Secure Digital Media Transmission for Image and Video Using Dual Layer Watermark Technique

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Abstract : ***Now a days there has been increase in the user of multimedia with this increase in number of users so many security issues are also been increased but this should not be the concern in this digital era but we only need to focus on the transmission of digital media with having great secure environment. We also focus on the other issue related to watermarking that is owner identification and copyright protection. So in this paper we introduce a best approach for making our digital transmission as well as the owner identification and copyright protection. Two layers of the watermarking technique means that we apply one watermarking technique at first step and the second watermarking technique at second step. After applying first step it will be secure but on applying second technique it will be more secure. We have got so many watermarking techniques exists we applied pixel transformation and wavelet transformation as the two layers in our research. We have introduced this to make this work actually effective and reliable and these parameters are verified by experiments.***

IndexTerms - **Pixel w**atermarking, wavelet watermarking, video frames Embed and Extraction, copyrights, Owner identication.

I. INTRODUCTION

WWW have now revolutionized the high speed intenet and computer networks so the use of the same thing would also increase day by day dur to this wide pread and accessibility very much possibilities that there can be many numbers of copies are created illegally with huge amount. Nobody even know how is this copies are so spreads how to save this. This is why so many solution have been introduced by so many researches and scientists the basic techniques is watermarking which has again many parts and classified into many categories which are also mentioned in this paper in brief. A watermark is a digital data embedded in multimedia objects such that the watermark can be detected or extracted at later times in order to make an assertion about the object. The main purpose of digital watermarking is to embed information imperceptibly and robustly in the host data. Typically the watermark contains information about the origin, ownership, destination, copy control, transaction etc. Potential applications of digital watermarking include transaction tracking, copy control, authentication. legacy system enhancement and database linking etc. [2].Growing popularity of video based applications such as Internet multimedia, wireless video, personal video recorders, video-on-demand, set-top box, videophone and video conferencing have a demand for much higher compression to meet bandwidth criteria and best video quality as possible. Different video Encoder Decoders (CODECs) have evolved to meet the current requirements of video application based products. Among various available standards H.264 / Advanced Video Codec (AVC) is be coming an important alternative regarding reduced band width, better image quality in terms of peak-signal-to-noise-ratio (PSNR)and network friendliness [26], but it requires higher computational complexity.

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II. LITERATURE SURVEY

As per Anita this paper deals to review a watermarking coding and decoding technique for image security. Here DWT technique is used for coding because of DWT have wide range of functionalities. Two images are considered, one as a host image and second as a watermark image. Then the extraction of image is done to get back the watermark image. This all is done under DWT technique. This paper simply reviews the DWT Technique , its enhancement, its challenges and also result analysis on MATLAB tool by calculating PSNR, SSIM and SSR values of extracted image.

As per Deepshikha Chopra In recent years, internet revolution resulted in an explosive growth in multimedia applications. The rapid advancement of internet has made it easier to send the data/image accurate and faster to the destination. Besides this, it is easier to modify and misuse the valuable information through hacking at the same time. Digital watermarking is one of the proposed solutions for copyright protection of multimedia data. A watermark is a form, image or text that is impressed onto paper, which provides evidence of its authenticity. In this paper an invisible watermarking technique (least significant bit) and a visible watermarking technique is implemented. This paper presents the general overview of image watermarking and different security issues. Various attacks are also performed on watermarked images and their impact on quality of images is also studied. In this paper, Image Watermarking using Least Significant Bit (LSB) algorithm has been used for embedding the message/logo into the image. This work has been implemented through MATLAB.

According to Maninder Kaur The rapid growth in the area of networking made the exchange of data easy over internet but with this the risk of tampering of data, illegal copying and other security issues also increases. This arise needs of providing security to data. Cryptography, digital watermarking and steganography are all methods to secure data transmitting over internet. In this paper digital watermarking and some of the recent techniques based on Least Significant Bit (LSB) watermarking which are used to protect data against various attacks are discussed.

According to Puneet Kr Sharma The rapid advancement of internet has made it easier to send the data/image accurate and faster to the destination. But this advantage is also accompanied with the disadvantage of modifying and misusing the valuable

information through intercepting or hacking.So In order to transfer the data/image to the intended user at destination without anyalterations or modifications, there are many approaches like Cryptography, Watermarking and Steganography. This paper presents the general overview of image watermarking and different security issues. In this paper, Image Watermarking using Least Significant Bit (LSB) algorithm has been used for embedding the message/logo into the image. This work has been implemented through

MATLAB

As per Tanmoy SARKAR Digital watermarking is the act of hiding information in multimedia data, for the purposes of content protection or authentication. In ordinary digital watermarking, the secret information is embedded into the multimedia data (cover data) with minimum distortion of the cover data. Due to these watermarking techniques the watermark image is almost negligible visible

Video watermarking applications can be grouped as security related like Copy control [18], fingerprinting, ownership identification, authentication, taper resistance etc. or value added applications like legacy system enhancement, database linking [1], video tagging, digital video broadcast monitoring[19], Media Bridge [20] etc. Apart from robustness, reliability, imperceptibility, practicality, and video watermarking algorithms should also address issues such as localized detection, real time algorithm complexity, synchronization recovery, effects of floating point representation, power dissipation etc [17]. According to the working domain, video watermarking techniques are classified in pixel domain and transform domain techniques. In pixel domain the watermark is embedded in the source video by simple addition or bit replacement of selected pixel positions. The main advantages of using pixel domain techniques are that they are conceptually simple to understand and the time complexity of these techniques are low which favor real time implementations. But these techniques generally lacks in providing adequate robustness and imperceptibility requirements. In transform domain methods, the host signal is transformed into a different domain and watermark is embedded in selective coefficients. Commonly used transform methodologies are discrete cosine transformation (DCT) and discrete wavelet transformation (DWT). Detection is generally performed by transforming the received signal into appropriate domain and searching for the watermarking patterns or attributes. The main advantage of the transformed domain watermarking is the easy applicability of special transformed domain properties. For example, working in the frequency domain enables us to apply more advanced properties of the human visual system (HVS) to ensure better robustness and imperceptibility criteria.

- Spread spectrum (SS) based watermarking technique was proposed in [11]. In the basic algorithm each bit of watermark }1,1{, -∈ aa is spread over a large number of chips)(cr and modulated by a binary pseudo-noise sequence ,ijjp }1,1{-∈ p . The video and watermark are represented as vectors and scaled addition is carried out for I watermark insertion. The retrieval of the watermark is carried out by high-pass filtering followed by correlation based method. The robustness of the algorithm can be s (variance of pseudorandom sequence), or increased by increasing cr, a2pμ (mean of locally adjustable amplitude factor). But increases incr reduces the data rate of the scheme, where as increases in μ results imperceptibility of the watermark. s or 2pa.

- A 2D spread spectrum method for video watermarking just another watermarking system, JAWS) was proposed in [19], which is used for monitoring video data transmitted over different broadcast links. This pixel domain watermarking scheme is distinctive for its enhanced payload capabilities and shift invariance.

- As DCT is a linear transformation and watermark is independent of the picture, the watermark can be added in the DCT domain. The 1D watermark vector is rearranged into frame structure and by transforming it to88× DCT domain; the watermark can be added directly to a partially decoded video stream. Since the size and transfer rate of water marked video should be identical to the original video, DCT coefficients of watermark and video frame are combined only if the resulting VLC code is of same length of the original one. Again drift compensation is required to cancel out watermark components from P and B frames, as motion compensated prediction or interpolation from other frames are added by the decoder to construct the P and B frames.

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- A novel collusion resistant (CR) video watermarking approach is proposed in [21]. This is a practical frame by frame video watermarking technique. Here a basic is watermark pattern is first created and this pattern is repeatedly embedded so that it is centre around a fixed number of selected points known as anchors in every video frame. The part of the video frame where the basic watermark is embedded is called the footprint. Anchor points are calculated using feature extraction algorithm. As the content of the video frames changes, so do the selected feature points. As a result of that watermark footprints evolves with the video. After generating these watermark frames with in a given host frame, spatial masking is applied on it to ensue robustness and imperceptibility criteria. Then the scaled watermark is embedded in the host data using addition.

III. PROPOSED METHODOLOGY

Algorithm

(1)First step to select a video

(2) Header check.

(3)Uncompressed video found, Then go to step 4 else stop.

(4)Frames extraction.

(5)Watermark Image selection

(6)Extracted frames have watermarked images.

(7)Audio Extraction

(8)Watermarked frames video creation.

(9)Audio insertion on new video.

(10)Result analysis

(11)top

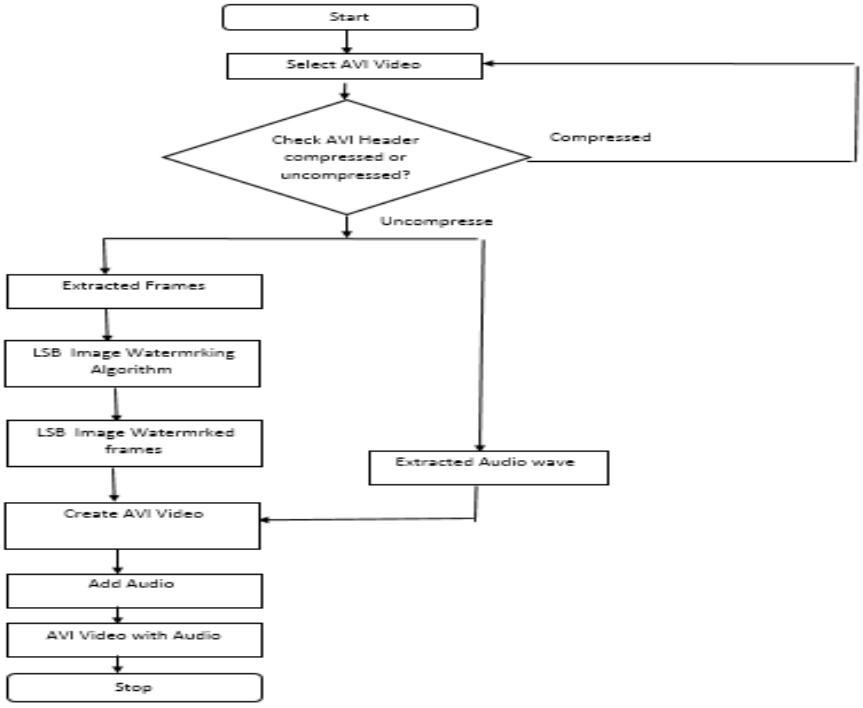

Figure 3.1 Proposed data Flow diagram

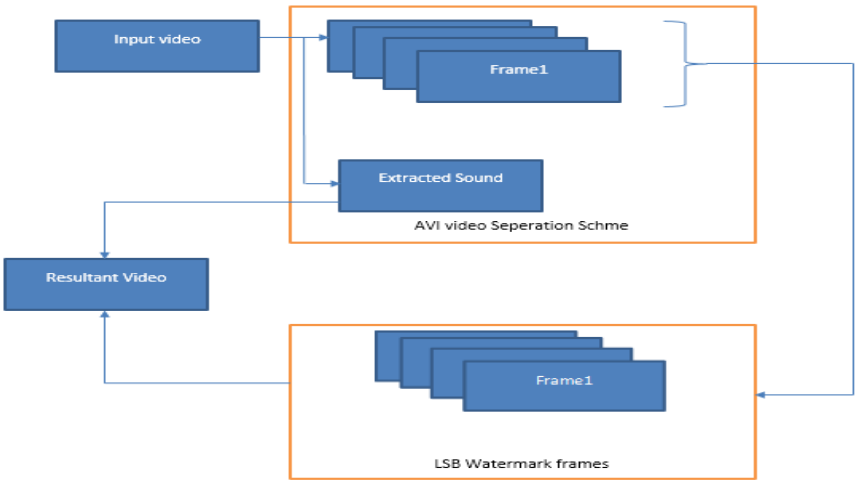

Figure 3.2 System Flow

Step 1: Select An AVI uncompressed video.

Step 2: Check its Header file. Every Digital Media file has its header and data field. Header field contains information about its compression and decompression.

Step 3: Split Video into Frames and audio. As per system flow diagram, split frames and an audio. In video file each object if identified by its header. By continuous check of a header of frames and sound, it could simple to separate it. Thus an avi video is represented with an equation

$$vi = \int_{i=1}^{n} \int (fi + Si) + (fi + 1 + Si + 1) + \cdots (fn + sn)$$

Where vi=Avi video
F=Frame.
S=Sound Sample

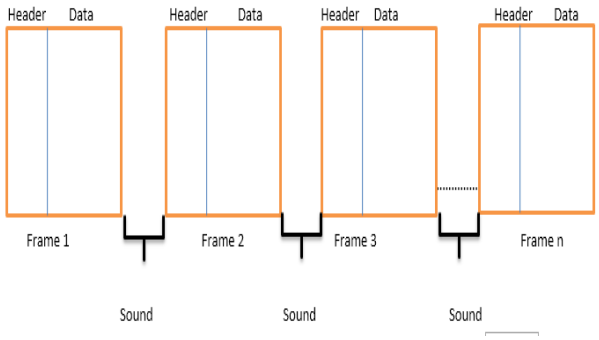

Figure 3.3 AVI Video file format

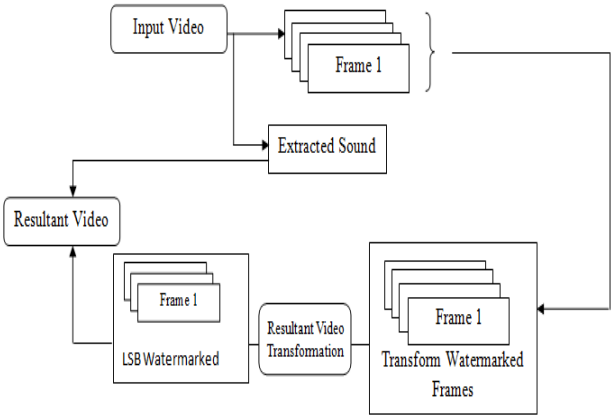

Figure 3.4 system flow

Step 4: Insert watermark Image into Extracted frames. Proposed Method Focus on LSB watermark insertion scheme that achieves low noise, robustness etc.

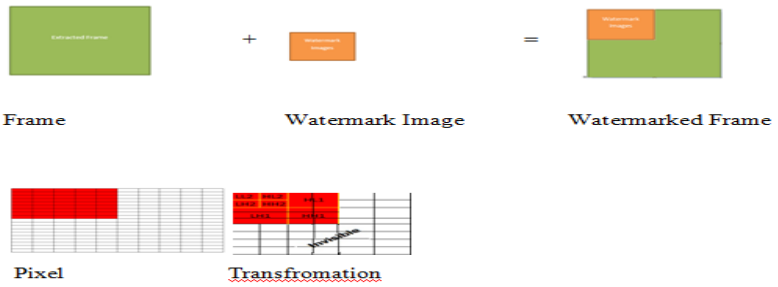

Figure 3.5 How frames is watermarked and red color shows the watermarked area.

Let an Input image is of size 1000 X 1000 and watermark image is 10 X 10 Size. It means numbers of pixels watermark in resultant frame is

$$Rf = \frac{1000 * Si}{Im}$$

Where
Rf=Resultant Image Pixels
Si=Watermark Image Pixels
Im=Input Image Pixels

Step 5: Create video from all watermarked frames.

Once all Frames are watermarked properly, group it into single avi video and then insert sound into two frames as per shown in figure 3.3

IV. RESULT ANALYSIS

SN	Input video name	Size of input video	Frame Size	Audio Size	No of Frames	Audio Format	Image Format
1	Sun.avi	10MB	200x250	5MB	115	.wav	.bmp
2	Sun1.avi	20MB	200x300	15MB	178	.wav	.bmp
3	Sun2.avi	30MB	200x350	20MB	165	.wav	.bmp
4	Sun3.avi	40MB	300x350	25MB	231	.wav	.bmp
5	Sun4.avi	50MB	400x400	25MB	326	.wav	.bmp

Figure 4.1 Result Analysis

SN	Input video name	Frame Size	Watermark Image Size	Resultant Watermark frame size	Intensity of Frames	Intensity of resultant watermarked frames
1	Sun.avi	200x250	15x15	200x250	0.57	0.67
2	Sun1.avi	200x300	15x15	200x300	0.67	0.367
3	Sun2.avi	200x350	15x15	200x350	0.72	0.82
4	Sun3.avi	300x350	15x15	300x350	0.32	0.42
5	Sun4.avi	400x400	15x15	400x400	0.56	0.36

Figure 4.2 Change in Frame intensity

V. CONCLUSION

We have now so many digital techniques to provide solutions to the problem of copyright, owner identification, digital media transfer for text, audio and video. Digital world still looking for the work which should have low distortion, high capacity complexity, and robustness

This paper proposed a new and best watermarking approach based on LSB method in combination with DWT method. This technique is tested on raw videos. The watermark which is inserted into the area into frames (HL, LH bands). Results show that the proposed new scheme has a higher degree of effectiveness against the attack of frame dropping, and frame filtering than the previous work. The parameters are tuned in order to find out the performance of the algorithm by using the number of performance parameters like quality measure and similarity.

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