

A Review of an Digital Audio Watermarking using DCT Technique

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Abstract- Recent rapid improvement in the communication technology through internet access is easier. In the field of digital media the issue of copyright protection is raised. Digital watermarking provides verification, protection and copyright security of digital media. The watermark provides a signature, embedded data of original signal which is inaudible to human ear and malicious attempts to remove it and undetectable. The main aim is to protect sharing and without authority copying the contents and the solution for this problem has been anticipated as "Audio watermarking". This technique does the hiding of copyright information into audio signal without affecting the original signal. In this paper, an audio watermarking technique to embed and extract procedure in DCT domain is proposed.

Keywords- Copyright, watermarking, original audio signal, original image.

I. INTRODUCTION

The term "Digital Watermarking" was brought in 1993 for the attainment of the Internet, gainful, admired digital recording and storage device and assure quality of service (QOS) and of elevated bandwidth for both wireless and wired networks and made feasible to generate, pass on, replicate and share out digital content. [1]

According to Won-Gyum Kim [2] the search engine "Baidu", as from one of the paper by Dan Levin, states that three of music largest companies would allow Chinese web user to allow to download and stream large number of free songs. The contract between One-stop China and Baidu, a joint venturing between Sony BMG, Universal Music Group and the Warner Music Group will close access to large amount of pirated music and will reorganize the 450 million net users gain access to online music. On Baidu's server about 500,000 songs licensed will be stored. The newspaper reported that 99% of music online is illegal. In Nigeria, the order also has just ameliorated the copyright act in the many countries making copying and other form of management is done on music illegal. There is technique for protecting this works against creating a need for critically and abuse of the reviewed work done so far and how it can meet its needs as in earlier times. This paper will make review of the Digital watermarking technique in audio. There are about some properties that

satisfy the need for effective watermarking applications. [1][3]

These are

Inaudible- The digital watermark is embedded into audio data as it should not be audible to human ear.

Security- A system is believed to be protected if the cracker cannot take away the watermark applied without having the knowledge of embedded algorithm, detector and composition of watermark. Only the authorized users can access it.

Verifiability- It can be used to check the object is protected i.e. copyright-protected and identify the authenticity and control of illegal copying

Robustness- It is the capability to deal with the copyright information of digital works, the embedded watermark can refuse to accept the common editing process, processing the image and lossy compression. Also after attacks the watermark can not be damaged and can be still detected to offer certification. For example filtering, noise, compression, cropping, A/D-D/A conversions, geometrical or non-geometrical attacks etc.

Fragile- Fragile watermarking is used for mainly integrity protection which is very sensitive to the changes of the signal. We can determine tampered data in accordance with the state of fragile watermarking.

Semi fragile- It is proficient in managing changes made to watermarked image such as addition of lossy compression (i.e. noise).

Constant Bit-rate- The amount of watermark data may be securely embedded within the host signal per unit space or time.

For solving the data security the watermarking techniques are introduced to provide security of information. In recent years the watermarking techniques have been introduced to

focus on images and video clips but audio watermarking is more complicated than video and image watermarking. [4]

Here are two key reasons so as audio watermarking has become complicated.

First, the **Human Auditory System** (HAS) has larger sensitivity than the Human Visual System (HVS) since human ear is capable of detecting the amplitude and frequency changes of the signal.

Second, the duration and size of the audio signal are very shorter than a video clips and image files and this information reduces the audio signal quality

This paper is divided as follows, In Section 3 we discuss methodology to use Audio Compression. In Section 4 we describe the embedding and extracting procedure of image + audio.

II. LITERATURE REVIEW

Prabhishek Singh, R S Chadha , [1] in this paper includes the detailed study of watermarking concept, its meaning and also it give the major contributions in this domain like category of watermarking method to tell which watermarking technique should be utilized.

A. Akinwale, M. Agbaje and A. Njah, [2] this paper states that the overview of work done by a variety of digital audio watermarking and using discrete cosine transform (abbreviated as DCT) and discrete wavelet transform (abbreviated as DWT) with universal watermarking carrying out investigation for real life application.

Jong Lee, Won Kim and Won Lee ,[3] this paper states that watermark is generated by the sequence in random with a seed and is embed into the coefficients directly of MPEG audio compression for the robustness. The watermark key is a seed known only the copyright owner.

Tejash Lad, Kaushal Doshi, [4] in this paper audio watermarking is a technique the information copyright is hidden into audio signal without affecting the original quality of audio signal and it proposes audio watermarking technique to embed and extract procedure in DCT domain.

B. Zaidan, M. Mat Kiah, Mohammed Ahmed, A. Zaidan, and Sameer Bakri, [5] this paper tells the main purpose is to provide background in proper way for the use of audio file for the purpose to implement new approaching and techniques in steganography and digital watermarking.

III. METHODOLOGY

DISCRETE COSINE TRANSFORM

The technique is based on Discrete Cosine Transform and abbreviated as DCT. DCTs are used for converting data into summation series of cosine waves with different frequencies. This is widely used in image and audio compression. Discrete Fourier Transforms DFT and DCT are similar but only using real numbers. DCT are simple to calculate. DCT convert data from spatial domain into frequency domain and inverse function converts back the other way. The DCT common variant is type-II DCT simply called "the DCT" its inverse type III DCT is called "the inverse DCT" or "IDCT". Here are two transforms related are the discrete sine transform (DST), is equal to a DFT of real and odd functions, and the modified discrete transform (MDCT), and is based on DCT of overlapping data. [4]

The audio signals high frequency DCT coefficients are replaced to low frequency DCT of watermark image file; during the transmission of the IDCT, final watermarked DCT is taken. The method contains image and audio both; we apply this method using 1D (dimensional) DCT for audio signal and 2D (dimensional) DCT for image.

1D DCT Transform for audio signal is defined as X[y] of sequence X[n] of length N is defined as:

$$X[y] = \alpha[y] \sum_{n=0}^{N-1} x[n] \cos \frac{\pi(2n+1)y}{2N}, \quad y = 0, 1 \dots N-1$$

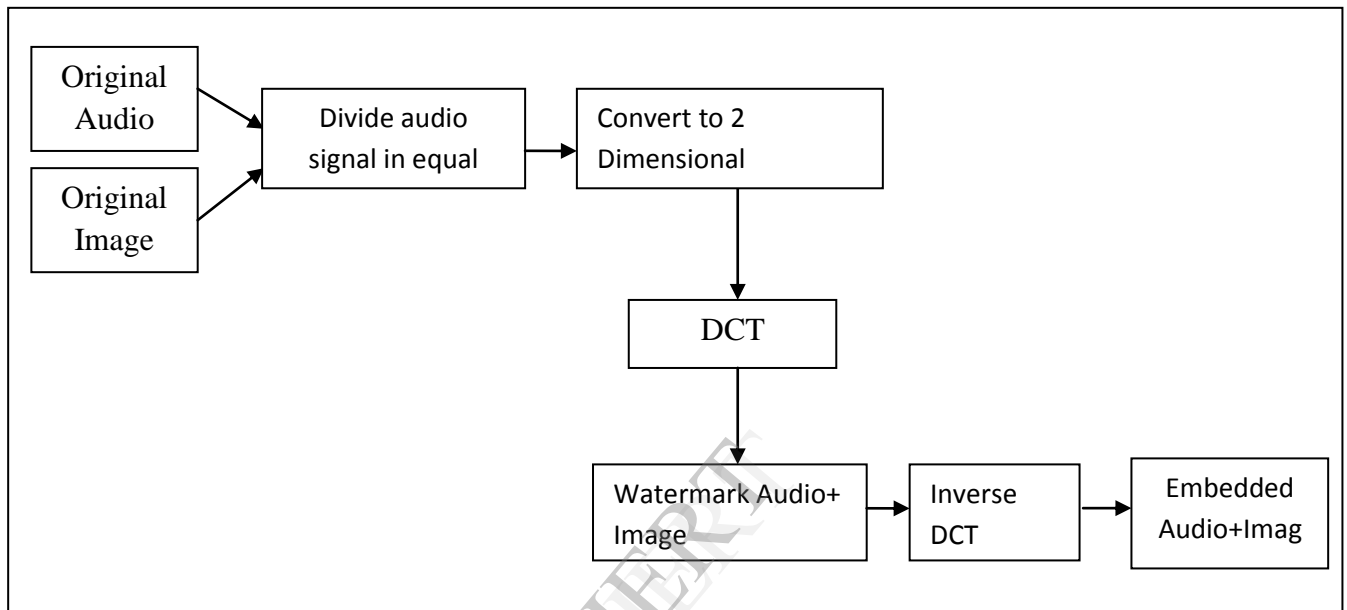
2D DCT Transform for Image is defined

$$XC(p, q) = \sum_{a=0}^{A-1} \sum_{b=0}^{B-1} XB_{ab} \cdot \frac{c(p)c(q)}{4} \cdot \cos \frac{\pi(2a+1)p}{2A} \cdot \cos \frac{\pi(2b+1)q}{2B}$$

IV. PROPOSED METHOD

In this section we will see the detailed embedded and extraction procedure of proposed method. [4]

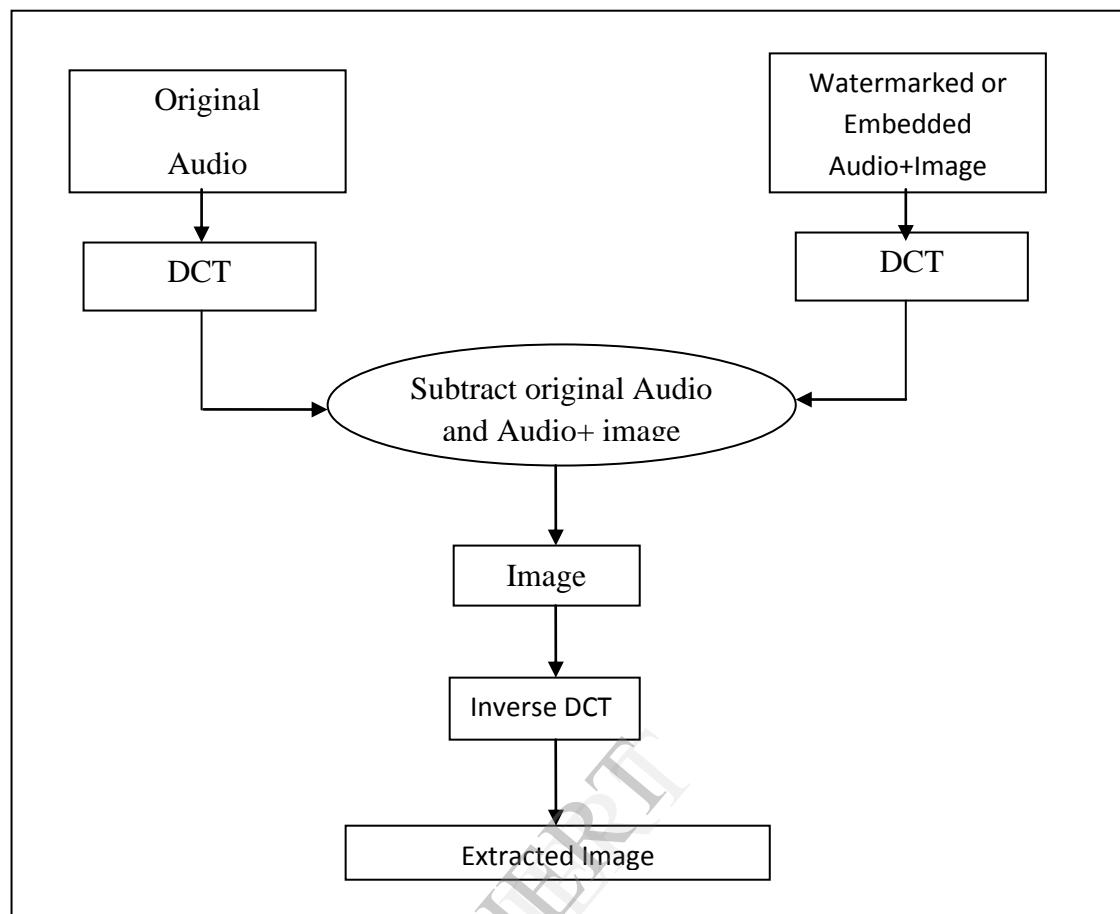
I. Embedded Procedure.



The inputs for the embedding procedure is combined original both audio and image. Block Diagram shows the proposed system for embedding procedure as shown in Figure 1. The following shows the algorithm i.e. steps of system proposed

1. Combine and input audio and image.
2. Divide audio and image into equal sized samples.
3. Convert the samples obtained to 2 Dimensional.
4. Apply the DCT transform.
5. After DCT transform Combine both Audio+ Image.
6. Apply the Inverse DCT on Combined Audio+Image.
7. We obtain Watermarked Audio+Image.
8. End.

II. Extraction Procedure



The inputs for extracting procedure is combined are original audio and watermarked audio + image. Block Diagram shows the proposed system for extraction procedure as shown in Figure 2. The following shows the algorithm i.e. steps of system proposed

1. Inputs original audio and watermarked audio + image are combined
2. Apply DCT Transform
3. Subtract original Audio and watermarked or embedded Audio+ image
4. Apply the Inverse DCT
5. End.

V. RESULTS

The proposed procedure has to be implemented into MATLAB software. In order to evaluate the procedure audio 16 bit mono audio signal in wave format. The watermark information is an image.

Image in Audio

The input i.e. original input audio signal and image is shown below:

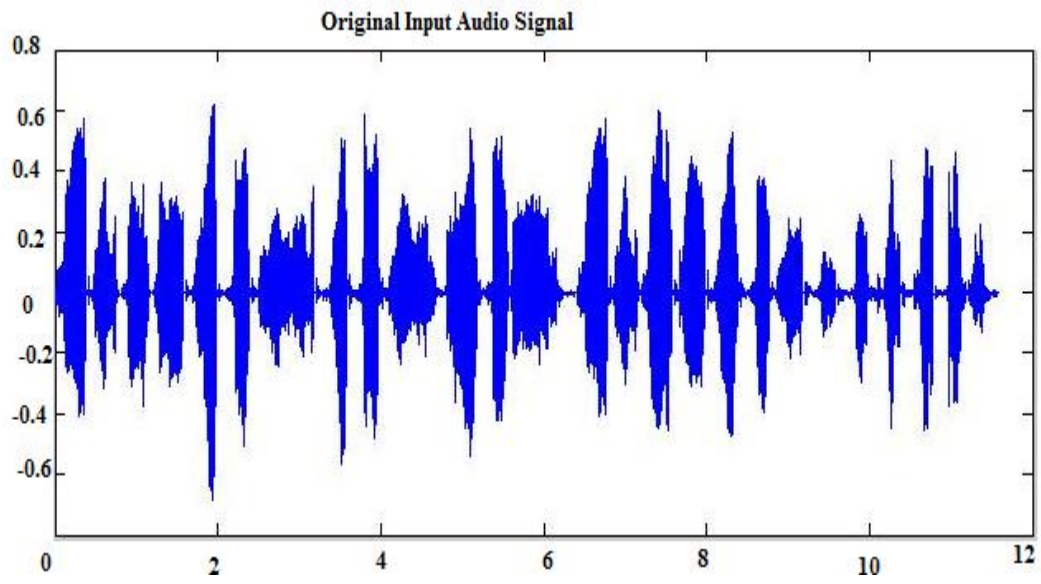


Fig.3. Original Audio Signal



Fig.4. Original Image

The embedded i.e. audio signal and recovered image is shown below:

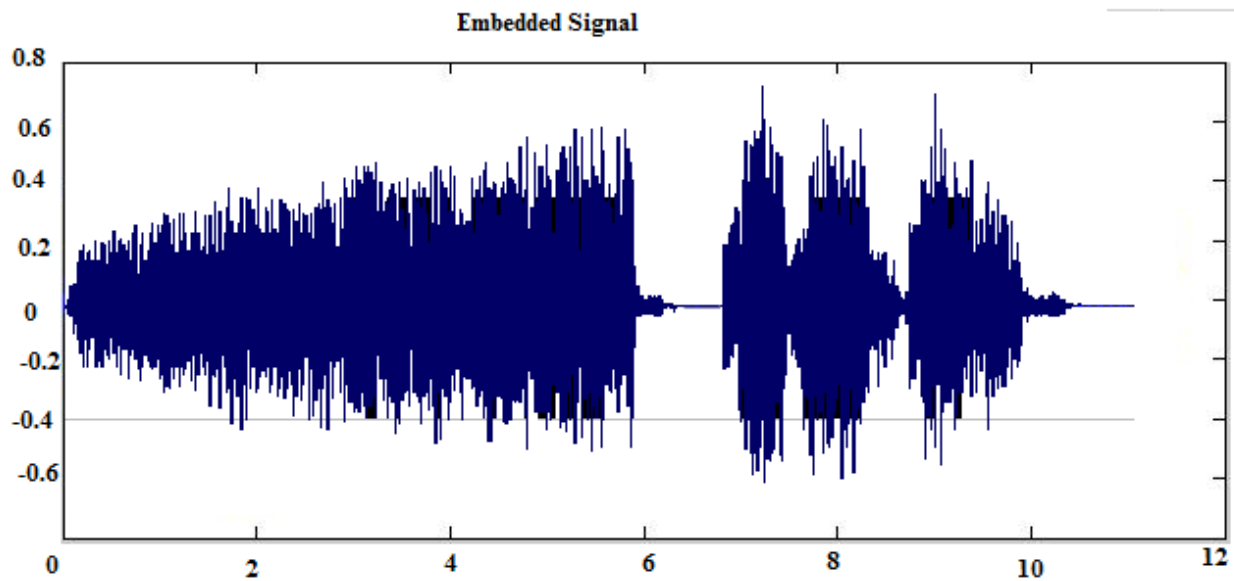


Fig.5. Embedded Audio Signal

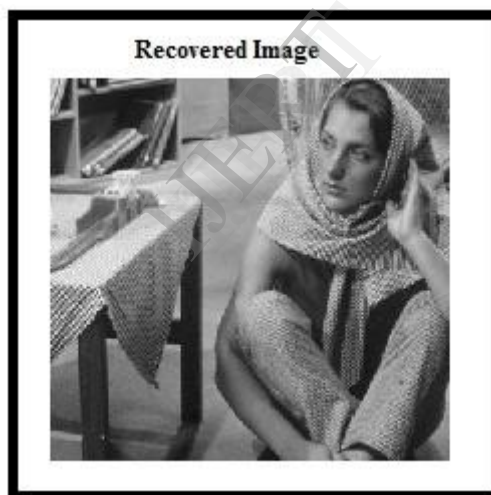


Fig.6. Recovered Image

VI. CONCLUSION

This paper provided a review of a digital audio watermarking using DCT transform which is robust and effective algorithm as the audio signal retrieved is clearly audible.

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