Enhancing Performance of Video Steganography Using Artificial neural network

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ABSTRACT

Need of hiding information from intruders has been around since ancient times. Nowadays Digital media is getting advanced like text, image, audio, video etc. To maintain the secrecy of information, different methods of hiding have been evolved. One of them is Steganography, which means hiding information under some other information without noticeable change in cover information.Video steganography is the technique of hiding some covert message inside a video.Our aim is to hide secret information behind images and text, audio is video file. As video is application of many still frames of images and text, audio. Artificial neural network based on classification or Segmentation is an advance technique providing rich information of an images of interest. As a past the work,an ANN is implemented to segment the images. ANN is configured and trained so that is become capable of segmenting an images. In this paper using ANN try to improve images accuracy, embedding capacity. To enhance more security each bit of secret frames will be stored in covered frames. That are achieves good images quality when compared with existing method.

Keywords: - *Video Steganography, Artificial neural network (ANN), PSNR, Embedding Capacity*

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1. INTRODUCTION:

In today's world, the communication is the basic necessity of every growing area. Everyone wants the secrecy and safety of their communication data. In our daily life, we use many secure pathways like internet or telephone for transferring and sharing information. But it's not safe at a certain level. In order to share the information in a concealed manner two technique could be used. These techniques are cryptography and steganography. In Cryptography the message is modified in an encrypted from with the help of encryption key which is known to sender and receiver only. The message can't be accessed by anybody without using encryption key. However the transmission of encrypted message may easily arouse attacker's suspicion, and the encrypted message may thus be intercepted, attacked or decrypted violently. In Steganography literally means covered writing. Its goal is to hide thefact that communication is taking place. It is a technique of hiding any secret information like password, text, images, audio behind original covered file. Steganography there are many type image, audio, video, text, or network or protocol steganography.

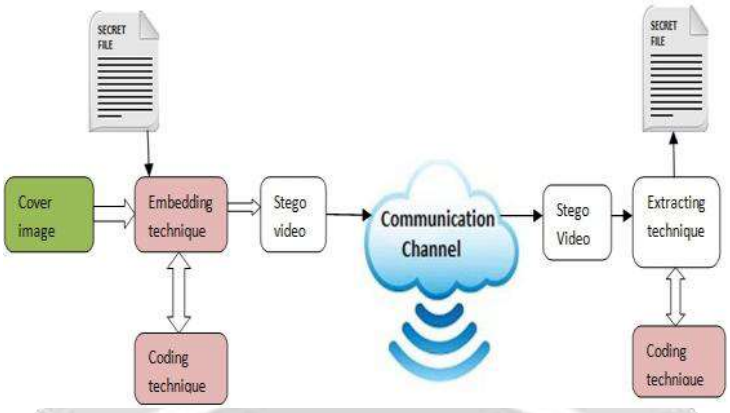


Fig -1: structure of Steganography system [6]

The given figure depicts simple representation of embedding and extracting process in steganography. In this figure, a secret message is being embedded inside a digital video to produce the stego video using data embedding technique. When stego object is produced then, it will be send via some public communications channel to receiver. The extracting process is simply the reverse of the embedding process. The receiver must decode the stego object to view the secret message by applying an extracting algorithm/technique. [6]

2. LITERATURE REVIEW:

2.1 Video Steganography by LSB Technique using Neural network

- In [1] Richa Khare, Rachana Mishra, Indrabhan Arya paper, three parties: the content owner, Video Steganography is the technique of hiding some covert message inside a video. The addition of this information to the video is not recognizable through the human eye as modify of a pixel color is negligible. The performance of this method can be further improved with the use Neural Networks Methods (like Artificial Neural Networks approach adoption (ANN) and Back Propagation Neural Networks (BPNN)). In this proposed method we used Back propagation Neural Network method to perform Steganography in video file.Neural network has good capability to estimate any nonlinear functions. Firstly we extract characteristics of image embedded information, than input them into neural network to get desired output.To start with, training the patterns which are formed from Existing Data and the preferred bits from the selected frame generates cipher text. This generated text is embedded in the Least Significant Bit of the chosen image of the video and then transmitted to the receiver. The confidentiality lies in the recommend of the neural network algorithm that prepares the pattern. The neural network algorithm has to be shared between the sender and receiver through a protected channel. This scheme of neural Network accepts “N” input pattern which has to be trained, equals to 2^k+1, for an input patternhaving k+1 bits. From the secret message 1 bit is selected and from carrier selected frame of the video k bits is selected. Input layer is designed with k+1neurons.The hidden layer neurons are depends on the problem domain. XOR Propagation algorithm is designed in training the bit patterns. On the other side decryption section, the input patterns bits are formed by the merging of cipher and chosen bits from the frame.This method is used a symmetric key for performing the hiding process of message in the video at the sender side and retrieving the data at the receiver side.These two main factors increase the value of Steganography from both sender and receiver. It provides more reliability and accuracy.

2.2 Image Hiding using Neighborhood similarity

- In [2] A.M. Nickfarjam, H. Ebrahimpour-komleh, A. Pourshabanan Najafabadi Paper, Three parties: the content in this paper, a new method for image hiding is presented which takes advantages of Particle Swarm Optimization (PSO) and neighborhood similarity features in order to embed pixels of secret image in best positions of host image. Most Significant Bits (MSBs) of secret image pixels are utilized to hide in Least Significant Bits (LSBs) of host image pixels. Three feature functions and three corresponding coefficients are defined to find appropriate pixels for hiding. The proposed technique employs the ability of three features for neighborhood similarity to improve embedding performance as well as making better visually proprieties of the cover image. The presented method defines a special secret key for each host image based on PSO. The novelty of using neighborhood similarity features with LSB replacement causes embedding performance improvement. The experimental results show the superiority of this approach over the LSB-based and evolutionary-based methods. There is no need to evaluate PSNR and MSE values of secret image which is extracted. Because, all of methods use 4-bits of MSBs for replacement and 4-connected neighbourhood for (2)-(4).These neighborhood similarity features defined based on MSBs of host image. Finding coefficients is performed by PSO which produces multiple pixels ranking and chooses the best one. The MSBs of host image are equal to MSBs of cover image. Thus, extraction procedure is clear. While LSB-based methods have high capacity for image hiding; but, LSB corrupt image histogram. Direction for future works can be replacing LSB approach by other appropriate algorithms and overcome this problem.

2.3 Image Texture Classification using Artificial Neural network (ANN)

- In [3]Shohel Ali Ahmed, Snigdha Dey, Kandarpa Kumar Sarma works on Texture classification is an important and challenging factor in image processing system which refers to the process of partitioning a digital image into multiple constituent segments. The goal of segmentation is to simplify and / or change the representation of an image into something that is more meaningful and easier to analyse. Artificial Neural Network (ANN) Based texture classification or Segmentation is an advanced technique providing rich information of an image of interest. As a part the work, an ANN is implemented to segment the image. For that a particular type of ANN is configured and trained so that it becomes capable of segmenting an image. The current work deals with a task where an object of interest is to be segmented out of a background for processes which can be carried out as part of extended applications.The work provides a framework of using ANN for texture classification and image segmentation. It can be applied for a range of areas like medical diagnosis, remote sensing, traffic control etc.

2.4 Colorization of gray scale natural still images by using ANN to predict the low frequency DCT components of the RGB channels

- In [4] Muna Darweesh, Mona AlZubaidi, Alavi Kunhu, Hussain Al-Ahmad and Fatma TaherPaper presents a new algorithm for colorizing grey scale natural still images. The algorithm uses artificial neural network (ANN) to predict the low frequency discrete cosine transform (DCT) components of the RGB channels. A set of natural colour images are used to train three ANNs. The trained networks estimates the RGB layers of the grey scale image that best match a set of training coloured images. The ANN predicts only the low frequency components. The high frequency components of the grey scale image are mapped to the RGB channels. The performances of the new algorithm are analysed using the peak signal to noise. Acceptable colours were obtained for a variety of still images.Neural networks are simple implementations of local behavior observed in our own brains. The brain is composed of 1011 neurons that are connected to approximately 1000 other neurons by axons. The artificial neural network (ANN) mimics the basic

operation of our own brain. Multi-layers ANN are complex networks, which provide a nonlinear relationship of input data to output results.

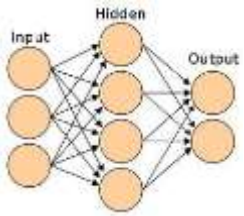


Fig -2: Neural Network[4]

2.5 A New Image Steganography Method in Spatial Domain Using XOR

- In [5] Kamaldeep Joshi, Pooja Dhankhar In this paper, we present a new technique for image steganography in spatial domain. The proposed method extracts two LSBs and two MSBs of the selected pixel value. Then perform the XOR operation on first and last bit and second bit and seventh bit. On the basis of result of these two XORoperations every bit of secret data is embedded one by one on LSB of selected pixel value. The objective of thistechnique is to maximize the PSNR rate and invisibility of the secret data with minimal modification to thecover image. Results indicate that our method achieves good image quality when compared with existing methods.

4. PROPOSED METHOD:

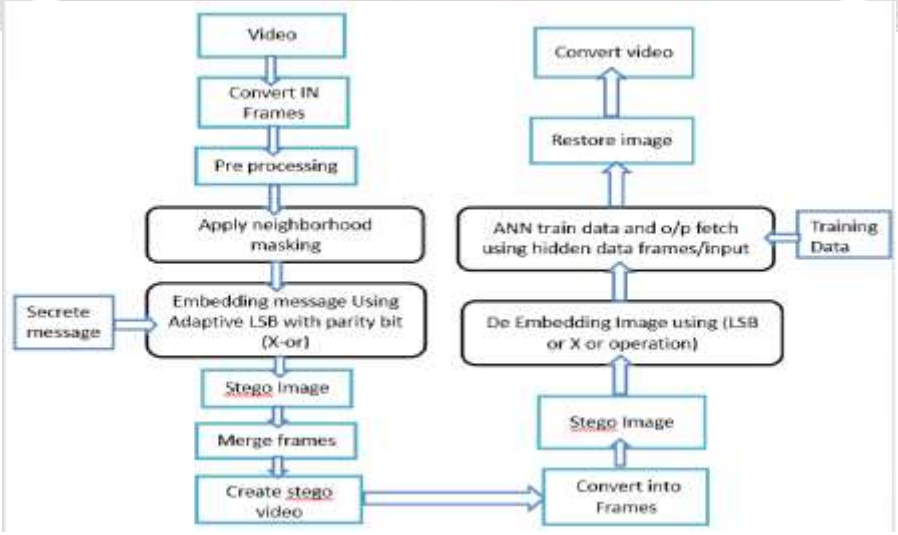


Fig 3: Proposed Flowchart

5. RESULT ANALYSIS:

For a result analysis we calculate PSNR and MSE rate and Embedding capacity.

5.1.Peak Signal-to-Noise Ratio (PSNR)

PSNR is an experimental parameter for the ratio between the maximum possible value (power) of a signal and the power of distorting noise that affects the quality of its representation. Because many signals have a very wide dynamic range, (ratio between the largest and smallest possible values of a changeable quantity) the PSNR is usually expressed in terms of the logarithmic decibel scale.

The mathematical representation of the PSNR(peak signal-to-noise ratio) is as follows:

$$PSNR = 20\ \log_{10}\left(\frac{Max_f}{\sqrt{MSE}}\right)$$

where the MSE (Mean Squared Error) is:

$$MSE = \frac{1}{mn}\sum_0^{m-1}\sum_0^{n-1}\|f(i,j) - g(i,j)\|^2$$

This can also be represented in a text based format as:

MSE = (1/(m*n))*sum(sum((f-g).^2))

PSNR=20*log(max(max(f)))/((MSE)^0

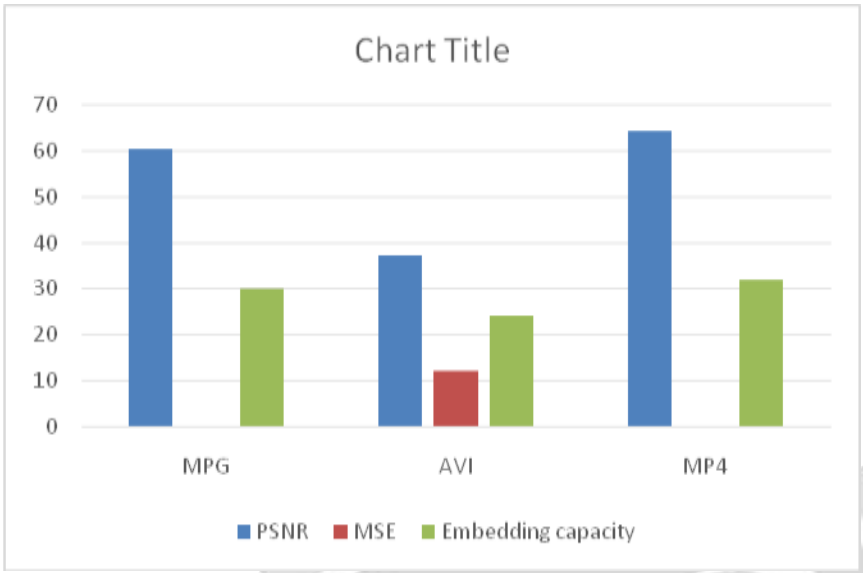
5.2 Embedding capacity:

For embedding payload, also called embedding capacity, we use ER, being short for embedding rate, to represent the percentage of the embedded secret bits in the whole pixels of the cover image.

$$ER = \frac{h}{H \times W}\ bpp$$

Different type of video	PSNR	MSE	Embedding capacity
MPG	60.3504	0.0605	30.12
AVI	37.3180	12.147	24.27
MP4	64.2321	0.0428	32.02

in proposed method we work on different types video. In above analysis determine that when apply to MP4 video we get better result than others video formats.



4. CONCLUSION:

The different securityand data hiding techniques are used to implement steganography using LSB, ISB, and MLSB. In this method we use LSB technique with ANN. Using ANN we get a better result. Novelty of our method it is a work with a different formats like MP4, MPEG, .AVI format and give good Embedding Capacity and PSNR value. But when a work with .AVI format some desire result not get. So in feature work try to get better result for .AVI video format.

5. REFERENCES:

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