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A SURVEY ON VARIOUS TECHNIQUES AND FEATURES OF DIGITAL VIDEO WATERMARKING

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Abstract: - With the increase in the internet digital world is growing rapidly in large scale. As the digital data is made easy to transfer from one place to another. This easy movement of data lead to big issue of the copyright or the originality of the digital data for all this there watermarking authentication technique has been developed, In order to provide watermarking for different digital data like image, audio, video, etc. various techniques has been develop. This paper give different requirement, features for video watermarking. As hiding data is watermarking but it goes under some kind of attacks which are also cover in this paper as they are the best measure for comparing different techniques of watermarking.

Index Terms: Digital Watermarking, Image segmentation.

I. INTRODUCTION

Digital water marking is a kind of information or data hiding process by this digital data authentication is provided. This can be understand as the ease of transfer of the data from one place to another is so fast and flexible that manipulation of the original content might possible, so it might get difficult for the user or the end party that the content it using is original or not. In order to provide some procedure for checking the originality of the digital content this technique of digital watermarking has been developed. Now some important parameters which should be taken care is to balance the hiding content into the original one. This can be understand as if the original content is overload by the hiding content then chance of the original content loss is more.

So watermarking techniques has to care a lot for the complete authentication of the originality as well as without affecting the data. Whole process of authentication is done in two steps

First is embedding Algorithm here the watermark is embedded on the original content which may be image, video, etc. and watermark is any data or image, sometime key is required for embedding.

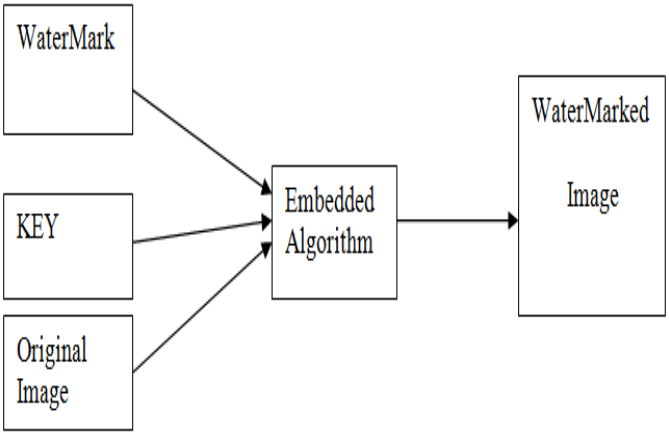

Fig.1. Embedding of watermark

Other step is the Extraction of watermark from the received data, now if the receiver extracts water mark and that is same as the original one then received data is authentic otherwise it is unauthentic.

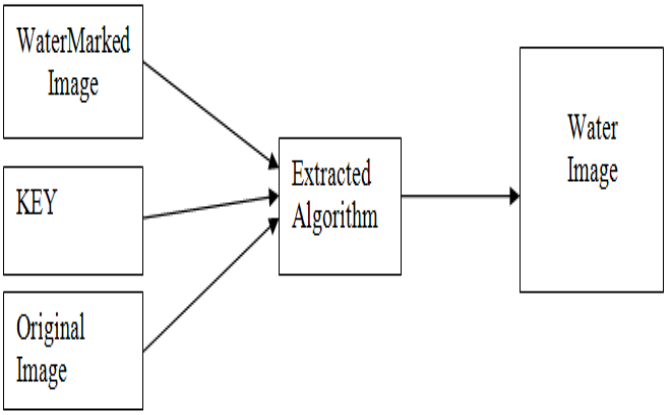

Fig.2 Extraction process.

For a watermark to be effective, it should satisfy the following features. Unobtrusive, Robustness, Subterfuge attacks, etc.

II. Digital Image Watermarking Classification and Attacks

Some of the important types of watermarking based on different watermarks [3] are given below:

2.1 Visible watermarks

This type of watermarking resembles the concept of the logos on different item to specify the product. Now these are visible in the whole data such as in case of video one constant light background or presence of logi in the video

act as visible digital video watermarking, then in case of image a kind of figure appear in the image but it is not the part of the image.

2.2 Invisible watermark

In this type of watermarking watermark data is hide in the original data. This can be understand as some frame part which are constantly changing are those part where if small changes are made then those part is not detectable of the presence of the unrelated content so it cannot be judge by the naked eyes. This kind of watermark is known as invisible watermarking.

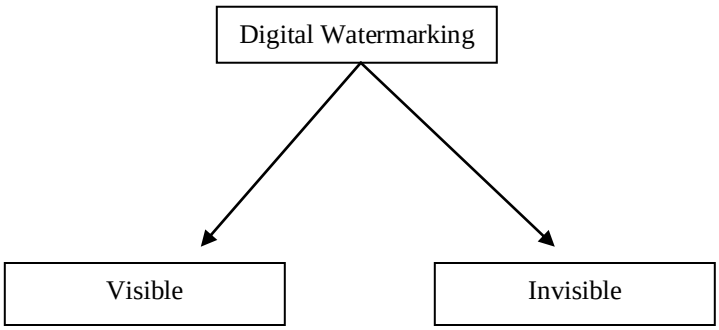

Fig. 3 Different types of watermarking methodologies.

III. Feature for Video Water Marking

Different features for object detection: - as video is collection or sequence of frame and each frame is treat as single image which is a kind of matrices. In order to identify an object in that image some features need to be maintained as different object have different feature to identify them which are explain as follows:

Colure feature: - each frame in a video file is an image and image is a matrix of light intensity values, these intensity values represent different kind of colures. so to an identify an object colure is an important feature, one important property of this feature is low computation cost .

The desired object has its own colure which can be store in a matrix and compare it with different block of an image to detect an object .with the help of Gaussian mixture model and colure feature one can easily identify object frame the back ground of different sequential frame of a video.

Different video files available in different color formats like images have different colure format ranging from RGB which stand for red, green, and blue. This is a three dimensional representation of a single image in which two dimensional three matrix is present for each color of red, green and blue. In order to make intensity calculation for each pixel gray format is use, which is a two dimension values range from 0 to 255. In case of binary format which is a black and white color matrix whose values are only 0 or 1. With the help of this color feature face has been detected efficiently in [8].

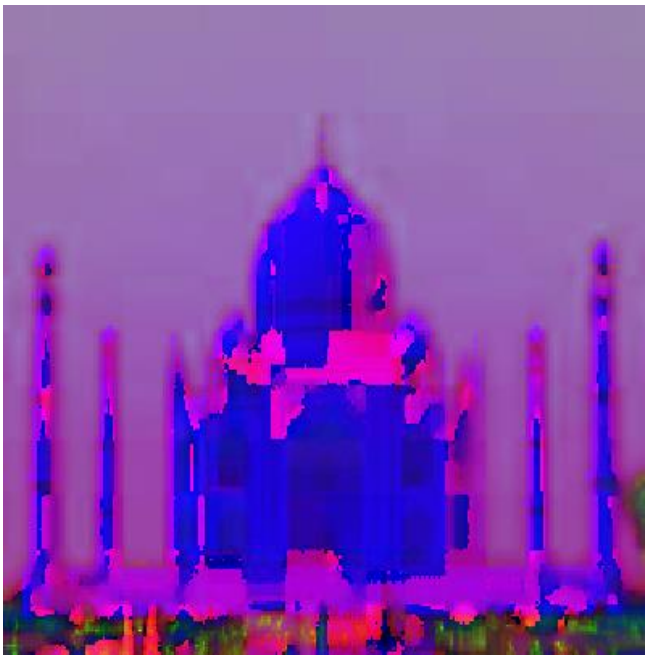

Fig. 4 Represent the HSV (Hue Saturation value) format of an image.

Edge Feature: As image is a collection of intensity values, and with the sudden change in the values of an image one important feature arises as the Edge. This feature is use for different type of image object detection such as building on a scene, roads, etc. [5]. There are many algorithm has been developed to effectively point out all the images of the image or frames which are Sobel, perwitt, canny, etc. out of these algorithms canny edge detection is one of the best algorithm to find all possible boundaries of an images, this is shown in fig.

Fig. 5 Represent Edge feature of an image.

Texture Feature: Texture is a degree of intensity difference of a surface which enumerates properties such as regularity and smoothness. Compared to color space model, texture requires a processing step. The texture features on the basis of color are less sensitive to illumination changes as same as to edge features.

Corner Feature: In order to stabilize the video frames in case of moving camera it require the difference between the two frames which are point out by the corner feature in the image or frame. So by finding the corner position of the two frames one can detect resize the window in original view. This feature is also use to find the angles as well as the distance between the object of the two different frames. As they represent point in the image so it is use to track the target object.

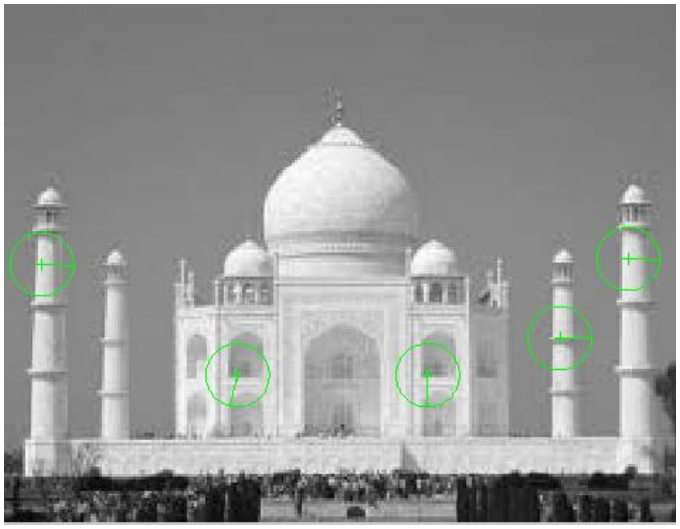

Fig. 6 Represent the corner feature of an image with Red point.

DWT (Discrete Wavelet Transform):

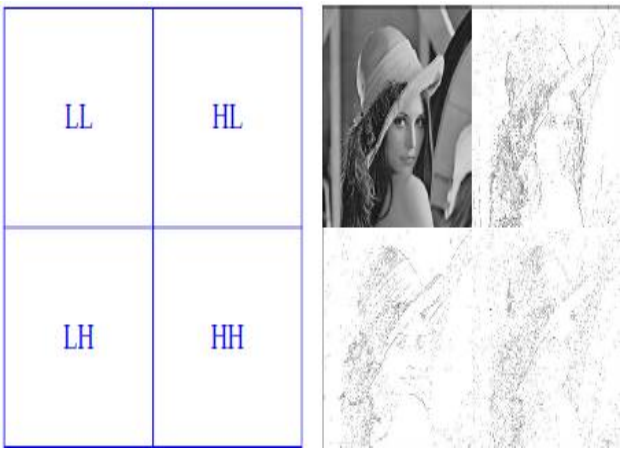

Fig. 7 DWT of lena image from [5]

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In this feature frame is partition into four part as per the output of the low and high pass filter. Here first quadrant contain the pixels having flat region while second quadrant contain pixels having vertical direction while third quadrant contain pixels with horizontal direction last the fourth quadrant contain regions having diagonal pixels.

IV. Video Watermarking Techniques

In [1] Video Watermarking is done with empirical PCA-Based Decoding, here whole video is divide into different scenes then each frames are divide into blocks where combine blocks of that scene frames are considered as the qube. Now each qubes of the scene are analyze for qube selection in order to hide the watermark in the video. Once qube get select then with the help of 2-DWT and then PCA is applied for the insertion of watermark bits in the qube. This process is repeat with all the selected qubes. In case of De-Coding or extraction reverse process is applied as whole received video is divide into frames then scene are analyze then select qube and retrieve the watermark bit from it.

In [3] Digital Video Watermarking Technique is applied, which is Based on Identical Frame Extraction in 3-Level DWT. Here whole video is divide into sequence of frames then each similar sequence of frames are consider as the video shots, after this frames are convert into RGB format and then in the blue matrix of the frame 3-level DWT is apply. The matrix obtained after the third level of the horizontal part is utilized to store or embedded the watermark. After this inverse video watermarking is applied then put that frame in the same sequence and make the video in original form.

In [8] digital video watermarking is done using modified LSB and DCT technique. Here divide video into frames and select the watermark image Watermark each frame using LSB Technique. Then simultaneously watermark each frame using DCT Technique.

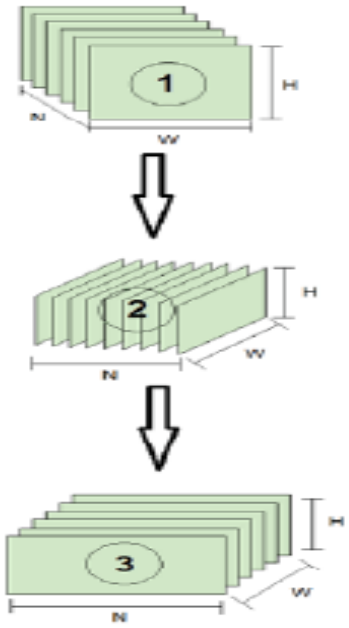

Fig. 8 from [2] side view conversion of video frames

In [2] video watermarking process is done using side view. Here all frames are retrieve from the video then hold the side view of the frame and applied DWT on the side view. After this apply the Singular Value Decomposition (SVD) in the horizontal part of the DWT then embedded the watermark in this part and reconstruct the video frame in reverse order.

In [9] one more algorithm has develop using the PCA and DWT technique. Here divide the video frame and convert RGB frames in to YUV components. Then for each frame, choose the luminance Y component and apply DWT to decompose the Y frames in to four multi-resolution sub bands LL,HL,LH,HH. After this divide the two sub bands LL and HH in to n x n non overlapping blocks and apply PCA to each block in the chosen sub band LL and HH. Now embedded the watermark in to LL and HH bands with the help of DWT and PCA for HH band, the watermark bits are embedded. At last apply inverse PCA on the modified PCA component of the two -bands to obtain modified wavelet coefficient.

In [10] work has increased the proprietorship property of the digital world. In this paper comparison of two approaches was done. Here first is frequency based approach while second is spatial based. Embedding is done in the specific HL and LH band of the DWT, as movement in these bands does not make more effect in the object movement. As some of attacks play vital role which make extraction losses. Here comparison shows that hiding in frequency domain is more robust as compare to spatial against compression, filter, etc.

In [11] watermarking of data in video frames is done by scrambling then selected scene of the video are utilize to hold embedded data. This algorithm also utilizes the spatial technique for placing watermark information in the least significant bit position of the frame. Selection of scene for embedding help in making robust algorithm for the various attacks like time frame rearrangement, compression etc.

In [12] frequency based watermarking is used where DCT and DWT technique is use for the selection of pixel region. As data is hide in the video so large room is available for embedding the information. Here PSNR value is highly increases.

V. Watermark Attacks

As video move from one place to another by a network. So movements of video make various changes in the original data. So it is required that watermarking or data hiding technique should be robust against various attacks which is describe in following points.

Noise Attack: This is very common problem in the transfer channel where information is sending in the data consist of some other information. So merging with other data cause small change in data which is term as noise in the original signal. In experiment different noise producing function is use for adding these noise in the data such as: Gaussian Noise Attack, Salt&Pepper Noise, Speckle Noise Attack, etc.

Filter Attack: In this type of attack as different servers act as the mediator for passing the information from sender to receiver end so filter use in those server make few changes in the data. This is term as filter attack. In experiment same type of attack is done by applying the filters such as average filter, motion filter, sharpen filter, etc. [6, 7].

Compression Attack: In various cases when data is compress for different requirement information hide in the video get loss. So algorithm should be protective against such type of compression attacks. Sometime due to change in video format different compression algorithm use different frame compression technique [7]. Some filtering attacks are: MP4compression, MPEG compression, etc.

Scene Swapping: This is count as temporal attack where video frame are swap with its own frame. In this type of attack correlation between the watermark extraction get loss and extracted frame get highly affected so watermarking algorithm which was depend on frame sequence is not robust against this attack.

VI. CONCLUSION

In this study the existing watermarking techniques and their requirements are studied in detail. Based on human perception view, watermarking process is classified into two broad categories. Strength and weakness for all the watermarking techniques are studied. Generation of novel hybrid techniques is essential to meet out the various attacks.

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