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Review on Video Steganography

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ABSTRACT

To maintain the secrecy of information, various information hiding techniques are used. Steganography is one of them, which means hide information inside another digital media like text, image, audio, video etc. without being detected by human visual system. Although many steganographic techniques, in the literature, have been developed for this purpose, most of them distort the quality of the host-signal during data embedding and the changes will be become visible to the human eye especially for those signals distributed via the Internet which must be processed by a low bit rate compression due to bandwidth limitations. Therefore, the challenge is to create a steganographic technique that is able to hide acceptable amount of data without altering the quality of the host-signal. This paper presents the steganography of an Image on a multiple frame video using Frame Decomposition Technique in which LSB Algorithm is used on multiple frame video for Steganography. The aim of the research is to get image so image decomposition is required for this type of steganography. It declares that same image which steganography has been done will extract at output phase. Message hiding technique using LSB algorithm has been used.

Keywords : Steganography of frame video, LSB, Video Steganography

I. INTRODUCTION

Nowadays security of private information is a major issue over the internet. Because in today's digitized world, the whole communication is done through internet and transferring private data from one end to another using various applications such as e-mails, chats, etc. but there is main issue that is how to protect our confidential information from hackers or cyber criminals over internet. To solve such problems and to maintain the security of data, we should follow algorithm which should not only encrypt the data into another form but also hides its presence and video steganography helps to provide such a secure environment over internet. To protect the private information from being misused by the attackers and to overcome the alteration of information, a novel data hiding approach is used. Steganography is one of the best information hiding technique, which hides the presence of secret message behind a multimedia file without changing the perceptual quality of media file and provide secure communication between two parties. On the basis of Digital media, steganography is categorized as; text, image, audio, video and protocol based steganography. Here we are dealing with video steganography. Video steganography is a process of hiding the secret information behind video bit streams. The main goal of video steganography is to hide presence of secret message from human visual system. Various companies and organizations are following this concept to secure their confidential information and databases from intruders. Video files can hide large amount of hidden data behind their bit streams than images. So, that why they are more preferable than image steganography. We have studied that there is lots of limitations in previous algorithms which are not good enough for video steganography process. In previous research works, the symmetric key based encryption algorithms (like XOR Transformation, permutation operation, DES, 3DES and AES) are used which can be easily decrypted by the attackers to understand the code of original hidden message instead of Asymmetric algorithms.

A. Objectives

In present day to day life, effective data hiding methods are needed due to attack made on data communication. This paper presents the technique for the above requirement. Today's large demand of internet applications requires data to be transmitted in a secure manner. Data transmission in public communication system is not secure because of interception and improper manipulation by eavesdropper. So the attractive solution for this problem is Steganography, which is the art and science of writing hidden messages in such a way that no one, apart from the sender and intend recipient, suspects the existence of the message, a form of security through obscurity. Audio steganography is the scheme of hiding the existence of secret information by concealing it into another medium such as audio file.

B. Scope

Today's large demand of internet applications requires data to be transmitted in a secure manner. Data transmission in public communication system is not secure because of interception and improper manipulation by eavesdropper. So the attractive solution for this problem is Steganography, which is the art and science of writing hidden messages in such a way that no one, apart from the sender and intend recipient, suspects the existence of the message, a form of security through obscurity. Audio steganography is the scheme of hiding the existence of secret information by concealing it into another medium such as audio file.

C. Organisation of Project

In Introduction chapter it gives some information on hiding data in any file such as text, image and audio. Further in Literature survey a brief survey on steganography is described which is followed by its types including text, image, audio and video steganography. It also contains different methods which are used to convert the data into stego files. In System development, the algorithms which are used to convert the data into stego file. It explains the method of LSB (Least Significant bits) which is used to convert the pixels into binary data which will be used in video frames for hiding. Conclusion section concludes that the LSB method is reliable compared to other methods.

II. LITERATURE SURVEY

A. Steganography and its Types

The word steganography is derived from the Greek words “stegos” meaning “cover” and “grafia” meaning “writing” defining it as “covered writing”. Steganography is one such pro-security innovation in which secret data is embedded in a cover. The notion of data hiding or steganography was first introduced with the example of prisoners' secret message by Simmons in 1983. Steganography and cryptography are closely related. Cryptography scrambles messages so they cannot be understood. Steganography on the other hand, will hide the message so there is no knowledge of the existence of the message in the first place. In some situations, sending an encrypted message will arouse suspicion while an “invisible” message will not do so. Both sciences can be combined to produce better protection of the message. In this case, when the steganography fails and the message can be detected, it is still of no use as it is encrypted using cryptography techniques. There exist two types of materials in steganography: message and carrier. Message is the secret data that should be hidden and carrier is the material that takes the message in it. There are many types of steganography methods.

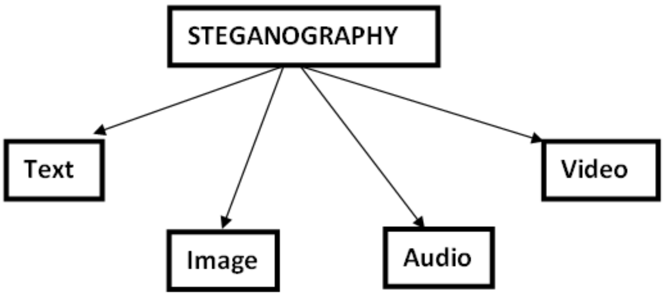

Figure 1: Steganography types

a. Text Steganography

Text steganography can be achieved by altering the text formatting, or by altering certain characteristics of textual elements (e.g., characters). The goal in the design of coding methods is to develop alterations that are reliably decode-able (even in the presence of noise) yet largely indiscernible to the reader. These criteria, reliable decoding and minimum visible change, are somewhat conflicting; herein lies the challenge in designing document marking techniques. The document format file is a computer file describing the document content and page layout (or formatting), using standard format description languages such as PostScript2, TeX, @off, etc. It is from this format file that the image - what the reader sees is generated. The three coding techniques that we propose illustrate different approaches rather than form an exhaustive list of document marking techniques. The techniques can be used either separately or jointly. Each technique enjoys certain advantages or applicability as we discuss below[10].

b. Line Shift Coding

This is a method of altering a document by vertically shifting the locations of text lines to encode the document uniquely. This encoding may be applied either to the format file or to the bitmap of a page image. The embedded codeword may be extracted from the format file or bitmap. In certain cases this decoding can be accomplished without need of the original image, since the original is known to have uniform line spacing between adjacent lines within a paragraph[10].

c. Word Shift Coding

This is a method of altering a document by horizontally shifting the locations of words within text lines to encode the document uniquely. This encoding can be applied to either the format file or to the bitmap of a page image. Decoding may be performed from the format file or bitmap. The method is applicable only to documents with variable spacing between adjacent words. Variable spacing in text documents is commonly used to distribute white space when justifying text. Because of this variable spacing, decoding requires the original image - or more specifically, the spacing between words in the un-encoded document[10].

d. Feature Coding

This is a coding method that is applied either to a format file or to a bitmap image of a document. The image is examined for chosen text features, and those features are altered, or not altered, depending on the codeword. Decoding requires the original image, or more specifically, a specification of the change in pixels at a feature. There are many possible choices of text features; here, we choose to alter upward, vertical end lines - that is the tops of letters, b, d, h, etc. These end lines are altered by extending or shortening their lengths by one (or more) pixels, but otherwise not changing the end line feature. There is another form of text steganography which is defined by Chapman et al. as the text steganography is a method of using written natural language to conceal a secret message[10].

B. Image Steganography

Hiding information inside images is a popular technique nowadays. An image with a secret message inside can easily be spread over the World Wide Web or in newsgroups. The use of steganography in newsgroups has been researched by German steganographic expert Niels Provos, who created a scanning cluster which detects the presence of hidden messages inside images that were posted on the net. However, after checking one million images, no hidden messages were found, so the practical use of steganography still seems to be limited. To hide a message inside an image without changing its visible properties, the cover source can be altered in ”noisy” areas with many colour variations, so less attention will be drawn to the modifications. This is most common method to make these alterations which involves the usage of the least-significant bit or LSB, masking, filtering and transformations on the cover image. These techniques can be used with varying degrees of success on different types of image files[2].

a. Least Significant Bits

A simple approach for embedding information in cover image is using Least Significant Bits (LSB). The simplest steganography techniques embed the bits of the message directly into least significant bit plane of the cover image in a deterministic sequence. Modulating the least significant bit does not result in human-perceptible difference because the amplitude of the change is small. To hide a secret message inside an image, a proper cover image is needed. Because this method uses bits of each pixel in the image, it is necessary to use a lossless compression format, otherwise the hidden information will get lost in the transformations of a lossy compression algorithm. When using a 24-bit colour image, a bit of each of the red, green and blue colour components can be used, so a total of 3 bits can be stored in each pixel.

For example, the following grid can be considered as 3 pixels of a 24-bit colour image, using 9 bytes of memory:

(00100111 11101001 11001000)
(00100111 11001000 11101001)
(11001000 00100111 11101001)

When the character A, which binary value equals 10000001, is inserted, the following grid results:

(00100111 11101000 11001000)
(00100110 11001000 11101000)
(11001000 00100111 11101001)

In this case, only three bits needed to be changed to insert the character successfully. On average, only half of the bits in an image will need to be modified to hide a secret message using the maximal cover size. The result changes that are made to the least significant bits are too small to be recognized by the human visual system (HVS), so the message is effectively hidden. As you see, the least significant bit of third colour is remained without any changes. It can be used for checking the correctness of 8 bits which are embedded in these 3 pixels. In other words, it could be used as “parity bit”[2].

b. Masking and filtering

Masking and filtering techniques, usually restricted to 24 bits or gray scale images, take a different approach to hiding a message. These methods are effectively similar to paper watermarks, creating markings in an image. This can be achieved for example by modifying the luminance of parts of the image. While masking does change the visible properties of an image, it can be done in such a way that the human eye will not notice the anomalies. Since masking uses visible aspects of the image, it is more robust than LSB modification with respect to compression, cropping and different kinds of image processing. The information is not hidden at the ”noise” level but is inside the visible part of the image, which makes it more suitable than LSB modifications in case a lossy compression algorithm like JPEG is being used[10].

c. Transformations

A more complex way of hiding a secret inside an image comes with the use and modifications of discrete cosine transformations. Discrete cosine transformations (DCT)), are used by the JPEG compression algorithm to transform successive 8 x 8 pixel blocks of the image, into 64 DCT coefficients each. Each DCT coefficient F(u, v) of an 8 x 8 block of image pixels f(x, y)[10].

C. Audio Steganography

In audio steganography, secret message is embedded into digitized audio signal which result slight altering of binary sequence of the corresponding audio file. There are several methods are available for audio steganography. We are going to have a brief introduction on some of them[11].

a. LSB Coding:

Sampling technique followed by Quantization converts analog audio signal to digital binary sequence. In this technique LSB of binary sequence of each sample of digitized audio file is replaced with binary equivalent of secret message. This is the most common, simple approach for embedding data in a cover image. The least significant bit (8th bit) of one or all of the bytes inside an image is changed to a bit of the secret message. When we use 24-bit image, three colour bits components are used which are red, green, blue, each byte store 3 bits in every pixel. An 800 × 600 pixel image, can thus store a total amount of 1,440,000 bits or 180,000 bytes of embedded data.

For example a grid for 3 pixels of a 24-bit image can be as follows:

(00100111 11101001 11001000)
(00100111 11001000 11101001)
(11001000 00100111 11101001)

When the character A, which binary value equals 10000001, is inserted, the following grid results:

(00100111 11101000 11001000)
(00100110 11001000 11101000)
(11001000 00100111 11101001)

The number was embedded into the first 8 bytes of the grid, only the 3 underlined bits needed to be changed according to the embedded message. On average, only half of the bits in an image will modified to hide a secret message using the maximum cover size. Since there are 256 possible intensities of each primary colour, changing the LSB of a pixel results in small changes in the intensity of the colours. These changes cannot be visible by the human eye due to the message hidden. In these consecutive bytes of the image data – from the first byte to the end of the message – are used to embed the information. And easy to detect, more secure system for the sender and receiver to share a secret key that specifies only some pixels to be changed. In its simplest form, LSB makes use of BMP images, since they use lossless compression. It hide a secret message inside a BMP file, one would require a very large cover image. In BMP images of 800 × 600 Pixels are not often used on the Internet and might arouse suspicion. For this reason, LSB steganography has also been developed for use with other image file formats [4]. It is a simple method for embedding data in a cover image. This is the simplest algorithm in which information can be inserted into every bit of image information. Given an image with pixels, and each pixel being represented by an 8-bit sequence, the watermarks are embedded in the last (least significant bit) of selected pixels of the image proposed a simple data hiding technique by simple LSB substitution. In this technique last bit of host data is randomly changed and produce the watermarked data at output. The cover LSB media data are used to hide the message

b. Phase Coding:
Human Auditory System (HAS) can't recognize the phase change in audio signal as easy it can recognize noise in the signal. The phase coding method exploits this fact. This technique encodes the secret message bits as phase shifts in the phase spectrum of a digital signal, achieving an inaudible encoding in terms of signal-to-noise ratio.

c. Spread Spectrum:
There are two approaches are used in this technique: the direct sequence spread spectrum (DSSS) and frequency hopping spread spectrum (FHSS). Direct-sequence spread spectrum (DSSS) is a modulation technique used in telecommunication. As with other spread spectrum technologies, the transmitted signal takes up more bandwidth than the information signal that is being modulated. Direct-sequence spread-spectrum transmissions multiply the data being transmitted by a "noise" signal. This noise signal is a pseudorandom sequence of 1 and −1 values, at a frequency much higher than that of the original signal, thereby spreading the energy of the original signal into a much wider band. The resulting signal resembles white noise. However, this noise-like signal can be used to exactly reconstruct the original data at the receiving end, by multiplying it by the same pseudorandom sequence (because 1 × 1 = 1, and −1 × −1 = 1). This process, known as "de-spreading", mathematically constitutes a correlation of the transmitted Pseudorandom Noise (PN) sequence with the receiver's assumed sequence. For de-spreading to work correctly, transmit and receive sequences must be synchronized. This requires the receiver to synchronize its sequence with the transmitter's sequence via some sort of timing search process. In contrast, frequency-hopping spread spectrum pseudo-randomly retunes the carrier, instead of adding pseudo-random noise to the data, which results in a uniform frequency distribution whose width is determined by the output range of the pseudo-random number generator.

d. Echo Hiding:
In this method the secret message is embedded into cover audio signal as an echo. Three parameters of the echo of the cover signal namely amplitude, decay rate and offset from original signal are varied to represent encoded secret binary message. They are set below to the threshold of Human Auditory System (HAS) so that echo can't be easily resolved.

D. Video Steganography

Video files are generally consists of images and sounds, so most of the relevant techniques for hiding data into images and audio are also applicable to video media. In the case of Video steganography sender sends the secret message to the recipient using a video sequence as cover media. Optional secret key 'K' can also be used during embedding the secret message to the cover media to produce 'stego-video'. After that the stego-video is communicated over public channel to the receiver. At the receiving end, receiver uses the secret key along with the extracting algorithm to extract the secret message from the stego-object. The original cover video consists of frames represented by Ck(m,n) where 1 £ k £ N. 'N' is the total number of frame and m,n are the row and column indices of the pixels, respectively. The binary secret message denoted by Mk(m, n) is embedded into the cover video media by modulating it into a signal. Mk(m, n) is defined over the same domain as the host Ck(m,n).The stego-video signal is represented by the equation

Sk(m, n) = Ck(m, n)+ak (m, n) Mk(m, n) , k = 1, 2, 3 . . .N

Where ak (m, n) is a scaling factor. For simplicity ak (m, n) can be considered to be constant over all the pixels and frames. So the equation becomes [11]:

Sk(m, n) = Ck(m, n)+a (m, n) Mk(m, n) , k = 1, 2, 3 . . .N

E. Brief on Steganography

Steganography is an art of hiding secret information inside a carrier file, such that the representation of carrier file won't be altered. Some steganographic experts introduced a method based on statistical analysis of Pairs of Values (PoVs) that are exchanged during message embedding. Pairs of Values that differ in the LSB only, for example, could form these PoVs. This method provides very reliable results when we know the message placement (such as sequential). However, we can only detect randomly scattered messages with this method when the message length becomes comparable with the number of samples in the audio. Existing cryptographic and steganographic mediums suffer from a myriad of attacks. In [1] has studied such attacks on image steganography, whereas [2] has studied similar attacks in the context of audio steganography. Even though cryptography and steganography are exposed to so many probable attacks, very few people have given a thought to find alternate ways to transmit information. The goal of steganalysis is to defeat steganography methods by identifying the presence of hidden information. In [3] data hiding in audio signal, video signal text and JPEG Images: In this paper the author introduced a robust method of imperceptible text, audio, video and image hiding. They provide an efficient method for hiding the data from hackers and it will sent to the receiver in a safe manner. Thus we know that data hiding techniques in audio, this can be used for number of purposes other than covert communication. In [8] Image hiding in video Sequence based on MSE: This paper proposes a method for hiding image in selected video sequence based on MSE. The proposed algorithm is an image-hiding scheme based on discrete wavelet transforms (DWT) and singular value decomposition (SVD). In this, the author is not directly embedding the secret image on the wavelet coefficients but on the singular values elements of the cover images DWT sub bands the cover image and also find the SVD of the cover image or each block of the cover image, and then the singular values get modified to embed the watermark. First the video sequence and frame conversion is to be done. Calculate MSE for each frame and the watermark is to be embedded on a frame which has low MSE. The model proposed by the author is more secured against attacks and satisfied both imperceptibility and robustness.

In [4] Applying public key watermark techniques in forensic imaging to preserve the authenticity of the evidence: In this paper public key Public key cryptography, infrastructure and watermarking techniques are used to design a novel encryption and decryption method using LSB algorithm by maintaining integrity using forensic imaging method .In [5] Steganography and cryptography in computer forensics: In this paper Computer forensic technique is use to find the parameter like height and width, frame number of data, PSNR, histogram of secrete message data before and after hiding to audio-video. If all these parameters are verified and found to be correct then only it will send to receiver otherwise it stop the secrete message data in computer forensic block. In [6] Anti-Forensics with steganography data embedding in digital images: In this paper digital images are used to communicate visual information. Author gives various forensic techniques which have been developed to verify the authenticity of digital images. They proposed a set of digital image forensic techniques capable of detecting global and local contrast enhancement, identifying the use of histogram equalization, and detection the global addition of noise to a previously JPEG compressed image. Singh and Dubey [7] proposed data embedding scheme based on the use of the quantization index modulation for MPEG-2 video. The scheme embeds data into the DC-QTCs of I- and P- frames during the MPEG-2 video encoding process. Since the scheme was tested on video sequence with frame resolution of 320 × 240, thousands of data bits were embedded in just one selected frame type. To reduce the effect on the visual video quality, QIM was adjusted according to the size of DC-QTCs. To preserve the quality of the stego frame,[9] proposed data embedding scheme in the compressed domain based on use of the AC-QTCs with the lower frequency only. The scheme embeds 2-D binary image watermarks into the MPEG-2 bit streams by modifying the AC-QTCs. The AC components with the higher frequencies in addition to DC component were avoided.

In [13] a blind video watermarking scheme that embeds data into the I-frames in H.264 compressed domain has been proposed. Here, an inexpensive spatiotemporal analysis was performed to select the appropriate sub-MBs for embedding. As result, the robustness of the watermark has increased and the impact on visual quality has reduced. Dutta et al. [14] proposed similar scheme which embeds data bits into the P-frames of H.264/AVC video. The scheme utilizes an appropriate block selection method to enhance the security of the method. Only nonzero AC-QTCs in 4 x 4 blocks of P-frames are selected for embedding. To embed larger amount of data, Sherly and Amritha [15] proposed a compressed video steganographic scheme that embeds data bits in the MBs of I-, B- and P-frames with maximum extent of MVs. The scheme based on an enhancement of the data hiding concept proposed in which is a modification of the original PVD method in [9]. Data hiding operations were defined and executed entirely in the compressed domain. Both DC- and AC frequencies components of each employed frames are employed. Experimental results prove that such a method can achieve excellent performance. Another steganographic scheme based video compressed domain is proposed. The proposed scheme used an EPVD scheme which is another modification of the original PVD method. The scheme reduced the distortion drift caused by reversible data hiding within selected AC-QTCs of both intra and inters frames for MPEG-2 video during compression. Based on the their obtained simulation results, the authors reported that the proposed scheme successfully improves the perceived quality and achieves much better security compared with PVD-based method while still retaining the advantage of hiding a large amount of data.

In this research the image is hiding on a multiple frame video using Component Division Technique. But before applying this technique we are extracting all the frames from the video and saved it in the current directories. An image has maximum 0-255 pixels. It means only 255 matrix will be generated from the image. The only condition of this Steganography is the video frame should be the minimum 255 frames. If the number of frames of the video is lesser than 255 frames then it cannot be hide in the video. The limitations are for security and exact image extraction. The video frames are divided into blocks and then several Steganography processes are performed. The colour map of the image has been extracted then only two dimensional matrix of the image is remained and then Component Division technique is applied in the two dimensional image matrixes for matrix extraction.

III. SYSTEM DEVELOPMENT

Data hiding is one of the emerging techniques that provide for security by hiding secret information into the multimedia contents by altering some components in the host or cover file. Data hiding, Steganography, and Watermarking are three closely related fields that have a great deal of overlap and share many technical approaches as private, confidential and Secret data in modern society and because malicious hackers and intruders are using more and more sophisticated methods and technologies, developing powerful data protection become an urgent need and due to the ease with which multimedia content can be manipulated, measures to verify the authenticity of multimedia content are in pressing need. The objective of steganography is to hide secret information within a cover-media in such a way that others cannot discern the presence of the hidden secret information. In this paper our aim is to hide the fact that communication is taking place. This is often achieved by using a rather large cover file and embedding the rather short secret message into this cover file. The result is an innocuous looking file which is the stego file that contains the secret message. Hiding information into a media requires following elements- The carrier (C) media file that will hold the hidden data. The secret message (M) may be plain text, cipher text or any type of data. The stego function (Fe) for data hiding and its inverse (Fe-1) for extracting data. A stego-key (K) that specifies the location in carrier file where secret message is to be hidden. The stego function operates over cover media and the message (to be hidden) along with a stego-key to produce a stego file (S). In our paper as video is the application of many still frames of images and audio. We can select any single frame of video and audio for hiding our secret data. This paper provides an algorithm for hiding authentication image in selected video sequence by using Discrete Wavelet Transform (DWT) and Singular Value Decomposition (SVD) and a random LSB (Least Significant Bit) audio steganography method it reduces quantization error of the host audio file.

A. Component Division Technique:

Component Division Technique of Matrix is the process in which we can extract different matrix of different values. In this technique all the remaining values will be zero except the values which choose. By the help of this process we will get the all binary matrix with appropriate value. After getting the appropriate matrixes of the image the hiding process of image will be started. In this stage we have mainly the different types of matrixes of the image which will further converted into binary images and saved in the directory. The process of converting the images in CDT matrixes is as follows in the flow chart in figure 3.1. The flow chart starts from input image and it decompose into two parts, one part is colour-map of the image and the second part is 2-D RGB image matrix. The colour-map has been saved in a variable named im_colour_map and the second 2D RGB image matrix saved in a variable named im_matrix. All the operations will be done in the im_matrix. Before applying CDT, we are saving all the pixel values in a different variable named im_pixel_values_unique with unique pixel values from im_matrix. This pixel value matrix will help to fetch the CDT matrix in Binary form and again convert it into the CDT matrix. After extraction the im_pixel_values_unique matrix from the RGB image matrix, the second process of the CDT will be applied. Now applying a loop on the 2D RGB image matrix and extract all the matrix with single value and remaining values will be zero in the entire matrix. After getting the CDT matrix it will be converted in to Binary images and saved in the directory in the image format. These matrix images in completely binary images so we don’t required converting our image in to gray scale and binary format.

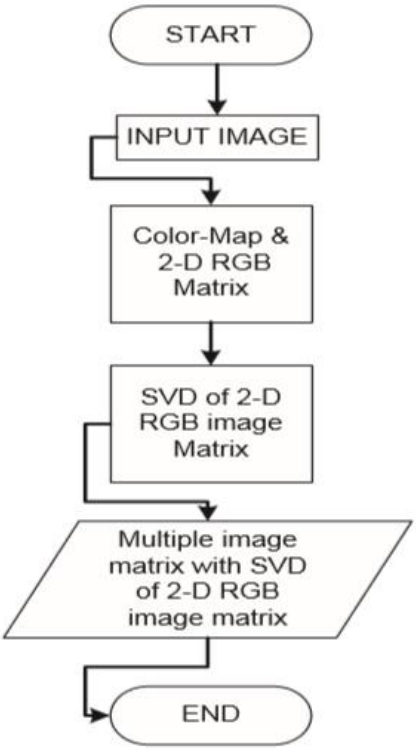

Figure 1. Flow chart of Component Division Technique

B. Taking Frames from Video File:

After applying CDT technique on image we have all the matrixes from the image. Now the second work is to extract frames from the video. It is very important to split frames from video because each frames will hide a binary image of image matrix. The flow chart starts from the input video. After insertion of a video, total number of frames will be counted by calling a function get().Get() function has a syntax by which it gives the detail of total number of frames available in the video. Now the challenge is if the total number of frames is less than or equal to the total number of image matrix which get by the image to be hide, then steganography process cannot be done. After the getting number of frames it will store in the variable named number of Frames. The next step is to extract all frames present in the video. By applying a for loop and extract the number of frames from video. The for loop will be start from 1 and end to number of Frame. Inside the for loop, extract cdata of the video by calling function vidFrames ().After getting the video frames cdata we are using imwrite () function to write the frames in the image format in our current directory. The process is explained in detail in the algorithm part.

C. Divide frames into Image Blocks:

The third step of this Steganography process is to divide the frames of the video into two blocks. Because in first block the colour-map and the unique matrix of the image will be hide in the form of text. This process is essential because all the frame of the video will be dividing in to two parts and the two matrixes colour-map and unique matrix will be hiding inside the blocks of the image. The binary image matrix extracted from the image will be hiding in the second block of the frame which got by dividing the frame into blocks as shown in figure 3.2

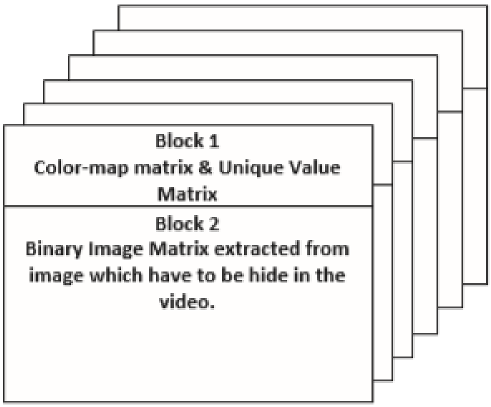
Block 1
Color-map matrix & Unique Value Matrix
Block 2
Binary Image Matrix extracted from image which have to be hide in the video.

Figure 2. Frames Divided into Blocks

The colour-map of the image and unique matrix of the image will hide in all the frame of the video because the measure challenge is if the frames of the video has been deleted by anyone and that frame has the information of colour-map and unique matrix then the image cannot be recover from the video. Without these two data no one can recover the image from the video frames. For security of image and easy to recover the image, we have to hide these two matrix in all the frames of the video. And for this reason we are dividing all the frames into two blocks. The first block is smaller than the second block because the two matrixes will hide in the smaller block but the image frame needs bigger frame image for hiding. The second block is 2/3 part of the frame image. The algorithm is to be discussed in the algorithm stage.

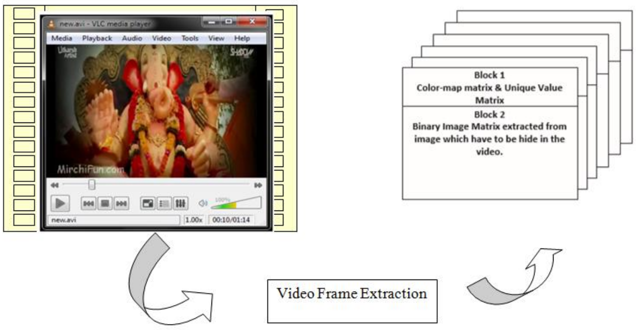
new.avi - VLC media player
Media Playback Audio Video Tools View Help
MirchiFun.com
new.avi
1.00x
00:10/01:14
Block 1
Color-map matrix & Unique Value Matrix
Block 2
Binary Image Matrix extracted from image which have to be hide in the video.
Video Frame Extraction

Figure 3. Frame extraction from video

D. Algorithm

Here we will discuss briefly the above process in algorithmic form.

```
Step1:  Start
Step2:  Initialize the process to insert image.
Step3:  Extract colour-map and image matrix by
        im_matrix, im_colour_map = rgb2ind
        (imread('12.jpg'), 128);
Step4:  Save
        im_pixel_values_unique = unique
        (im_pixel_value);
Step5:  Call size() function to calculate the size of the
        im_matrix in [im_row, im_col] =
        size(im_matrix)
Step6:  k =1:
         im_pixel_values_unique
         i = im_row  j = im_col  ifim_matrix(i, j) = k
        Then im_matrix(i, j) = k
        else
         im_matrix(i, j) = 0
Step7:  Call logical () function to convert im_matrix to
        logical values.
Step8:  Save all the matrix in the form of image by
        calling im_write() function.
Step9:  Jump to step 3.
```

Algorithm of Extraction of Video frames from the image Here we are discussing about the extraction process of frames of the image.

```
Step1:  Start
Step2:  Initialize the process to insert Video.
Step3:  Call the VideoReader () function to read object
        of the Video and save it in variable named vidObj.
Step4:  By calling get () function to get the information
        about total number of frames in the video.
Step5:  Save the number of frames in a variable named
        numberofFrames.
Step6:  k =1:numberofFrames
            Find cdata of the video.
            Save this cdata of the video with different name
        of image in *.png or *.jpg format.
```

Algorithm of dividing video frame images in two blocks with proper ratio Here we are discussing the algorithm to divide image into two blocks with proper ratio.

```
Step1:  Read the Video frame image by calling imread ()
        function.
Step2:  n = fix(size(im, 1)/3)
Step3:  By calling matrix with this size, got the first
        block of image and save this block for steganography.
Step4:  By calling matrix with this size, got the second
        block of image and save this block for steganography.
```

IV. CONCLUSION

After Steganography of image on Video we got the exact video which we input and there is no any difference between the input video and output video. The process of CDT and LSB are really useful but there are some limitations in the process. The major limitation is the number of frames should be greater than 255 because in an image there are maximum 255 pixels and after applying CDT we will get maximum of 255 matrix of image. It means it will give maximum 255 frames of a single image. For steganography process of an image on video by CDT Technique, it requires the condition number of video frames is greater than or equal to number of Image frames. After Decoding the image we can get the exact RGB image due to help of colour- map and unique matrix. The difference of the output RGB image and Input RGB image will be zero.

V. Future scope

We are hiding image into video file successfully and also decode the video file. This method is very easy, safe, secure and strong method of hiding secret information. This is currently done in .avi file and can be extended into any other video file format. In future work, we can use different formats of video such as .mov, .mp4, .Flv to hide image behind video and also different format of images can be hide behind video such as .jpeg, .png etc. We can also hide the audio file into video file format using LSB coding technique in future.

VI. Applications

Highly secure: Since random data are also placed in unused frames in the video, the attacker is left clueless to know the real secret data hidden in the video. Hence highly confidential data like military secrets and bank account details can be easily steganographed in ordinary video and can be transmitted over internet even in unsecured connection.

Capacity: Text based steganography has limited capacity and Image steganography tried to improve the capacity where 50% of original image size can be used to hide the secret message. But there is limitation on how much information can be hidden into an image. Video Steganography has been found to overcome this problem.

Imperceptibility: Lowest chances of perceptibility because of quick displaying of the frames, so it becomes harder to be suspected by human vision system.

Less computational time: Since use of indexing concept, the process of retrieving the secret data from the steganographed video becomes very simple and requires very less time.

VII. REFERENCES

[1]. Lin, C.-Y., et al., "Rotation, Scale, and Translation Resilient Watermarking for Images," IEEE Transactions on Image Processing, Vol. 10, No. 5, May 2001.

[2]. Lee, Y. K. and Chen L. H. "High Capacity Image Steganographic Model". IEEE Proceedings Vision, Image and Signal Processing, pp. 288-294, 2000.

[3]. V. Sathya, K Balasubramaniyam, N Murali "Data hiding in audio signal, video signal text and JPEG Images" IEEICAESM 2012.Mrach 30-3 I 2012, pp74l -746.

[4]. A. Hamsathavani. "Image hiding in the video sequence based on MSE" International Journal of Electronics and Computer Science Engineering IJECSE, Volume1, Number 2013

[5]. George Abboud, Jeffery Marean, "Steganography and cryptography in computer forensics." 2010 IEEE Fifth international workshop on systematic application to digital forensic application. pp. 25-30.

[6]. Hung min Sun, Chi Yao Weng, Chin Feug Lee."Anti- Forensics with steganography data embedding in digital images" IEEE journal on selected areas in Communication vol. 29.no.7 pp. 1392- 1403. August 2011

[7]. J. Singh and A. Dubey, "MPEG-2 video watermarking using quantization index modulation," in Internet Multimedia Services Architecture and Application (IMSAA), 2010 IEEE 4th International Conference on, pp. 1-6, , December 2010

[8]. A. Hamsathavani. "Image hiding in the video sequence based on MSE" International Journal of Electronics and Computer Science Engineering IJECSE, Volume1, Number 2013

[9]. S. N. Biswas, S. Nahar, S. R. Das, E. M. Petriu, M. H. Assaf, and V. Groza, "MPEG-2 digital video watermarking technique," in Instrumentation and Measurement Technology Conference (I2MTC), 2012 IEEE International, pp. 225-229, May 2012

[10]. RGB Image Steganography on Multiple Frame Video using LSB Technique, Saket Kumar1, Ajay Kumar Yadav2, Ashutosh Gupta3, Pradeep Kumar4, 978-1-4799-1819-5/15/$31.00 ©2015 IEEE

[11]. Audio-Video steganography,Yugeshwari Kakde, 2Priyanka Gonnade, 3Prashant Dahiwale Rajiv Gandhi College of Engineering & Research RTMNU Nagpur University Nagpur, India , 978-1-4799-6818-3/15/$31.00 © 2015 IEEE

[12]. A. Mansouri, A. M. Aznaveh, F. Torkamani-Azar, and F. Kurugollu, "A low complexity video watermarking in H. 264 compressed domain," Information Forensics and Security, IEEE Transactions on, vol. 5, no. 4, pp. 649-657, 2010

[13]. T. Dutta, A. Sur, and S. Nandi, "A robust compressed domain video watermarking in P-frames with controlled bit rate increase," in Communications (NCC), 2013 National Conference on, pp. 1-5, February 2013

[14]. A. Sherly and P. Amritha, "A compressed video steganography using TPVD," International Journal of Database Management Systems (IJDMS, vol. 2, no.3, pp. 67-80, 2010

[15]. K. C. Chang, C.-P. Chang, P. S. Huang, and T.-M. Tu, "A novel image steganographic method using tri-way pixel-value differencing,"Journal of multimedia, vol. 3, no. 2, pp. 37-44, 2008