iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 3 **Issue:** I **Month of publication:** January 2015

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Hiding Image in Audio Steganography Using Discrete Cosine Transform and Skin Detection

Durgarao. R[1], Adithya. T[2]
[1]Student, prasiddha college of engineering & technology, Andhra Pradesh, India
[2]Assistant Professor Department of ECE, prasiddha college of engineering & technology, Andhra Pradesh, India

Abstract: ***Now days, security is an important problem in hacking technologies such as internet, digital devices and so on. To solving the security problem using steganography. The paper presents the hiding security image into audio signal. For hiding image in audio, skin detection and discrete cosine transform are used. In audio steganography, hiding image also called as cover or host image. The cover image hiding to audio signal is called stego signal. The proposed method results prove the effective and less time efficient. The experimental results shows the invisible image in audio signal after embedded step and recover the security image accurately without distortion at decoding stage.***
Index term: - skin detection, DCT, audio data hiding and steganography

I. INTRODUCTION

The Steganography word is come from the Greek words “stegos” meaning “cover” and the name “grafia” as “writing” defining it as “covered writing” [1]. Steganography definition of hiding information “in plain sight”. This technique relies on a message being encoded and hidden in a transport layer in such a way as to make the existence of the message unknown to an observer [2]. The notion of data hiding or steganography was first introduced with the example of prisoners' secret message by Simmons in 1983 [3]. Watermarking is similar to steganography. It is “the practice of imperceptibly altering a Work to embed a message about that Work” [4]. Steganography satisfy two requirements. The first requirement is transparency that is host image (image containing any some data) and stego image (image containing secret information) must be perceptually indiscernible. The second requirement is the high data rate of the encode data [5]. In a computer based secret messages, audio Stenography system are embedded in digital audio. Used audio signal as a host image to audio Stenography [5]. In audio Stenography the weakness of the Human auditory system is used to hide message in the audio. However embedding secret information in digital audio is usually a high difficult process then encodes data in other media and can hide data into a host signal is perceptually transparent [5]. Embedding message into audio Stenography seems more secure due to less steganalysis techniques for attacking to audio. Furthermore, natural sensitivity and difficulty of working on audio and improvement in related techniques is needed. All these Stenography techniques deal with a few common types of Stenography procedure depending on the variation of the host media. That means the cover image or carrier image which will be used to hide the data. Different media like images, text, video and audio has been used as a carrier in different times [2]. Audio Stenography has wide range of applications such as Covert communication, Digital water marking, access control, etc [6]. In this paper is organized as follows. Steganography characteristics in section II. Embedded process is presented in Section III. Section IV describes the decoding process. Section V describes the simulation results. Concluding remarks are made in Section VI.

II. CHARECTERSTICS

The audio steganography follows three characteristics. They are Inaudibility of distortion, robustness and capacity as discussed in section a, b and c respectively.

A. capacity

It is also known as data rate. It defined as the hiding the data successfully embedded without distortion. That means total number of hiding bits with in a time [7]. In this paper presents the skin detection approach to increase the hiding capacity of host image. So, it embedded large amount of data in audio signal. The skin detection method used in steganography, watermarking and so on.

B. Inaudibility Of Distortion

The steganography methods get distortion such as noise and lossy compression. Inaudibility of distortion occurs by attacking some

noise or image embedding. The audio steganography method without affecting audio quality of the recover audio signal.

C. Robustness

Robustness measuring the embedded data of audio signal and attacks. The attacks generally include lossy compression, white additive noise, resampling and so on. In fig.1 shows the tradeoff between inaudibility of distortion, capacity and robustness.

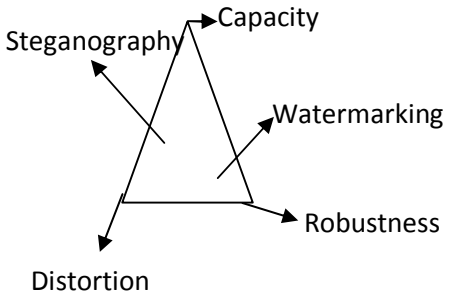


Fig.1. shows tradeoff between inaudibility of distortion, capacity and robustness.

III. PROPOSED METHOD

The proposed method is high hiding capacity, robustness and invisibility of security image. One benefit is to embed the security image in select region of audio signal. The proposed method contains two steps. They are embedded and decoding as explain in section A and B respectively.

A. Embedded Process

In embedded process, skin detection and DCT is important key role in audio steganography. The skin detection separates the region and non region objects. So, it is reliable and less complexity. The block diagram of encoding in audio steganography as shown in fig.2.

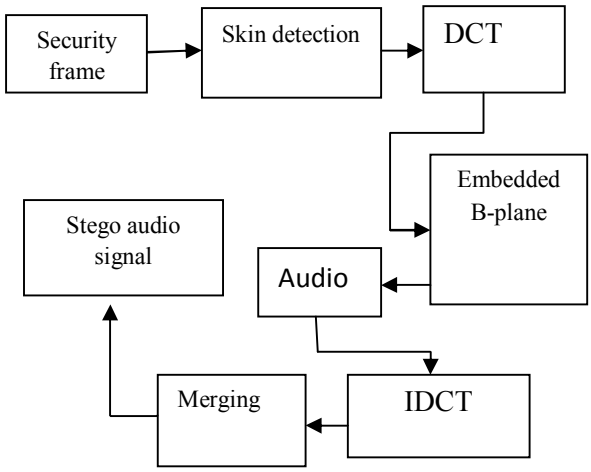


Fig.2. block diagram of embedded process of audio steganography

1) *Skin detection:* The aim of skin detection to determine the region and non-region pixels of security or host image. The skin detection generates the binary image. The 0 pixels represent as black and be a non-region image. The 1 pixel represents as white and be region image. The 1's and 0's act as binary map in skin detection algorithm. The boundary of one's pixels is skin and the boundary of zero pixels is non skin in skin detection algorithm. The basic steps of skin detection algorithm in video frame as shown

a) Converting the video into the frames and used the same color space
b) Classifying the pixel of each frame using the skin detection to either a region or non-region.
c) Apply the morphological operations to remove the noise and distortions.

2) *Discrete cosine transforms (DCT):* Improving the image quality using DCT. It divides dc and ac coefficients of each frame. It converts the image into frequency components. It is similar to DFT and separate ac and dc components. It is simplicity, less complexity and less computation time. The numerical example of DCT as shown in fig.3.

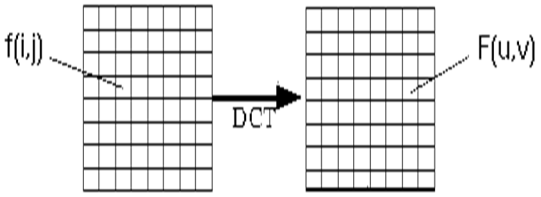


Fig.3. shows original frame matrix and DCT frequency component

The equation two dimensional DCT of each frame is defined as

$$X_k = \sum_{n=0}^{N-1} x_n \cos\left[\frac{\pi}{N}\left(n+\frac{1}{2}\right)k\right] \qquad k = 0, \ldots, N-1.$$

Where

Xn= input frame intensity pixel
Xk= is the DCT coefficient of Xn

The basic steps of the DCT are given by:
a) The input frame is given N by M;
b) Xn is the intensity of the pixel frame
c) Xk is the DCT coefficient of Xn
d) Xk generate low and high frequencies. The low frequencies appear in the left corner of upper side of DCT.
e) Frame Compression is occur at higher frequencies and low frequency components can be neglected with little visible distortion.
f) The DCT input is an 8 by 8 array of integers. This array contains each pixel's gray scale level;
g) 8 bit pixels have levels from 0 to 255.

3) Embedded B-plane: After DCT step, the Embedding process is performed either G-plane (represent as green plane) or B-plane (represent as green plane) but strictly not in red-plane. The B-plane is more visible skin color than the R and G-plane and these planes cannot retrieve security frame at decoding side. So, we prefer to B-plane in the paper. It is raster-scan order of embeds secret frame coefficient by ac frequency coefficient. After that adding security frame of bits in to audio signal.

4) Crop image: If we select the particular region of security frame using crop process. It optional and not guarantee used in proposed method. It crop the area value is store in rectangle variable. It is used in embedded and decoding process. The rectangle variable is act as key on encode and decode process.

B. Decoding Process

The decoding process is reciprocity of embedded process. The proposed method extract the security frame from audio signal is accurately and efficiently. The block diagram of decoding process as shown in fig. 4

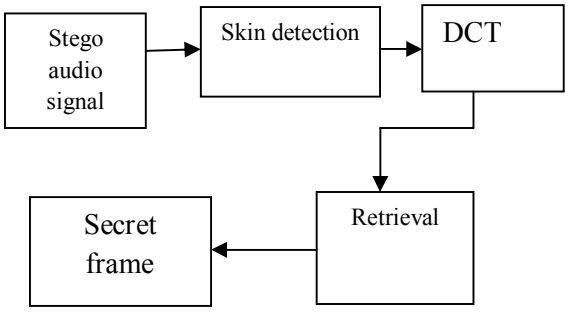


Fig.4. decoding process audio steganography

To measure image quality of audio steganography based on the PSNR performance. The PSNR measured in dB and is given by

PSNR = 10 $\log_{10}$ (255^2/MSE)

Where

MSE is the mean square error and is defined as

$$MSE = \frac{1}{M * \mathrm{N}} \sum_{i=1}^{n} (X_i - Yi)^2$$

Where

M, N is rows and size of frame.
Xi is the input security image and
Yi is the extract frame from audio signal.
If higher the PSNR in the extract security image, the quality of is better.

IV. EXPERIMENTAL RESULTS

The proposed method tested audio signal with frequency of 40000Hz that represent by 20bits/sample and clips ranged started from 2 to 8 seconds. The security quality analysis in terms of MSE and PSNR. The results of PSNR and SNR of proposed method as shown in table1.

Measurement	Value
MSE	3.1e-008
PSNR	79.563
SNR	58.36

Table1: Results of the proposed Method

If increase the PSNR, the quality of secret frame is high. The embedded frames into audio are secure, reliable and recover the

information without error.

In this section we show the simulation results for proposed method that can be implemented in MATLAB 7.0.

A color video is converting into frames then each frame employed as a secret frame with size of 100×100 as shown fig.5.

Fig.5. shows the secret frame.

Fig.6 show the audio signal which represents as cover or host audio signal.

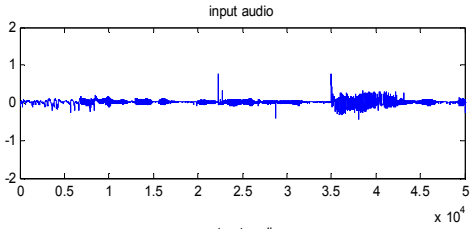


Fig.6. shows the cover audio signal

Fig.7 shows the select the skin region using crop process. It detects the dog face accurately.

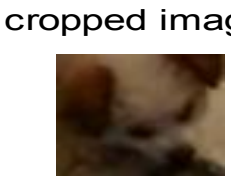


Fig.7. crop image

Fig.8. shows to determine the region and non-region pixels of security or host image. The skin detection generates the binary image.

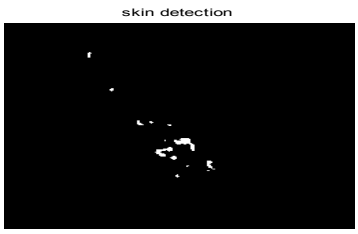


Fig.8. binary frame using skin detection algorithm

Fig.9. shows the secret and recover frame from audio signal

(a) (b)

Fig.9. (a) secret frame and (b) recover frame

Fig.10. shows the stego audio signal. This means hiding frame into audio signal.

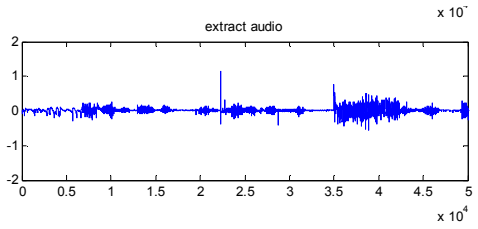


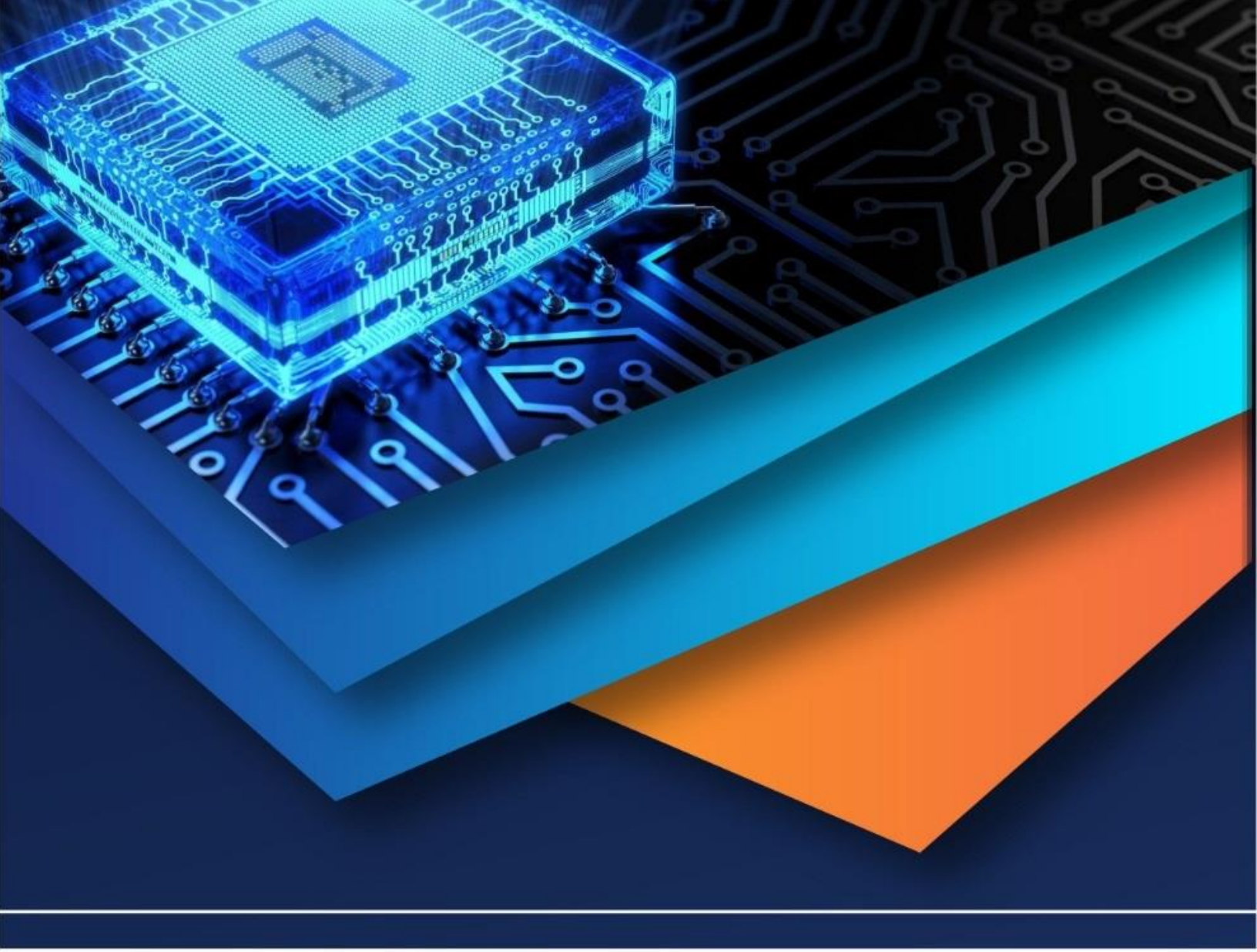
Fig.10. shows the stego audio signal

V. CONCLUSION

The paper presents the hiding image in audio steganography using discrete cosine transform and skin detection. It is reliable, less complexity and less computation time. The experimental results shows the invisible image in audio signal after embedded process and recover the secret image accurately without distortion at decoding process.

REFERENCES

[1] S. Katzenbeisser, F.A.P. Petitcolas, Information Hiding Techniques for Steganography and Digital Watermarking, Artech House, Norwood, MA, 2000.
[2] Sridevi R., Damodaram A., SVL.Narasimham, Efficient Method of Audio Steganography by Modified LSB Algorithm and Strong Encryption Key with Enhanced Security, Journal of Theoretical and Applied Information Technology, 2009.
[3] G. J. Simmons, "The prisoners' problem and the subliminal channel" in Proc. Advances in Cryptology (CRYPTO '83), pp. 51-67.Berglund, J.F. and K.H. Hofmann, 1967. Compact semitopological semigroups and weakly almost periodic functions. Lecture Notes in Mathematics, No. 42, Springer-Verlag, Berlin-New York.
[4] I. J. Cox, M. L. Miller, J. A. Bloom, J. Fridrich, and T. Kalker, Digital Watermarking and Steganography, 2nd Edition, Morgan Kaufmann, 2008, p. 31.
[5] W. Bender, D. Gruhl, N. Morimoto, and A. Lu, "Techniques for data hiding", IBM Systems Journal, vol. 35, Issues 3&4, 1996, pp. 313-336.
[6] Stefan Katzenbeisser, Fabien A. P. Petitcolas, "Information HidingTechniques for Steganography and Digital Watermarking". Boston,Artech House, pp. 43 – 82. 2000.
[7] C. C. Chang, T. S. Chen and H. S. Hsia, "An Effective Image Stenographic Scheme Based on Wavelet Transform and Pattern- Based Modification", IEEE Proceedings of the 2003 International Conference on Computer Networks and Mobile Computing, 2003.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY