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### A REVIEW: EFFICIENT IMPLEMENTATION OF WATERMARKING TO REDUCE BIT ERROR RATE

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#### ABSTRACT

Digital watermarking is a term to describe inserting data invisibly within a host sound, image or video file in order to prove ownership. Over the past decade many watermarking techniques have been proposed to make this possible. Any such mark should still be detectable after common processing operations, including lossy file compression. Various audio watermarking techniques representative of this work will be implementing against many sound processing operations which may or may not remove the watermark. The individual strengths and weaknesses will be analysed. In proposed work, the algorithm should be able to add more data with less BER (Bit Error Rate).

**KEYWORDS:** BER (Bit Error Rate), PSNR (Peak Signal To Noise Ratio), MSE (Mean Square Error).

#### INTRODUCTION

Digital audio watermarking schemes currently are the most interesting and popular research area for copyright protection of the multimedia data, where a lot of work has been done and is still being developed for finding more improved method to enhance the security, robustness and quality of watermark data. A variety of procedures have been used to appropriate watermarks to the audio indicators three requirements which are indispensable for any audio watermarking format is: Inaudibility, Robustness and data rate. Inaudibility indicates that implantation should be performing in such a way that there is a slight difference sandwiched between inventive signal and watermarked indicator. Therefore, inaudibility is extra imperative metric than the others for any audio watermarking scheme. Other desires, that is, robustness and data rate are also important but these two cannot be accomplish at the same point in time to function as a constructive and steadfast rational belongings protection technology, the watermark

- Must be embedded within the host media
- Perceptually inaudible inside the mediums
- Statistically indemonstrable to make certain safety measures and thwart unconstitutional subtraction
- Full-bodied to management and signal dispensation operation on the host indication, e.g. noise, firmness, cropping, resizing, D/A conversions, etc.
- Willingly haul out to utterly differentiate the official document owner.

Basically, the watermark possibly will not be accumulated in a ple header and separate ple. Those kind of copyright methods are straightforwardly separated. The watermark must be muffled surrounded by the congregation audio data to keep up audio quality. The watermark is required to be statistically untraceable to spoil unofficial amputation by machinist. A watermark which possibly will be restricted through averaging, correlation, spectral analysis, Kalman filtering, etc., may perhaps be voluntarily removed or changed. Digital watermarking being capable of be alienated into image watermarking, video watermarking, audio watermarking, and text watermarking and graphic watermarking supported on the close media. Image watermarking can be stated as to adjoining of watermark in motionless image. Video watermarking appends digital watermark in the video brook to organize video purposes. Text watermarking is the way of affixing watermark to PDF, DOC and other text file to avoid alterations of text. Graphic watermarking is implant watermark to two-dimensional or three-dimensional computer-produced graphics to point towards the copyright.

**Types of watermarks****DIGITAL WATERMARKS**

Digital watermarking acquires its forename commencing watermarking of broadsheet or capital. A digital watermark is imperceptible data interleaved into image, audio or video. Digital watermarks are the signals concealed into the digital data. This type of watermark more often than not carries patent information of the dossier. These watermarks can be haul out or distinguished later. Watermarks may perhaps be visible or invisible.

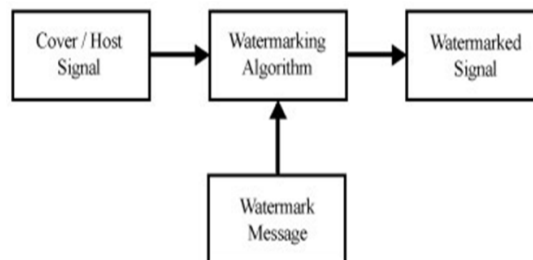
- *Visible watermarks:* A visible watermark is an observable and noticeable text or image spread over the surface of the original signal. Visible watermarks are additional more vigorous against conversion.
- *Invisible watermarks:* An invisible watermark is unseen information that cannot be professed through human. Invisible watermarks are employed to blotch a digital contented to demonstrate its dependability. Digital watermark may possibly be full-bodied or brittle depending of the requests of the functions. Extraordinary software is used to dig out the veiled information to recognize the copyright possessor. Robust watermarks are those proposed to survive molests such as content modification, solidity, filtering, analog to digital, digital to analog alteration.

**CREATING WATERMARK**

The straightforwardness of the understanding joined with the homogeneous natural world of the watermarking restriction tolerates for the development of 'Blind detection' in authentic-time. 'Blind detection' is the most important motivator for the expansion of this arrangement since many preceding hard work to use watermarking for the keep an eye on and recognizing of screened production have a propensity in the direction of acoustic fingerprinting, which relies on the accessibility of the original congregation aural, or some representation of it, at the point of identifying and decoding the watermark. The alternative of data was not untrained and was as an alternative guided by the intentional utilize of the watermarked auditory. However, any structure of information can be surrounded, with constraint only on the quantity of such data. It can follow by deciphered devoid of any acquaintance of the inventive host content by means of pre-definite watermark restriction.

**BACKGROUND**

Digital watermarks are messages drive in a compact disc employment in any digital objects. Digital watermarking expands its attractiveness as an investigation theme for the duration of 1990s. The speediness development of digital objects and the uncomplicated communication and admittance performance to these products make a compulsory stipulate for the digital copy true fortification, digital watermarking coordination outline a useful mean to look after the digital contented. Watermarks are results that supplementary to the document for the duration of the paper industrialized progression .These results discover the manuscript maker. In times gone by the initial watermarks was notice in Italy during the 13th century. An illustration of a watermark. In the 18th century watermarks appeared in America and Europe they were used in money and as trademarks .The expression watermark were second-hand to make clear the end product of stream on the broadsheet. In the digital watermarking systems the digital information which also called payload, do not have an effect on the transport object; it fights change or manoeuvring in the carrier. Many Digital watermarking algorithms appear for the duration of the last 20 years these algorithms use the haulier features to insert the required watermark.



*Figure 1 General Watermarking Block Diagram*

## REQUIREMENTS OF AUDIO WATERMARKING

- *Imperceptibility*: The digital watermark should not have an effect on the quality of original audio signal after it is watermarked.
- *Robustness*: The implanted watermark data should not be disconnected or eliminated by not permitted distributors using common signal processing operations and attacks.
- *Capability*: capability refers to the figures of bits that can be surrounded into the audio signal within a unit of time.
- *Security*: security implies that the watermark can only be noticeable by the authorized person

## TRANSFORM DOMAIN DIGITAL WATERMARKING ALGORITHM

Transform domain algorithm is a system of thrashing statistics comparable to spread-spectrum announcement expertise. First of all, it does a category of orthogonal alteration for image, and then drive in watermark information in the transform domain of image, ultimately bring into play the contrary transform to convalesce the image in spatial domain, the uncovering an withdrawal of the watermark are also understand in convert domain. There is quite a lot of widespread used transform domain system, such as discrete Fourier transform (DFT), discrete cosine transforms (DCT), and discrete wavelet transforms (DWT).

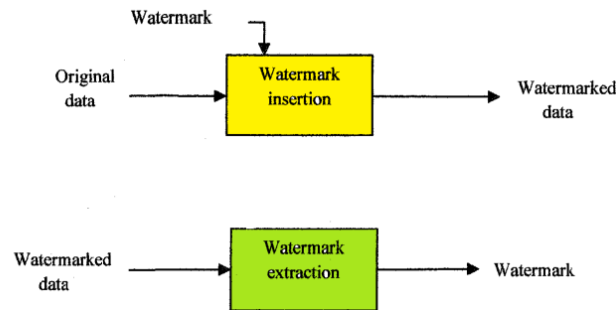


Figure 2 General Audio Watermarking System

In encoding process the encoder is being used to initiate watermark hooked on innovative signal. The watermark possibly is any text or PN progression sound signal. In decoding process, the decoder is used to confirm for the occurrence of a watermark. The extracted watermark is then match up to the original watermark. In Universal audio watermarking system the watermark have to be removable although ordinary signal processing procedures are practical to the host audio. This is mainly accurate in the casing of purposeful unauthorized challenges to eliminate it.

## LITERATURE REVIEW

[1] Harleen Kaur, Usvir Kaur” Blind Audio Watermarking schemes: A Literature Review”, IRACST – Engineering Science and Technology: An International Journal, 2013 In this paper they re-examine the audio watermarking algorithms based on blind watermark detection techniques. These techniques are used to get the outcomes. The majority of the algorithms mainly work on enhancing robustness and imperceptibility. In this paper the enhanced algorithm also make its concentration on the attributes such as embedding capacity and security. So, as the more parameters include we get the more appropriate results.

[2] Yekta Said Can, Fatih Alagoz, and Melih Evren Burus” A Novel Spread Spectrum Digital Audio Watermarking technique“, Journal of Advances in Computer Networks, 2014 In this paper a new enhanced scheme is proposed for the watermarking in audio this technique is based on the spread spectrum technique. Watermarking has become vital from many years because of the official document safety applications. Embedding information into an audio file is very challenging process as contrasting with images because human acoustic system is more perceptive than human optical system. The tentative outcomes reveal that the embedding technique is not just audible a smaller amount but also extra healthy and robust adjacent to the general signal processing attacks like low-pass filter, adding white

Gaussian noise, shearing, and compression. This new method does not require the original audio transporter indicator when there make a try to extract the watermark from audio by the usage of blind extraction audio watermark.

[3] Aman Chadha, Sandeep Gangundi, Rishabh Goel, Hiren Dave, M. Mani Roja “Audio Watermarking with Error Correction”, (IJACSA) International Journal of Advanced Computer Science and Applications, 2011 In today’s time making the contact with each other and to make the communication with each other is terrifically facilitate the division of multimedia statistics, although that is an advantage. One of its benefit is it provide the privacy. Copyright violation by means of illegal allotment, as well as unlawful tampering of copyrighted audio data is a significant technical and exploring issue. Disreputable attempts can be made to misuse the data such as intentionally alter such copyrighted data and thus, misuse it. Audio watermarking has been planned as a solution to undertake the problems of research and for the technical issues. The main purpose of audio watermarking is to guard next to feasible threats to the audio data and sometimes to guard against the copyright infringement or unauthorized tampering. So, authenticity of data is achieved by the audio watermarking.

[4] Mikdam A. Turkey Alsalami” A Novel Spread Spectrum Algorithm for Audio Watermarking Based on Wavelet Transform”, 2008 In this paper a new algorithm is proposed called as new wavelet-based spread spectrum audio watermarking algorithm. In this algorithm, new procedures are needed to be followed. In the proposed algorithm, the watermark patterns are regenerated from watermarked audio signal and reshaped before correlation. A sort of whitening operation is used to enhance watermark detection. The proposed algorithm has been subjected to and survived robustness tests and the results are reported. The primary technique is used to identify periods of audio signal to introduce a watermark into these periods. The technique used for that purpose is called Block Selection Process (BSP). Selected periods must satisfy conditions designed to enable robust and inaudible embedding. An additional technique is projected for watermark embedding. In this technique, embedding is proceeded by generating signal-dependent watermark patterns and accumulating them to the signal in wavelet domain. Before adding the patterns into audio signal, patterns are modulated and filtered to reduce a possible distortion might be resulted from these patterns. For each watermark bit two patterns are produced, one to be embedded in estimate part and the other to be embedded in particular part. In the detection stage, they place where the watermarks were embedded before begin extracting them. BSP is used again to accomplish this assignment. For determining the existence of watermark patterns are stimulated and linked with the audio signal.

[5] Harsh Verma<sup>1</sup>, Ramanpreet Kaur<sup>2</sup> and Raman kumar<sup>3</sup>” Random Sample Audio Watermarking Algorithm for Compressed Wave Files”, IJCSNS International Journal of Computer Science and Network Security, 2009 In this paper a novel audio watermarking method is proposed in which watermark is added transparently after ADPCM (Adaptive differential pulse code modulation). For research purpose, a variety of audio watermarking techniques have been considered and investigated. In the proposed scheme they have used unsystematic section in its place of permanent or low frequency carriers to insert the watermark into the audio. Proposed technique has been implemented to get the best results and for its audio quality comparison is made on the basis of parameters. These parameters are compared to the other best known audio watermarking technique. For Comparison purpose various parameters have been considered which include Peak Signal to Noise Ratio, Signal to Noise ratio and Bit Error Rate. A tool has been used for measuring the audio quality factors. Further, these quality parameters have been used to generate graphical outputs and tabular values for comparison with the best known audio watermarking technique. The new scheme is suitable for retaining first generation archived files of high quality. As the audio signal quality metrics i.e. higher Peak Signal to Noise Ratio (PSNR) and lower Bit Error Rate (BER) and higher Signal to Noise Ratio (SNR) itself are proving that the proposed technique for audio. The contrast with the best known Watermarking technique recognized as An Adaptive Watermarking Algorithm for MP3 Compressed Audio Signal techniques proves that the newly proposed and implemented algorithm has given much better results for audio watermarking. The proposed algorithm is more robust as it has the higher values of PSNR of audio signal.

## PROPOSED METHODOLOGY

### Problem Statement

The problem with previous methods are that some audio streams carry only a few scaling factors per frame. Therefore, the space for embedding a watermark is reduced. This leads to the problem that watermarks cannot be embedded, because altering scale factors already used for embedding the first watermark destroys the quality of the audio data. A second approach in the variation of the MPEG (Moving Picture Experts Group) frame tries to alter the sample values instead of the scaling factors. Embedding multiple watermarks is also critical in this case. The additional

requirement of using the original track as input for the retrieval process further limits the applicability of this approach and BER (Bit Error Rate) should be reduced.

The main problem statement for the proposed work is to cope up with distortion of text and carrier signal, reduction of processing time for encoding and decoding of data by applying DCT technique and by adding text as watermark in audio signal( as a carrier waves)

The present work will sort the issues of non embedding of watermark problem, distortion of embedded text, late processing of watermark and will try to reduce bit error rate produced in previous work.

### **Objective**

The objectives of present work are:

- a. To study the Watermarking Concept in multimedia and analyze the watermarking techniques.
- b. Study the steps of existing algorithms such as DWT and DCT.
- c. Research on these Techniques for identification of issues.
- d. To Implement LSB (Least Significant bit) watermarking Technique & Filtration based Watermark to the information.
- e. Flow development of DCT technique on text image & text to reduce bit error rate.
- f. To compare PSNR AND MSE value of present work to previous work.

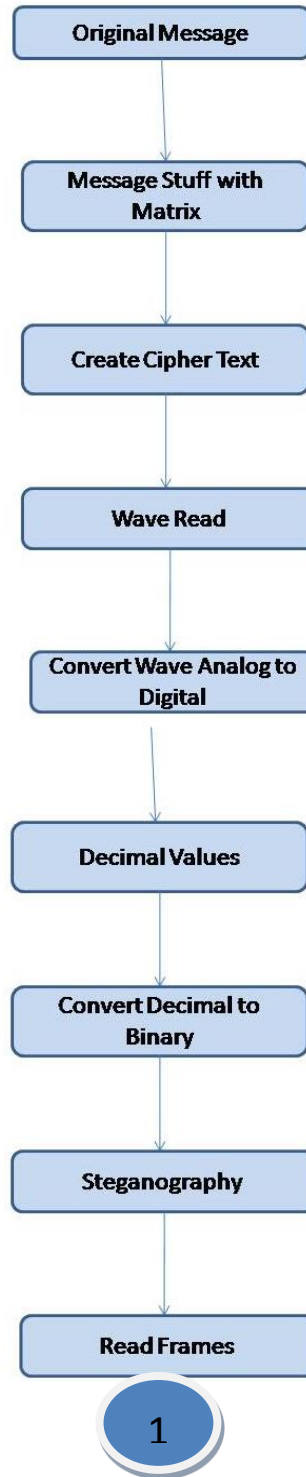
### **Methodology**

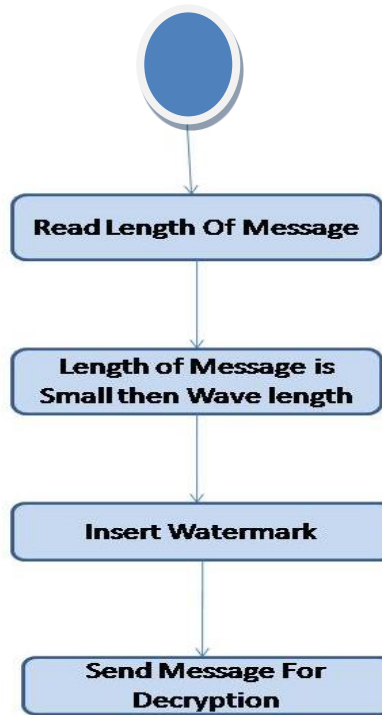
There are different methods for watermark the information in multimedia files and this research has been considered the audio file as carrier and text as waterark. This method should will reduce the BER (Bit Error Rate). The proposed methodology is shown by flow chart.

### **Encryption Process**

In encryption process the original message is converted in cipher text for that, the matrix manipulation has been initializing and data has shuffled then cipher text is created. After this the song wave is read using wave read function .The wave is converted into analog to digital form and decimal values are generated. The sign value is store in MSB (Most significant bit). Now the decimal values are converted into binary form.

The processes of steganography hide the message in wave form. For that it read the frames .First time only 16 frames are read then next 16 frames. The length of Cipher text message is calculated using Strlength in METLAB. Then the LSB (Least Significant bit) Method of data hiding has been implemented, In which the data has been replaced with LSB (Least Significant bit) and new data has been hidden.



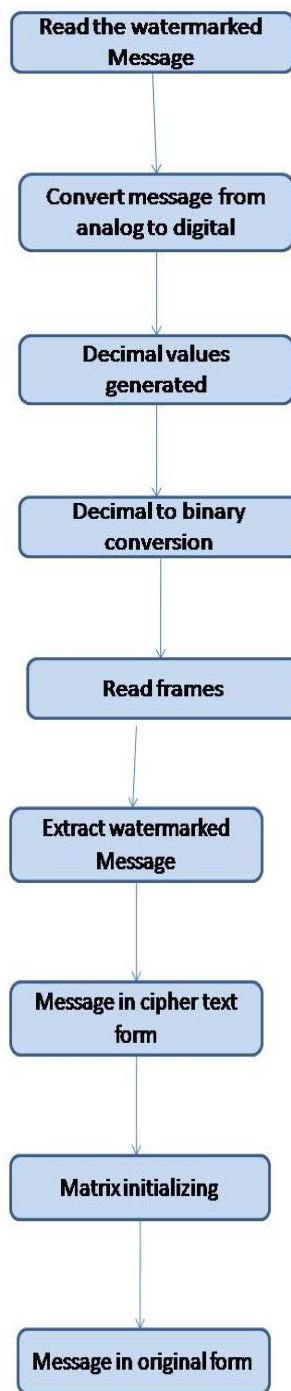


*Figure 1: Encryption process*

### **Decryption Process**

In decryption process the watermarked message is read. The message is converted from analog to digital the decimal values are generated .the decimal values are converted into binary form. First 16 samples are read and the message is extract. After the extraction of message the message is in cipher text form. The matrix has been initializing and data is converted in original form.





*Figure4: Decryption process*

## CONCLUSION

Characteristics of watermarking are: Imperceptibility, robustness to common signal and geometric processing operations, robustness to attack, and applicability to audio, image and video data.

Number of research has been done on watermarking techniques. Multiple techniques applied to embed the data safely but number of shortcoming are still there such as the processing time of encryption and decryption of data is somewhat



large, the carrier may be distorted, the data may not be encrypted and decrypted properly. According to ongoing analysis of previous work, it can be concluded that embedding watermark in form of text where carrier will be an audio sound using LSB and DCT methods will sort some issues. The encryption and decryption of text will be comparatively less time consuming and the appropriate data can be retrieved at receiver end. There will not be any restriction on length of text as well. So this technique will be quite better than sending text as scanned image This will reduce distortion in the original carrier signal and original watermark can be added within carrier signal without any distortion. The watermarked image can be retrieved at receiver end with accuracy. The applied DCT technique on text watermark will produce better results than applied DWT technique by other researcher.

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