

# An Enhanced Approach for Image Steganography in video

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**Abstract**— Steganography is a method used to transmit covering information by changing an audio signal in an invisible manner and is an art of hiding information in ways that avoid declaring hidden messages. The secure data transmission over internet is achieved using Steganography. Video files are generally a list of images. The presented techniques on images and audio can be enforced to video files too. The great advantages of video are the large amount of data that can be hidden inside and video is a moving stream of images. The network provides a method of communication to distribute information to the masses. The Security of information has become a major issue with the growth of data communication over computer network. Steganography and cryptography are two different data hiding techniques. Cryptography, on the other hand obscures the content of the message. In this research work we proposed a high capacity data embedding approach by the combining two approaches LSB and DWT.

**Key words:** Steganography, Data Hiding, File Security, Frame Extraction, LSB Technique, DWT Algorithm

## I. INTRODUCTION

### A. Image Processing

It is a method for changing an image into digital form and performing operations, in order to get some useful information from it. Image processing is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics correlated with that image. Image processing system includes treating images as two dimensional signals while enforcing already set signal processing methods to them. Image processing basically include three steps, first is to implicate the image, second to estimate and manipulating the image including compression, enhancement and spot patterns and last is to estimate the image to get desired output.

### B. Data Hiding

Data hiding is used to embed any secret data into any file, the user has to enter a password and the same password to be used to unhide the secret message.

### C. Steganography

Steganography is a technique used to transfer covert information by reshape an audio signal in an undetectable manner and is an art of hiding information in ways that avoid the declaring of covering messages. Video files are generally a list of images. So most of the presented methods on images and audio can be enforced to video files too. Steganography simply means is the practice of hiding a file, message, image, or video within another file. Steganography is a fusion of two words “stegano” means is covered and “graphy” means is writing. Steganography[2] is an art of covering the existence of the message so it does attract the attention toward the secret message, hence third party or illegal person cannot be able to detect the message.[3].

Steganography techniques include covering within text file, text in image or audio or video, images within images, images within audios or videos, covering messages in voice-over-IP, WLAN steganography is also used for delivering information over local area network. The main difference between cryptography and steganography, cryptography hides the message but the message cannot be decrypted until unless public or private key is not known. On the other hand steganography cover the existence of the message, secret message is not difficult to decrypt in case of steganography but most of the people are not able to detect the presence of the message.[4]

### D. Preprocessing

The solution of preprocessing method is to eliminate noise from image. Noise particles may noticed due to gray scale alteration in image. De-noising of image is mandatory because noise can change the final results. So enforce proper filter, median filter is enforced because the results are efficient. To check its efficiency, we will use ‘add noise’ command to add noise in an image

There are several types of filters. Like linear filters and non-linear filters, adaptive filters, Gaussian filter among all median filter works superior. It is a non-linear filter mainly used for noise elimination without disturbing the image. It is more flourishing and maintain maximum information of the image. It is widely used in digital image processing because in many conditions while eliminating noise it safe boundaries. It performs better than other filters. Command used for median filter is ‘medfilt’.

### E. Enhancement

While eliminating noise, some parts of the images become dim. So to purify the visual appearance of the image, improvement is applied. There are different methods among all histogram equalization is better. Histogram equalization usually increases the contrast of foreground and background of image, both are bright or both are dark. ‘histeq’ command will be used for this function.

### F. Discrete Wavelet Transforms

Wavelets are special functions which are used as basal functions for showing signals. For 2-D images, we apply DWT for preparing the image by 2-D filters in each dimension. The filters break the input image into four non-overlying multi-resolution sub-bands LL1, LH1, HL1 and HH1. The sub-band LL1 shows the coarse-scale DWT coefficients while the sub-bands LH1, HL1 and HH1 shows the fine-scale of DWT coefficients. To obtain the next coarser scale of wavelet coefficients, the sub-band LL1 is processed until some final scale N is reached. When N is reached,  $3N+1$  sub-bands reposing of the multi-resolution sub-bands LLx and LHx, HLx and HHx is obtained where x ranges from 1 until N. Due to its excellent spatial-frequency localization attributes, the DWT is very suitable to find the areas in the host image where a watermark can be installed effectively. This property allows the uses of the covering

effect of the human visual system such that if a DWT coefficient is changed, only the part to that coefficient will be changed. Most of the image energy is concentrated at the lower frequency sub-bands LLx and watermarks installed in this may degrade the image greatly. Installing in the low frequency sub-bands could increase flourishing greatly. On the other hand, the high frequency sub-bands HHx include the edges and textures of the image and the human eye is not generally sensitive to changes in such sub-bands. This allows the watermark to be installed without being perceived.

In signal processing and image compression the wavelet transform has achieving large acceptance. Due to their inherent multi-resolution nature, wavelet-coding schemes are suitable for applications where scalability and tolerable degradation are necessary recently the JPEG committee has released its new image coding standard, JPEG-2000, which has been based upon DWT.

The wavelet transform is calculated break down for different segments of the time-domain signal at different frequencies. Multi-resolution test: used to estimate the signal which giving different resolutions at different frequencies. it is better for those signal which are having high frequency components for short time and low frequency components for longtime .e.g. Images and video frames. WT divide a signal into a set of basic functions.

These basis functions are called wavelets.

#### G. Parameters

- 1) PSNR- PSNR (Peak Signal -to-Noise Ratio) used for quality measurement between input and Output image. If greater the PSNR value that means improves the quality of output image.
- 2) MSE- MSE (Mean Square Error) describes the Cumulative Squared Error between Input and Output image Whereas PSNR describes a measure of the Peak Error. If lesser the value of MSE that means reduce the error.
- 3) RMSE- The root-mean-square deviation (RMSD) or root-mean-square error (RMSE) is a frequently used measure of the differences between values (sample and population values) predicted by a model or an estimator and the values actually observed.
- 4) Execution Time- The execution time or CPU time of a given task is defined as the time spent by the system executing that task, including the time spent executing run-time or system services on its behalf.

## II. BLOCK DIAGRAM & METHODOLOGY

### A. Methodology

- 1) Firstly browse an image after converting Colour image into grey scale image
- 2) Secondly apply Median Filter on the input image to remove the salt-and-pepper Noise from the image.
- 3) Next apply proposed filter on the image received from previous step with the selection of best possible filtration coefficients to remove the other types of noises from the image.
- 4) Then apply the Gaussian filter on the image received from preceding step to remove the Gaussian noise from the image.
- 5) Final obtain the filtered image.

### B. Block Diagram

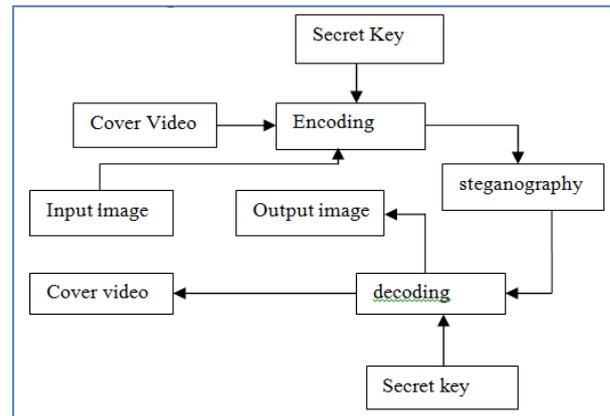


Fig. 1: Block Diagram

## III. PROBLEM FORMULATION

Steganography is technique for hiding secret information into another file. Steganography technique is used text, image, video and audio for hiding the secret data. Video steganography is type of steganography, in which video used as medium for hiding secret data. Video steganography has hide text data into video using LSB, spread spectrum techniques. After this, image used as secret data which hide into video by using DCT, vector embedding techniques. These techniques have been many drawbacks like less secure, less robust, high PSNR value due high MSE. These techniques have taken more time for implementation. To overcome these drawbacks introduces new technique named DWT technique. In which firstly convert video into frames then select random frames for hiding secret image. DWT compressed the selected frames and embedding image into compressed frames. Before embedding secret key is generate for more security. This technique increased PSNR value by decreased MSE value

### A. Objective

The main objective of the proposed work is to

- 1) To hide secret image into video using DWT AND LSB techniques.
- 2) To improve PSNR by minimizing MSE.
- 3) To compute more quality check parameters to measure performance like RMSE and Execution time.

## IV. PROPOSED WORK

The proposed technique DWT is used for hiding secret data. The proposed method for the data hiding is based on video steganography where we have used the DWT algorithm to make the steganography more secure and robust. In this work the avi video file is taken and then video divided into frames and random frames are selected. Generate the secret key for embedding image in video. By using DWT compressed the frames and bit value of secret image is embedded into frames then apply IDWT for reconstruct the video and extracted the secret image by key.

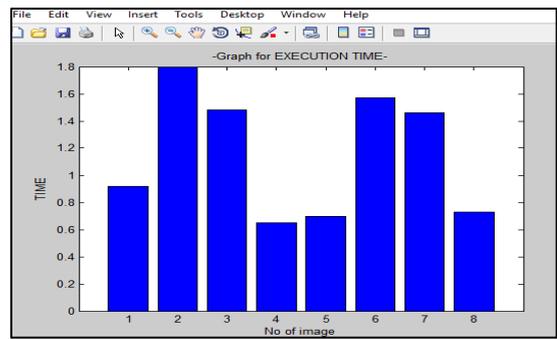
## V. RESULTS



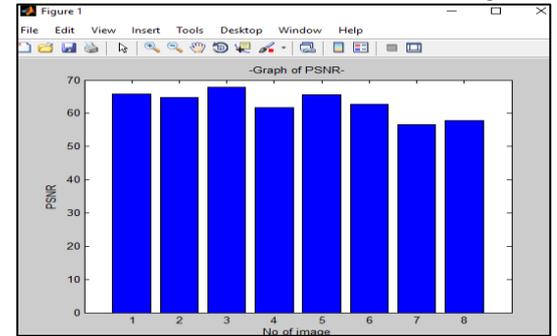
(a) Resultant Image 1



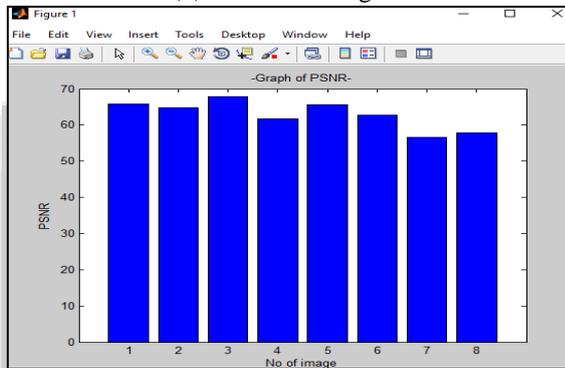
(b) Resultant Image 2



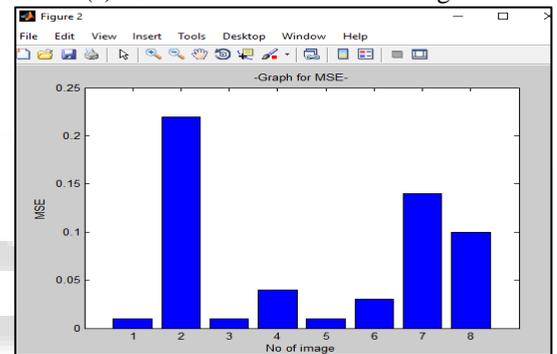
(b) Execution Time value for resultant Image 1



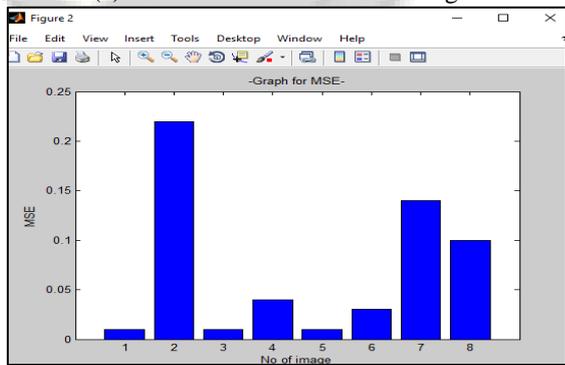
(a) PSNR value for resultant Image 2



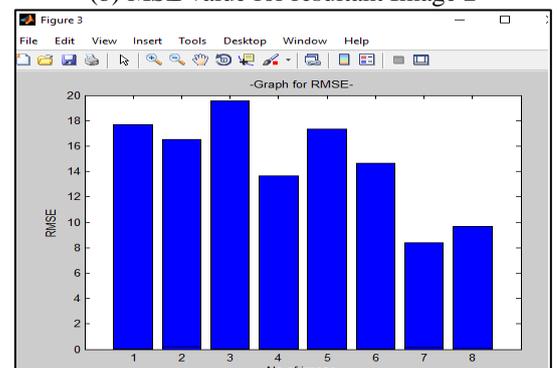
(a) PSNR value for resultant Image 1



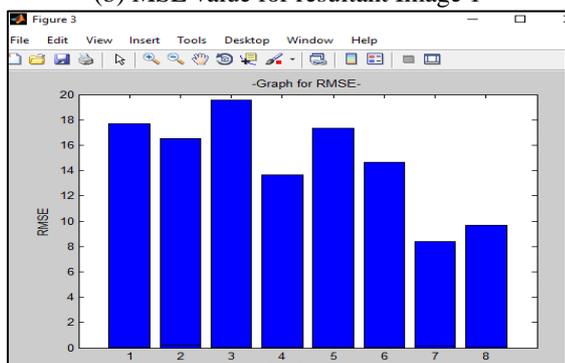
(b) MSE value for resultant Image 2



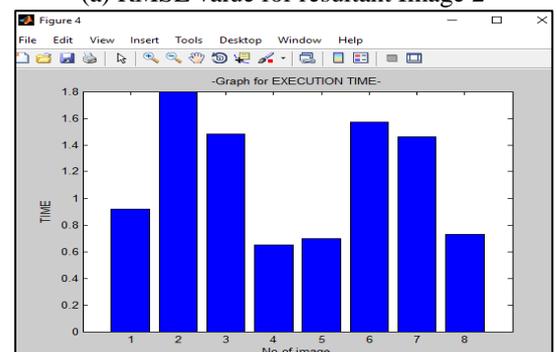
(b) MSE value for resultant Image 1



(a) RMSE value for resultant Image 2



(a) RMSE value for resultant Image 1



(b) Execution Time value for resultant Image 2

Fig. 2: Graphical Representation of MSE, RMSE,PSNR, & Execution Time.

Parameter Metrics	PSNR	MSE	RMSE	Execution time
Image 1	64.6984	0.02221	16.5336	0.57159
Image 2	61.8100	0.04319	13.6452	0.50463
Image 3	67.764203	0.01096	19.5994	1.48135
Image 4	56.5943	0.14357	8.42951	1.46836

Table 1: Comparison Using Parameters MSE, RMSE, PSNR, & Execution Time.

## VI. CONCLUSION

Implementation of DWT and LSB of hiding secret image into video in Steganography is new technique and we found results using different images i.e. secret images (original image) and extracted image are different. We conclude that DWT using filters (high pass and low pass) which increase capacity, security, Imperceptibility and decrease noise. In this generate secret key for embedding which provides large secrecy. It shows that DWT and LSB performance is better than of DCT. Also the new technique which is now implemented is more secure and robust than previous implemented technique. In this research work we have implemented the design using DWT algorithm and LSB technique with GRAPHICAL USER INTERFACE (GUI) tool of MATLAB. In this research work we took number of images for experiment. In future one can use some other technique to implement same design and calculate parameters MSE and PSNR. Someone can also add some better attractive GUI design.

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