

Information Hiding in to Multimedia using Steganography

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Abstract— Today’s large demand of internet application’s requires data to be transmitted in a secure manner. Data transmission in public communication system is not secure because of interception and improper manipulation. So the solution of this problem is steganography. Which is art and science of writing hidden message in such a way that no one, apart from the sender and intent recipient, suspects the existence of the message, a form of security through obscurity. A steganography technique for embedding information in audio using LSB based algorithm with discrete wavelet transform here, we increased the capacity of the classical LSB insertion method by performing the embedded process in the wavelet domain. The two most important parameters for audio steganography algorithm are peak signal to noise ratio(PSNR) and mean square error(MSE). We have applied the least significant bit technique with DWT to improve PSNR and MSE. The results have shown increased security, improve the parameter, increased robustness. This research focus on audio steganography in wavelet domain, in form of waveform audio file format. is used as a substitution technique. In order to increase PSNR and decreased MSE, A secure LSB based audio steganography is proposed.

Key words: Audio steganography, LSB method, DWT, MSE, PSNR

I. INTRODUCTION

In this era of emerging technology, electronic communication has become an integral and significant part of everyone’s life because it is simpler, faster and more secure, with adoption of electronic communication on such a large scale, it has become necessary to devise ways to transmit information secretly. Steganography is the branch of science which deals with embedding secret message on the transmitter side and retrieving it successfully on the receiver side.

Steganography is an art of hiding some secret message in another message without letting anyone know about presence of secret message except the intended receiver. The message used to hide secret message is called host message or cover message. Once the contents of the host message or cover message are modified, the resultant message is known as stego-message. In other words, stego-message is combination of host message and secret message. Steganography can be applied to different type of media including text, audio, and video. Audio and video files are considered to be excellent carriers for the purpose of steganography due to presence of redundancy. Audio steganography requires a text message or image to be embedded within a cover audio. Due to availability of redundancy, the cover audio message before steganography and stego message after steganography remains same. However, audio steganography is considered more difficult than video steganography because the human auditory system is more sensitive than human visual system.

The objective of this paper is to come up with a technique hiding the presence of secret message and working against steganalysis as well. For this purpose, the technique needs to satisfy transparency. Apart from this, capability is

also a major concern because an efficient technique is one which can embed more secret information. To increase the hiding capacity and improve the parameter PSNR and MSE. We can use discrete wavelet transform. The discrete wavelet transform decomposes signal into low-pass and high-pass components subsampled by two, the inverse transform, perform the reconstruction. We decided to make use of haar wavelet transform because it is the only quadrature mirror filter that has a finite impulse response.

II. BACKGROUND

A. Block Diagram

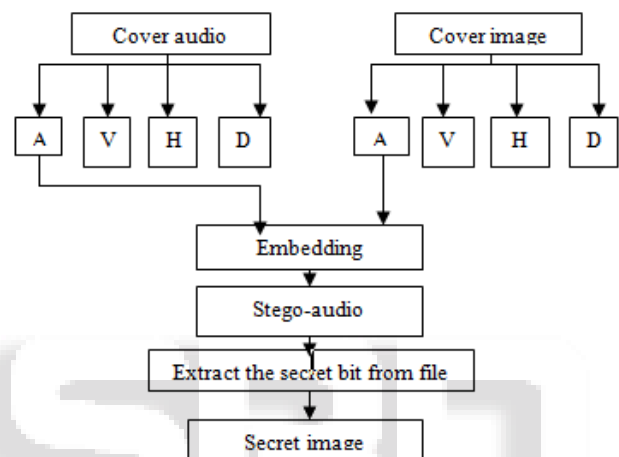


Fig. 1: Block Diagram

In image processing for comprise the image we can use the wave late transform. This is the block diagram of image hide in audio using LSB method in wavelet domain .here the original image is large so decries the size of image use the wavelet transform. so first apply the discrete haar wavelet transform. then image convert into four component approximations, horizontal, vertical, diagonal. But we can use the approximation image because visual information of them is very large. Then decries the size of pixel apply the coding of them whose comprise the image. Then embedding this image in audio using LSB algorithm. then provide the stego image. then extract the secret bits from the audio file. and finally produced the original image back.

B. Discreet Wavelet Transform

Discrete wavelet transform audio steganography is described data is embedded with signal in the LSBs of the wavelet coefficient of audio signal. To improve the inaudibility of embedded data employed a hearing threshold when hiding data in the integer wavelet coefficient, while avoided data hiding in the silent parts of audio signal. In addition an algorithm is proposed for high capacity and inaudibility audio steganography scheme which is based on discrete wavelet packet transform with adaptive embedding in least significant bits. the cover audio signal is break down into wavelet coefficients; each signal is scaled according to its maximum value and the number of bit per sample. the algorithm determines the number of bits that can be safely hidden in

each sample. After that stego key is embedding in the lowest frequency details signal that makes the stego-key more resistant against distortion and then stego signal is reconstructed.

C. LSB Coding

LSB algorithm replace the least significant bit in some bytes of the cover files to hide a sequences of byte containing the hidden data. In binary integer, the LSB is the bit position which gives the units values to determine whether the number is even or odd. It is equivalent to the least significant digits of a decimal number, which is the digit in the ones position. LSB technique is used to encoded the message into audio file and also perform bit level manipulation to encode the message

1 0 1 1 0 1 0 1

Fig. 2: Binary representation of decimal 181

The binary representation of decimal 181, with the LSB highlighted, the MSB in an 8-bit binary number represents a value of 128 decimal.

The LSB represents a value of 1. Example to hide letter "a", (ASCII code 97), which is 01100001 inside eight byte of cover.

1 0 1 1 0 1 0 1
0 1 0 1 0 0 1 1
1 0 0 1 1 0 1 1
1 1 0 1 0 0 1 0
1 0 0 0 1 0 1 0
0 0 0 0 0 0 1 0
0 1 1 1 0 0 1 0
0 0 1 0 1 0 1 1

The embedding of the speech file into the music file is done by LSB replacement method for which the total number of samples in both has to be known. If one has to hide any speech signal inside a music file, which is also called a "carrier". It can be done by replacing consecutive LSB's in each sample of the carrier with the message bits. Such a bit replacement is very simple and safe. It consists in embedding each bits form the message in the least significant bit of the cover audio.

I LSB coding, the ideal data transmission rate is implementation of LSB coding, however, the two least significant bit of a sample are replaced with two message bits. This increases the amount of data that can be encoded but also increases the amount of resulting noise in the audio file as well.

D. Embedding Algorithm

- Step 1. In audio first 40 byte make the wave header that contain the information of wave file.
- Step 2. Next 41 to 43 byte show the length of audio signal.
- Step 3. The 44 to 52 byte in identifier that identify that identify that message hiding starte after that.
- Step 4. Before the hiding message first hide the length of row and column of secret message.
- Step 5 Then start the hiding image using LSB. First apply the haar discrete wavelet transform because the size of original image is large so they describe the size of image.
- Step 6. Then rescaling the pixel of this image we can coded the image, then obtain compressed image.
- Step 7 This image hide in audio using LSB
- Step 8 Then calculate MSE and PSNR.

E. Extracting Algorithm

- Step 1. Read the stego image.
- Step 2. Retrieval of image bits is done by checking the MSB of samples.
If MSB is '0' then use 6 LSB's for data retrieve.
If MSB is '1' then use 7 LSB's for data retrieve.
- Step 3. After every image bits retrieved, they are converted into their decimal equivalents and finally the secret audio signal reconstructed.

PSNR and MSE

We then test the algorithm using the PSNR. PSNR is a standard measurement used in steganography technique in order to test the quality of the stego- audio. the higher the value of PSNR and low value of MSE, the higher quality the stego-audio will have. The PSNR and MSE can be calculated as follows.

$$MSE = \frac{\text{sum}(\text{sum}(\text{error} .* \text{error}))}{(M * N)}$$

$$PSNR = 20 * \log_{10}(0.2529 / MSE)$$

F. Result and Discussion



Fig. 3: Original Image



Fig. 4: The image using haar wavelet transform

This is the result of image hide in audio using discrete haar wavelet transform. Here, in Fig.a is the original image but it size is large so decries the size of the image without loss the information of the image we can use haar wavelet transform. So In the Fig.b we apply the haar wavelet transform. and than haar wavelet transform convert the image into four part approximation, horizontal, vertical, diagonal. But we can use approximation image to hide in audio because visual information of approximation image is high. then decries the size of the pixel of approximation image we can coding the image whose compares the image . And then hide this image

in audio.then stego-audio is obtain.and then calculate the MSE and PSNR.

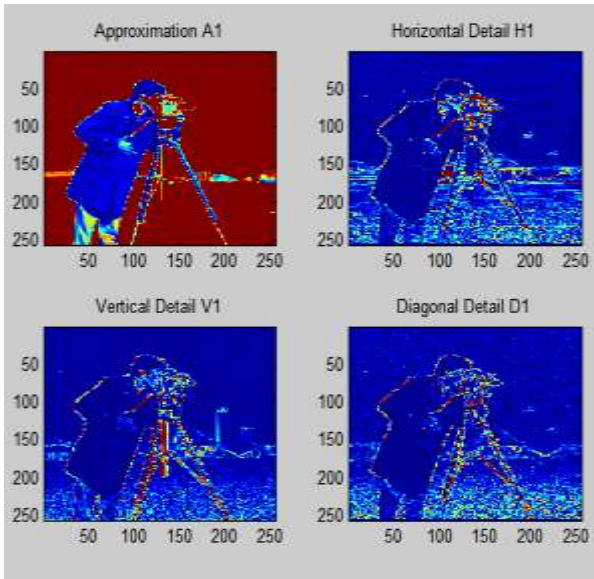


Fig. 5: Coded image

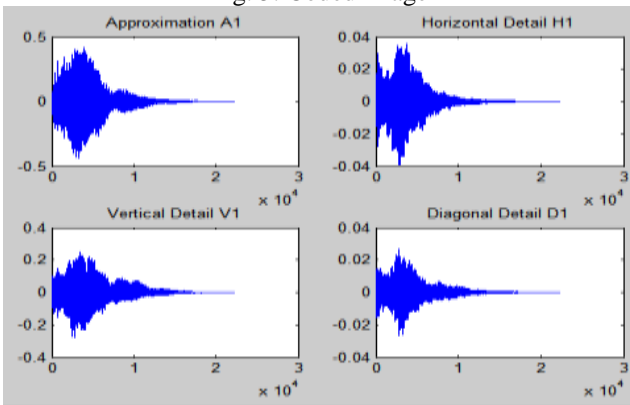


Fig. 6: Audio signal

Then we can improve the parameter PSNR and MSE .The PSNR is increase and MSE decries. comparison of MSE and PSNR.

	MSE	PSNR
Without Wavelet Transform	0.1480	112.9246
With Wavelet Transform	0.0135	133.7184

Table 1: comparison of MSE and PSNR

III. CONCLUSION

We conclude that the wavelet domain is a new high capacity data hiding technique .this technique make use of perfect reconstruction and embeds additional information inside the wavelet domain in the audio signal by modifying LSB's of WDT coefficients.

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