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Audio Watermarking By Using Reversible Contrast Mapping (RCM)

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Abstract: In recent times, communication through the internet has tremendously facilitated the distribution of multimedia data. Although this is indubitably a boon, one of its repercussions is that it has also given impetus to the notorious issue of online music piracy. Unethical attempts can also be made to deliberately alter such copyrighted data and thus, misuse it. Copyright violation by means of unauthorized distribution, as well as unauthorized tampering of copyrighted audio data is an important technological and research issue. Audio watermarking has been proposed as a solution to tackle this issue. The main purpose of audio watermarking is to protect against possible threats to the audio data and in case of copyright violation or unauthorized tampering, authenticity of such data can be disputed by virtue of audio watermarking. For this I propose a Reversible Contrast Mapping (RCM) which is a simple integer transform that applies to pairs of pixels. For some pairs of pixels, RCM is invertible, even if the least significant bits (LSBs) of the transformed pixels are lost. The data space occupied by the LSBs is suitable for data hiding.

Keywords: Watermarking, Audio watermarking, Reversible Contrast Mapping, Least Significant Bits (LSB's).

I. INTRODUCTION

The past few years have seen an explosion in the use of digital media. Industry is making significant investments to deliver digital audio, image, and video information to consumers and customers. A new infrastructure of digital audio, image, and video recorders and players, on-line services, and electronic commerce is rapidly being deployed. At the same time, major corporations are converting their audio, image, and video archives to an electronic form. Along with the rapid growth of Internet, the distribution of audio visual media becomes easier. It leads to the problems regarding copyright protection. Among them, copyright protection is the primary concern and the hotspot of international area in recent areas. The embedded data are perceptually inaudible or invisible to maintain the quality of the source data. The embedded data can add features to the host multimedia signal, e.g., multilingual soundtracks in a movie, or provide copyright protection Digital product information hiding and digital watermarking technology is generated on this basis and developed along with the protection of copyright; this technology is widely used in protecting the copyright of image, audio and video by means of extracting or detecting the watermark for its various application including copyright protection, broadcast and publication monitoring, authentication, copy control.

A. Audio Watermarking

Digital audio watermarking involves the obscuring of data inside a digital audio file. Demands for this vision are numerous. Intellectual property protection is presently the main steering manipulation behind security in this area. To combat online music piracy, a digital watermark could be added to all recording prior to discharge, signifying not merely the author of the work, but the user who has bought a legitimate copy. The DRM multimedia will safeguard that the user has paid for the song by contrasting the watermark to the tolerating bought licenses on the arrangement.

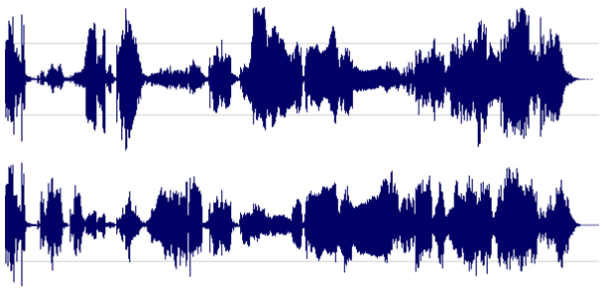

Fig. 1. An Example of Digital Audio Watermark

B. Background of RCM

It introduces a new concept of compression with a different approach on lossless image compression that has been commonly known. The concept uses Reversible Contrast Mapping (RCM) which is a function of a simple integer transform developed for reversible watermarking method. The use of RCM in image compression is done similarly with the watermarking method. In this method, an image is divided into fixed-size blocks, the blocks are divided into two groups based on the data storage capacity. Blocks with smaller storage capacities are used as watermarks for the other blocks. The compression ratio of this method is similar to the Huffman compression. This method can also be used together with the Huffman compression technique to increase the overall compression ratio.

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The rapid developments in information technology lead to shifting towards paperless working environment. The flow of information in a transaction does not involve physical documents but through the data files that are transmitted over a local network or the Internet. Data communication that occurs does not only transfer text documents but also involves multimedia data such as images, sound or video. In general, the process of lossless image compression is shown in Figure 2.

In contrast to the previous researches of lossless image compression methods that aim to optimize the redundancy of pixel values in the image, my project work will use watermarking techniques in the process, that store a part of the data into another part. This concept will use a simple integer transform function called Reversible Contrast Mapping (RCM).

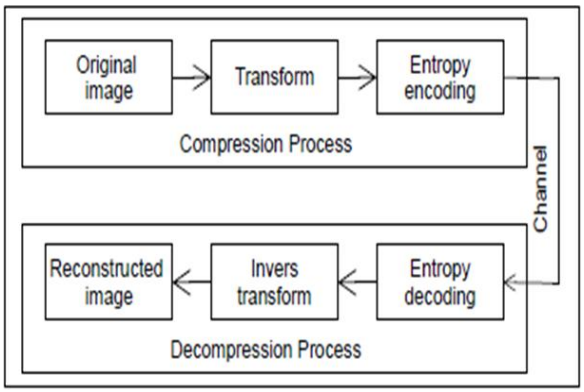

Fig. 2. Lossless image compression technique

II. LITERATURE SURVEY

Traditionally, cryptography has been the principle technique for obscuring information. From the pre-computer era, encrypted messages have been exchanged between people in situations where the sender wants to ensure that the message in question cannot be understood by anyone other than those with the decrypting key. A famous example of this was the German Enigma Machine from the second world war, whose story it told in Enigma [4]. As discussed previously, the rise of peer-to-peer (P2P) software has caused a surge in the ease of piracy, as discussed in Sonic Boom: Napster, P2P and the Battle for the Future of Music [2]. Piracy has always been a matter the music industry has taken very seriously but in recent years, the ease of file sharing has caused actual media sales to decline noticeably.

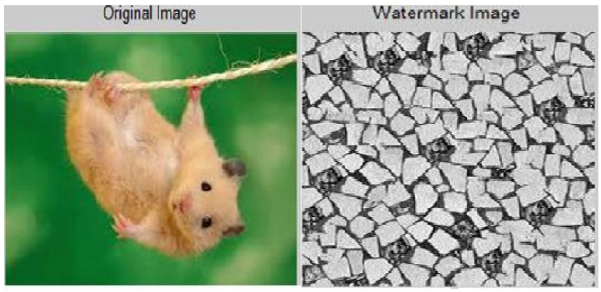

Fig. 3 Image Watermarking

Since watermark is of no importance in the creation of the mark, the name is probably given because the marks resemble the effects of water on paper. Watermarking is an important mechanism applied to physical objects like bills, papers, garment labels, product packing. Physical objects can be watermarked using special dyes and inks or during paper manufacturing. It is emerging field in computer science, cryptography, signal processing & communication [2]. Watermark: is a "secret message" that is embedded into a "cover message". Digital watermark: is a visible or perfectly invisible, identification code that is permanently embedded in the data and remains present within the data after any decryption process.

A. Digital Watermarking techniques
These are mainly as follows:-
a. Text-based Watermarking
This uses Line shift coding, word shift coding, feature coding.

b. Image Watermarking:-These are mainly
- Watermark design (meaningful watermark)
- Watermark embedding(time domain, transformed domain)
- Watermark detection(blind, informed)

c. Audio Watermarking

d. Video Watermarking

e. 3D Watermarking

B. Image Watermarking techniques
a. Spatial-domain techniques: - These are of two categories
- Least-Significant Bit (LSB) technique: The given image contains pixels these pixels are indicated by the 8-bit sequence, the watermarks are linked two the last, bit of selected pixels of the original image, its used to hide the information and attackers could not destroy the information.
- SSM-Modulation-Based Technique: These techniques are applied in the water marking algorithms with an linked information and attached to the original image with pseudo noise.

b. Transform-domain techniques:-These are mainly
- DCT-based
- DFT-based
- Wavelet-based
- Other transforms

c. Compressed stream-domain techniques
- Watermarking MPEG bit streams

d. Spatial-domain watermarks
- Transparent mark
- Visually pleasing, not robust to compression
- Transform-domain watermarks
- Watermark added to frequency coefficients
- Watermark location and strength based on perceptual rules recordings requiring special processing, the human assisted watermark key is available.

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III. PROBLEM DEFINATION

Audio or speech can be easily recorded and manipulated with the kind of handheld devices available today. It is important to detect and prove the authenticity of an audio source especially when it is recorded by a malicious user using a mobile phone, while the audio being played by authorized device. Detection of malicious audio source is possible by using an audio watermarking technique. This audio watermarking method like RCM must be robust. The technique used to hide copyright information (watermark) into the digital audio signal is termed as audio watermarking.

Audio watermarking is an excellent approach to provide a solution to mitigate challenges that occur from easy copying and distribution of audio files that are being downloaded or uploaded through the web. The audio watermarking algorithms proposed earlier were implemented by image or binary logo or a unique pattern as watermark.

To tackle the difficulty of online musical piracy, unethical attempt to alter purposefully copyrighted audio data and unauthorized distribution and tampering of audio files an efficient audio watermarking method is suggested here. In this method the copyright information (watermark) which is an audio signal of shorter length is imperceptibly added into the original image.

Here audio watermarking methods using RCM is proposed. The main purpose of audio watermarking is to protect against possible threats to the audio data and in case of copyright violation or unauthorized tampering, authenticity of such data can be disputed by virtue of audio watermarking. For this we propose a Reversible Contrast Mapping (RCM) is a simple integer transform that applies to pairs of pixels. For some pairs of pixels, RCM is invertible, even if the least significant bits (LSBs) of the transformed pixels are lost. The data space occupied by the LSBs is suitable for data hiding.

A. Problem Statement

The aim of the project is to encrypt the data i.e., hide the audio data over an image using forward transform and inverse transform algorithms and to compare those algorithms in the context of speed, quality of concealing and the use of watermarks and to describe their functionality in data security.

B. Need of System

There is need of a system is to hide (generally encrypted) audio data into other data. The "secrecy" of the embedded data is essential in this area. Reversible contrast mapping for image allows for two parties to communicate secretly and covertly. It allows for some morally-conscious people to safely whistle blow on internal actions it allows for copyright protection on digital files using the message as a digital watermark. One of the other main uses for RCM is for the transportation of high-level or top-secret documents between international governments.

IV. PROPOSED ARCHITECHTURE

- System Implementation Plan-

Watermarking is the process that embeds data called a watermark or digital signature or tag or label into a multimedia object such that watermark can be detected or extracted later to make an assertion about the object. The object may be an image or audio or video.

A simple example of a digital watermark would be a visible "seal" placed over an image to identify the copyright. However the watermark might contain additional information including the identity of the purchaser of a particular copy of the material.

In general, any watermarking scheme(algorithm) consists of three parts:

- The watermark
- The encoder(marking insertion algorithm)
- The decoder and comparator(verification or extraction or detection algorithm)

Each owner has a unique watermark or an owner can also put different watermarks in different objects the marking algorithm incorporates the watermark into the object.

The verification algorithm authenticates the object determining both the owner and the integrity of the object.

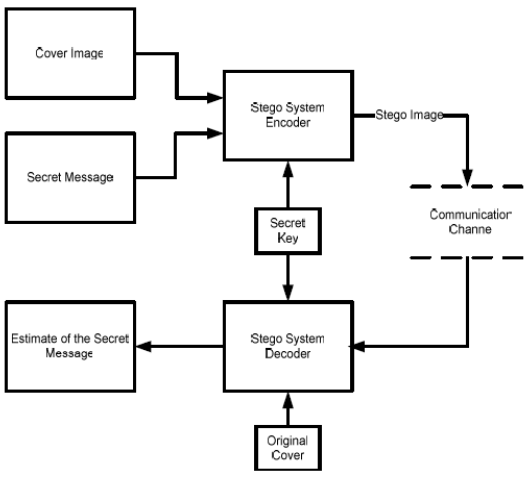

Fig. 4 Proposed System Architecture

The architecture for embedding phase of the proposed system is shown in Figure. The proposed system initializes some parameters, which are used for subsequent data preprocessing and region selection, and then estimates the capacity of those selected regions. If the regions are large enough for hiding the given secret message, then data hiding is performed on the selected regions. Finally, it does some post processing to obtain the stenographic-image. Otherwise the scheme needs to revise the parameters, and then repeats region selection and capacity estimation until can be embedded completely. Please note that the parameters maybe different for different image

content and secret message. We need them as side information to guarantee the validity of data extraction. In practice, such side information can be embedded into a predetermined region of the image. In data extraction, the scheme first extracts the side information from the steno image. Based on the side information, it then does some preprocessing and identifies the regions that have been used for data hiding. Finally, it obtains the secret message according to the corresponding extraction.

V. RESULTS ANALYSIS

The PSNR block computes the peak signal-to-noise ratio, in decibels, between two images. This ratio is often used as a quality measurement between the original and a compressed image. The higher the PSNR, the better the quality of the compressed or reconstructed image.

The Mean Square Error (MSE) and the Peak Signal to Noise Ratio (PSNR) are the two error metrics used to compare image compression quality. The MSE represents the cumulative squared error between the compressed and the original image, whereas PSNR represents a measure of the peak error. Lower the value of MSE, the lower the error.

VI. CONCLUSION

Audio watermarking is an active research area that has been driven by the need to solve the copyright protection problem of digital audio products. Many promising audio watermarking techniques have been proposed and proved to be effective, however, and due to the challenging nature of audio signal processing, there remains much to do. In this paper, we proposed an effective audio signal watermarking Algorithm based on the Reversible Contrast Mapping (RCM) is a simple integer transform that applies to pairs of pixels.

REFERENCES

[1]. Dinu Coltuc and Jean-Marc Chassery, "Very Fast Watermarking by Reversible Contrast Mapping", IEEE SIGNAL PROCESSING LETTERS, vol. 14, pp. 255–258, Apr. 2007.
[2]. GouenouCoatrieux, Wei Pan, Nora Cuppens and Christian Roux, "Reversible Watermarking Based on Invariant Image Classification and Dynamic Histogram Modification," IEEE Tran.on Information Security, vol. 8, pp. 111–120, Jan. 2013.
[3]. Seung-Won Jung, Le Thanh Ha, and Sung-JeaKo, "A New Histogram Modification Based Reversible Data Hiding Algorithm Considering the Human Visual System," IEEE Signal Process. Lett., vol. 18, pp. 95–98, Feb. 2012.
[4]. X. M. Chen, G. Doërr, M. Arnold, P.G Baunm. (2011). Efficient coherent phase quantization for audio watermarking, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2011.
[5]. Zhicheng Ni, Yun-Qing Shi, Nirwan Ansari and Wei Su, "Reversible Data Hiding," IEEE Trans. Circuits and Video. Lett., vol. 16, pp. 354–362, Mar. 2006.
[6]. Xinpeng Zhang, "Separable Reversible Data Hiding in Encrypted Image," IEEE Trans. Informaion Forensics.Lett., vol. 7, pp. 826–832, Apr. 2012.
[7]. Lingling An, Xinbo Gao, Xuelong Li, Dacheng Tao, Cheng Deng and Jie Li, "Reversible Data Hiding," IEEE Transactions on image processing., vol. 21, pp. 3598–3611, Aug. 2012.
[8]. Puneet Sharma, 2012. Analysis of Image Watermarking Using Least Significant Bit Algorithm.IBM Systems Journal, vol. 2, no. 4.
[9]. S. Priya, P. Swaminathan, 2012. Image Watermarking Techniques. vol. 2, pp. 2251-2254.
[10]. N. Cvejic, and T. Seppanen. Digital audio watermarking techniques and technologies: applications and benchmarks, IGI Global. 2007.
[11]. GwoboaHorng, Ying-Hsuan Huang, "Image Reversible Data Hiding," International journal of Multimedia Signal Processing, vol. 5, no. 2, pp. 1147–1156, Apr. 2014.
[12]. Arnold, M., ―Audio watermarking: features, applications and algorithms‖, IEEE InternationalConference Multimedia and Expo, vol. 2, pp. 1013-1016, 2000.