Review of Existing Techniques for Copyright Protection and Introducing New Technique

[1]Priyanka
[1]M.Tech Scholar (CSE), Amity University,
Computer Science & Engineering
Amity University,
Gurgaon, India

[2]Charu Jain and [3]Geet Sandhu
[2]Sr. Lecturer, Computer Science & Engineering
[3]Lecturer, Computer Science & Engineering
Amity University,
Gurgaon, India

*Abstract--*__With the fast development of information technology , the sharing of contents over the Internet which are in form of audio , video , text , images etc have become easy. Everyone can easily copy , transmit and distribute the digital data which leads to piracy of the content and copyright issues.__

__Copyright protection is a technique which is used by the data providers so that the data can be easily protected from the piracy and misuse. The digital watermarking is one of the solution for copyright protection. In this paper, we have reviewed and compared the existing techniques and proposed a technique based on BFO for digital watermarking for copyright protection.__

Keywords : Digital Watermarking , Copyright protection , BFO , DCT , Bacterial Foraging Optimization , Combined DWT and DCT

I. INTRODUCTION

Over the past years , due to the success of the internet , sharing and transmitting of electronic media , which is present in the form of images , audio , video , text etc has become very easy. The digital media are present in large amount and increasing rapidly , everyone can copy and transmit the data without permission of the content providers. This has created a problem of copyright protection for the content providers. Watermarking is the one solution for the copyright protection of the digital images. There are many technique based on spatial and frequency domain for copyright protection in digital images.

In Spatial domain , watermark insertion is done on image pixels directly while in the Frequency domain , the image is first converted into the frequency domain with the help of DCT ,DWT , DFT etc approaches and the watermark is embed and again to restore the watermarked image , the inverse transform is performed.[1]

However , insertion of watermark is simple and easily implemented in spatial domain , it performs weak against attacks while the frequency domain based watermark is more robust against the attacks. [2]

There are some techniques which have used the Genetic algorithm. For example Shieha [3] applied the GA in DCT domain to find the optimal frequency for embedding of watermark.

In this paper , we have reviewed and discussed the results of the techniques used for copyright protection like using DCT , Combined DCT with DWT. A new technique for copyright protection has also proposed.

Further , the remaining paper has been organized as follows. Section II contains the literature survey of techniques used. Section III represents the experimental results of the techniques and Section IV represents the Proposed technique and finally the Section V concludes the paper.

II. LITERATURE SURVEY

The year 1993 can be considered the beginning of the digital image watermarking era. [4]. After that many techniques of watermarking have been proposed. Macq et al. [5], [6] introduce watermarking technique which is adapted to the human visual system using masking and modulation. Koch et al. [7], [8], [9] proposed an efficient watermarking in the DCT domain for the first time This method has shown good robustness to JPEG compression down to a quality factor of 50%. Tao and Dickinson et al [10] introduced an adaptive DCT Domain watermarking technique based on a regional perceptual classifier with assigned sensitivity indexes.

A. DCT Approach for Copyright Protection

Many techniques have been proposed over the years for copyright protection by DCT approach. Shinfeng D. Lin et.al [11] represented a technique which embeds the watermark in the low frequency. To improve the imperceptibility of the watermark , the weighted correction by used by them. The experimental results shown by the technique proves the robustness of the technique.Later on Chin-Chen Chang et.al [12] represented a technique which does not actually hide the watermark in the original image and also applicable for multiple watermarks. This technique is also robust to different attacks. Recently in year 2010 Majid Rafigh et.al [13] DCT based algorithm which uses the genetic algorithm to find the best location in image blocks where the watermark is inserted in 8×8 blocks of image according to mathematical relation. The algorithm proves its robustness to many attacks and more robustness against JPEG Compression. General steps for DCT Block Based Watermarking Algorithm :

1) Divide the image into blocks of 8×8 which are not overlapping.

2) After that Apply DCT to each non overlapping block.

3) Choose some block selection criteria like HVS (Human Visual System) and criteria for coefficient selection.

4) Insertion of watermark by modifying the selected coefficients and performing Inverse DCT transform on each and every block.[14]

Advantages of DCT Approach :

- Resist against the compression , filtering and noisy attacks.
- Watermark is having good perceptual invisibility.
- It is having reasonable execution time.

B. Combined DCT-DWT Approach for Copyright Protection

Kaushik Deb et.al [15] represented a technique for embedding watermark for copyright protection. In this, the watermark is added into the low frequency band of DCT Block of particularly selected DWT sub-band. For embedding of watermark, two uncorrelated pseudorandom sequences were used like one sequence for embedding bit one and another one is to embed the bit zero. The process of extraction of watermark is just reversing the embedding operations without referencing the original image. The algorithm is robust against the various attacks like JPEG compression, cropping, contrast adjustments, filtering and noises.

C. DWT Approach for Copyright Protection :

The principle followed in the DWT approach is same as DCT but the process in which the image is transformed into the transformed domain is different so the resulting coeeficients are different. Basically in Discrete Wavelet Transform divides the image into Horizontal (HL) , Diagonal(HH) and Vertical (LH) components. To calculate the multiple "Scale" wavelet decompoistion , the process is repeated.[16]
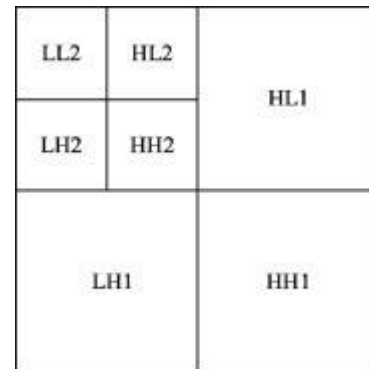

Fig 1 : 2D DWT

There are many techniques in the frequency domain like DFT which is robust against scaling, cropping, rotation, translation types of attacks.[17] and FFT etc.

III.   EXPERIMENTAL RESULTS

In this section we have compared the results of DCT and DWT –DCT combined approach results. If we compare both the technique for the JPEG compression, then we find that the combined approach of DWT-DCT is better than DCT approach.

The Gaussian Noise attack for both the DCT and DWT-DCT approach is 95% and 99%. The results from other attacks like salt & pepper , Sharpening , rotating, median filter, cropping, resizing are mentioned below as :

Figure 1 provides the results of various attacks on the DCT approach for copyright protection and Figure 2 represents the results of various attacks on combined DWT-DCT approach as :

Result analysis of DCT approach for Copyright protection

Attack	LENA
JPEG Compression	100%
Gaussian noise	95%
Sharpening Filter	98%
Salt & Pepper	97%
Median Filter	99%

Next we have mentioned the results for DWT-DCT combined approach for Copyright protection as :

Result analysis of Combined DWT DCT approach for Copyright protection

Attack	Method
Gaussian white house	.9906
Gaussian white house	.9906
Median Filter	.9558
Crop 25% watermarked image	.9777
Resizing	.9798
JPEG Compression	.9839
Similarity Ratio	.9906

IV. PROPOSED TECHNIQUE

Here we have proposed a new technique based on BFO bacterial foraging optimization algorithm to insert a digital watermark in the image. As the name signify , the algorithm is based on basic to bacterial movement. Basically BFO identify the areas having higher frequency where the data can be stored. After finding the high frequency areas , the data hiding takes place to hide the data.

To perform the data encoding , the ADAPTIVE algorithm is used over the image. The algorithm performance can be checked against the various attacks like Gaussian filter , Salt & Pepper and Sharpening etc. The analysis of technique can also be performed under different approaches such as MSE, PSNR, Image similarity and BER etc.

V. CONCLUSION AND FUTURE SCOPE

We have discussed the results for copyright protection by DCT and DCT with DWT technique and can conclude that the combined approach of DWT-DCT is more robust than the DCT approach. Also have proposed a new technique based on BFO.

The technique based on BFO here is just theoretical approach and can be implemented further to check its performance under various parameters and attacks. The results can be compared with the approaches already existing to check its efficiency.

REFERENCES

[1] Jamal A. Hussein "Spatial Domain Watermarking Scheme for Colored Images Based on Log-average Luminance" Journal of Computing, Volume 2, Issue 1, January 2010, ISSN 2151-9617

[2] Lee, Dongeun, et al., "Genetic Algorithm-Based Watermarking in Discrete Wavelet Transform Domain."Kunming , CHINE : International Conference on Intelligent Computing, 2006.

[3] Shieha, Chin Shiuh, Huang, Hsiang Cheh and Hsin,Feng., "Genetic watermarking based on transform-domain techniques." s.l. : Pattern Recognition, 2004, Vol. 37.

[4] Frank Hartung , Martin Kutter, "Multimedia Watermarking Techniques" Processing of the IEEE , Vol 87,No. 7 , July 1999

[5] J. F. Delaigle, D. De Vleeschouwer, and B. Macq, "Low cost perceptive digital picture watermarking method," in Proc.ECMAST'97, Milan, Italy, May 1997, pp. 153–167.

[6] B. Macq , J-F Delaigle and C. De Vleeschouwer , "Digital watermarking" SPIE Proc. 2659 : Optical Security and Counterfeit Deterrence Techniques , Mar 1996 pp 99-110.

[7] S. Burgett , E.Koch and J.Zhao , "A novel method for copyright labeling digitized image data", Hraunhofer Inst. Comput. Graphics , Darmstadt , Germany , tech.rep , Sept 1994

[8] E. Koch, J. Rindfrey, and J. Zhao, "Copyright protection for multimedia data," Digital Media and Electronic Publishing, 1996

[9] E. Koch and J. Zhao, "Toward robust and hidden image copyright labeling," in Proc. Workshop Nonlinear Signal and Image Processing, Marmaros, Greece, June 1995

[10] B. Tao and B. Dickinson, "Adaptive watermarking in the DCT domain," inProc. Int. Conf. Image Processing (ICIP), Lausanne, Switzerland, Sept. 1996.

[1] University Science, 1989.

[11] Shinfeng D. Lin and Chin-Feng Chen "A Robust DCT-Based Watermarking for Copyright Protection" IEEE Transactions on Consumer Electronics, Vol. 46, No. 3, AUGUST 2000

[12] Chin-Chen Chang, Jyh-Chiang Yeh, and Ju-Yuan Hsiao "A Method for Protecting Digital Images from Being Copied Illegally" IEEE 2001

[13] Majid Rafigh, Mohsen Ebrahimi Moghaddam "A Robust Evolutionary Based Digital Image Watermarking Technique in DCT Domain", Seventh International Conference on Computer Graphics, Imaging and Visualization 2010

[14] Mrs. Chhaya S. Gosavi , Dr. C.S. Warnekar "Study of Multimedia Watermarking Techniques" IJCSIS , Vol. 8, No.3,August 2010

[15] Kaushik Deb , Sajib Al-Seraj,1 Md. Moshiul Hoque , Md. Iqbal Hasan Sarkar "Combined DWT-DCT Based Digital Image Watermarking Technique for Copyright Protection"7th International Conference on Electrical and Computer Engineering,2012

[16] Lin Liu , "A Survey of Digital Watermarking Technologies"

[17] Vinita Gupta , Mr. Atul Barve, "A Review on Image Watermarking and Its Techniques" , IJARCSSE, Volume 4, Issue 1, January 2014 , ISSN: 2277 128X