total no.of bits}}$$

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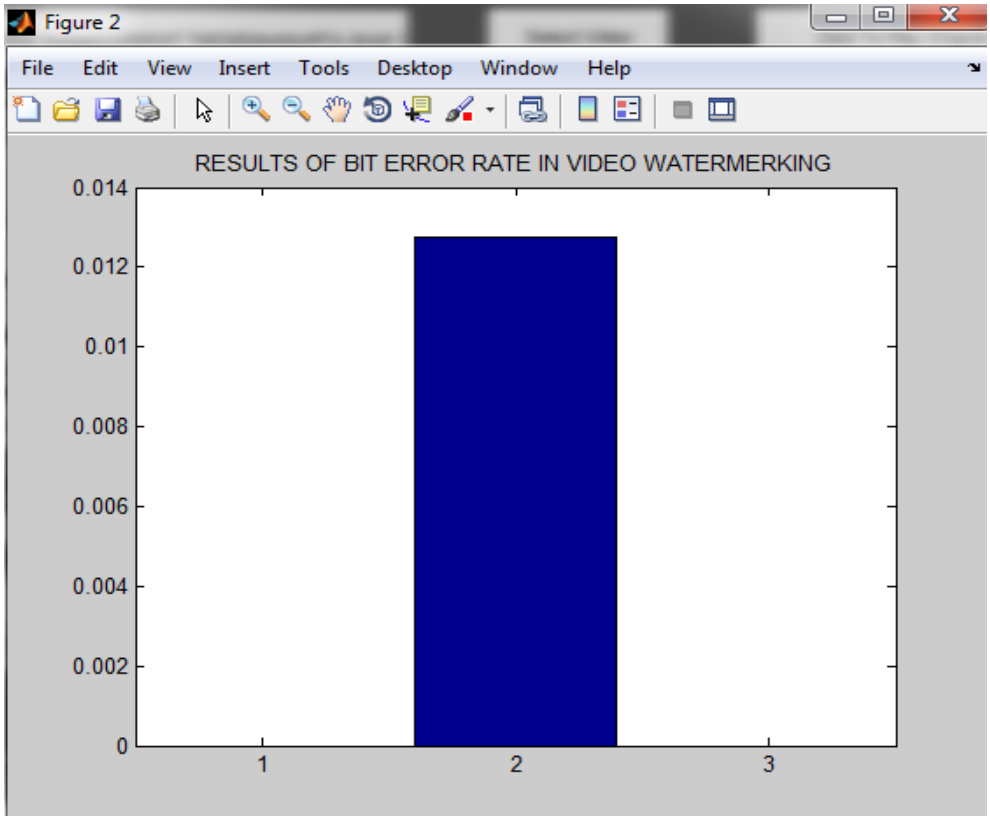
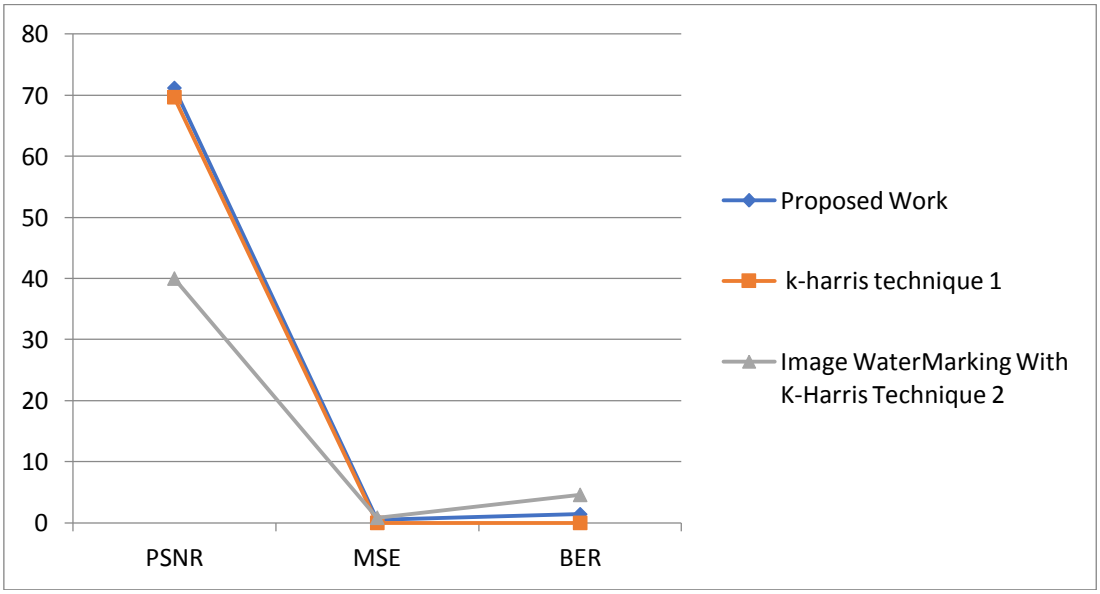


II. CONCLUSION

Applying K-harris method to video watermarking is beneficial to locate the embedding frame index and coordinates, which improves the robustness resisting against both spatial and temporal attacks efficiently. Watermarking is a copyright protection system that allows tracking back illegally produced copies of the protected multimedia content. Compared with other copy protection systems like Digital Rights Management, the main advantage of watermarking is that the watermark is embedded permanently in visual data of the content but at the cost of slight loss in fidelity.



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	Our Work	k-harris technique1	k-harris technique2
PSNR	71.1852	69.6811	40
MSE	0.0103	0.0147	0.85
BER	0.0071	0.0127	4.6

PSNR is calculated between the original and watermarked video. Larger the PSNR value, more similar is watermarked video to the original video. In our thesis PSNR Value is 71.1852 that is more than the base papers as we use three images in our thesis.

The performance metric is suitable for random binary sequence watermark.Theparameteris defined as ratio between number of incorrectly decode bits and length of the binary sequence.

as we see BER in less than other two base paper values as we use three images.

Mean Square Error between original video and watermarked video is calculated as follows:

$$\text{MSE} = \frac{1}{\text{size of image}} \sum_{i,j} [\text{Original Image} - \text{Watermarked Image}]2$$

as we see MSE in less than other two base paper values as we use three images.