ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 12, December 2017

Optimized Blind Image Watermarking Method Based On Firefly Algorithm in Wavelet Packet Transform (WPT) Domain

[1] P.Nancy Jothibai
PG Student, Dept of Electronics and Communication Engineering, Keelavalllanadu, Tuticorin

Abstract: **- The rapid spread of the internet, accompanied by the comprehensive development of digital technologies and easily reproduced digital media, has increased the popularity of such media. The current challenge is how to protect the ownership of digital products while allowing the full usage of internet resources. Digital watermarking has been suggested as a way to achieve digital protection. The purpose of digital watermarking is to insert the secret data into the image without significantly affecting the visual quality. The authenticity & copyright protection are two major problems in handling digital multimedia. The Image watermarking is the most popular method for copyright protection by Wavelet Packet Transform (WPT) which performs 3 Level Decomposition of original (cover) image and watermark image is embedded in Lowest Level (LL) sub band of the cover image. Inverse WPT is used to recover the original image from watermarked image. The fingerprint is used as a biometric key.**

Keywords **– Wavelet packet transform; fingerprint; digital watermarking; biometric key.**

I. INTRODUCTION

A biometric system is essentially a pattern recognition system which recognizes a user by determining the authenticity of a specific anatomical or behavioral characteristic possessed by the user. Several important issues must be considered in designing a practical biometric system. First, a user must be enrolled in the system so that his biometric template or reference can be captured. This template is securely stored in a central database or a smart card issued to the user. The template is used for matching when an individual needs to be identified. Depending on the context, a biometric system can operate either in a verification (authentication) or an identification mode.

II. BEHAVIORAL BIOMETRICS

A.Keystroke or Typing Recognition

Keystroke recognition measures the characteristics of an individual's typing patterns, including the time spacing of words. It can be used for identifying people who may create inappropriate email or conduct fraudulent activity on the Internet. Keystroke or typing recognition software is installed onto a computer. When a person uses it their typing patterns are then measured. It effectiveness depends on an individual using the same keyboard as different types may create a variance in the keystroke pattern measured. B.Speaker Identification or Recognition Speaker identification and recognition are used to discover an unknown speaker's identity based on patterns of voice pitch and speech style. Behavioral patterns of a voice differ with every individual. In criminal investigations, a voice is compared to a database of voice model templates that were previously recorded. The success of the biostatistics voice data comparison varies since it is based on the availability of the voice recordings.

III. LITERATURE SURVEY

Navnidhi Chaturvedi1, Dr.S.J.Basha2- 2012 [1]demonstrated in this paper "Comparison of Digital Image watermarking Methods DWT & DWT-DCT on the Basis of PSNR" The authenticity & copyright protection are two major problems in handling digital multimedia.The Image watermarking is mmost popular method for copyright protection by discrete Wavelet Transform (DWT) which performs 2 Level Decomposition of original (cover) image and watermark image is embedded in Lowest Level (LL) sub band of cover image. Inverse Discrete Wavelet Transform (IDWT) is used to recover original image from watermarked image. And Discrete Cosine Transform (DCT) which convert image into Blocks of M bits and then reconstruct using IDCT. In this paper we have compared watermarking using DWT & DWT-DCT methods watermark.Ankush R. Patil*, V. K. Patil- 2016[2] demonstrated in this paper "A REVIEW OF IMAGE

WATERMARKING METHODS" Due to the recent progress in internet technology and evolution of very high speed networks operating everywhere, protection of digital content is must. So, it has become a tough task to protect copyright of an individual's creation.m The purpose of digital watermarking is to incorporate concealed information in multimedia content to ensure a security amenity or simply a labeling application. This paper then categorizes the various watermarking techniques into numerous categories dependent upon the domain in which the concealed data is inserted. We have also provided the comparative analysis of these techniques that can help us to know the positive and negative of these techniques.

S.Manikanda prabu1, Dr.S.Ayyasamy2- 2014 [3]demonstrated in this paper "A Novel Image Watermarking Method Using Discrete Wavelet Transform and Back Propagation Neural Network" The copyright protection of digital data became a crucial issue nowadays. Watermarking is one of the powerful solutions, in which a specified signal or image is embedded in digital data that can be extracted or detected later for authentication purpose. In this paper, a new watermarking approach based on wavelet coefficient quantization using back propagation neural network in discrete wavelet transform domain is proposed. The host image is decomposed up to three levels using discrete wavelet transform. The secret image is chosen as a watermark. The back propagation neural network is used while embed and extract the watermark. Peak signal to noise ratio and normalized crosscorrelation coefficient are computed to measure the image quality of the proposed technique. Experimental results demonstrate that the proposed watermarking algorithm has good imperceptibility and robustness against several types of attacks, such as salt and pepper, Gaussian and speckle noise addition, compression and rotation. Vikas Sharma, P. S. Mann-2017[4] demonstrated in this paper "A Review on Various Optimized Image Watermarking Techniques" This paper represents digital watermarking is a technique which allows an individual to add hidden copyright notices or other verification messages to digital audio, video, or image signals and documents. Two types of digital watermarks may be distinguished, depending upon if the watermark seems to be visible or even cannot be seen to the rare viewer. The complete goal of this paper is to explore the comparison of various techniques based on watermarking image and it also demonstrate that it provides the secured image watermarking with a decent capacity.

Jyoti sahu , Dolley shukla- 2015 [5]demonstrated in this paper "Digital Image Watermarking Method 4 Level DWT-DCT on the Basis of PSNR "The authenticity & copyright protection are two major problems in handling digital multimedia". The Image watermarking is most popular method for copyright protection by discrete Wavelet Transform (DWT) which performs 4 Level Decomposition of original (cover) image and watermark image is embedded in Lowest Level (LL2) sub band of cover image. Inverse Discrete Wavelet Transform (IDWT) is used to recover original image from watermarked image. And Discrete Cosine Transform (DCT) which convert image into Blocks of M bits and then reconstruct using IDCT. In this paper we have compared watermarking using DWT & DWT-DCT methods performance analysis on basis of PSNR, Similarity factor of watermark and recovered watermark

IV. EXISTING SYSTEM

The duplicate copy of a digital media is as good as the original and hence the issue of Piracy and copyright protection is alarming. Illegal production and unauthorized distribution of digital media has become a high alarming problem in protecting the copyright of digital media. Digital watermarking has been proposed as one of the solution for the copyright protection and digital right management.

WPT is applied to provide more security in the watermarking process and there is no biometric is given as key. A watermark is designed for residing permanently in the original digital data even after repeated reproduction and circulation. An optimized watermarking embedding and extraction method is supposed to meet necessities of perceptual transparency, robustness to sustain signal processing attacks and also needs to be secure. Perceptual transparency means that the insertion of the digital watermark in the host image does not change the visibility of image.

A.DRAWBACKS OF EXISTING SYSTEM

The Existing System only used an image based approach. This system does not support the minutiae approach. This system also takes long time identification. This system result is not accurate.

V. PROPOSED SYSTEM

The proposed ridge features are composed of four elements: ridge count, ridge length, ridge curvature direction, and ridge type. These ridge features have some advantages in that they can represent the topology information in entire ridge patterns existing between two minutiae and are not changed by nonlinear deformation of the finger. For instance, patient data inserted in the image is defined as a posterior control mechanism since the content was still available for the interpretation and protected. Spatial domain wavelet transform (WPT) features watermarking system substitutes or modulates the image pixels spatially with the message.

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 12, December 2017

A.ADVANTAGES OF PROPOSED SYSTEM

This system using a minutia approaches.This system recognition is accurate.This system identifies quickly

VI. SYSTEM DESIGN SPECIFICATION

A. SYSTEM ARCHITECTURE

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be the considered to be the most critical in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods

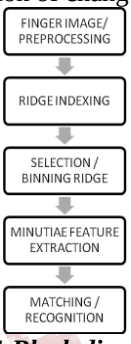


fig.1 Block diagram

B. MODULE DESCRIPTION

The following are the modules of the project along with the way they are implemented and that is planned with respect to the proposed system, whiled below. Each module has specific usage in the project and is description is given below followed by the list of modules.

- Finger Image/Preprocessing
- Ridge Indexing
- Selection/Binning Ridge
- Minutiae Feature Extraction
- Matching/ Recognition

Finger Image/Preprocessing

Before extracting the proposed ridge features we need to perform some preprocessing additional procedures for quality estimation and circular variance estimation. To estimate the ridge orientation and the ridge frequency is calculated. Gabor/Gaussian Filter is applied to enhance the image and obtain a skeleton zed ridge image. A finger robust preprocessing method to reduce the image enhancement errors.

Ridge Indexing

Ridge indexing is known as ridge count, that the ridge count methods find the number of ridges that intersect the straight line between two minutiae in the spatial domain is counted. When the ridge-counting line is parallel to the ridge structures, the line may meet the same ridge at one point, at more than two points, or at no point, due to skin deformation. The ridge count (rc) is not always a positive number and the sign of the ridge count follows the sign of the vertical axis.

Selection/Binning Ridge

The Ridge length (rl) is the distance on the horizontal axis from the intersection of the vertical and horizontal axis. The absolute differences of ridge length elements are mostly less than 16 pixels. Therefore, the threshold of the ridge length feature is set to determine the same fingerprint as 16 pixels. To define the Ridge curvature sampling points are used along the horizontal axis from the intersection of the vertical axis. Ridge curvature based sampling point is calculated as, 1) Ridges may have more than two inflection points. 2) Some ridges are too straight to define a curved direction. Therefore, to avoid the error caused by more than two inflection points. Due to the feature extraction error, skin condition changes, and different finger pressures, end points may appear as bifurcations and vice versa. To improve the discriminating power of ridge features, the ridge type (rt) is used as one of the ridge features instead of a minutia type.

Minutiae Feature Extraction

The ridge coordinates and extract ridge features is defined between two minutiae. In the ridge-based coordinate system is defined by a minutia (called origin) and vertical and horizontal axes starting from the origin minutia. To represent the relative position of the minutiae according to the origin, horizontal axes should be defined. The ridge-based coordinate system, the ridge features that describe the relationship between the origin and an arbitrary minutiae. To determine the ridge type (rt), each minutia is first classified as an end point or a bifurcation. If a minutia is an end point, there is only one ridge belonging to the minutia. If a minutia is a bifurcation, there are three ridges connected to the minutiae.

Matching/Recognition

For every initially matched pair, a breadth-first search (BFS) is performed to detect the matched ridge-based coordinate pairs. The ridge-based coordinate system is very similar to the K-plet structure. Initially match any pair of ridge-based coordinate systems extracted from the enrolled fingerprint image and the input fingerprint image using dynamic programming. Dynamic programming is applied to find the optimal solution in matching two string sequences in the

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 12, December 2017

enrolled and input ridge-based coordinates. The Ridge feature vector the three feature elements (ridge count, ridge length, and ridge curvature direction) are used to calculate the matching scores and the ridge type feature is used to check the validity of the candidate pairs.

VII. ALGORITHM

WAVELET PACKET TRANSFORM

The Haar Wavelet Transform is the simplest of all wavelet transform. In this the low frequency wavelet coefficients are generated by averaging the two pixel values and high frequency coefficients that are generated by taking half of the difference of the same two pixels. The four bands obtained are LL, LH, HL, and HH which is
shown in Fig 1. The LL band is called as approximation band, which consists of low frequency wavelet coefficients, and contains significant part of the spatial
domain image. The other bands are called as detail bands which consist of high frequency coefficients and contain the edge details of the spatial domain image. Integer wavelet transform can be obtained through lifting scheme. Lifting scheme is a technique to convert WPT coefficients to Integer coefficients without losing information.

Step 1. Column wise processing to get H and L Where Co and Ce is odd column and even column wise pixels value.

Step 2. Row wise processing to get LL, LH, HL and HH, Separate odd and even rows of H and L.

Hodd – odd row of H,
Lodd – odd row of L,
Heven – even row of H,
Leven – even row of L.

After applying 1st level WPT of decomposition, there are 4 sub-bands: LL1, LH1, HL1, and HH1. For each successive level of decomposition, the LL sub-band of the previous level is used as the input. To perform second level decomposition,
the WPT is applied to LL1 band which decomposes the LL1 band into the four sub-bands LL2, LH2, HL2, and HH2. To perform third level decomposition, the WPT is applied to LL2 band which decompose this band into the four sub-bands:
LL3, LH3, HL3, HH3 .

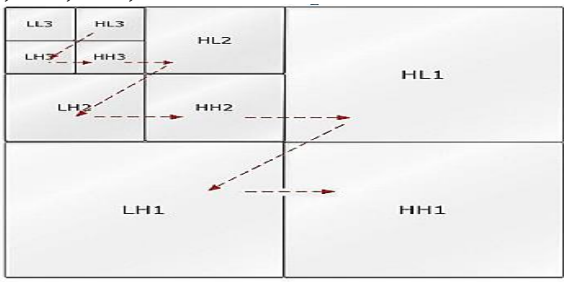


FIG.2

IMAGE ACQUISITION

Image Acquisition Toolbox™ enables you to acquire images and video from cameras and frame grabbers directly into MATLAB and SIMULINK. You can detect hardware automatically and configure hardware properties. Advanced workflows let you trigger acquisition while processing in-the-loop, perform background acquisition, and synchronize sampling across several multimodal devices. With support for multiple hardware vendors and industry standards, you can use imaging devices ranging from inexpensive Web cameras to high-end scientific and industrial devices that meet low-light, high-speed, and other challenging requirements.

VIII. RESULT

Thus the optimised blind image watermarking method based on firely algorithm in wavelet packed transformm domain was successfully completed and expected output was succeded

fig 3 Menu

fig 5 Original image

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 12, December 2017

fig 6

fig 7

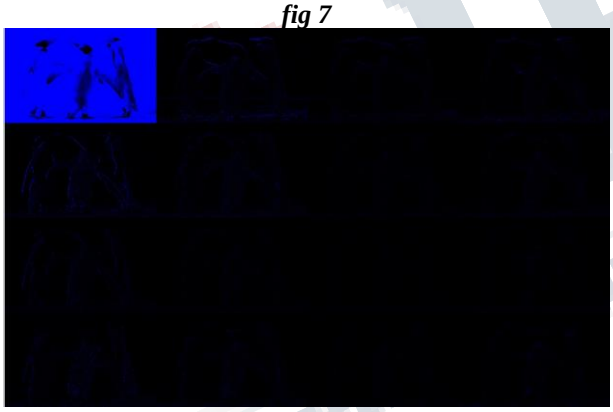


fig 8

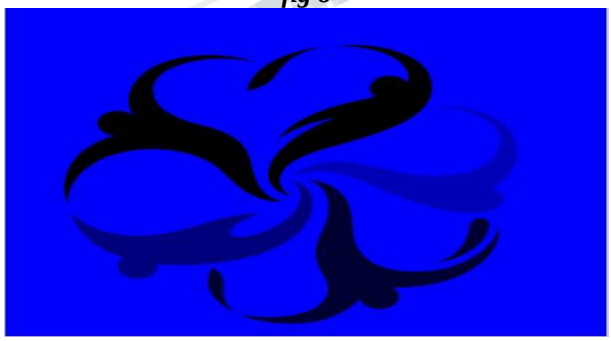
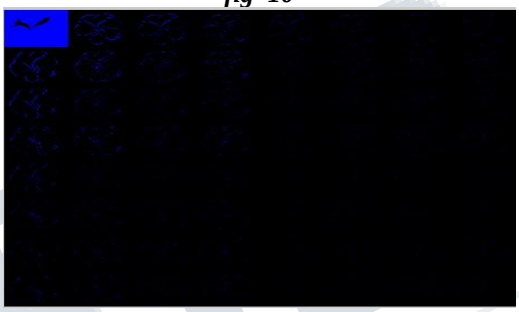


fig 9

fig 10



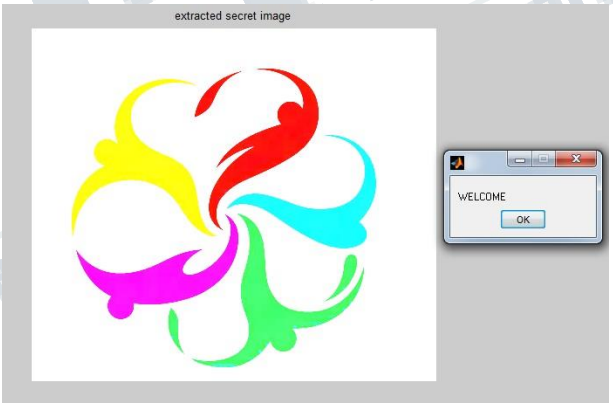


FIG 12

REFERENCES

[1] Navnidhi Chaturvedi1, Dr.S.J.Basha2 2012IEEEtransction vol.2"Comparison of Digital Image watermarking Methods DWT & DWT-DCT on the Basis of PSNR"

[2] Ankush R. Patil*, V. K. Patil- 2016[2] "A REVIEW OF IMAGE WATERMARKING METHODS"

[3] S.Manikanda prabu1, Dr.S.Ayyasamy2- 2014 [3]demonstrated in this paper "A Novel Image

Watermarking Method Using Discrete Wavelet Transform and Back Propagation Neural Network"

[4]. Vikas Sharma, P. S. Mann-2017[4] demonstrated in this paper "A Review on Various Optimized Image Watermarking Techniques"

[5] Jyoti sahu , Dolley shukla- 2015 [5]demonstrated in this paper "Digital Image Watermarking Method 4 Level DWT-DCT on the Basis of PSNR "

[6] Navnidhi Chaturvedi 1 , Dr.S.J.Basha 2 Comparison of Digital Image watermarking Methods DWT & DWT-DCT on the Basis of PSNR International Journal of Innovative Research in Science, Engineering and Technology Vol. 1, Issue 2, December 2012

[7] Nagaraj V.Dharwadkar & B. B. Amberker International Journal of Image Processing Volume (4): Issue (2) 89 Determining the Efficient Subband Coefficients of Biorthogonal Wavelet for Gray level Image Watermarking International Journal of ImageProcessing Volume (4): Issue (2)

[8] [2] Chu, W, 2003. "DCT-Based Image Watermarking Using Subsampling," IEEE Trans. Multimedia, 5(1): 34-38.

[9] Lin, S. and C. Chin, 2000. "A Robust DCT-based Watermarking for Copyright Protection," IEEE Trans. Consumer Electronics, 46(3): 415-421.

[10] Deng, F. and B. Wang, 2003. "A novel technique for robust image watermarking in the DCT domain," in Proc. of the IEEE 2003 Int. Conf. on Neural Networks and Signal Processing, vol. 2, pp: 1525-1528.

[11] Wu, C. and W. Hsieh, 2000. "Digital watermarking using zero tree of DCT," IEEE Trans. Consumer Electronics, vol. 46, no. 1, pp: 87-94.

[12] Digital Image Steganography:Survey and Analysis of Current Methods Abbas Cheddad, Joan Condell, Kevin Curran and Paul Mc

[13] Kevitt Zhang Guangnan, Wang Shushun. A Blind Watermarking Algorithm Based on DWT for Color Image.

[14] Vikas Sharma,P. S. Mann "A Review on Various Optimized Image Watermarking Techniques" International Journal of Computer Applications (0975 – 8887) Volume 162 – No 2, March 2017

[15] Shi, Hailiang, Nan Wang, Zihui Wen, Yue Wang,Huiping Zhao, and Yanmin Yang. "An RST invariant image watermarking scheme using DWT-SVD." In Instrumentation & Measurement, Sensor Network and Automation (IMSNA), 2012 International Symposium on, vol. 1, pp. 214-217. IEEE, 2012

[16] Qianli, Yang, and Cai Yanhong. "A digital imagewatermarking algorithm based on discrete wavelet transform and Discrete Cosine Transform." In Information Technology in Medicine and Education (ITME), 2012 International Symposium on, vol. 2, pp.1102-1105. IEEE, 2012.

[17] C. N. Sujatha, P. Satyanarayana. “An Improved Hybrid Color Image Watermarking under Various Attacks.” In International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), Vol. 4, Issue 3, pp.339-343. March 2015.

[18] Yonghong Chen and jiancong Chen, “A Novel Blind watermarking Scheme Based on Neural Networks for Image”, 2010 IEEE Transactions, pp. 548-552.

[19] Kashyap, N., SINHA, G. R., "Image Watermarking Using 3-Level DiscreteWaveletTransform"I.J.Modern Education and Computer Science, vol.3, pp. 50-56 2012.

[20] Potdar, V. M., Han, S., and Chang, E., "A Survey of Digital Image Watermarking Techniques", 3rd IEEE International Conference on Industrial Informatics (INDIN), pp. 709-716, 2005.