ISSN: 2278 – 7798
International Journal of Science, Engineering and Technology Research (IJSETR)
Volume 2, Issue 12, December 2013

EDGE DETECTION OF MEDICAL IMAGE MINING TECHNIQUES

S.Yuvarani
Research Scholar,
Department of Computer Science,
Bharathiar University,
Coimbatore,
Tamil Nadu, India.

P.Manikandan
Research Scholar,
Department of Computer Science,
Bharathiar University,
Coimbatore,
Tamil Nadu, India.

Dr.C.JothiVenkateswarn
Asst. Professor &Head,
Department of Computer Science,
Presidency College,
Chennai,
Tamil Nadu, India.

ABSTRACT

This research paper on Edge Detection of medical image mining Techniques. This paper reviews some of the important Edge based algorithms and recent trends in image processing techniques which are applicable to quality evaluation and defect identification. Issues related to evaluation are discussed. We develop edge detection an object oriented Programming in C++. The input of medical images we present the results achieved in Heart images analysis, our method can be used to Edge Detection of medical images.

Keywords: Medical Image mining, Edge Detection, Non-maxima suppression, image shape, image mining.

I. INTRODUCTION

Edge detection refers to the process of identifying and locating sharp discontinuities in an image. The discontinuities are abrupt changes in pixel intensity which characterize boundaries of objects in a scene. Classical methods of edge detection involve convolving the image with an operator, which is constructed to be sensitive to large gradients in the image while returning values of zero in uniform regions. There is an extremely large number of edge detection operators available, each designed to be sensitive to certain types of edges. Variables involved in the selection of an edge detection operator include:

- **Edge orientation:** The geometry of the operator determines a characteristic direction in which it is most sensitive to edges. Operators can be optimized to look for horizontal, vertical, or diagonal edges.

- **Noise environment:** Edge detection is difficult in noisy images, since both the noise and the edges contain high-frequency content. Attempts to reduce the noise result in blurred and distorted edges. Operators used on noisy images are typically larger in scope, so they can average enough data to discount localized noisy pixels. This results in less accurate localization of the detected edges.

- **Edge structure:** Not all edges involve a step change in intensity. Effects such as refraction or poor focus can result in objects with boundaries defined by a gradual change in intensity. The operator needs to be chosen to be responsive to such a gradual change in those cases. Newer wavelet-based techniques actually characterize the nature of the transition for each edge in order to distinguish, for example, edges associated with hair from edges associated with a face.

The rest of this paper is organized as follows: Section 2 presents a Review of Literature. Section 3 describes each of the Edge detection Techniques. Section 4 discusses Result and Discussion. Section 5 gives the Conclusion.

II. REVIEW OF LITERATURE

There are different possibilities for development of fuzzy logic based edge detections. One method is to define a membership function indicating the degree of edginess in each neighborhood [1].

Images are often corrupted by random variations in intensity values, called noise. Some common Types of noise are salt and pepper noise, impulse noise and Gaussian noise. Salt and pepper noise contains random occurrences of both black and white intensity values. However, there is a trade-off between edge strength and noise reduction. More filtering to reduce noise results in a loss of edge strength [2]

ISSN: 2278 – 7798
International Journal of Science, Engineering and Technology Research (IJSETR)
Volume 2, Issue 12, December 2013

The prewitt edge detector is an appropriate way to estimate the magnitude and orientation of an edge. Although differential gradient edge detection needs a rather time consuming calculation to estimate the orientation from the magnitudes in the x- and y-directions, the compass edge detection obtains the orientation directly from the kernel with the maximum response.

The prewitt operator is limited to 8 possible orientations, however experience shows that most direct Orientation estimates are not much more accurate. This gradient based edge detector is estimated in the 3x3 neighborhood for eight directions. All the eight convolution masks are calculated. One convolution mask is then selected, namely that with the largest module [3].

An Edge in an image is a significant local change in the image intensity, usually associated with a discontinuity in either the image intensity or the first derivative of the image intensity. Discontinuities in the image intensity can be either Step edge, where the image intensity abruptly changes from one value on one side of the discontinuity to a different value on the opposite side, or Line Edges, where the image intensity abruptly changes value but then returns to the starting value within some short distance [4].

Quantitative descriptors such as length, area and texture falls in the area of decision theoretic computerized pattern recognition system. Image preprocessing techniques such as image conversion, edge detection, image restoration and image segmentation is an important prerequisite to computerized image processing. MATLAB implements point, line and peak detection in the image segmentation process. The segmentation process carries on until the level of detail to identify the element (point, line, peak) has been isolated which is limited by the choice of imaging sensor in remote processing application [5].

III. EDGE DETECTION TECHNIQUES

There are many edge detection techniques in the literature for image segmentation. The most commonly used discontinuity based edge detection techniques are reviewed in this section. Those techniques are Roberts edge detection, Sobel Edge Detection, Prewitt edge detection, Kirsh edge detection, Robinson edge detection, Marr-Hildreth edge detection, LoG edge detection and Canny Edge Detection.

➢ Canny edge detector

The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images. It was developed by John F. Canny in 1986. Canny also produced a computational theory of edge detection planning why the technique works Canny's aim was to discover the optimal edge detection algorithm. In this situation, an "optimal" edge detector means:

- **Good detection** – the algorithm should mark as many real edges in the image as possible.
- **Good localization** – edges marked should be as close as possible to the edge in the real image.
- **Minimal response** – a given edge in the image should only be marked once, and where possible, image noise should not create false edges.

➢ Non-maxima suppression

To find the edge points, we need to find the local maxima of the gradient magnitude. Broad ridges must be thinned so that only the magnitudes at the points of greatest local change remain. All values along the direction of the gradient that are not peak values of a ridge are suppressed.

Algorithm

For each pixel (x,y) do:
if *magn*(*i*, *j*) < *magn*(*i*1, *j*1) or *magn*(*i*, *j*) < *magn*(*i*2, *j*2)
then *IN* (*i*, *j*) □0
else *IN* (*i*, *j*) □*magn*(*i*, *j*)

➢ Hysteresis shareholding /Edge Linking

The output of non-maxima suppression still contains the local maxima created by noise. Can we get rid of them just by using a single threshold? If we set a low threshold, some noisy maxima will be accepted too. If we set a high threshold, true maxima might be missed (the value of true maxima will fluctuate above and below the threshold, fragmenting the edge). A more effective scheme is to use two thresholds:
* a low threshold *tl*
* a high threshold *th*
* usually, *th̦* 2*tl*

Algorithm

1. Produce two threshold images *I*1(*i*, *j*) and *I*2(*i*, *j*). (note: since *I*2(*i*, *j*) was formed with a high threshold, it will contain fewer false edges but there might be gaps in the contours)

2. Link the edges in $I2(i, j)$ into contours
2.1 Look in $I1(i, j)$ when a gap is found.
2.2 By examining the 8 neighbors in $I1(i, j)$, gather edge points from $I1(i, j)$until the gap has been bridged to an edge in $I2(i, j)$. The algorithm performs edge linking as a byproduct of double-shareholding.

IV. RESULT AND DISCUSSION

The implementation of this Non-maxima suppression algorithm is described in objected oriented programming in C++. This program input any image to active edge detect and diagram. The image collections used in our experiments were taken from free repositories on the Internet.

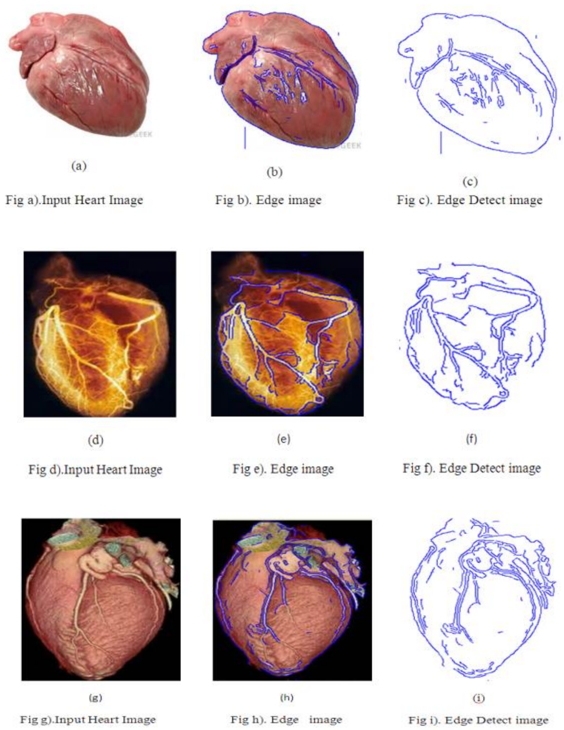

Fig1.Edge Detect results from an Heart image with Edge detect image. The human heart is a pear-shaped structure about the size of a fist. The heart is an amazing organ. It is responsible for supplying the body with oxygenated blood. Each time the heart beats, it exerts a pressure on the veins and arteries called blood pressure.

Blood pressure is extremely important and must be controlled if it is too high or low. Blood pressure can be controlled by medication prescribed by your doctor, proper exercise and a diet filled with plants and vegetables.

Given estimates of the image gradients, a search is carried out to determine if the gradient magnitude assumes a local maximum in the gradient direction.

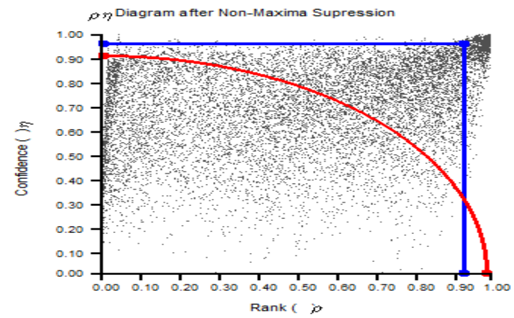

Fig 2. Diagram after non-maxima suppression

- ✓ if the rounded gradient angle is zero degrees (i.e. the gradient is in the north-south direction) the point will be considered to be on the edge if its gradient magnitude is greater than the magnitudes at pixels in the east and west directions,
- ✓ if the rounded gradient angle is 90 degrees (i.e. the gradient is in the east-west direction) the point will be considered to be on the edge if its gradient magnitude is greater than the magnitudes at pixels in the north and south directions,
- ✓ if the rounded gradient angle is 135 degrees (i.e. the gradient is in the north east-south west direction) the point will be considered to be on the edge if its gradient magnitude is greater than the magnitudes at pixels in the north west and south east directions,
- ✓ if the rounded gradient angle is 45 degrees (i.e. the gradient is in the north west-south east direction) the point will be considered to be on the edge if its gradient magnitude is greater than the magnitudes at pixels in the north east and south west directions.

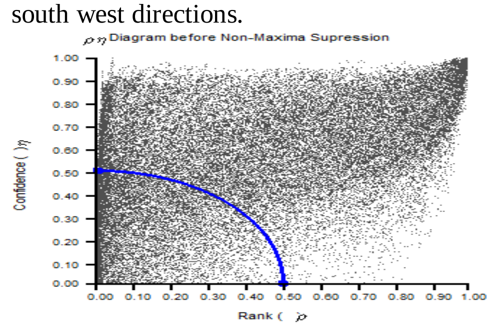

Fig3. Diagram before non-maxima suppression

ISSN: 2278 – 7798
International Journal of Science, Engineering and Technology Research (IJSETR)
Volume 2, Issue 12, December 2013

Both the Blue and saturation curves produced good performances. The identification and removal of noise can best be facilitated by first enhancing the images. This paper conducted a set of experiments to identify the most appropriate of the enhancement techniques identified above, compared with no enhancement, to support the identification of blood vessels in retina images.

V. CONCLUSION

Even though, so many edge detection techniques are available in the literature, since it is a challenging task to the research communities to detect the exact image without noise from the original image. During this paper we learned a lot of interesting things. We get some experience in image Edge Detection in practice using object oriented programming in C++.

VI. REFERENCE

[1] N. Senthilkumaran and R. Rajesh, "A Study on Edge Detection Methods for Image Segmentation", Proceedings of the International Conference on Mathematics and Computer Science (ICMCS-2009), 2009,Vol.I, pp.255-259.

[2] N. Senthilkumaran and R. Rajesh, "A Study on Split and Merge for Region based Image Segmentation", Proceedings of UGC Sponsored National Conference Network Security (NCNS-08) , 2008, pp.57-61.

[3] N. Senthilkumaran and R. Rajesh, "Edge Detection Techniques for Image Segmentation - A Survey", Proceedings of the International Conference on Managing Next Generation Software Applications (MNGSA-08), 2008, pp.749-760.

[4] M. Abdulghafour,"Image segmentation using Fuzzy logic and genetic algorithms", Journal of WSCG, vol. 11, no.1, 2003.

[5] Gonzales, R. C., Woods, R. E. and Eddins, S. L. Digital image processing using MATLAB. Pearson Education, Inc., 2004.

VII. AUTHOR INFORMATION

Mrs.S.Yuvarani received her M.Phil in computer science from Allagappa University, karaikudi, India in 2005. Pursuing Ph.D in computer science at Bharathiar University, Coimbatore, India. Currently she is working as Asst.Professor in the Department of Computer Application, Thanthai Hans Roever College, Perambalur, India. Her current research interests include Data structure algorithms, Image mining. She has published 3 papers in international Conference, 3 papers in international Journals and 4 papers in national Conferences.

Mr.P.Manikandan received his M.Phil in computer science from Bharathidasan University, Tiruchirappalli, India in 2005. Pursuing Ph.D in computer science at Bharathiar University, Coimbatore, India. Currently he is working as Asst.Professor in the Department of Computer Application, Thanthai Hans Roever College, Perambalur, India. His current research interests include, Image mining, Nano Computing, software metrics. He has published 3 papers in international Conference, 3 papers in international Journals and 6 papers in national Conferences.

Dr. C. Jothi Venkateswaran is the Head of the Department of Computer Applications, Presidency College, Chennai, Tamil Nadu, India. His area of research interests are data mining, image mining, software engineering and database management systems. He has been serving for more than 24 years in teaching and more than 10 years in research field. He has published many articles in the National and International Journals and has presented papers in many conferences. He is a reputed consulting editor in the Institute of Innovative Indian Research. He is a special officer of Directorate of Collegiate Education, Tamil Nadu, and India.