Boundary Detection of an Image Using Matlab and GUI

Mukti Yadav, Deepti Mehta

***Abstract*— This work is aimed at the development of a MATLAB GUIDE-based interactive platform for Boundary detection algorithms of images. The developed Graphical user interface provides a comparative analysis between a tumour brain and a non-tumour brain and presents the output results in figures. In this paper we proposed a novel approach for detecting boundaries automatically based on the degree of roundness.**

***Index Terms*— Image, MATLAB, Boundary Detection, GUI, Noise, Threshold, Labelling, Conversion, Degree of Roundness, Tracing Algorithm, Holes, Tumour**

I. INTRODUCTION

Boundary detection is an important part of now computer generation, with the broad applicability in areas like feature extraction, object recognition, image segmentation etc. The majority of papers have focussed on traditional method of edge detection using only low-level cues, such as pixel intensity or color. Recent work has started exploring the problem of boundary detection based on higher-level representationsof the images, such as motion, surface and depth cues. This paper deals with the detection of discontinuous boundaries of images without any loss of Information and based on the degree of roundness, the value is calculated.

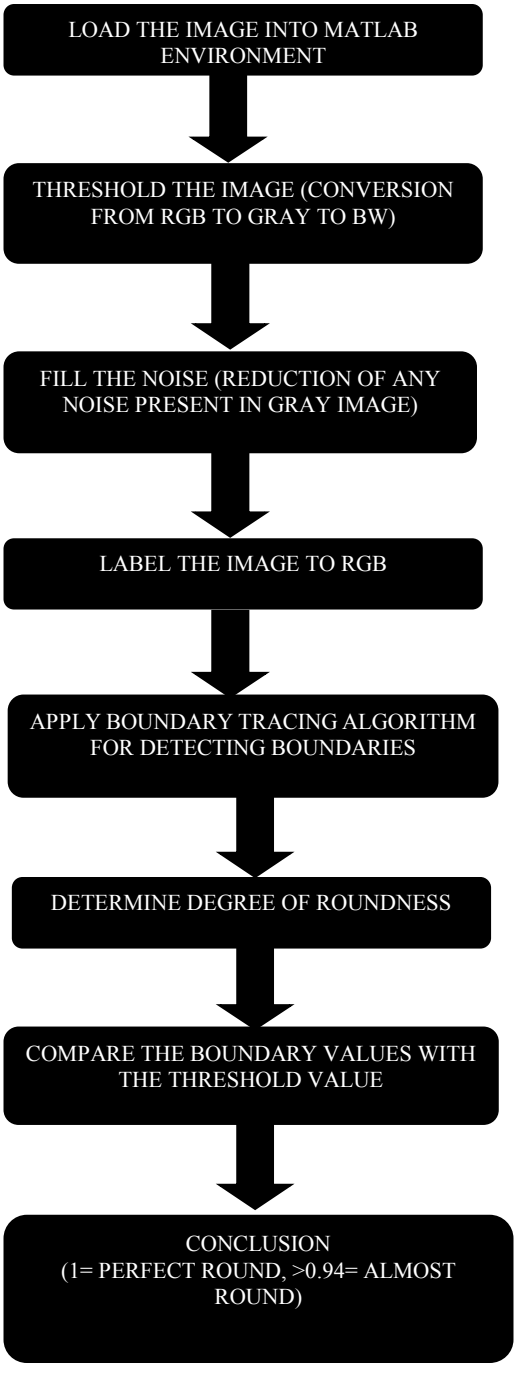
Remaining part of this paper is arranged as; in section II the requirement of image segmentation and the complete process of image segmentation is discussed. Section III briefly explains the methodology used to calculate the degree of roundness, which is very helpful for determining the round objects in the image.

II. METHODOLOGY

MATLAB® is programming software for technical computing. It integrates computation, visualization, and processing in an easy-to-useenvironment where problems and solutions are expressed in familiar mathematical notation. We have used MATLAB® 2013a version.

GUIs are known as Graphical User Interfaces or UIs, which provide point-and-click control of software applications, eliminating the need to learn the complex languages or type commands in order to run the application. GUIs can be called as MATLAB apps which are helpful to automate task or calculations.

The flow diagram represents the processes carried out to determine the boundary values on the basis of degree of roundness. We have given the 2D RGB input image to the MATLAB command box, and then the image is converted into grayscale so as to minimize the bit value. The next process is to remove the unwanted pixels from the image and to the fill up the holes in order to smoothen the image then the image is labelled to RGB for different regions. The labelled image is set to detect the boundaries of the corresponding regions on the basis of degree of roundness and the value of every detected boundary is calculated.



Manuscript received June, 08 2016

Mukti Yadav M. TECH SCHOLAR, ECE DEPARTMENT, NGFCET, MDU, INDIA

Deepti Mehta, ASSISTANT PROFESSOR, ECE DEPARTMENT, NGFCET, MDU, INDIA

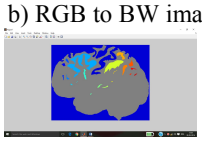
After following the steps according to the flow chart the result of the respective images have been concluded. We have taken two images of Brain one without tumour and the other with tumour. Both these images were processed using Boundary Tracing Algorithm and values were calculated which were different for both images. The results showed that boundary detection is an effective method to distinguish between tumour and non-tumour organs.

Fig1: Brain image without tumour has been shown;

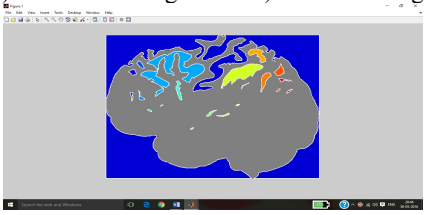
a) RGB image of Brain

b) RGB to BW image

c) Noise free Image



d) Labelled Image



e) Boundary Detected Image

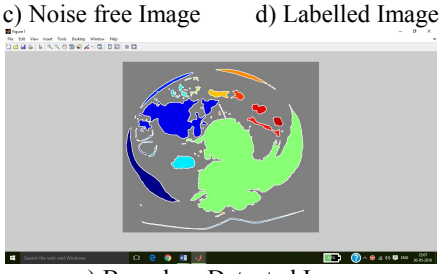
Fig2: Brain image with tumour has been shown;

a) Grayscale image of Brain

b) GRAY to BW

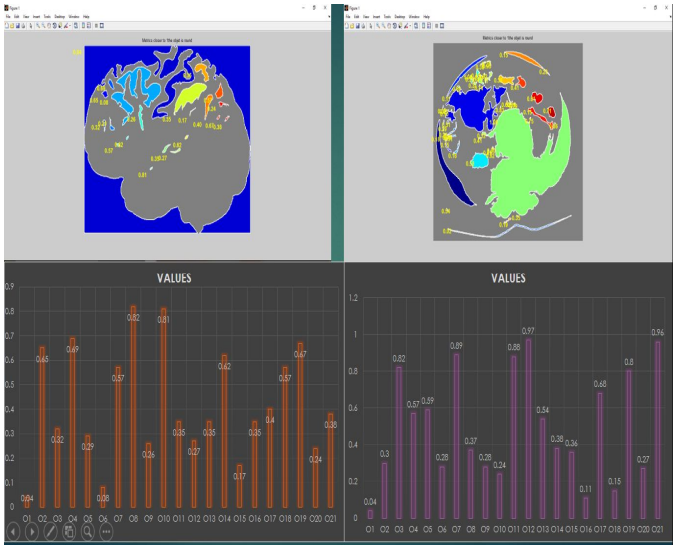
c) Noise free Image

d) Labelled Image



e) Boundary Detected Image

Fig3: Comparison of the Brain image with no tumour and with tumour has been shown along with the graph of the values determined on the basis of degree of roundness. The x-axis of the graph shows the number of boundary regions for which the values are determined and the y-axis of the graph shows the values determined for each boundary. From the graph it is shown that the brain without tumour has the maximum value of 0.84 and 0.82 which does not match to the threshold value whereas the brain with tumour has the maximum value of 0.97 and 0.96 which closely matches to the threshold value of 0.94 and can be approximated to 1 showing the more accurate roundness of the image.



CONCLUSION

It has been observed that boundary detection is having a significant importance in image processing. In this Paper, the basic concept of boundary tracing algorithm is introduced and the results of images with the Boundary Detection Techniques are compared on the basis of degree of roundness. The values so obtained clearly shows that the boundary values of normal brain do not consist of any value greater than the threshold value (which is 9.4) and the values of boundary for the brain image with tumour when detected consists the highest value of 0.97 which is greater than the threshold (0.94) value in the nearby area of the tumour. Thus, it clearly defines the boundaries of tumour and normal Brain. This shows that nothing can be perfectly or almost round in the normal Brain whereas if we are getting the values which show anything in the Brain is almost round or perfectly round then it must be a tumour. The software was implemented with GUI using MATLAB. The objective of the research paper was to study the use of boundary detection in various areas like Medical Images.

REFERENCES

[1] Shrasthta Chauhan* Mrs. Neha Shrma**, "**Brain Tumor Detection and Segmentation Using Histogram Thresholding and Artificial Neural Network Techniques**",** International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 8, August 2014.

[2] Nidhi1, Poonam Kumari2, "Brain Tumor and Edema Detection using Matlab 7.6.0.324", Volume 5, Issue 3, March (2014), pp. 122-131.

[3] Ashraf A. Aly1, Safaai Bin Deris2, Nazar Zaki3, "RESEARCH REVIEW FOR DIGITAL IMAGESEGMENTATION TECHNIQUES", International Journal of Computer Science & Information Technology (IJCSIT) Vol 3, No 5, Oct 2011

[4] J. F. Canny. "A computational approach to edge detection". IEEE Trans. Pattern Anal. Machine Intell., vol. PAMI-8, no. 6, pp. 679-697, 1986

[5] Jose Anand1, K. Sivachandar2," An Edge Vector and Edge Map Based BoundaryDetection in Medical Images", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 1, Issue 4, June 2013.

[6] Ch. Sambasivarao1, V. Naganjaneyul2 "An Efficient Boundary Detection and Image Segmentation MethodBased on Perceptual Organization", International

Journal of Computer Trends and Technology (IJCTT) – volume 7 number 1– Jan 2014

[7] S. Banerjee, C. Rose, and A. I. Rudnicky, "The necessity of a meeting recording and playback system, and the benefit of topic–level annotations to meeting browsing," in Proceedings of the Tenth International Conference on Human-ComputerInteraction, Rome, Italy, September 2005.