NAG6

by Cnn Cnn6

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CHAPTER 01

INTRODUCTION

Audio watermarking is currently at the forefront of technology development to detect illegal reproduction and redistribution of audio recordings. Because the human auditory system (HAS) is more sensitive than the human visual system, audio watermarking is more challenging than visual watermarking.

A reliable digital audio watermarking shall have imperceptibility, data capacity, and robustness. The watermark must be inaudible within the host audio to maintain audio quality. The watermark data capacity is the information embedded or hidden in the host audio without perceptible distortion. The watermark robustness is that the watermark must remain intact or identifiable through signal processing such as compression, time-scaling, filtering, and resampling performed on the watermarked audio.

Therefore for our project we have aimed at a way to protect an audio signal or audio file by encrypting it with a watermark which will ensure that each audio signal transmission and reception is protected from both ends of the communication. Basically an **Audio Watermarking is the process of adding a distinctive sound pattern undetectable to the human ear to an audio signal to make it identifiable to a computer.**

Watermarking is the process of embedding information into a signal (audio, video or pictures) which becomes difficult to remove. If the signal is copied, then the information is also carried in the copy. Watermarking has become essential to enable copyright protection and ownership verification.

One of the most secure techniques of audio watermarking is **spread spectrum audio watermarking (SSW).** In the above method a narrow-band signal is transmitted over a much larger bandwidth such that the signal energy presented in any signal frequency is undetectable. Thus the watermark is spread over many frequency bands so that the energy in one band is undetectable. In order to destroy this watermark technique a noise of high amplitude is required to be added in all frequency bands.

Spreading Spectrum is done using a Pseudo Noise commonly referred to as PN sequence. In SSW approach the receiver must know the PN sequence that is used at the transmitter as well as the location of the watermark in the watermarked signal for detecting hidden information. This is a high security feature since any unauthorized user who doesn't have access to this information will not be able to detect any hidden information. Detection of the PN sequence is the key factor for detection of hidden information from SSW.

NEED FOR DIGITAL WATER WATERMARKING

The pandemic not only has brought destruction to us but also has changed our way of living and working. Since the majority of the population has switched to work from home and this has led to the majority of information being interchanged and transactions taking place online. This does not stop here as the pandemic has also paved the way for digital innovation, from shopping to medical checkups that are taking place through online, it becomes essential to maintain the security and confidentiality of big data therefore Watermarking/encrypting plays a vital role in present and in the future.

With advantages we also have disadvantages of everything switching to an online mode of working. This would augment cyber attacks like phishing, malware, cross site scripting, sql injection and so on. In order to reduce the disadvantages and protect the data watermarking becomes mandatory.

Digital Watermarking is a process of hiding digital information in a carrier signal where the hidden information need not contain a relation with the carrier signal. Digital Watermarks intend to verify the authenticity or integrity of the carrier signal or to show the identity of its owners.

One of the features of watermarking is that it does not affect the data usage. Furthermore this technology often protects copyright of multimedia data and protects databases and text files from unauthorized access and being corroded.

One of the applications of Watermarking that explains it best and stresses its importance is its use in money and stamps to to assist in identifying counterfeiting. This technique has its similarities to steganography. Hence basically the idea behind creating a watermark is to create a translucent image on the paper to provide authenticity.

In this era of digitization and digitalization it is very difficult to claim 99.999% protection of data after embedding a watermark in the media since there are chances of web scraping, cropping, editing and redistributing but this does not claim the inefficiency of watermarking rather to be on the safer side it is recommended to create a copy of the data with watermark embedded in it.

The ideal watermark is 30-70% transparent and covers a significant portion of the asset.

Hence adding a digital watermark is basically adding bits of pattern which are unnoticeable to the human eye in the picture/ video that is to be protected and authenticated. Furthermore since the watermarks are easy to create, applicable in seconds, it is considered to be one of the most effective methods of safeguarding images from theft and unauthorized use.

Therefore these are the reasons why Watermarking is the need of the hour and why one should go for watermarking the data.

PRINCIPLE OF DIGITAL WATERMARKING

A Watermark is embedded into the digital signal at each point of distribution which is unnoticeable to the human eye. If the data is copied the watermark is carried with the data and the watermark can be retrieved from the copy and the source of distribution is known.

Digital Watermarking is a technology that embeds machine readable information within the content of a digital media file that could be image, audio or video. The information is encoded through subtle changes to the image, audio, or video.

In other words the watermarking is a practice of modifying the digital data(software program, photos, songs, videos) without causing destruction to it to embed a message about that work.

Multimedia watermarking is the practice of imperceptibly altering a work. The watermarking is a technique related to steganography which means keeping the existence of messages secret by hiding them within objects, media, or other messages.

There are two types of digital watermarking- visible and invisible. The visible watermark is similar to the corporation logo displayed at its letterhead but the invisible one that is embedded in the media is unnoticeable and undetectable to the human eye.

There are some six types of watermarks- visible, non-visible, private, public, perceptual and bit stream.

This is a blind watermarking technique that meets the requirements of invisibility and robustness.Watermarking is performed by embedding a watermark in the middle-frequency coefficient block of three DWT levels.

The PNN is used during watermark extraction.

MAJOR ISSUES IN CURRENT ENCRYPTION

Encrypting data though necessary is a challenge and according to the reports there are five reasons why encryptions doesn't work. The reasons are listed below.

1. Encryptions don't work for systems.
2. Encryptions cannot be audited
3. Encryptions does not work against the insider threat
4. Data Integrity is the biggest threat in cyberspace
5. One can't prove whether encryption security is working

These are the gaps present with encrypting media and through our research we are trying to reduce these gaps to minimal.

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