Secure Text/Image Data Communication by Image Steganography into Video Sample using Wavelet Technique

Kamlesh Deshmukh

M.Tech Scholar, Department of Computer Science, Rungta College of Engineering and Technology, Bhilai, CG, India

ABSTRACT: Steganography is a method of concealing private or delicate information inside something that emits an impression ofbeing nothing out of regular. Diverse carrier file formats can be used, for example text documents, audio tracks, digital images,and videos. But, due to immense advancement of information over the web, video steganography has turned into a very populardecision for data hiding. In video steganography, secret information is concealed inside a video to keep it safe from gatecrashers. There exists variety of techniques for hiding secretinformation in a video, each having their own qualities andshortcomings. This paper is an attempt to present a comprehensivestudy of various state-of-the-art video steganography methods inspatial domain developed in the past decade which are verybeneficial for video steganography analysts to acquire betteroutcomes, high proficiency and security. The paper also suggestswith recommendations to improve on existing videosteganography techniques.

KEYWORDS: Video Steganography; Spatial domain; Embedding;Payload; DCT; DWT; PSNR

I.INTRODUCTION

Notwithstanding the way that the Internet is used as well-known venues for users to access desired data, it has in like manneropened another passage for assailants to get valuable andintellectual information of other users with little effort.Steganography offer an assurance system that preventsmeddlers from any progressing communication between anapproved transmitter and its beneficiary. Steganography is theway towards hiding some profitable data inside other commoninformation [16]. Steganography has been originated fromGreek word Steganos and graphics. Steganos implies securedor covered up and graphics implies writing. Carrier data is alsoreferred as "cover object". Cover object can be perceived invarious forms, for example, audio, text, image, and video. Thedata which is embedded in the cover object using an embeddingalgorithm is referred as "secret message". A "stego-object" isacquired by consolidating the embedded data with the coverobject. Figure represents the general model of a typicalsteganographic method.Embedding efficiency, Payload, and Robustness arethe three noteworthy prerequisites incorporated in any fruitfulsteganographic technique [20,21]. Embedding efficiency relieson how exact are the stego object's qualities after theembedding, and undetectable of secret message from thestego object. In other words, the steganographic method isefficient if it incorporates encryption, indistinctness andimperceptibility qualities.

Payload or hiding capacity is the second fundamental prerequisite refers to the quantity of secret message that we canhide inside the cover object. There is an exchange-off between the hiding capacity and the embedding efficiency. Onincreasing the hiding capacity, the quality of stego object maybe reduced which diminishes the algorithm's efficiency. Digital watermarking is another technology that is firmly confused with steganography.

This technique utilizes aprotection mechanism to shield the copyright ownership information from unauthorized users. This process is proficient by hiding the watermark information into plain carrier data.Watermarking is of two sorts: visible watermarking andinvisible watermarking. In visible watermarking the watermark inserted is visible on the media as in case of broadcaster's logoon the TV screen. In invisible watermarking the watermark is not visible, similar is with steganography the message embedded is invisible. Fundamental difference amongst steganography and watermarking is that in watermarking the information about details of owner is embedded while in steganography message which can be

intercepted by only sender and receiver is embedded, watermarking can be visible and invisible while steganographyis only invisible. Intruders might not be able to even interceptthat this carrier contains a secret message.

Figure demonstrates the general similarities and contrasts between steganography, cryptography, and watermarking methods.

(a)   (b)
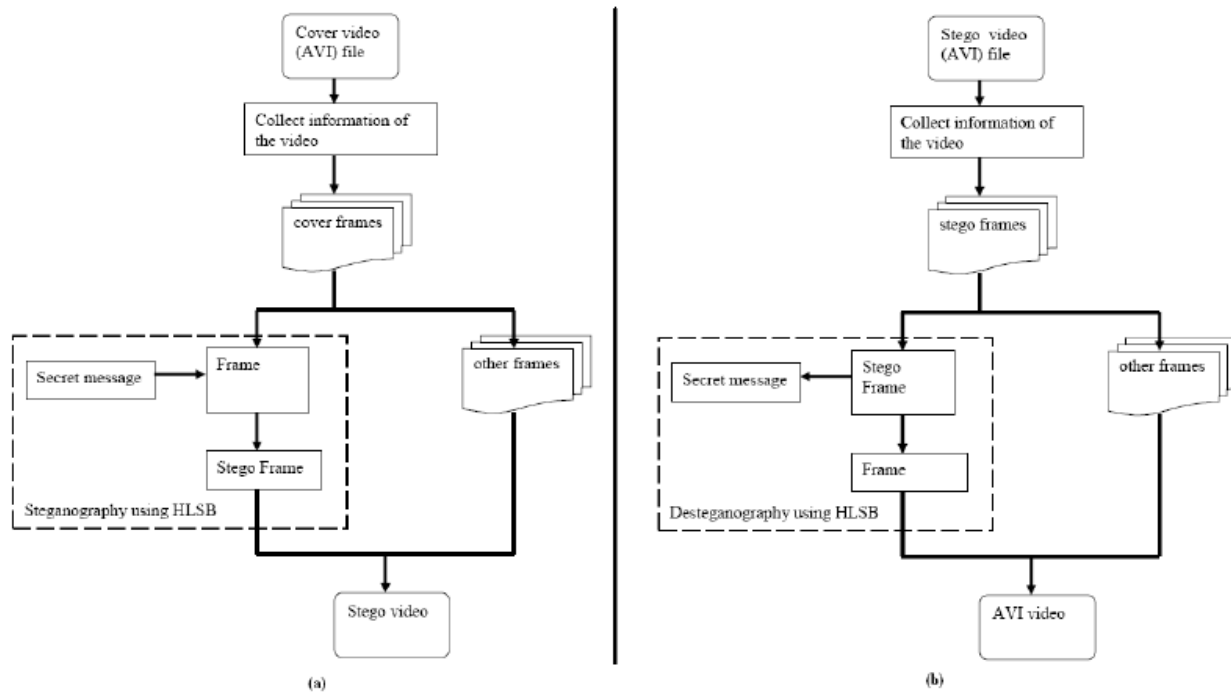
II.LITERATURE SURVEY

Cheddad et al. [1] proposed a skin tone information hiding method which relies on upon the YCbCr color space .Different methods such as object detection and compression techniques use YCbCr. In YCbCr, the correlation between RGB colors is segregated by isolating the luminance (denoted as Y)from the chrominance red (denoted as Cr) and the chrominanceblue (denoted as Cb). In this manner, the human skin areas areperceived, the Cr of these areas are used for concealing thesecret information. In general, the method has a constrainedembedding capacity because embedding of the secret messageis performed just in the Cr plane of the skin area.

The determination of appropriate pixels in whichsecret message will be embedded is particularly important forviable and effective embedding.

Ozdemir Cetin, A. TuranOzcerit [2] presented two new steganographic methods utilizing similar and dissimilar histograms. Histogram rates acquiredfrom every video frame is the most essential distinctionbetween these two data-hiding algorithms. The review has beenadditionally enhanced by two extra methodologies namelyblock-based and frame-based techniques to watch few impactsfor crucial parameters like the no. of modified bits, and HDC(hidden data capacity). It can be reasoned that the frame-basedtechniques have outperformed the block-based techniques insimilar histogram approaches; the block-based techniquesdeliver better outcomes over the frame-based techniques indissimilar histogram approaches.

KousikDasgupta et al [3] designed a hash based LSB (Leastsignificant bit) technique for video steganography. In this work,eight bits of the secret information are isolated into 3,3,2 andinserted into the least significant bit of RGB pixel values of thecover frames respectively. This dissemination pattern is takenon the grounds that the chromatic impact of blue to the humaneye is greater than that of red and green pixel. Thus, the videoquality is not relinquished but we could increment the payload.The proposed method is contrasted with existing LSB (Leastsignificant bit) based steganography techniques and theoutcomes are observed to be inspiring.

Cetin et al [4] proposed a blind data hiding method forvideo steganography based on histogram techniques to keep thedetectable quality level of secret data in the cover video at thevery least. In this work, the frames of the cover video areisolated into sub-regions and the values of the histogram ofthese are figured separately to decide the region of interest.

Sunil. K. Moon et al [5] proposed a secure method forvideo steganography based on computer forensic method. Thesecret message is validated and encoded using a secret key and thenembedded in the 4 least significant bit (LSB) of every pixel of thevideo frames. To exchange the validation key to the receiver, it ishidden into one of the frame known by both the sender and receiver. The aim of using the computer forensic method is the legitimacy of the videos obtained.

SnehaKhupse and Nitin N. Patil [6] proposed anadaptive video steganography method in which ROI in a frameis utilized instead of the entire frame. This method uses humanskin tone as carry object for hiding the secret message. For skinregion detection, morphological dilation techniques and filling operation are used.

III.METHODOLOGY

This work is based on image encryption. According toan existing technique [11], which is applied on enciphering application in which image is transmitted over unsecured channels. To encrypt the image for the transmission over unsecured channels, image is divided into blocks. The image when divided into blocks, these divided blocks are rearranged to encrypt the image. The blocks are shuffled into fixed pattern and this pattern is decided by the message which used for encryption. The message is derived based on relationship between pixels of the image. The proposed algorithm can be applied in the following steps:-

Pre-processing Phase: In the pre-processing phase, the two random video frames are chosen as input images which need to encrypt and second image is the image from which key need to generate.

Feature extracted: In the second phase, the textual features of the first image is extracted using the wavelet transform algorithm. The wavelet transformalgorithm will extract the features like energy, entropy etc. from the image.

Wavelet Transform Algorithm:

1. Count all the number of pixels in the matrix in which the data is saved.
2. Store the counted pixels in matrix P[i,j].
3. Check similarity between pixels in the matrix by applying histogram technique.
4. Calculate contrast factor from the method.
5. The elements of pixel need to be normalized by dividing the pixels.
6. Apply DCT with its level of decomposition.
7. Apply DWT1 and DWT3 with HAAR family and its level of decomposition.
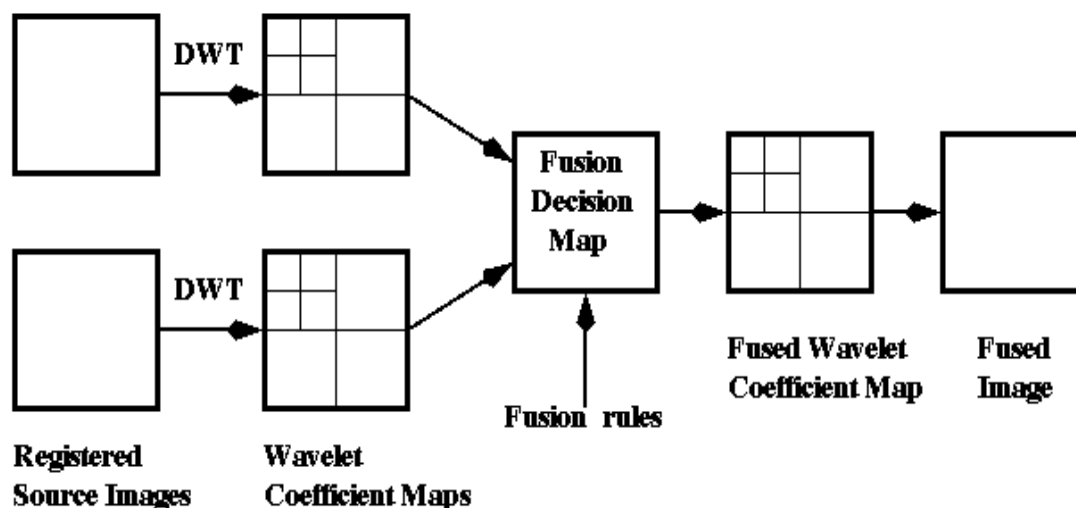
IV.RESULT

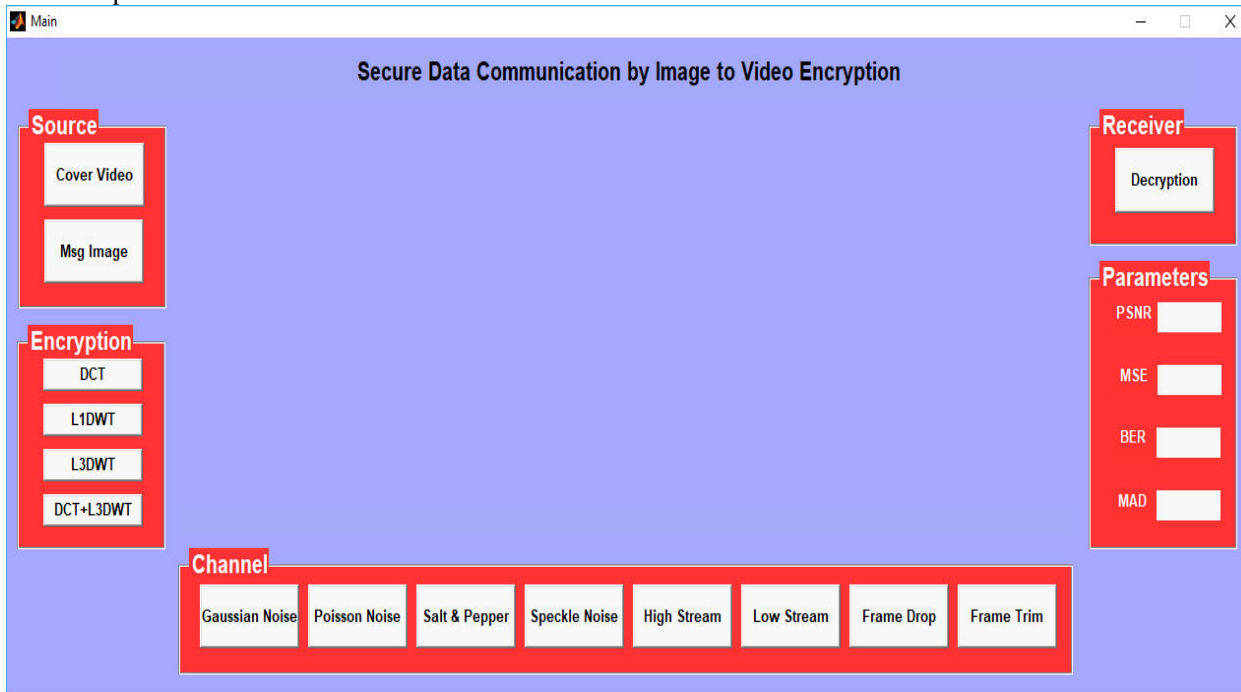Initial Graphical User Interface is shown below:

Table contained different techniques, Noise, PSNR, MSE, BER and MAD:

S.No.	Applied Technique	Applied Noise	PSNR	MSE	BER	MAD
1	DCT	No	69.1385	0.954167	0.119271	0.195604
2	DCT	Gaussian	37.8466	21.808	2.72599	2.72599
3	DCT	Poisson	37.8333	21.837	2.72962	2.72962
4	DCT	Salt & Paper	37.8336	21.8364	2.72995	2.72995
5	DCT	Speckle	37.8333	21.837	2.72962	2.72962
6	DCT	High Stream	69.1385	0.954167	0.119271	0.195604
7	DCT	Low Stream	69.1385	0.954167	0.119271	0.195604
8	DCT	Frame Drop	69.1385	0.954167	0.119271	0.195604
9	DCT	Frame Trim	69.1385	0.954167	0.119271	0.195604
10	L1DWT	No	72.0153	0.715625	0.089453	0.146703
11	L1DWT	Gaussian	37.8407	21.8202	2.7276	2.7276
12	L1DWT	Poisson	37.8333	21.837	2.72962	2.72962
13	L1DWT	Salt & Paper	37.8335	21.8364	2.72955	2.72955
14	L1DWT	Speckle	37.8333	21.837	2.72962	2.72962
15	L1DWT	High Stream	72.0153	0.715625	0.089453	0.146703
16	L1DWT	Low Stream	72.0153	0.715625	0.089453	0.146703
17	L1DWT	Frame Drop	72.0153	0.715625	0.089453	0.146703

18	L1DWT	Frame Trim	72.0153	0.715625	0.089453	0.146703
19	L3DWT	No	76.07	0.477083	0.059635	0.097802
20	L3DWT	Gaussian	37.8368	21.8292	2.72865	2.72865
21	L3DWT	Poisson	37.8333	21.837	2.72962	2.72962
22	L3DWT	Salt & Paper	37.8335	21.8366	2.72957	2.72957
23	L3DWT	Speckle	37.8333	21.837	2.72962	2.72962
24	L3DWT	High Stream	76.07	0.477083	0.059635	0.097802
25	L3DWT	Low Stream	76.07	0.477083	0.059635	0.097802
26	L3DWT	Frame Drop	76.07	0.477083	0.059635	0.097802
27	L3DWT	Frame Trim	76.07	0.477083	0.059635	0.097802
28	DCT+L3DWT	No	83.0014	0.238542	0.029818	0.048901
29	DCT+L3DWT	Gaussian	37.8349	21.8335	2.72918	2.72918
30	DCT+L3DWT	Poisson	37.8333	21.837	2.72962	2.72962
31	DCT+L3DWT	Salt & Paper	37.8335	21.8366	2.72957	2.72957
32	DCT+L3DWT	Speckle	37.8333	21.837	2.72962	2.72962
33	DCT+L3DWT	High Stream	83.0014	0.238542	0.029818	0.048901
34	DCT+L3DWT	Low Stream	83.0014	0.238542	0.029818	0.048901
35	DCT+L3DWT	Frame Drop	83.0014	0.238542	0.029818	0.048901
36	DCT+L3DWT	Frame Trim	83.0014	0.238542	0.029818	0.048901

V.CONCLUSION

In this paper, we have presented a review and analysis of videosteganography techniques in spatial domain. Distinctionbetween steganography, cryptography, and watermarking were

also examined. Then, video steganography techniques of spatialdomain were discussed and their performance assessments,video preprocessing, and secret messages preprocessing werespotlighted. The accompanying proposals are recommended tocome up of a proper technique for information hiding:

1. For real time security strategies, proposing a videosteganography technique that keeps up an exchange offbetween video quality, payload, and robustness would be moresuitable.

2. Proposing a steganographic method that consolidatessteganography with other system protection methods such ascryptography and error correcting codes. In this way,encrypting and encoding the secret massage before embeddingwill give an extra security level to the secret message androbustness against attacks.

3. Proposing a video steganography method that utilizes a partof the video for embedding the secret message rather thanutilizing the whole video. Such a technique will prompt toimprove the quality of stego video and enhance the resistanceagainst attacks.

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