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AUDIO WATERMARKING VIA EMD TECHNOLOGY

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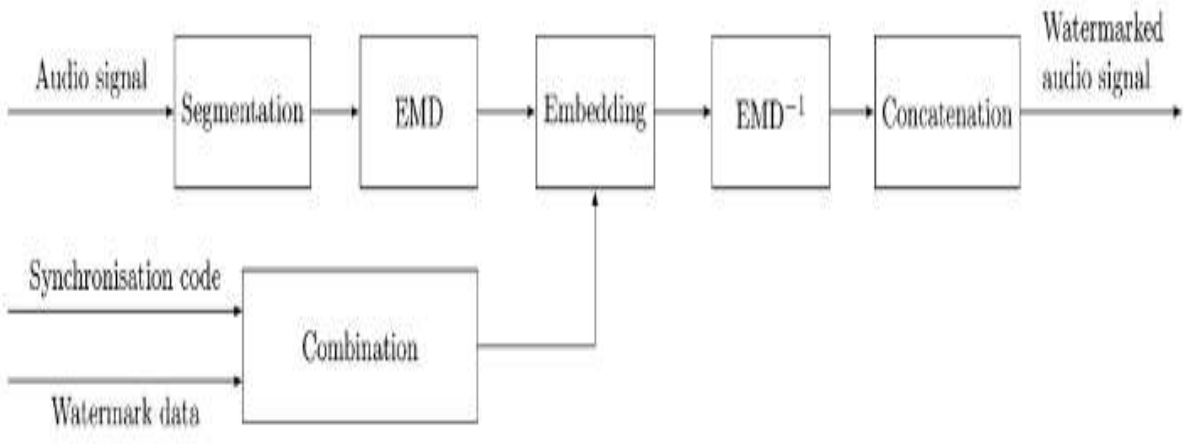
ABSTRACT :- *In this paper a new adaptive audio watermarking algorithm based on Empirical Mode Decomposition (EMD) is introduced. The audio signal is divided into frames and each one is decomposed adaptively, by EMD, into intrinsic oscillatory components called Intrinsic Mode Functions (IMFs). The watermark and the synchronization codes are embedded into the extrema of the last IMF, a low frequency mode stable under different attacks and preserving audio perceptual quality of the host signal. The data embedding rate of the proposed algorithm is 46.9–50.3 b/s. relying on exhaustive simulations, we show the robustness of the hidden watermark for additive noise, MP3 compression, re quantization, filtering, cropping and resampling. The comparison analysis shows that our method has better performance than watermarking schemes reported recently.*

EXISTING METHOD: Digital audio watermarking has received a great deal of attention in the literature to provide efficient solutions for copyright protection of digital media by embedding a watermark in the original audio signal. Main requirements of digital audio watermarking are imperceptibility, robustness and data capacity. More precisely, the watermark must be inaudible within the host audio data to maintain audio quality and robust to signal distortions applied to the host data. Finally the watermark must be easy to extract to prove ownership. To achieve these requirements, seeking new watermarking schemes is a very challenging problem

DEMERITS: 1. The method is robust to attacks such as band-pass filtering and cropping.
Proposed method: The idea of the proposed watermarking method is to hide into the original audio signal a watermark together with a Synchronized Code (SC) in the time domain. The input signal is first segmented into frames and EMD is conducted on every frame to extract the associated IMFs. Then a binary data sequence consisted of SCs and informative watermark bits is embedded in the extrema of a set of consecutive last-IMFs. A bit (0 or 1) is inserted per extrema. Since the number of IMFs and then their number of extrema depend on the amount of data of each frame, the number of bits to be embedded varies from last-IMF of one frame to the following. Watermark and SCs are not all embedded in extrema of last IMF of only one frame. In general the number of extrema per last-IMF (one frame) is very small compared to length of the binary sequence to be embedded. This also Depends on the length of the frame.
MERITS: 1. The method is not robust to attacks such as band-pass filtering and cropping.

BLOCK DIAGRAM:



1.1WATERMARKING EMBEDDING

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INTRODUCTION

In the current time of data innovation, listening stealthily can be consolidated by utilizing cryptography or/with Steganography. Steganography is a strategy for installing mystery messages in a cover flag to evade unlawful presentation [1]. Steganography contrasts from cryptography regarding message perceivability. It conceals mystery messages totally contrasted with cryptography where the mystery message is unmistakable [2]. Steganography is repetitively utilized as a part of secret correspondence for example military and government interchanges. Constantly it requires reasonably high payloads. The key necessities that ought to be satisfied for good quality steganography calculations contain perceptualprecision, payload or limit and quality. High limit is measured as a vital segment for steganography. As of late different systems have been produced for data stowing away, and a considerable lot of these methods utilized either picture or video media however infrequently utilize sound flag as a cover flag for the most part in high rate of information implanting. This is because of the way that Human Auditory System (HAS) is more agreeable contrasted with the Human Visual System In this paper, a novel steganography conspire that has high limit and high yield quality has been proposed. The proposed calculation depends on Double Density Dual Tree Complex Wavelet Transform with blowfish encryption. The Blow angle calculation relies upon the cover message quality. Rest of the paper is sorted out as takes after. Area II presents related work and hypothetical foundation. Proposed concealing plan with installing and extraction calculations and blowfish encryption is depicted in detail in Section III. Segment IV shows the trial comes about. At long last conclusions and future work are given in area V.

RELATED WORK

The easiest concealing procedure in time space with appropriate limit is the Least Significant Bits (LSB), however it is powerless to changes in LSB that can uncover the installed message [1,2,4]. In the change space, there are various change strategies that can be occupied with stowing away, for example, Fourier area, discrete cosine area, and wavelet area [4]. Each area has its highlights in flag handling and data concealing, still, the wavelet space has a fore most favorable position over the others since it partitions a flag into various recurrence segments with various resolutions, and after that every segment can be utilized as a part of implanted process as indicated by its predominance.

Discrete Wavelet Transform

DWT in one-dimensional examination parts the sound flag into two sections to be specific high and low recurrence parts. This procedure of part is called deterioration [8]. The edge segments compare to high frequencies part. These can be dissected utilizing high pass channels and low recurrence parts can be broke down utilizing low pass channels. The message concealing procedure begins by distinguishing repetitive bits which can be adjusted without debasing the nature of the sound and after that supplant the excess bits with the mystery message [10]. DWT calculation disintegrates a sound flag into an arrangement of coefficients where guess coefficients comprises of low recurrence data and detail coefficients contains high recurrence data. These coefficients can be gotten by going the flag through low pass and high pass channels [9].

Twofold Density DWT

It comprises of one scaling capacity and two unmistakable wavelets

It incorporates 1 low pass channel h0(- n) and two high pass channels h1(- n), h2(- n) in investigation channel. In its converse frame, it comprises of one low pass channel h0(n) and two high pass channels h1(n), h2(n) . Twofold Density DWT [12] improves the highlights of standard DWT. However, a couple of wavelets in this method are directional. In spite of the fact that this strategy uses more wavelets, some do not have a spatial introduction. An answer for this issue is given by the intricate twofold double tree wavelet change The proposed calculation begins by separating the info sound cover flag and afterward disintegrates each portion by utilizing twofold thickness double tree complex wavelet change. It joins twofold thickness discrete wavelet change and double tree complex wavelet transform[14,15,16].The proposed strategy is like DD-DWT with the exception of that disintegration

is performed for both high and low recurrence segments. The decayed flag by DD-DT-CWT for L levels, yields (2L) system with break even with lengths where one speaks to the guess flag that has the most noteworthy control and least recurrence, while the others are itemized signals with diminishing impact, beginning from the least to the most noteworthy recurrence point by point parts. Therefore, the Inverse DD-DT-CWT (IDD-DT-CWT) is utilized to reproduce the yield stego flag.

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LITERATURE REVIEW

Proposed technique initially partitions the information sound flag into fragments. At that point each fragment is deteriorated into change spaces utilizing forward complex twofold double tree wavelet change. The mystery message is encoded utilizing blowfish calculation and afterward installed in the change spaces. At that point opposite DD-DT-CWT is connected to reproduce stego flag.

Twofold Density Dual Tree Complex Wavelet Transform

Standard DWT and twofold thickness DWT experience the ill effects of three noteworthy impediments.

Absence of Shift Invariance

At the point when down examining operation of flag is performed at each level, move difference happens. The wavelet coefficients acquired from down inspecting operation fluctuates because of move in input flag.

Absence of Directional Selectivity

As the DWT channels are genuine and detachable the DWT can't recognize the contradicting corner to corner headings. The main issue can be maintained a strategic distance from if the channel yields from each level are not down tested but rather this expands the computational expenses altogether and the subsequent undecimated wavelet change still can't recognize contradicting diagonals since the change is as yet detachable. To recognize contradicting diagonals with divisible channels, the channel

recurrence reactions must be hilter kilter for positive and negative frequencies. This can be accomplished by utilizing complex wavelet channels which smothers negative recurrence parts. The proposed strategy has enhanced move invariance and directional selectivity than the distinct DWT.,

Nonappearance of Phase Information

The underlying inspiration driving the prior advancement of complex-esteemed DWT was the third restriction that is the 'nonappearance of stage data'. The proposed concealing plan utilizes complex-esteemed separating (expository channel) that breaks down the genuine/complex signs into genuine and nonexistent parts in change space. These are utilized to figure sufficiency and stage data, which is the data expected to depict the vitality confinement of swaying capacities (wavelet premise) precisely. 2-D DT-CWT depends on two scaling capacities and two particular wavelets though Double Density DWT depends on single scaling capacity and two unmistakable wavelets.

MATLAB has developed over a time of years with contribution from numerous clients. In college situations, it is the standard instructional device for basic and propelled courses in arithmetic, designing, and science. In industry, MATLAB is the instrument of decision for high-profitability research, advancement, and examination.

MATLAB highlights a group of extra application-particular arrangements called tool stash. Important to most clients of MATLAB, tool stash enable you to learn and apply particular innovation. Tool compartments are far reaching accumulations of MATLAB capacities (M-documents) that stretch out the MATLAB condition to tackle specific classes of issues. Ranges in which tool compartments are accessible incorporate flag handling, control frameworks, neural systems, fluffy rationale, wavelets, reenactment, and numerous others.

The MATLAB System

The MATLAB framework comprises of five fundamental parts:

1)Improvement Environment:

This is the arrangement of devices and offices that assistance you utilize MATLAB capacities and documents. A significant number of these devices are graphical UIs. It incorporates the MATLAB desktop and Command Window, an order history, a proofreader and debugger, and programs for survey help, the workspace, records, and the hunt way.

2) The MATLAB Mathematical Function:

This is a huge gathering of computational calculations going from basic capacities like whole, sine, cosine, and complex math, to more advanced capacities like network reverse, grid eigen esteems, Bessel capacities, and quick Fourier changes.

3) The MATLAB Language:

This is an abnormal state network/cluster dialect with control stream explanations, capacities, information structures, input/yield, and question arranged programming highlights. It permits both "programming in the little" to quickly make straightforward discard projects, and "programming in the expansive" to make finish vast and complex application programs.

4) llustrations:

MATLAB has broad offices for showing vectors and networks as diagrams, and in addition commenting on and printing these charts. It incorporates abnormal state capacities for two-dimensional and three-dimensional information representation, picture preparing, movement, and introduction illustrations. It additionally incorporates low-level capacities that enable you to completely redo the presence of designs and in addition to fabricate finish graphical UIs on your MATLAB applications.

5) The MATLAB Application Program Interface (API):

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This is a library that enables you to compose C and Fortran programs that collaborate with MATLAB. It incorporates offices for calling schedules from MATLAB (dynamic connecting), calling MATLAB as a computational motor, and for perusing and composing MAT-documents.

RESULTS AND DISCUSSIONS

The proposed algorithm was implemented by using Matlab (2013a) programming. The proposed algorithm was tested using five audio cover signals: male speaker, female speaker, male song, female song, jazz, kid song. Each signal has resolution of 16 bits per sample and sampling frequency 44.1k samples/sec. The quality of output signal in each test was computed using PSNR.

Input Signal
Stero Signal
For Existing Techniques
PSNR Values for Proposed Technique
Comparison of PSNR Values for Different Techniques
MSE Values for Existing Methods
Comparison of MSE Values for Audio Samples
MSE Values for Music Samples for Existing Techniques
Comparison of MSE Values for Music Samples.

CONCLUSION

Flash Magic is an application advanced by means of Embedded Systems Academy to permit you to easily get entry to the features of a microcontroller device. With this program you can erase individual blocks or the complete Flash memory of the microcontroller. This software is very beneficial for folks that paintings within the electronics subject. The most important window of the program consists of five sections wherein you may find the maximum not unusual features in an effort to software a microcontroller device. Using the “Communications” section you'll be capable of pick out the way a particular device connects in your computer. Select the COM port to be used and the baud price. It is recommended that you choose a low baud price first and growth it afterwards. This manner you'll decide the best velocity with which your device works. In order to choose which components of the reminiscence to erase, choose from the items within the “Erase” section. The third phase is non-compulsory. It offers you the opportunity to program a HEX file. In the subsequent segment you'll be capable of find distinct programming alternatives, which include “verify after programming”, “gen block checksums”, “execute” and others. When you’re executed, click the Start button that may be located in the “Start” segment. The software will start the tool, and you'll capable of see the progress of the operations at the bottom of the principle window. Using Flash Magic, Mat lab Desktop is the fundamental Matlab application window. The desktop contains five sub windows, the order window, the workspace program, the present index window, the charge history window, and at least one figure windows, which are demonstrated just when the client shows a realistic. The charge window is the place the client sorts MATLAB orders and articulations at the incite (>>) and where the yield of those summons is shown. MATLAB characterizes the workspace as the arrangement of factors that the client makes in a work session. The workspace program demonstrates these factors and some data about them. Double tapping on a variable in the workspace program dispatches the Array Editor, which can be utilized to get data and salary cases alter certain properties of the variable. The present Directory tab over the workspace tab demonstrates the substance of the present registry, whose way is appeared in the present index window. For instance, in the windows working framework the way may be as per the following: C:\MATLAB\Work, showing that catalog "work" is a subdirectory of the primary index "MATLAB"; WHICH IS INSTALLED IN DRIVE C. tapping on the bolt in the present index window demonstrates a rundown of as of late utilized ways. Tapping on the catch to one side of the window enables the client to change the present index. MATLAB highlights a group of extra application-particular arrangements called tool stash. Important to most clients of MATLAB, tool stash enable you to learn and apply particular innovation. Tool compartments are far reaching accumulations of MATLAB capacities (M-documents) that stretch out the MATLAB condition to tackle specific classes of issues. Ranges in which tool compartments are accessible incorporate flag handling, control frameworks, neural systems, fluffy rationale, wavelets, reenactment, and numerous others

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