IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 6, June 2017

A Survey: Digital Audio Watermark Designed Methods

Prof. Y.D. Chincholkar[1], Dr. S.R. Ganorkar[2], Shalaka Pravin Kude[3]

Scholar, Dept Electronics and Telecommunications, Sinhgad College of Engineering Pune, Maharashtra, India[1]

Professor, Dept Electronics and Telecommunications, Sinhgad College of Engineering Pune, Maharashtra, India[2]

Student, Dept Electronics and Telecommunications, Sinhgad College of Engineering Pune, Maharashtra, India[3]

Abstract: Audio watermarking is becoming a popular method in digital processing because it has the capability to secure the audios by embedding watermarks in them. Audio watermarking is getting to be distinctly a prominent strategy in advanced digital image processing since it has the ability to secure the audios by infusing watermarks in them. This paper is survey on a various watermarking methods.

Keywords: Audio watermarking, DCT, DWT, de-synchronization.

I. INTRODUCTION

In recent years, audio watermarking techniques have achieved significant progress, and several good algorithms for embedding watermarks into audio data have been presented a watermarking procedure to embed a watermark by directly modifying the audio samples. In recent years, there has been increasing research interest in the protection of digital media concerning intellectual property rights. Digital watermarking is a promising technique to solve this problem. From the technical aspect, digital watermarking aims to embed proprietary data (such as signature, logo, ID number, image etc.) into the media object. When necessary, the owners can extract these data to declare their copyright. While digital watermarking can be applied to various multimedia data such as audio, image, and video. This paper gives the idea about various audio watermarking methods. Since an audio signal contains only one-dimensional data and the human auditory system is more sensitive than the visual system, it is more difficult to hide additional information into an audio signal than into other multimedia data, without lowering the quality of the media object. An effective and practical audio watermarking method should possess three important traits: imperceptibility, robustness, and payload. Imperceptibility means that the watermark should be inaudible in the watermarked audio signal. Robustness indicates the ability to recover the watermark data from the watermarked signal, both in the situations with and without attacks. Security ensures that an unauthorized user cannot extract or delete the watermark without using a secret key. Payload indicated how many number of bits can be hide into the audio clip. In addition, low computation complexity is also considered as an advantage since it reduces the time of watermark embedding and extraction. This feature is particularly important for some time-demanding applications, such as delivering the audio data over the Internet. Furthermore, a good watermarking method should be able to extract watermarks at the decoding stage without making use of the host audio signal.

II. MOTIVATION

Digital watermarking aim to conceal the watermark information, for example, distributer's name, signature, logo, ID number, and so on into the real media protest without influencing its nature of the signal processing. Whenever important, the proprietors can extricate the watermark information to pronounce their copyright. In light of the application zones, digital watermarking is normally arranged into sound watermarking, picture watermarking and video watermarking. This paper concentrates on sound watermarking. Since a sound signal is one-dimensional and the human sound-related capacity is more sensitive than other tactile observations for example, vision. It is harder to shroud extra information into a sound signal than into other mixed media information, without decreasing the nature of unique sound. A successful and secure sound watermarking plan having three essential angles: intangibility, strength, and security. Intangibility implies that the implanted watermark information ought to be practically tranquil. Strength concentrated on a capacity to get the first type of information without influencing the outrage. The necessity on intangibility and strength are opposing, be that as it may, must be fulfilled. Security implies that giving the mystery key an incentive to unique discourse or information. It is utilized to obscure individual can't extricate the watermarks without knowing the mystery key. Aside from these traits, low computational multifaceted nature and customizability of the watermarking plan are extra points of interest. An effective watermarking plan is especially essential for time-requesting applications (e.g., conveying the sound information over the Internet). In these days, numerous

watermarking strategies have been proposed for advanced sound signs. This sort of sound watermarking strategies has actualized the systems, for example, Patchwork-based sound watermarking [9].In this way to deal with opposing de-synchronization attack created by elements of inserting stage, the watermarks are installed into the host sound motion in the stationary wavelet transform domain and afterward, an arrangement of synchronization bits are embedded into the watermarked signal in the logarithmic SWT (LSWT) area.

III. OBJECTIVES

The objective of this paper are listed below

- Develop the algorithm based on patchwork based method which makes a system process robust, imperceptible and more secured.
- Stationary wavelet transform is used to find the segment coefficient.
- To make the system more robust, imperceptible and secured, to satisfy these trait parameters like DR ratio, SNR ratio, PSNR ratios are verified.
- To verify attacks either it is scaled or not like De-synchronization, quantization etc.

IV LITERATURE SURVEY

In literature, the problem and the previous techniques of Audio watermarking is described: Yong Xiang et al. [1] It introduces a patchwork-based audio watermarking method to oppose de-synchronization assaults, for example, pitch-scaling, time-scaling, and jitter assaults i.e. attack. At the embedding stage, the watermarks are implanted into the host sound flag in the discrete cosine transform (DCT) area. At that point, arrangements of synchronization bits are embedded into the watermarked motion in the logarithmic DCT (LDCT) area. At the interpreting i.e. decoding stage, breaks down the gotten sound flag in the LDCT area to discover the scaling variable forced by an assault. At that point, received signal is removed the scaling impact, together with the embedded synchronization bits. This method is limited for de-synchronization attack only. High payload along with the imperceptibility and robustness can't be satisfied. This method achieves average of 94% DR.

Pranab Kumar et al. [2] proposes a blind singular value decomposition (SVD) based audio watermarking scheme using entropy and log-polar transformation (LPT) for copyright security of sound flag. In this plan, at first the first sound flag is portioned into non-overlapping outlines and discrete wavelet transform (DWT) is connected to each casing. Low recurrence SWT coefficients are separated into sub-band and entropy of each sub-band is computed. Its computation make process complex and it is limited only for sound flag [2].

X. Wang, W. Qi, and et.al [3]. The new adaptive blind digital audio watermarking algorithm is proposed in this paper. The elements of the proposed calculation are as per the following. 1) The watermark embedding depth is resolved by the sound to possess qualities, which enhance the working execution of the entire audio \ sound watermark. 2) The components are not chosen by joining the standard of perpetual quality, which improves the working proficiency of SVR prepare demonstrate, and enhances the intangibility and strength execution of watermarking. 3) The plan not just guarantees the ideal tradeoffs between intangibility and strength execution, additionally actualizes the visually impaired recognition of watermark. Furthermore, this calculation proposed additionally such merits, for example, simple computation, simple implementation; all these merits enhance the practicality and application value for audio copyright protection. By using this method tradeoff between robustness, imperceptibility and security can't be satisfied [3].

Fabrizio Guerrini, Masahiro et.al [4] in this paper, they exhibited an algorithm for a HDR detectable watermarking system framework with the prerequisites of intangibility and vigor i.e. robustness against TM administrators as security. A formerly created watermarking framework for gray scale LDR pictures has been utilized in the Log Luv space. The result comes about have turned out to be great, particularly considering how the plan parameters have been determined to a solitary picture and afterward utilized for the whole test database. Programmed methods for setting these parameters will in certainty be considered in what's to come. The watermarks embedded using this system have always been detected, with the exception of the cases where the TM algorithms have given visually unsatisfactory output images.[4]

Y. D. Chincholkar et al. provide its attention to audio watermarking. Since an audio signal contains only one-dimensional data and the human auditory system is too sensitive than the visual system, it is difficult to hide extra information into host audio signal than into other multimedia data, without reducing the quality of the media signal. Digital audio watermarking by using SWT algorithm and LSB coding shows the moderate robustness and imperceptibility [5].

Bai Ying Lei et al. (2011) [6] propose another, visually impaired and strong audio watermarking plan in light of SVD–DCT with the synchronization code strategy. They implant a paired watermark into the high-recurrence band of the SVD–DCT piece indiscriminately. The Turbulent sequence is embraced as the synchronization code and embedded into the host signal.

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 6, June 2017

Singhal et al. [7] proposed an algorithm which utilizes multilevel wavelet deterioration nearby DCT and SVD technique. Multi-level Daubechies wavelet decay is connected after confining the first music signal. In the wake of reworking the guess coefficient, DCT-SVD is connected and a watermark is embedded. This paper shows the result for PSNR.

Lalitha et al. [8] proposed a DWT-Arnold change focused music watermarking algorithm. Taking after examining and separating the music signal, DWT is connected to the underlying music signal to gives actualities and guess sub-groups. After applying Arnold change nearby DWT on the photo, it's stuck into the created music signal [8].

In-Kwon Yeo and Hyoung Joong et.al this paper introduces a center thought of MPA (Modified Patchwork Algorithm). Primary commitments of this paper incorporate the taking after. 1) The embedding factor is computed adaptively in view of the specimen mean and test fluctuation. Versatile inter woven calculation is critical in two regards. It can keep up imperceptibility while keeping adequate vigor. Moreover, versatile interwoven calculation is more vigorous against particular assaults, for example, duplicate outrage since its esteem is figured in view of the host signals. 2) Sign capacity in implanting capacities is utilized. It improves the discovery rate and thusly diminishes false positive and false negative mistakes. The sign capacity itself is basic; however extremely hard to determine scientific equation since it is a nonlinear capacity. 3) Patch size is around 50 tests in change space. Indeed, even with such little specimens, we can accomplish adequate heartiness. Since the example size is so little, unintelligibility qualities are great. Obviously, the 50 tests are spread over the entire examples, for our situation, more than 4410 tests when we change them contrarily to the time area. In this regard, the interwoven calculation is considered to be a sort of spread-range calculation. The three certainties make the MPA calculation extremely strong.[9]

Ketcham et al. [10] set forward a hereditary algorithm i.e genetic algorithm which utilizes Discrete Wavelet Transform. It is a visually impaired watermarking algorithm. In the installing some portion of the calculation, the 2-D twofold picture is changed over to the 1-D antipodal succession which is thus scrambled utilizing an irregular arrangement. After the decay of the info sound into 5 levels, the division of the coarsest estimation sub-band is fragmented into k-sections. After estimation and expulsion of normal incentive from each fragment, one piece at any given moment is inserted to the beforehand adjusted sections. The GA calculation is utilized for choosing the position of implanting. Administrators like choice, hybrid, and change are utilized. At long last, the IDWT is performed to get the watermarked sound flag. To expand the vigor i.e. robustness of the calculation encourage, GA has been utilized on the parallel picture also. In the location calculation, comparable strides are performed. The execution is assessed alongside the strength of the calculation utilizing the assaults like arbitrary commotion, separating, trimming. This calculation indicates reasonable heartiness. An adaptive audio watermarking calculation utilizing DWT and SVD has been given.[10]

Michael Arnold et.al in this paper the watermarking of audio as for various sorts of watermarks were displayed and conceivable applications talked about. The calculation displayed is a measurable approach working in the Fourier area. The use of various test insights in the calculation was researched. The watermarking methods were assessed as far as quality, security, and strength. The security is ensured by the tremendous number of watermarks and the vanishing likelihood of faking a watermark. The algorithm shows good robustness against common signal processing. Possible enhancements were discussed and are subject to current research [11].

V. WATERMARK TECHNIQUE USING DCT

Extraordinary growth of internet, peer-to-peer file sharing, and signal processing technologies has made the reproduction, manipulation and distribution of multimedia data much easier than ever before. This unavoidably increases the demand for protection of copyrighted data. Digital watermarking is a promising technology for copyright protection. Whilst digital watermarking can be applied to various multimedia contents such as audio, image, and video, this paper focuses on audio watermarking. A good audio watermarking method should have some important traits such as imperceptibility, robustness, security and embedding capacity. Imperceptibility refers to the ability of the watermarking method to embed watermarks without significantly lowering the audio quality. Robustness denotes the capability of the watermarking method to extract the embedded watermarks under common attacks. Security means that watermark extraction should rely on a secret key and not on the secrecy of the watermarking algorithm. Embedding capacity indicates the ability of hiding watermarks under certain imperceptibility and robustness constraints.

In addition, blind watermarking methods are preferred as they can extract the embedded watermarks from the watermarked signal without using the host audio signal. A novel patchwork-based audio watermarking method to resist de-synchronization attacks is one of the recent techniques used for audio watermarking. [1] In the embedding process, first scramble the original watermark bits using a secret key and apply DCT to the host audio signal to obtain the corresponding DCT coefficients. Then, remove those DCT coefficients related to low- and high-frequency components, and segment the remaining DCT coefficients. An improved patchwork embedding scheme is utilized to embed the scrambled watermark bits into the non-silent audio segments by modifying the associated DCT coefficients.

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 6, June 2017

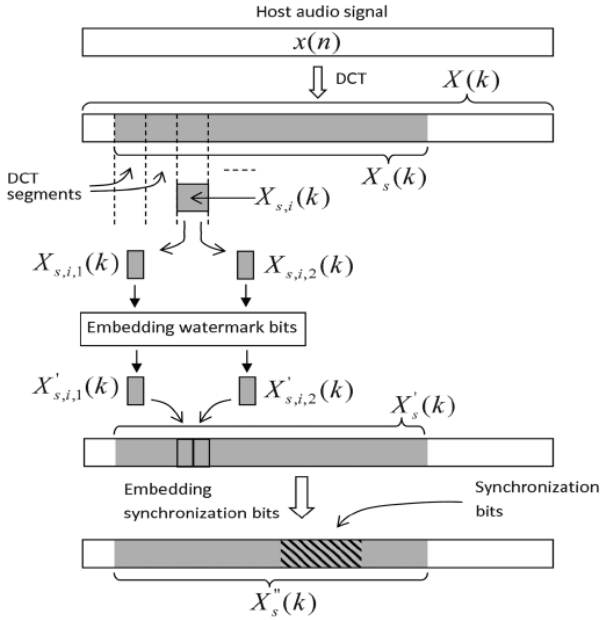

Fig.1: Watermark embedding process [1]

After that, a set of synchronization bits are implanted into the watermarked signal in the logarithmic DCT (LDCT) domain. In the decoding process, first determine whether the received signal has been scaled by an attack or not by analyzing the locations of bits. The synchronization bits in the LDCT domain. If it has been scaled, the location information of the synchronization bits can be used to find the scaling factor. Then, the received signal is re-scaled to remove the scaling factor and the synchronization bits. Afterward, the embedded scrambled watermark bits are extracted from the modified version of the received signal. Finally, the extracted watermark bits are descrambled to obtain the original watermark bits using the secret key.

V. FURTHER RESEARCH

A novel patchwork-based audio watermarking method to resist de-synchronization attacks, in this paper DCT is used to determine the coefficient. But DCT shows drawback of blockage artifacts in image. And also this paper is limited only for de-synchronization attack. To overcome this issue SWT is the promising method. The SWT is an inherently redundant scheme as the output of each level of SWT contains the same number of samples as the input. By using patchwork method it is easy to embed the watermarks bits and it will increase the security. SWT helps to find out the coefficient of audio signal.

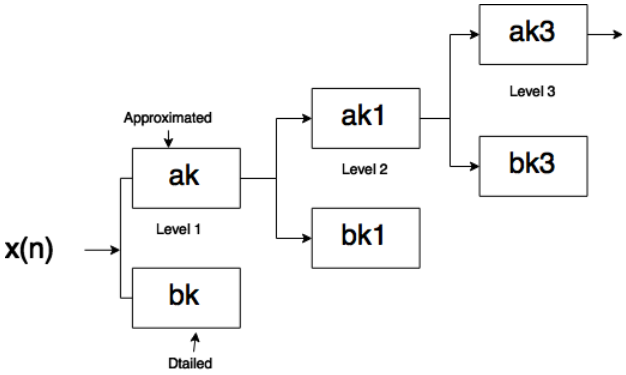

Fig.2: SWT Levels decomposition

Watermarks bits are embed into this decomposed level. And inverse SWT is applied to combine the patches of the signal. Similarly opposite action will take place for decoding of the signal to extract the watermark bits those are embedded into the audio signal. Simultaneously attack will be check by adding attack like pitch scale, amplitude, noise etc. at embedding stage.

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 6, June 2017

VI. CONCLUSION

All the methods listed in this paper are efficient for copyright protection. But all the methods can not satisfy the traits of imperceptibility, robustness and payload. To overcome this problem future research is introduced in this paper. Future research will be based on patchwork method using SWT. SWT is an inherently redundant scheme as the output of each level of SWT contains the same number of samples as the input. It helps to improve the security and robustness of the system. Surveyed methods listed a particular attack only. By adding some attack at the embedding stage it will help to make system imperceptible and robust by finding the parameter like SNR, BER, PSNR and DR.

ACKNOWLEDGMENT

Authors would like to thanks to Management, Principal and Head of Department of Electronics and Telecommunication of Sinhgad College of Engineering, Pune for their constant support. Authors also would like to thanks to their family member for their constant support and encouragement.

REFERENCES

[1] Y. Xiang, I. Natgunanathan, S. Guo, W. Zhou and S. Nahavandi, "Patchwork-Based Audio Watermarking Method Robust to Desynchronization Attacks," in IEEE/ACM Transactionson Audio, Speech, and Language Processing, vol. 22, no. 9, pp. 1413-1423, 2014.
[2] Dhar, Pranab Kumar, and Tetsuya Shimamura. "Blind SVD-based audio watermarking using entropy and log-polar transformation." Journal of Information Security and Applications, pp.74-83, 2015.
[3] X. Wang, W. Qi, and P. Niu, "A new adaptive digital audio watermarking based on support vector regression," IEEE Trans. Audio, Speech, Lang. Process., vol. 15, no. 8, pp. 2270–2277, Nov. 2007
[4] Fabrizio Guerrini, Masahiro Okuda, Nicola Adami, and Riccardo Leonardi "High Dynamic Range Image Watermarking Robust Against Tone-Mapping Operators" IEEE Transactions On Information Forensics And Security, Vol. 6, No. 2, June 2011 283-295
[5] Y. D. Chincholkar, S. R. Ganorkar, A. S. Sawai , "Implementation Of Audio Watermarking Technique For Copyright Protection Using SWT Algorithm", IJFEAT,pp.42-48 May 2016.
[6] S. C. Ng, W. Zhang, Y. Zhang, Y. Yang and G. Mao, "Analysis of Access and Connectivity Probabilities in Vehicular Relay Networks," IEEE Journal on Selected Areas in Communications, vol. 29, no. 1, pp. 140-150, 2011.
[7] Kim JH, Lee S. Reliable routing protocol for vehicular ad hoc networks. AEU-International Journal of Electronics and Communications, pp:268-71, 2011.
[8] Venkata, M. D., MM Manohara Pai, Radhika M. Pai, and Joseph Mouzna. "Traffic monitoring and routing in VANETs—A cluster based approach." In ITS Telecommunications (ITST), 2011 11th International Conference on, pp. 27-32. IEEE, 2011.
[9] In-Kwon Yeo and Hyoung Joong Kim, Member IEEE "Modified Patchwork Algorithm: A Novel Audio Watermarking Scheme"IEEE Transactions On Speech And Audio Processing, Vol. 11, No. 4, July 2003 381-386
[10] Ketcham, M., & Vongpradhip, S, "Intelligent audio watermarking using a genetic algorithm in DWT domain". International Journal Of Intelligent Technology, Vol.2 No.2, pp: 135-140, 2007.
[11] Michael Arnold "Audio Watermarking: Features, Applications and Algorithms" in Proc. IEEE Int. Conf. Multimedia Expo, 2000, vol. 2, pp. 1013–1016.