

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

Enhanced Local Entropy Maximization and Edge Based Detection for the Mammogram

Er. Kajal, Er. Sandeep Singh Dhaliwal

P.G Student, Department of Computer Engineering, Bhai Maha Singh College of Engineering and Technology, Shri
Muktsar Sahib, Punjab, India

Assistant Professor, Department of Computer Engineering, Bhai Maha Singh College of Engineering and Technology,
Shri Muktsar Sahib, Punjab, India

ABSTRACT: Segmentation is the process of dividing the digital image into number of segments such that we obtain simplifies image in more meaningful way and that is easy to analyze. It is the most challenging process. There are number of applications in which medical imaging is used e.g. Content-based image retrieval, medical imaging, scientific fields and recognition tasks. Medical field is now a day's most prevalent field where image processing is used for the diagnosis purpose. Various automatic software are there which process the image for the image segmentation and further features extraction. But system still requires improvement for enhancing the efficiency. In current project edge based segmentation based on texture is being performed. So that the accuracy of the system can be enhanced. A large MRI images dataset is taken. Which is being used for the segmentation using edge based technique. The result generated on different parameters is better compared for the proposed technique compared to the base technique. Research is based on cancer segmentation of the cancer in breast. It will helps in facilitating the process of automatic decision regarding early diagnosis system. The work can be further enhanced by considering other optimization based technique.

KEYWORDS: Segmentation, Mammogram, Edge based.

I. INTRODUCTION

Medical imaging is the technique that is used to see inside the body which means that our body needs not to be opened by medical practitioners surgically to look for the problem or organs areas. The techniques used for medical imaging make use of radiations that forms electromagnetic spectrum. Visual representation of interior parts of the body is obtained for clinical view using medical imaging for medical interventions as to visually represent the functions of organs and tissues. Hidden structure behind the skin and bones is revealed through medical imaging for the treatment and diagnoses of diseases. Medical imaging is used to find out abnormalities by establishing the database for normal anatomy to identify problems.

1.1 IMAGE SEGMENTATION

Segmentation is the process of dividing the digital image into number of segments such that we obtain simplifies image in more meaningful way and that is easy to analyze. It is the most challenging process. There are number of applications in which medical imaging is used e.g. Content-based image retrieval, medical imaging, scientific fields and recognition tasks.

Segmentation partitions the image pixels into group that strongly are correlated with the objects in image. It is based upon the measurement obtained from image like gray level, colour, texture, depth etc. There are different image segmentation techniques:

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

Threshold based segmentation: This technique of segmentation is based on intensity levels. It works by assuming the pixels that fall in same range of intensity and the remaining pixels of the image represent different class. In this threshold value is considered where image is considered as object and background. It generates binary image with which object pixels with binary value '1' and other pixels treated as background with value '0'.

Region based segmentation: It is based on the principle of homogeneity by the fact that neighbouring pixels inside the region has similar characteristics and dissimilar are kept in other region .Every pixel is compared with the neighbouring pixels to check grey level, colour, texture and shape.

Clustering based segmentation: In clustering based segmentation, clusters are formed such that the data with similar features form one cluster and the different one form the different cluster .This method helps us to know about the similar and dissimilar clusters.

Edge based segmentation: Segmentation is the separation of one or more regions or objects in an image based on a discontinuity or a similarity criterion. Because of this, image segmentation approaches can typically be divided into two categories; edge and region based methods.

II. LITERATURE SURVEY

D. Barbosa (2018) proposed a new image segmentation technique which joins the edge and region based information with spectral method using Morphological Watershed algorithms. Firstly noise filter is used with Magnitude Gradient in a pre-processing stage, secondly, pre-segmentation is done using region merging, then region similarity graph is generated and finally segmentation is performed using Multi Class Normalized Cut. Method is compared with Mean Shift, MNCUT, and JSEG using natural images. Proposed technique overcomes Spectral Clustering method. Gang Chen [41] found that fast extraction of object information from a given image is still a problem for real time image processing. They also found that region based methods are also time consuming and not give effective segmentation. They proposed a new region based method based on Least Square method in order to detect objects sharply. They used a weight matrix for region based method which also takes the local information into account and also the usage of Least Square method provides optimal and fast segmentation. Comparison of their method is conducted with Otsu method and Chan-Vese method using Lena image. Their method can extract the features more accurately than other methods.

Syoji Kobashi (2018) used scale based fuzzy connected image segmentation and fuzzy object model to segment the cerebral parenchyma region of new born brain MRI image. Foreground region is separated in first step, correction of MRI intensity in-homogeneity is performed next, and then scale-base Fuzzy Object Model (FOM) is applied on resultant image. Results of proposed method are evaluated on the basis of Fast Positive Volume Fraction (FPVF) and Fast Negative Volume Fraction (FVNF). Results from experiment have shown that FOM (Fuzzy object model) has attained minimum FPVF and FVNF values.

Refik Samet (2012) proposed a new Fuzzy Rule based image segmentation technique to segment the rock thin segment images. They take RGB image of rock thin segment as input and give segmented mineral image as output. Fuzzy C Means is also applied on rock thin images and results are compared of both techniques. Firstly, the user will take sample image from minerals; features are distinguished on the basis of red, green and blue components of image. Membership function is defined for each component using Fuzzy rules. Each membership function represents the color's distribution in the image. Strong and weak points are defined, whereas strong points are considered as seed points and weak points become their members. Results have shown that proposed technique is better than FCM algorithm.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

Muhammad Rizwan Khokher (2012) presented a new method of image segmentation using Fuzzy Rule based system and Graph Cuts. Authors have firstly segmented the gray scale, color, and texture images using Graph Cuts. Weights are assigned to the features of image using Fuzzy Rules. Their algorithm works by firstly extracting the features of image, calculate the constants using fuzzy rules, calculate the weighted average of constants to find the similarity matrix, partition the graph using Normalized Graph Cut method[25], and finally get the segmented image from partitioned graph. Berkley database is used to evaluate the algorithm. Simulation is performed in Matlab and C language. Results are evaluated on the basis of Mean, Standard Deviation, and PPV value. It is found that most of the evaluation measure range from 0.85 to 0.95 for S.D and PPV.

III. FLOWCHART

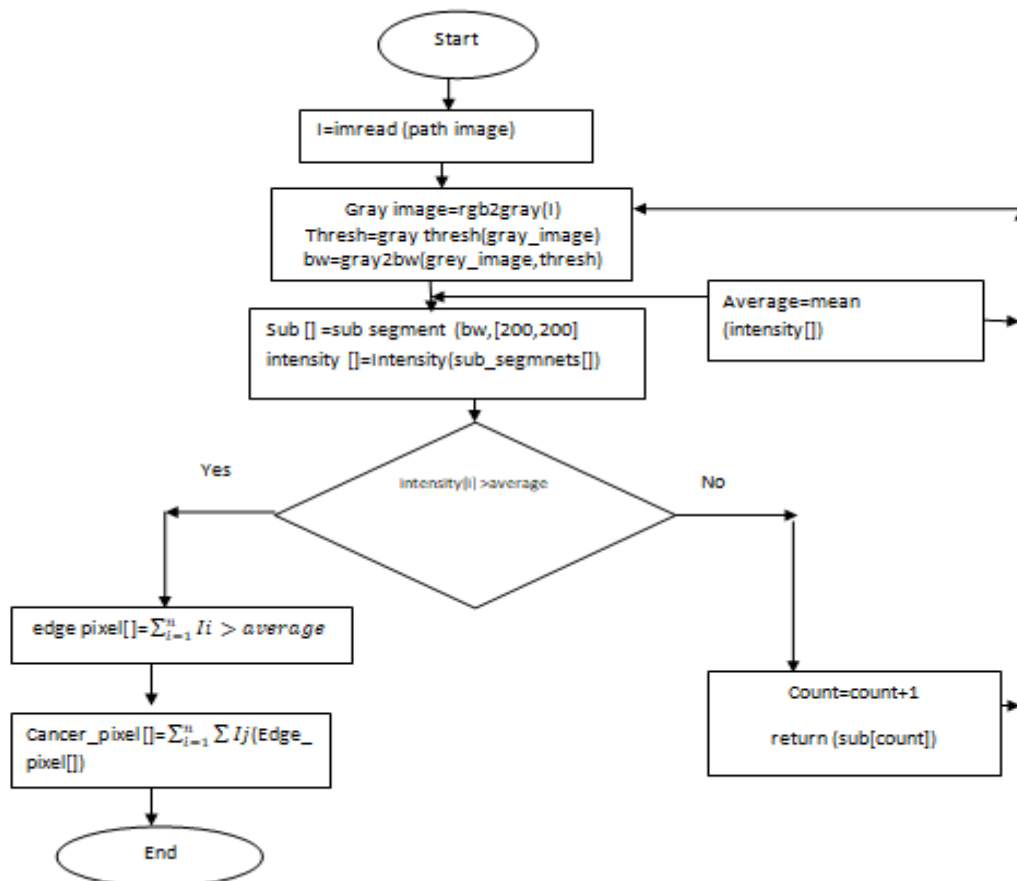


Fig.1 Flowchart

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

IV. ALGORITHM

Step1 Input the image of MRI for the breast cancer detection.

`I=imread(path_image)`

`Gray_image=rgb2gray(I)`

`Thresh=graythresh(gray_image)`

`bw=gray2bw(grey_image,thresh)`

Step2 Calculate the average Intensity of the image

$Average = \frac{\sum_{i=1}^n intensity}{\text{Total Number of pixels}}$

`Sub[]=sub_segment(bw,[200,200])`

`intensity[]=Intensity(sub_segmnets[])`

`Average=mean(intensity[])`

Step3 Compare the each segment pixel intensity to the average intensity.

If `intensity[i] > average`

goto step 4

Else goto step7

Step4 Identify the edge of the segment based on intensity differentiation.

$edge_pixel[] = \sum_{i=1}^n I_i > average$

Step5 Extract the segment by considering the portion.

$Cancer_pixel[] = \sum_{i=1}^n \sum I_j(Edge_pixel[])$

Step6 Extract the segment.

`count=count+1`

`return(sub[count])`

Step7 End

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

V. RESULTS AND DISCUSSIONS

5.1 EC Comparison

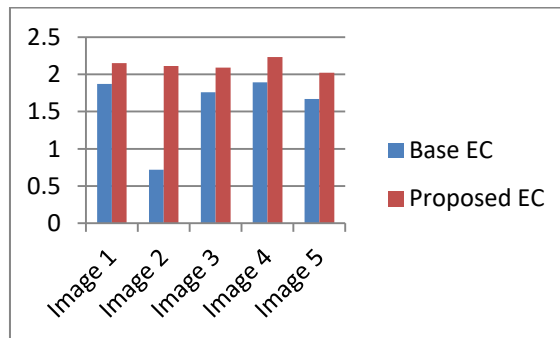


Fig. 2 EC Comparison

Fig. 2 shows the Comparison for base and proposed techniques. Proposed Technique shows better performance in comparison to the base technique.

	Base	Proposed
	EC	EC
Image 1	1.87	2.15
Image 2	0.72	2.11
Image 3	1.76	2.09
Image 4	1.89	2.23
Image 5	1.67	2.02

Table 1 EC Comparison

Table 1 show the EC comparison for the base and proposed technique.

5.2 EBCM Comparison

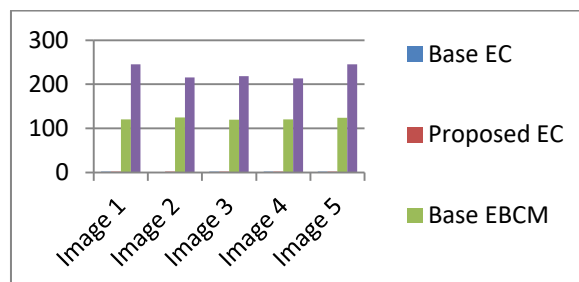


Fig. 3 EBCM comparison

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

Fig. 3 shows the comparison for EBCM for base and proposed technique. Performance for the proposed technique is better compared to the base technique.

	Base	Proposed
	EBCM	EBCM
Image 1	120.1	245.1
Image 2	124.95	215.1
Image 3	119.21	218.2
Image 4	120.21	213.21
Image 5	124.21	245.39

Table 2 EBCM Comparison Table

5.3 FSIM Comparison

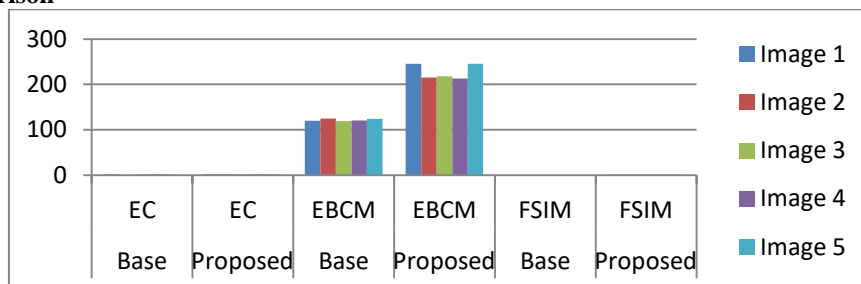


Fig. 4 FSIM comparison

Fig. 4 shows the FSIM comparison for the base and proposed technique. Proposed technique shows better results compared to the base technique.

	Base	Proposed
	FSIM	FSIM
Image 1	0.97	1.34
Image 2	0.96	1.21
Image 3	0.89	1.19
Image 4	0.78	1.11
Image 5	0.83	1.09

Table 3 FSIM table

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

5.4 AMBE Comparison

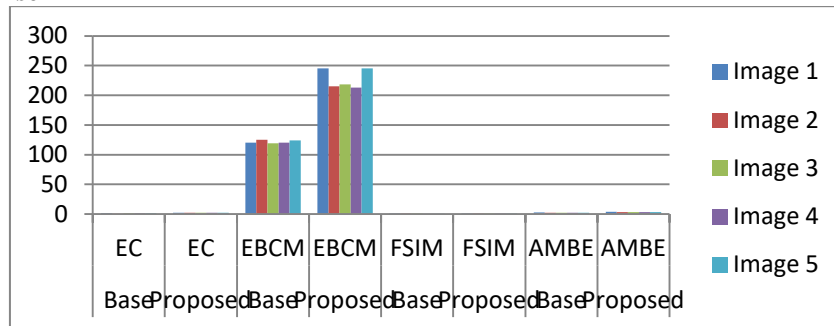


Fig. 4 AMBE comparison

Fig. 4 shows the AMBE comparison for base and proposed technique. Proposed technique has better AMBE value.

	Base	Proposed
	AMBE	AMBE
Image 1	2.53	3.673
Image 2	2.01	3.45
Image 3	2.23	3.12
Image 4	2.43	3.14
Image 5	2.39	3.09

Table 4 AMBE table

5.5 Comparison table for all parameters

	Base	Proposed	Base	Proposed	Base	Proposed	Base	Proposed
	EC	EC	EBCM	EBCM	FSIM	FSIM	AMBE	AMBE
Image 1	1.87	2.15	120.1	245.1	0.97	1.34	2.53	3.673
Image 2	0.72	2.11	124.95	215.1	0.96	1.21	2.01	3.45
Image 3	1.76	2.09	119.21	218.2	0.89	1.19	2.23	3.12
Image 4	1.89	2.23	120.21	213.21	0.78	1.11	2.43	3.14
Image 5	1.67	2.02	124.21	245.39	0.83	1.09	2.39	3.09

Table 5 All Parameters Comparison table

This table shows the comparison of all four parameters for five images with base and proposed technique. The comparison shows that the proposed technique performance is better compared to the base technique for all the parameters.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

VI. CONCLUSION

Image segmentation is the most important aspect for various fields where image processing is required for the analysis purpose. Medical field is now a day's most prevalent field where image processing is used for the diagnosis purpose. Various automatic software are there which process the image for the image segmentation and further features extraction. But system still requires improvement for enhancing the efficiency. In current project edge based segmentation based on texture is being performed. So that the accuracy of the system can be enhanced. A large MRI images dataset is taken. Which is being used for the segmentation using edge based technique. The result generated on different parameters is better compared for the proposed technique compared to the base technique.

VII. FUTURE WORK

Current Research is based on cancer segmentation of the cancer in breast. It will helps in facilitating the process of automatic decision regarding early diagnosis system. The work can be further enhanced by considering other optimization based technique.

REFERENCES

1. A. Fabijanska, "Variance filter for edge detection and edge-based image segmentation," in Proc. International Conference on Perspective Technologies and Methods in MEMS Design (MEMSTECH), pp. 151-154, 2011.
2. A. Xu, L. Wang, S. Feng, and Y. Qu, "Threshold-based level set method of image segmentation," in Proc. 3rd International Conference on Intelligent Networks and Intelligent Systems (ICINIS), pp. 703-706, 2010.
3. C. Yuan and S. Liang, "Segmentation of color image based on partial differential equations," in Proc. Fourth International Symposium on Computational Intelligence and Design (ISCID), pp. 238-240, 2011.
4. D. Barbosa, T. Dietenbeck, J. Schaerer, J. D'hooge, D. Friboulet, and O. Bernard, "B-spline explicit active surfaces: An efficient framework for real-time 3-D region-based segmentation," IEEE Transactions on Image Processing, vol. 21, pp. 241-251, 2012.
5. F. Zhang, S. Guo, and X. Qian, "Segmentation for finger vein image based on PDEs denoising," in Proc. 3rd International Conference on Biomedical Engineering and Informatics (BMEI), pp. 531-535, 2010.
6. F. C. Monteiro and A. Campilho, "Watershed framework to region-based image segmentation," in Proc. International Conference on Pattern Recognition, ICPR 19th, pp. 1-4, 2008.
7. F. Jiang, M. R. Frater, and M. Pickering, "Threshold-based image segmentation through an improved particle swarm optimisation," in Proc. International Conference on Digital Image Computing Techniques and Applications (DICTA), pp. 1-5, 2012.
8. H. Hedberg, "A survey of various image segmentation techniques," Dept. of Electroscience, Box, vol. 118, 2010
9. J. S. M. Sharif, S. Mohsin, and M Raza, "Sub-holistic hidden markov model for face recognition," Research Journal of Recent Sciences, vol. 2, pp. 10-14, 2013.
10. J. Xiao, B. Yi, L. Xu, and H. Xie, "An image segmentation algorithm based on level set using discontinue PDE," in Proc. First International Conference on Intelligent Networks and Intelligent Systems, ICINIS'08., pp. 503-506, 2008.
11. L. Yucheng and L. Yubin, "An algorithm of image segmentation based on fuzzy mathematical morphology," in International Forum on Information Technology and Applications, IFITA'09, pp. 517-520, 2009.
12. M. Yasmin, S. Mohsin, I. Irum, and M. Sharif, "Content based image retrieval by shape, color and relevance feedback," Life Science Journal, vol. 10, pp:78-85, 2013.
13. M. Rehman, M. Iqbal, M. Sharif, and M. Raza, "Content based image retrieval: survey," World Applied Sciences Journal, vol. 19, pp. 404-412, 2012.
14. M. M. S. J. Preetha, L. P. Suresh, and M. Bosco, "Image segmentation using seeded region growing," in Proc. International Conference on Computing, Electronics and Electrical Technologies (ICCEET), pp. 576-583, 2012.
15. M. Yasmin, S. Mohsin, M. Sharif, M. Raza, and S. Masood, "Brain Image Analysis: A Survey," World Applied Sciences Journal, vol. 19, pp. 1484-1494, 2012.