

A Review on Hiding an Image and Data Using Video Steganography

Manju Kumari Gupta¹, Ms. Vipra Bohara²

¹PG Scholar, ²Asst. Professor

Yagyavalkya Institute of Technology, Jaipur, India

Abstract- Security plays a major role to send data from one place to another place. In this paper we present various techniques to hide image and data into video with the help of video steganography and cryptography. Video based steganography is better than other techniques because its security level is high and it can hide large amount of data. In this video is converted into no. of frames. Frame looks like an image, so we can say video is a collection of images.

Keywords- Video steganography, LSB, LZW, DWT, AES encryption, LFSR, Mid point circle algorithm.

Introduction- Steganography is the method in which data is embedded with in the cover media without changing the data to it attaches, whereas in cryptography data is converted from original form to unreadable form which is known as cipher text. Here we are using video steganography, video contains a set of frames(digital images) which are played back at fixed frames rate based on the video standards. Embedding process in video-

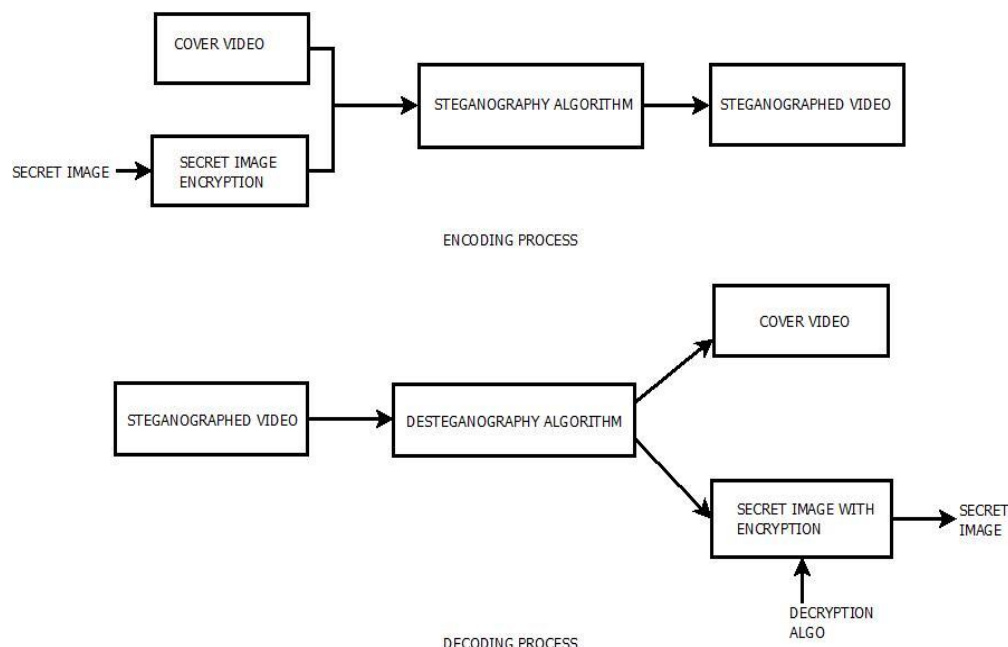


Fig 1: Encoding and Decoding process

Literature survey

In this paper author hides variable sized image and text into video. Author uses compression technique before hiding due to largeness of data with the help of LZW compression algorithm, if hiding data is small in size then no need to compression. For hiding image LSB (least significant bit) technique is used. In this each row of pixel of secret image is hidden in first row of multiple frames of the video. Before hiding secret message and image AES encryption algorithm is used. LZW compression is used in GIF and optionally in pdf and TIFF files. When compression is used no data is lost.

LZW Compression Algorithm

Step-1: Read the TEXT data.

Step-2: Count the total number of words, alphabets, special characters and digits in the text data.

Step-3: Find out the repeated words in the text data.

Step-4: Prepare the word dictionary for the text data .

Step-5: Create compressed data. In the compressed data place the word's number instead of actual words.

LSB algorithm-

An image segment ,which we want to hide, is given as-

(I) = 11100111 11101010
11011110 01101010

the eight pixels value of a selected video is-

(v) =10101001 10101001 10101001 10101001
10101001 10101001 10101001 10101001

11011110 these 8 bits of image segment will be hidid into video frame with the help of LSB replacement, the above pixels will look like-

10101001 10101001 10101000 10101001
10101001 10101001 10101001 10101001

When all the columns of a frame are used next frame is selected ,after that Next row of the image is hidid in the next row of the frames. The reverse process is used to get the secrete image[1].

In this paper author proposed DWT(discret wavlet transformation) algorithm to hide the data in selected frame at specific location with the help of LSB algorithm by replacing the last bit of pixel value of that specific location with the secreat data. wavlet transformation is done with the help of high pass filter and low pass filter. decomposition is done firstly with rows and then coloums.

There is an $p \times q$ image, down sample the image, starting with row to obtain two $p/2 \times q/2$ images. same process done with coloum to obtain four images $p/2 \times q/2$. Image produced by the low pass filtering first with the rows and then coloums is known as the LL image, image produced by the high pass filtering first with the rows and then coloums known as HH image. High pass filtering the rows and low pass fitering the coloums, this type of image is known as HL and same as we receive LH image. Same technique is used to obtain four images by one of LL image. This technique is used until the desired sub band structure[2].

In this paper author hides grayscale image into a coloured video. This technique use five stages , these five stages take the 6 most significant bits from each pixel of the secret image and hide these bits in different layers in the cover video using the LSB algorithm, 2 bits from each colour in each pixel in the selected image. Five stages which is used in this paper are as follows-

Stage 1 - It generate random number to determine which pixel will be used to conceal the secret image. 256 random numbers are generated.

Stage2 - In this stage image is read and converted into $m \times n$ matrix, after that converted into one dimensional array and then it divided into n blocks with each bock containing 256 pixels.

Stage 3 - In this, frames are divided into secret frames group, index frames group and unused frames group.

Stage 4 - Each frame consist of three layers red, green, blue. in this approach 2 lsb are used to hide 2 msb from the secret image, after determination of required layer, substitution method is appied between the block of secret Image and the layer.

Stage 5 - In this outut of the three frame is combined . secret frame contains partial secret information of the secret image, index frame contains the information about exact pixel of the secret image, unused frames that is used for future work.combined output of these three frames create steganographed video[3].

In this paper author emphasized on secret message is hidden with the help of key values in an specific frame of the cover video. Key value is generated with linear feedback shift register method. AES algorithm is used for further security.

Key generation- This technique uses shift register and a feedback function. Least significant bit shows output bit. Most significant bit is calculated by the ex-or of some bits. In this key value is generated by 14 bit LFSR.

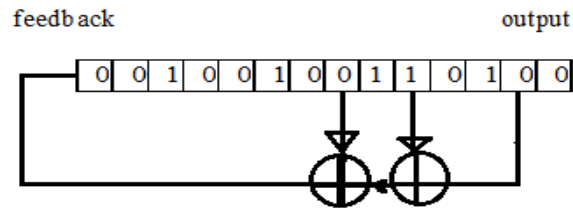


Fig 2: 14-Bit LFSR

The sequences are 00100100110100 (0934), 10010010011010 (149a), 01001001001101 (124d), etc.

Hiding process is done in two ways –

1. It determines the location of pixel, which is used to hide data with the help of pseudorandom sequence.
2. Hiding data in selected pixel by using decimal values[4].

In this paper author briefed about, Least Significant Bit (LSB) Technique is used for Video Steganography, using this algorithm text is embedded in selected frames and Mid-point circle algorithm is used for finding correct position of pixel in which text is embedded. first secret text is changed into ASCII values after that in binary bits. These bits are hidden at the selected locations using mid point algorithm.

we store the secret text into Red channel in the selected frames.

Algorithm-

1. Input radius of the circle is r and circle center is (x_c, y_c) and first point on the circle centered at origin is $(x_0, y_0) = (0, r)$.
2. Calculate decision parameter $p_0 = (5/4) - r$.
3. At each x_k position, starting with $k=0$, continuing the process if $p_k < 0$, the next point along the circle center at $(0,0)$ is (x_{k+1}, y_k) where as $p_{k+1} = p_k + 2x_{k+1} + 1$ otherwise, the next point along the circle is (x_{k+1}, y_{k-1}) where $p_{k+1} = p_k - 2x_{k+1} + 1 - 2y_{k-1}$ and $2x_{k+1} = 2x_k + 2$, and $2y_{k+1} = 2y_k - 2$.
4. Find out regularity points on the other seven octants.
5. Move about each calculated pixel position (x, y) into circle path centered at (x_c, y_c) as $x = x + x_c$, $y = y + y_c$.
6. Do again the step3 and 5 until $x \geq y$. [5]

Conclusion

This paper provides a successful review of various techniques used for image and data hiding. In this paper we have used least significant bit algorithm for all papers which is used in literature survey. This algorithm is used to hide image and in extracted frame of video. We have used some other algorithms like DWT Algorithm (used for finding specific location in frame to hide data), LFSR (used for key generation and key is used for provide randomness in frame), Mid point circle algorithm (used for finding the positions in frame to embed data bits into red channel. study of these algorithms mentioned in this paper successfully, these algorithms are used with lsb algorithm due to provide more security.

References

- [1.] Prof. D P Gaikwad¹, Trupti Jagdale², Swati Dhanokar³, Abhijeet Moghe⁴, Akash Pathak⁵ “Hiding the Text and Image Message of Variable Size Using Encryption and Compression Algorithms in Video Steganography” IJERA 2018.
- [2.] M Abhilash Reddy¹, P.Sanjeeva Reddy², Member, IEEE and GS Naveen Kumar³ “DWT And LSB Algorithm Based Image Hiding In A Video” International Journal of Engineering Science & Advanced Technology 2013.
- [3.] Shadi A. Alhaj¹, Ahmad M. Shaheen² and Talal M. Al-Kharoubi³ “Multi-layers Video Steganography: A Novel Technique for Image Hiding” TRANSACTIONS ON NETWORKS AND COMMUNICATIONS 2016.
- [4.] Rajpreetha C¹, HariPriya C², Vanitha Lakshmi M³ “A Secured Video Steganography by Linear Feedback Shift Register Method” International Journal on Applications in Information and Communication Engineering 2015.
- [5.] M.Mary Shanthi Rani¹, S.Lakshmanan² and G.Deepalakshmi³ “Video Steganography using Mid-Point Circle Algorithm and Spatial Domain Technique” International Journal of Engineering and Techniques 2018.