ISSN 2348 – 8034
Impact Factor- 3.155

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

A NEW CONTOURLET TRANSFORM FEATURE TECHNIQUES FOR DIGITAL WATERMARKING

G.MARIYADAS[*1] and M.PRADEEP[2]
[*1]PG Student, ECE Department, Indira Institute of Technology, Markapur
[2]Assistant Professor, ECE Department, Indira Institute of Technology, Markapur

ABSTRACT

contourlet transform feature techniques for digital watermarking is proposed in this paper, now a day's watermarking technique is powerful technique for security of copyright by hiding information, the input image is partitioned with different features are the combination of anisotropy and directionality using contourlet transform. In contourlet transform the image is decomposed with the help of laplacian pyramid and directional filter bank. In laplacian pyramid highest features are taken using low pass filter. After that given watermark image is inserted in low content part of the decomposed image. Band pass filter can be extract in noise image from the output image, based on contourlet transform can gives better PSNR and MSE as compared to existing techniques.

Keywords- *contourlet transform, watermark extraction .*

I. INTRODUCTION

Nowadays, the developments in digital technology have resulted in explosion in the use of digital media products such as image, audio and video. This raises, however, security concerns due to digital multimedia products high vulnerability to the illegal copying, distribution, manipulation, and other attacks. The digital watermarking systems, in literature, have been developed to remedy these security threats. In order to be effective storage of medical information and patent information, it is required to apply digital watermark [1][2] , it must be robust and secure, easy to recoverable from a document. This paper deals with the reversible watermarking technique is proposed with minimal image distortion the watermark image is recovered from the image using the unaltered components. In image watermarking, the authentication information is embedded in to the image, later it is extracted to define the copy-rights of the author [1]. Most of the watermarking techniques modify or distort the host image in order to embed the authentication information. Except telemedicine, all other image applications can tolerate the loss of image fidelity as long as the original and modified images are perceptually similar. In medical imaging applications, there are stringent constraints on image fidelity that strictly prohibit any permanent image distortion by the Watermarking. The following section is having information of different medical image watermarking techniques described in section 2, proposed watermarking technique in section 3, section 4 describes the results, concluding remarks are given in the section 6.

II. MEDICAL IMAGE WATERMARKING TECHNIQUES

Medical image watermarking has not been the subject of as much research as generic image watermarking, however some methods have been designed that are specifically tailored for medical images. These methods are briefly reviewed here, with particular focus on the perceptual degradation caused to images. Each method is categorized in according to robustness, namely fragile, robust or semi-fragile. *Fragile* watermarking methods are designed such that the watermark is easily destroyed if the watermarked image is manipulated in the slightest manner. These methods generally cause the least perceptual degradation in images and are primarily used for image authentication. Fragile watermarks are often capable of localization, and are used to determine where modifications were made to an image. Traditional methods embed checksums or pseudorandom sequences in the Least Significant Bit (LSB) plane [2]. More recent work has employed increasingly sophisticated embedding techniques such as cryptographic hash functions [1]. Fragile invertible authentication schemes have been proposed for medical images, whereby a watermark can be removed from a watermarked image, and the exact original image results .Another medical imagewatermarking system embeds information in bit planes, which results in watermarked images with very low normalized root mean square errors

(NRMSEs), indicating that the watermark is practically invisible . A watermark that is embedded in the high frequency regions of an image has also been proposed, which also resulted in low NRMSEs .*Robust* watermarks are designed to resist attempts to remove or destroy the watermark [3]. They are used primarily for copyright protection and content tracking. Many traditional robust methods are spreadspectrum, whereby the watermark is spread over a

ISSN 2348 – 8034
Impact Factor- 3.155

wide range of image frequencies [2]. More recent work includes the creation of imageadaptive watermarks, where parameters change depending on local image characteristics . A number of robust medical image watermarking systems have been developed. For example one system uses a spread spectrum technique to encode copyright and patient information in images [4]. Another embeds a watermark in a spiral fashion around the Region of Interest (ROI) of an image [5]. Any image tampering that occurs will severely degrade the image quality. The Gabor transform has also been applied to hide information in medical images [6]. One observation that is generally applicable to robust systems is the greater the robustness of the watermark, the lower the image quality. *Semi-fragile* watermarks combine the properties of both fragile and robust watermarks. Like fragile methods, they are capable of localizing regions of an image that are authentic and those that have been altered. Like bust methods, they can tolerate

some degree of change to the watermarked image (for example, quantization noise from lossy compression). Recent work in the area includes embedding a heavily quantized version of the raw image in the image, embedding key-dependent random patterns in blocks of the image, wavelet embedding, and embedding multiple watermarks. Recently, much emphasis has been placed on semi-fragile medical image watermarking. This paper presents a new method where color medical image is watermarked such that the perceptual degradation of the medical image is very less than compare to the previous techniques.

III. PROPOSED SCHEME

RGB color space is highly correlated and is not suitable for watermarking applications. Except of the lue channel, it is used by some researchers because of its low sensitivity to human perception; the intensity value of blue plane pixel is represented using 8 bits. The proposed scheme relies on binary stream of intensity of pixel to define space for embedding the watermark bits. We used the redundancy in binary stream of a pixel to achieve high embedding capacity. The bit values of pixel are used to match with the watermark bits. The matched locations of pixel are stored into two arrays. Later, these arrays are used to extract the watermark bits. Thus, our scheme produces zero distorted watermarked images

A) Watermarking procedure:

Let us consider the blue plane of the image is consider as in the given matrix form for watermarking procedure the intensity values of the pixels are represented in the form of 8 bit's in binary form, compare the corresponding location of the watermarking bits with the host image binary location, write the location of the bits in two different arrays by using those two arrays we can recover the watermark. The watermarking procedure is illustrated by using the given example. Consider I is the Host matrix where the watermark get insert, W is the watermark binary image. For storing the location two keys are used as key1 and key2.

B) Watermark embedding block diagram:

a

Fig 1 : Original image

ISSN 2348 – 8034
Impact Factor- 3.155

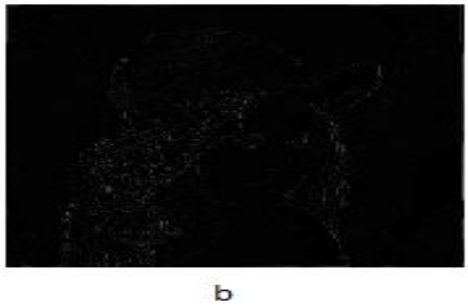

Fig 2: DFB extraction image

C) Watermark embedding Algorithm:

1) Step1 I= Host image with size AxB size, W= Watermark Image with pxq size, Key1, key2

2) Step2 If I (I,j) is the corresponding host image pixel convert it into Binary format

3) Step3 Collect successive pixels of W

4) Step4 Compare the successive pixels of W with binary represented Host Pixel

5) Step5 Find the location where successive pixels of the W appear as Key-1

6) Step 6 if the successive pixels are not located Key-2 value is stored as the decimal representation of Successive pixels

D) Watermark Extraction:

Key-1 and Key-2 are used for extraction of the Water mark image from the host image. Key-1 have the information regarding the location of successive pixels in the Image I, Key 2 gives the information of the key regarding not appearing of the pixel location.

E) Watermark Extraction Algorithm:

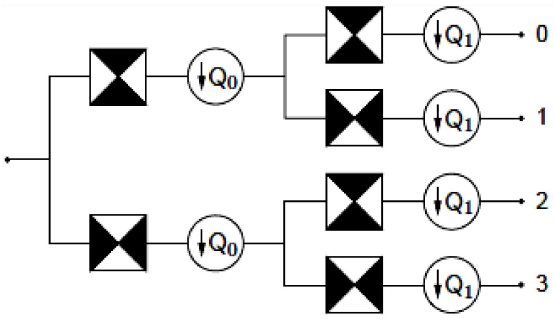

Fig3 : Decoposition image

ISSN 2348 – 8034
Impact Factor- 3.155

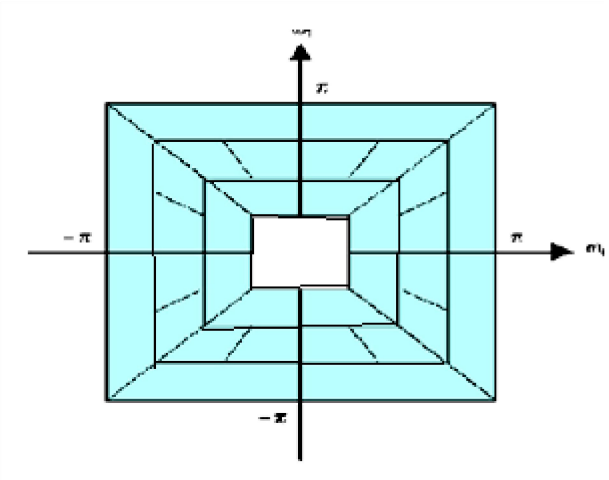

Fig 4 : directional iamge in frequency doamin

IV. EXPERIMENT RESULTS

Experiments are performed on five color medical images to verify the proposed method. These five images are represented by 110x110 host image and a logo binary image of 64x64 image is used for Watermarking operation. The proposed algorithm is developed by using MATLAB

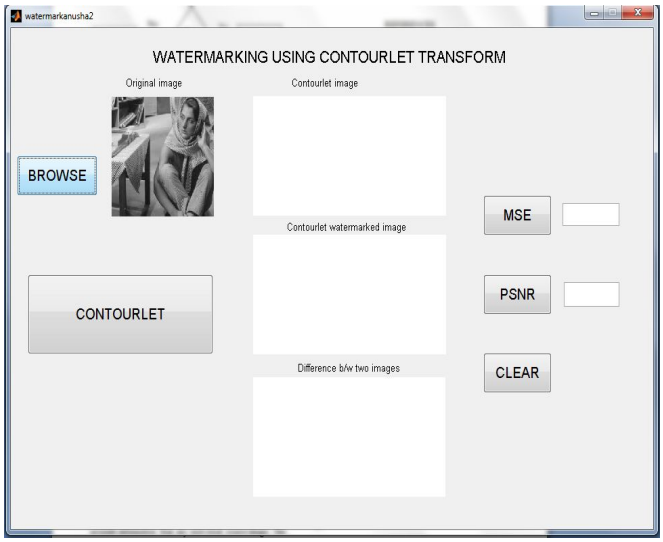

Figure4: original image

ISSN 2348 – 8034
Impact Factor- 3.155

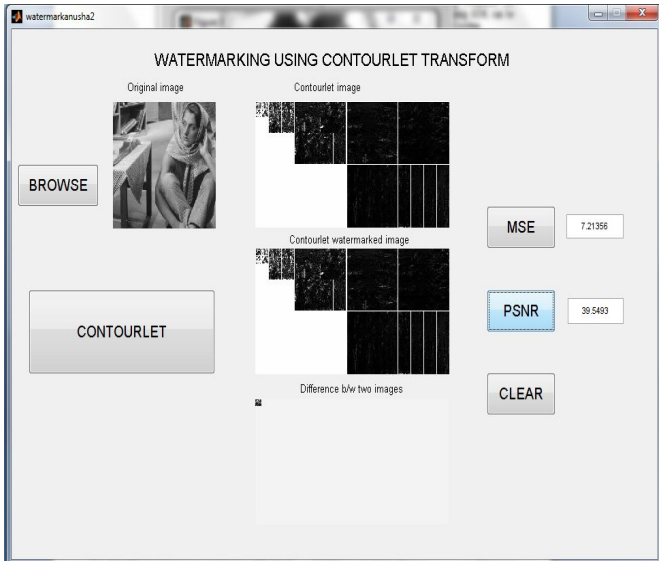

Figure 5: watermarked image. image

V. CONCLUSIONS

Contourlet transform feature techniques for Digital watermarking is is proposed in this paper. The input image is partitioned with different features are the combination of anisotropy and directionality using contourlet transform. In contourlet transform the image is decomposed with the help of laplacian pyramid and directional filter bank. In laplacian pyramid highest features are taken using low pass filter. After that given watermark image is inserted in low content part of the decomposed image. Band pass filter can be extract in noise image from the output image, based on contourlet transform can gives better PSNR and MSE as compared to existing techniques.

REFERENCES

[1] C.Rey, and J.Dugelay, "A survey of watermarking algorithm for Image authentication", Journal on Applied Signal Processing, Vol.6, pp.613-621, 2002.

[2]. A. Giakoumaki, S. Pavlopoulos, and D. Koutsouris, "A medical image watermarking scheme based on Spatial," In Proc. of the 25th Annual Int. Conf. of the IEEE-EMBS, pp. 856–859, Cancun, Mexico, Sept. 2003.

[3]. C. Coatrieux, H. Maitre, B. Sankur, Y. Rolland, and R. Collorec, "Relevance of Watermarking in Medical Imaging," 2000 IEEE EMBS Conf. On Information Technology Applications in Biomedicine, pp.250-255, Nov. 2000.

[4] Deepthi An and, U.C.Niranjan, "Watermaking medical images with patient information," in proc. IEEE/EMBS Conference, Hong Kong, China, pp. 703-706, Oct 1998.

[5] Akiyoshi Wakatani, "Digital Watermarking for ROI Medical Images by Using Compresses Signature Image," HICSS, vol. 157, 2002.

[6]. Veni.S A, K.A.Narayanankutty "Image Enhancement of Medical Images using Gabor Filter Bank on Hexagonal Sampled Grids" World Academy of Science, Engineering and Technology 41 2010

[7] Dr.M.Mohamed Sathik and S.S.Sujatha "An Improved Invisible Watermarking Technique for Image Authentication" International Journal national of Advanced Science and Technology Vol. 24 24, November November, 20 , 2010

[8] Arnold. W. M. Smeulders, M. Worring, S. Satini, A. Gupta, R. Jain. Content – Based Image Retrieval at the end of the Early Years, IEEE Transactions on Pattern analysis and Machine Intelligence, Vol. 22, No. 12, pp 1349-1380 , 2000.

[9]. Gupta. A. Visual Information Retrieval Technology: A Virage respective, Virage Image Engine. API Specification, 1997.
[10] Ping-Cheng Hsieh,Pi-Cheng Tung,A Novel Hybrid Approach Based On Sub pattern Technique and Whitened PCA for Face Recognition, Pattern Recognition 42 (2009) 978-984.
[11] Vytautas Perlibakas Distance measures for PCA based face recognition, Pattern Recognition letters 25 (2004) 711-724
[12] S.I. Choi, C. Kim, C.H. Choi, Shadow compensation in 2D images for face recognition, Pattern Recognition 40 (2007) 2118–2125.
[13] M. Turk, A. Pentland, Eigenfaces for recognition, J. Cognitive Neurosci.3 (1) (1991) 71–86.
[14] Yalefacedatabase http://cvc.yale.edu/projects/yalefaces/yalefaces.html.
[15] J. Yang, D. Zhang, J.Y. Yang, Is ICA significantly better than PCA for face recognition? in: Proceedings of IEEE International Conference on Computer Vision, vol. 1, 2005, pp. 198–203.
[16] A.J. Bell, T.J. Sejnowski, The independent components of natural scenes are edge filters, Vision Res. 37 (23) (1997) 3327–3338.
[17] M.S. Bartlett, H.M. Lades, T.J. Sejnowski, Independent component representation for face recognition, in: Proceedings of SPIE Symposium on Electronic Imaging: Science and Technology, 1998, pp. 528–539.
[18] S. Chen, Y. Zhu, Subpattern-based principle component analysis, Pattern Recognition 37 (2004) 1081–1083.
[19] K.Tan and S.Chen. Adaptively weighted sub-pattern pca for face recognition. Neurocomputing, 64:505–511, 2005.
[20] R. Gottumukkal and V.K. Asari. An improved face recogntion
technique based on modular pca approach. Pattern Recogn.
Lett., 25(4):429–436, 2004.
[21] Yang J and Zhang D. Two-dimensional pca:a new approach to appearance-based face representation and recognition. IEEE Transactions on Pattern Analysis and Machine Intelligence, 26(1):131–137, 2004.
[22] S. H. Ou, Q. L. Wang, and Z. Y. Zhu. The Application
and Technology of Digital Image Processing(In Chinese). Tsinghua Press, Beijing, China, 2004.
[23] Vytautas Perlibakas "distance measure for PCA-based face recognition. Pattern Recognition Letters 25 (2004) 711–724
[24] Gupta Navarrete, P., Ruiz-del-Solar, J., 2001. Eigenspace-based recognition of faces: Comparisons and a new approach. In: International Conference on Image Analysis and Processing ICIAP2001. pp. 42–47.
[25] Graham, D.B., Allinson, G.N.M., 1998. Characterizing virtual eigensignatures for general purpose face recognition. Face recognition: From theory to applications. NATO ASI Series F, Computer and Systems Sciences 163, 446–456.
[26] Swets, D.L., Pathak, Y., Weng, J.J., 1998. An image database system with support for traditional alphanumeric queries and content-based queries by example. Multimedia Tools Appl. (7), 181–212.
[27] Yilmaz, A., Gokmen, M., 2001. Eigenhill vs. eigenface and eigenedge. Pattern Recognition 34, 181–184.
[28] D.Q. Zhang, S.C. Chen, J. Liu, Representing image matrices: eigenimages vs. eigenvectors, in: Proceedings ofthe Second International Symposium on Neural Networks (ISNN'05), Lecture Notes in Computer Science, vol. 3497, Chongqing, China, 2005, pp. 659–664.
[29] Paul Computer and Ahmad , Afandi and Amira, Abbes ,optimal discrete wavelet transform (dwt) features for face recognition Nicholl, (2010), Malaysia
[30]Xu,D.Zhang,F.Song,J.Yang,Z.Jing,M.Li,AmethodforspeedingupfeatureextractionbasedonKPCA,Neurocomputing70(2007)1056–1061.
[31] Y.Xu,D.Zhang,Z.Jin,M.Li,J.Y.Yang,Afastkernel-basednonlinear discriminant analysisformulti-classclassification, PatternRecognit.39(6) (2006)1026–1033.
[32]M.E.Tipping,Sparsekernelprincipalcomponentanalysis,in:T.K.Leen,T.G.Dietterich,V.Tresp(Eds.),NeuralInformationProcessingSystems(NIPS), MIT Press,Cambridge,MA,2000,pp.633–639.
[33]S.W.Kim,B.J.Oommen,Onusingprototypereductionschemestooptimize kernel-based Fisherdiscriminantanalysis,IEEETrans.Syst.,Man,Cybern.— Part B:Cybern.38(2)(2008)564–570.
[34]M.T.Ding,Z.Tian,H.X.Xu,Adaptivekernelprincipalcomponentanalysis, Signal Process.90(2010)1542–1553.
[35]Z.Y.Zhang,T.Tian,X.Duan,X.Fu,Adaptivekernelsubspacemethodfor speeding upfeatureextraction,Neurocomputing113(2013)58–66.
[36] D. Valentin,H.Abdi,A.J.O.Toole,G.W.Cottrell,Connectionistmodelsofface processing: asurvey,PatternRecognit.27(1994)1209–1230.

[37]M.Oravec,J.Polec,S.Marchevský,Neuralnetworksfordigitalsignalproces- sing, Bratislava,Slovakia,1998,80-967503-9-937nSlovak).
[38]K.Hlaváčková,R.Neruda,Radialbasisfunctionnetworks,NealNetw.World 3 (1)(1993)93–102.
[39]J.L.Mark,IntroductiontoRadialBasisFunctionNetworks,CentreforCognitive Science, UniversityofEdinburgh,Edinburgh,Scotland,1996.
[40]M.J.Er,S.Wu,J.Lu,H.L.Toh,Facerecognitionwithradialbasisfunction(RBF) neural Networks, IEEETrans.NeuralNetw.13(3)(2002)697–710.
[41].H. Schwenk,TheDiaboloclassifier, NeuralComput.10(1998)2175–2200.
[42]A.H.Monahan,Nonlinearprincipalcomponentanalysisbyneuralnetworks: theory andapplicationtotheLorenzsystem,J.Clim.13(4)(2000)821–835.
[43]M.A.Kramer,Nonlinearprincipalcomponentanalysisusingautoassociative neural networks,AIChEJ.37(2)(1992)233–243.
[44]K.Fukunnaga,IntroductiontoStatisticalPatternRecognition,2ndedition, Academic Press,NewYork,1991.
[45]C.Bishop,NeuralNetworksforPatternRecognition,OxfordUniversityPress, NewYork,1995.
[46]T.J.Moody,C.J.Darken,Fastlearninginnetworksoflocallytunedprocessing units, NeuralComput.1(1989)151–160.
[47]J.Li,Z.Xiao,Y.Lu,Adaptingradialbasisfunctionneuralnetworksforone-class classification, in:ProceedingsoftheIEEEInternationalJointConferenceon NeuralNetworks,2008,pp.3766–3770.