Text Hiding in Multimedia by Huffman Encoding Algorithm Using Steganography

Madhavi V. Kale[1], Mrs. Swati A. Patil[2]

[1]PG Student, Dept. Of CSE., G.H.Raisoni Institute Of Engineering And Management, Jalgaon (Ms), India
[2]Assistant Professor, Dept. Of CSE., G.H.Raisoni Institute Of Engineering And Management, Jalgaon (Ms), India

---***---

Abstract - *Information hiding is a part of information Security. Information Security is becoming important part of today's life. Because unlimited use of internet. We generally need to communicate data in the form of text, image audio and video. The Information is mostly communicated throw the network. But in a network data is not secure. So to protect transfer of sensitive data in a network from third party steganography technique is used. Steganography is a technique of information hiding that focuses on hiding the existence of secret messages. Generally LSB technique is used to secure data in Communication data. In Propose system, we use Huffman Encoding algorithm to compress data and hide in Image , Audio and Video with the help of LSB Technique. And also, For Image PSNR and For Audio SNR, THD, Mean and Mean Frequency ratios are calculate.*

Key Words: LSB, PSNR, SNR, THD, Steganography

1 .INTRODUCTION

Steganography entails the art of writing concealed messages in such a manner that only the sender and the intended receiver are aware of the presence of the message.. There are Four Types of Steganography: Text Steganography, Image Steganography, Audio Steganography and Video Steganography. Hiding information in text is the most important and basic method of steganography. Image steganography is a process that hides the message into cover-image and generate a stego-image. That stego-image then sent to the receiver without anyone else knowing that it contain the hidden message. The receiver can extract the message with or without stego-key that depends on the hidden scheme. Audio steganography is one of the popular data hiding techniques that embeds secret data in audio signals. The secret data is hidden in a way that unauthorized persons are not aware of the existence of the embedded data and without altering the quality of the cover audio. Data hiding in audio signals has numerous applications such as protection of copyrighted audio signals, covert communication, hiding data that may influence the security and safety of governments and personnel Least significant bit (LSB) coding is the simplest way to embed information in a digital audio file. By substituting the least significant bit of each sampling point with a binary message, LSB coding allows for a large amount of data to be encoded. Embedding secret messages into digital sound is known as audio Steganography. In Video Steganography, a Sequence of High Resolution of Image called Frames. In that Particular Frame, we can hide data by using Huffman Encoding Algorithm.

2. Literature Survey

Adel A. Sewisy and Romany F. Mansour and S. Z. Rida and Amal A. Mohammed, Proposed that, The text message is encoded using Huffman coding method and entrenched into audio file using LSB algorithm. after that The result is then put into a new audio file and thereafter contrasted through the use of various values that include; PSNR (peak signal to noise ratio), and SNR (signal to noise ratio). The frequency of audio file prior and after entrenched text message is schemed[5]. Deepesh Rawat and Vijaya Bhandari has proposed that 24 bit of image can improve by using LSB Method.and after that calculating their PSNR ratio[4]. Miss Amruta B. Bhojane, Prof. Priti A. Khodke has proposed that data hide by substitution by embedding and extraction Procedure[2]. Najiya Thasneem. E1, Renjith V Ravi has Propose that the secret messages are embedded into the cover audio file by modifying its amplitude. Here the cover audio file is converted fro-m time domain to frequency domain and the secret image is embedded in its compressed form and an error correction technique also used to improve the robustness of the system. Finally the original image can be retrieved[3].Chi-Kwong Chan∗, L.M. Cheng has Propose that simple LSB substitution method. The image quality of the stego-image can be greatly improved with low extra computational complexity. Extensive experiments show the effectiveness of the proposed method[1].

3.Problem Identified

The LSB technique is most challenging one as compared to others like Masking and Filtering. It is difficult to differentiate between cover Object and stego object. if Few LSB bits of Cover object are replaced. any process that modifies the values of some pixel either directly or indirectly, may result in degrading of the quality of the original image. Although the LSB embedding method hides data in such way that human can not perceive it, but such scheme can be easily destroy by lossy Compression Algorithm and redundancy technique also reduce the data transmission rate significantly.

4. Proposed System

The novel method is proposed to hide a text in Image, Audio and Video by Huffman Encoding Using Steganography. Huffman Encoding Algorithm is the lossless data compression technique. And the secret information is secure and PSNR and SNR ratios are calculated.

4.1 Hiding Text in Image:-

- o Take one BMP Image.
- o For each of R, G, and B, makes the LSB equals to 0. These bits will be used in hiding characters.
- o Compress the Entered data using Huffman Encoding algorithm.
- o Encrypt the compressed data using LSB algorithm with one secret key.
- o When the 8 bits of the character are processed, jump to the next character, and repeat the process until the whole text is processed.

4.2 Hiding Text in Audio:-

Least significant bit (LSB) coding is the way to embed information in a digital audio file. By substituting the least significant bit of each sampling point with a binary message, LSB coding allows for a large amount of data to be encoded. Among many different data hiding techniques proposed to embed secret message within audio file, the LSB data hiding technique is one of the safest methods for inserting data into digital signals in noise free environments, which merely embeds secret message-bits in a subset of the LSB planes of the audio stream.

The following steps are:

- Receives the audio file in the form of bytes and converted in to bit pattern.
- Hide a text in that particular audio file and use secret key to encrypt text in audio.
- Each character in the encrypted message is converted in bit pattern.
- Replaces the LSB bit from audio with LSB bit from character in the message.

This proposed system is to provide a good, efficient method for hiding the data from hackers and sent to the destination in a safe manner. This proposed system will not change the size of the file even after encoding and also suitable for any type of audio file format. Encryption and Decryption techniques have been used to make the security system robust. Low-bit encoding embeds secret data into the least significant bit (LSB) of the audio file.

4.3 Hiding Text in Video:

The main high resolution AVI fie is nothing but a sequence of high resolution image called frames. Initially system will stream the video and collect all the frames in bitmap format and also collect the following information:

- o Starting frame: It indicates the frame from which the algorithm starts message embedding.
- o Starting macro block: It indicates the macro block within the chosen frame from which the algorithm starts message embedding.
- o Number of macro blocks: It indicates how many macro blocks within a frame are going to be used for data hiding. These macro blocks may be consecutive frame according to a predefined pattern. Apparently, the more the macro blocks we use, the higher the embedding capacity we get. Moreover, if the size of the message is fixed, this number will be fixed, too. Otherwise it can be dynamically changed.
- o Frame period: It indicates the number of the inter frames, which must pass, before the algorithm repeats the embedding. However, if the frame period is too small and the algorithm repeats the message very often, that might have an impact onto the coding efficiency of the encoder. Apparently, if the video sequence is large enough, the frame period can be accordingly large. The encoder reads these parameters from a file. The same file is read by the software that extracts the message, so as both of the two codes to be synchronized.

5.Experimental Result

5.1 PSNR:- the *Peak Signal to Noise Ratio (PSNR)* are the two error metrics used to compare image compression quality. PSNR represents a measure of the peak error. The lower the value of MSE, the lower the error.

Formula:- $10\log_{10}[R^2/MSE]$

5.2 SNR:-

Signal to noise ratio is a measurement of the audio signal level compared to the noise level present in the signal. SNR specifications are used in components such as amplifiers, CD/DVD players etc

Formula: $SNR = \mu/\sigma$ Where,

μ - Mean,

σ - Standard Deviation,

SNR - Signal to Noise Ratio.

	IMAGE	VIDEO
	PSNR	PSNR
LSB + Huffman Encoding Algorithm (propose Algorithm)	75.48 (for Leena Image)	54.06

Table 5.1 Propose System shows PSNR Ratios.

5.3 THD:

The total harmonic distortion, or THD, of a signal is a measurement of the harmonic distortion present and is defined as the ratio of the sum of the- powers of all harmonic components to the power of the fundamental frequency. THD is used to characterize the linearity of audio systems and the power quality of electric power systems. Distortion factor is a closely related term, sometimes used as a synonym.

$$THD = \left(\frac{\sqrt{(V_2{}^2 + V_3{}^2 + V_4{}^2 + \cdots + V_n{}^2)}}{V_1} \right) * 100$$

5.4 Weighted Mean :-

Weighted **mean C**alculates sum of products Xi * Yi divided with sum of Yi (Xi are values on x-axis and Yi corresponding values on y-axis from origin plot). If applied to a FFT plot, it is equivalent to a mean frequency.

5.5 Weighted Frquency:

Weighted median: Xi are values on x-axis and Yi corresponding values on y-axis of the origin plot. This function calculates Xi value so that sum of Xi * Yi on both sides of the Xi is the same (or nearly the same). If applied to a FFT plot, it is equivalent to a median Frequency.

	AUDIO			
	SNR	THD	Weighted Mean	Weighted Mean Frequency
LSB+Huffman Encoding Algorithm (Propose System)	29.062	1.56	0.17	0.090

Table 5.2 Shows SNR , THD WM,WMF Values

6. Conclusion and Future Scope:-

In the Proposes steganographic system, Compress ratio is calculated by Huffman Encoding Algorithm. after that Text is hide in image, audio and Video by Least Substitution Method (LSB). On the another Hand Receiver receive that that hiding image, audio as well as Video as appear Original Image. This

system Produce Security Tool which is based on Steganography. we can hide a message by using Huffman encoding algorithm is more secure and feasible. In Future Propose method can be modify to use different video format(MPEF,MP4),different Audio format(AU,MP3)

REFERENCES

[1]Chi-Kwong Chan∗, L.M. Cheng "Hiding data in images by simple LSB substitution" Department of Computer Engineering and Information Technology, City University of Hong Kong, Hong Kong ,Received 17 May 2002; received in revised form 11 July 2003; accepted 11 August 2003

[2] Miss Amruta B. Bhojane, Prof. Priti A. Khodke, "data hiding in video stream by text substitution"ISSN (O): 2348-4098 ISSN (P): 2395-4752

[3]Najiya Thasneem. E, Renjith V Ravi "An Effective Technique for Hiding Image in Audio" International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

[4] Deepesh Rawat , Vijaya Bhandari " A Steganography Technique for Hiding Image in

an Image using LSB Method for 24 Bit Color Image"International Journal of Computer Applications (0975 – 8887) Volume 64– No.20, February 2013

[5] Adel A. Sewisy and Romany F. Mansour and S. Z. Rida and Amal A. Mohammed, "Hidden Text into Audio Files" International Journal of Research Studies in Science, Engineering and Technology Volume 2, Issue 5, May 2015, PP 33-39 ISSN 2349-4751 (Print) & ISSN 2349-476X (Online)

[6] Prof.Samir Kumar and BandyopadhyayBarnali and Gupta Banik, "LSB Modification and Phase Encoding Technique of Audio Steganography Revisited", International Journal of Advanced Research in Computer and Communication Engineering Vol. 1, Issue 4, June 2012.

[7] Shaveta Mahajan and Arpinder Singh, "A Review of Methods and Approach for Secure Stegnography", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 10, October 2012.

[8] Mukesh Garg and A.P. Gurudev Jangra, "An Overview of Different Type of Data Hiding Scheme in Image using Steganographic Techniques", International Journal of Advanced Research in Computer Science and Software Engineering, January 2014.