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Feature Extraction and Tissue Segmentation for Early Detection of Brain Cancer Using Histogram Clustering in MATLAB

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A B S T R A C T

In medical image processing brain tumor detection is one of the challenging tasks, since brain images are complicated and tumors can be analyzed only by expert physicians. The knowledge of volume of a tumor plays an important in the treatment of malignant tumors. Manual segmentation of brain tumors from Magnetic Resonance images is a challenging and time consuming task so in this paper brain tumor is detected at various levels. First the pre-processing is reduce noise and then edge detection is done by using canny filter, then Segmentation is done by means of histogram clustering in which the tumor affected image is divided into two parts and threshold value is set , based on this value tumor is detected. Secondly the other technique involved is superimposing of the tumor affected with the healthy image. This method can detect not only white pixel containing tumor but also gray and black pixels containing tumor by using fuzzy set. This method also does not require any initialization while the others require an initialization inside the tumor. The third method in which, the histogram is calculated and the threshold is fixed. This work is carried in MRI image

Keywords: Histogram, MRI, Thresholding, Brain Tumor.

1.INTRODUCTION

Our human system is made up of many organs, of all this brain is the first and the foremost controller of the human system. Excess cells growing in an uncontrolled manner in brain is called as brain tumor. In this paper this tumor part is identified by various levels. First the input taken is tumor affected MRI image. Then it is pre-processed by using median filter. Since the reason to choose median filter is it completely removes the noise and makes image very clear, whereas the Gaussian and linear filter does not. Brain cancer"s location and ability to spread quickly makes treatment with surgery or radiation like fighting an enemy hiding out among minefields and caves. A brain cancer is a disease in which cells grow uncontrollably in the brain. Brain tumors are of two main types: (i) Benign tumors (ii) Malignant tumors. Benign tumors are incapable of spreading beyond the brain itself. Benign tumors in the brain usually do not need to be treated and their growth is self-limited. Sometimes they cause problems because of their location and surgery or radiation can be helpful. Malignant tumors are typically called brain cancer These tumors can spread outside of the brain. Malignant tumors of the brain are most harmful which may remain untreated and an aggressive approach is almost always warranted. Detection of Brain tumor is a serious issue in medical science. Brain tumor is one of the major causes for the increase in mortality among children and adults. Tumors can be benign or malignant. Imaging plays a central role in the diagnosis and treatment planning of brain tumor. Imaging of the tumors can be done by CT scan, Ultrasound and MRI etc.

The MR imaging method is the best due to its higher resolution. But there are many problems in detection of brain tumor in MR imaging as well. An important step in most medical imaging analysis systems is to extract the boundary of an area we are interested in. Many of the methods are there for the MRI segmentation. Though till now histogram thresholding is used for preprocessing only in many of the segmentation methods this paper shows that it can be used as a powerful tool for segmentation. The image captured from a tumors brain shows the place of the infected portion of the brain. The image does not give the information about the numerical parameters such as area and volume of the infected portion of the brain. After preprocessing of the image, first image segmentation is done by using region growing segmentation. The segmented image shows the unhealthy portion clearly. From this image the infected portion (tumor) is selected by cropping the segmented image. From this cropped image, area is calculated.

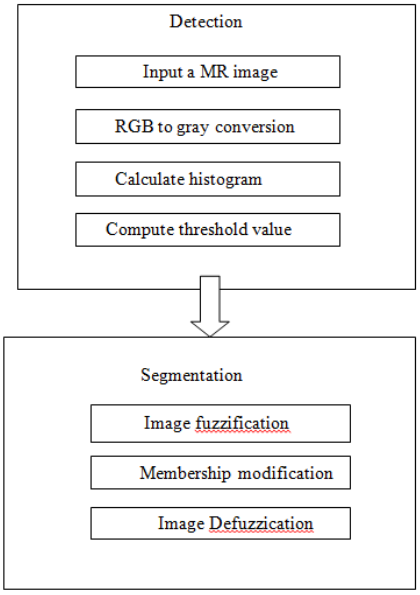


Fig.1. Flow Chart of proposed work *PREPROCESSING*

II. METHOD

The pre-processing is used to read the input image into the MATLAB, convert the image in to Gray scale image and also to remove the noise present in the image. In this method noise is removed by using median filter. Since it reduces the variance of the intensities in the image and also it is used to preserve edge shapes and the location of the edges.

2.1 DIVISION THE IMAGE

After converting the image into Gray scale we have covert the image in to two equal halves along its central axis (because brain images are symmetric) by dividing X- axis and Y- axis according to the requirement The image pixels are stored as a variable (say P) where P shows the values of the pixels in a 2D matrix (row – column) form. Number of rows and columns are assigned some other variables (say Q and R) The column value is divided by 2 and assigned another variable name (say S) Form new matrix using for loop by rows from 0:1:Q as outer loop and columns from 0:1:S as inner loop. Using the command 'imshow', the image is constructed based on the new matrix. This image will be the halves of the original image. For the other half of the image, the column value from S:1:R is considered as the inner loop.

2.2 HISTOGRAM PLOTTING AND COMPARE THEM

Histogram is a plot between number of pixel and pixel intensity. To plot the histogram, bar graph can be used. The histogram code operates by first reading the gray scale value at the first entry and coming up with pixel intensity between 0 and 255. It increments the total number of pixels and then it will move on to the next row or column entry until it finishes reading all the raster data. However, while it is reading each entry, if it picks up pixel intensity value more than once it will increment that particular value. MATLAB command used for this is 'imhist, axis tight'. Finally the two histograms are compared to detect the tumor and hence the tumor.

2.3 SET THRESHOLD POINT

The difference of the two histograms is calculated and the resultant difference is plotted using bar graph to select the threshold point.

2.4 MODIFIEDHISTOGRAM CLUSTERING AND SEGMENTATION

After selecting threshold point, a zero matrix of same size of original image matrix is considered. Each pixel value of the image matrix is compared with the threshold point. If the value of pixel is greater than threshold, coordinate of c matrix is assigned a value 255 otherwise 0 is assigned to that. This process is repeated till all the pixel values are compared to threshold point. Threshold value is set by taking mid of gray level because in the tumor affected image, tumor is shown as white spot. Below shown are for the threshold value 129 for various images.

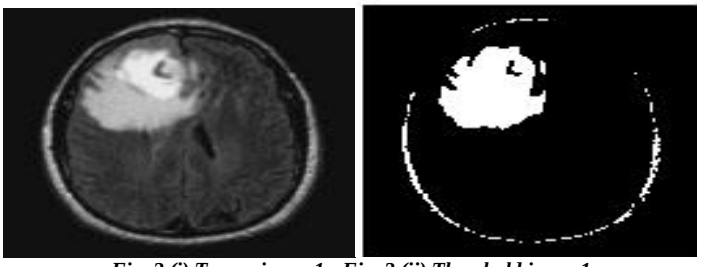


Fig. 2 (i) Tumor image1 Fig. 2 (ii) Threshold image1

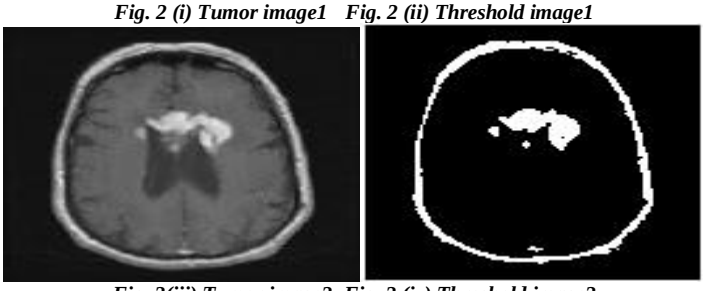


Fig. 2(iii) Tumor image2 Fig. 2 (iv) Threshold image2

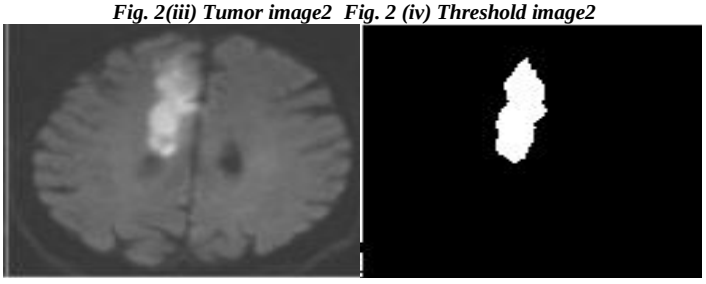


Fig. 2(v) Tumor image3 Fig. 2(vi) Threshold image3

Threshold results for various images:

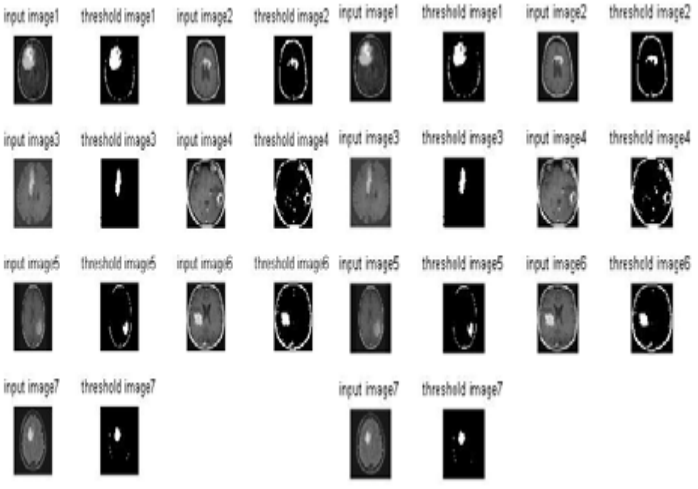


Fig. 2 (vii) Threshold -128

III. RESULT AND ANALYSIS

In order to taste the algorithm developed, an image of brain having tumor has been considered. The outputs of the program resulted the following graphs and images:

- Two halves of the original image and their respective histogram.
- Difference of the two histogram.
- Original and segmented image.
- Cropped image and area of the tumor in command window of the MATLAB.

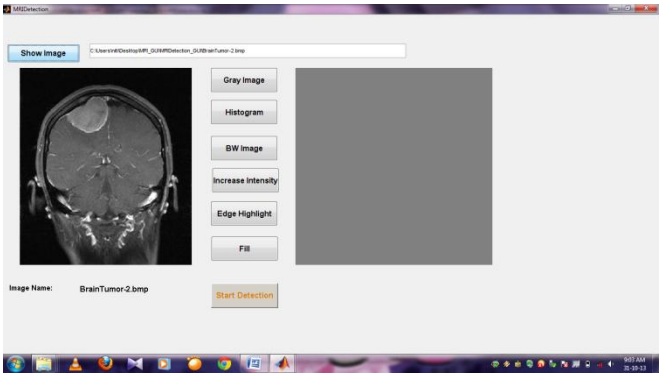


Figure 3: Input an MR image

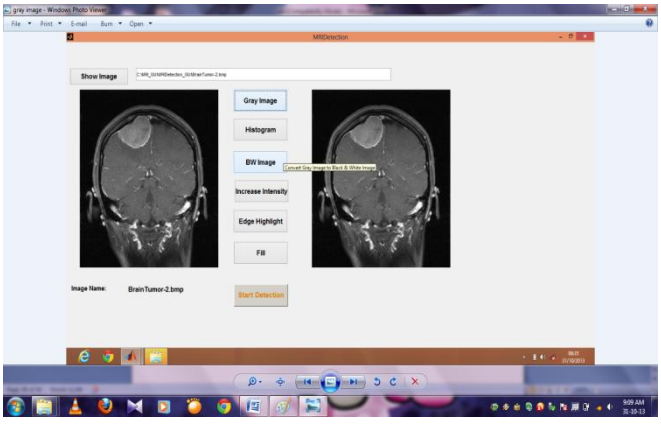
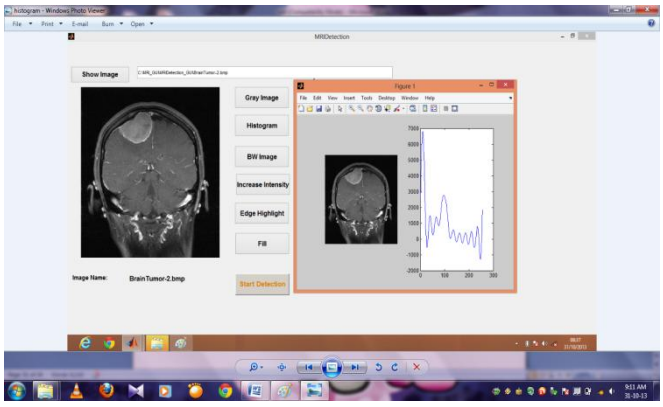


Figure 4:Gray image

Histogram



Figue 5: Black and White Image

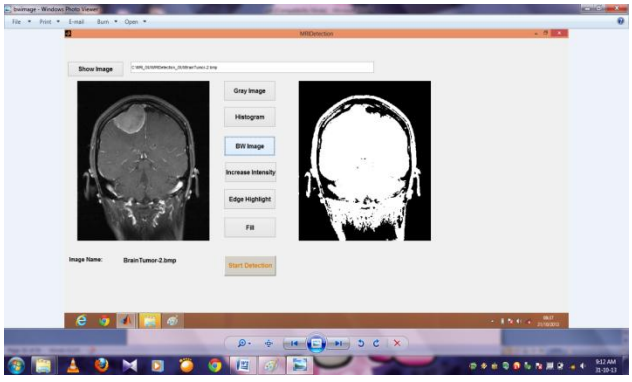


Figure 6: Increase Intensity

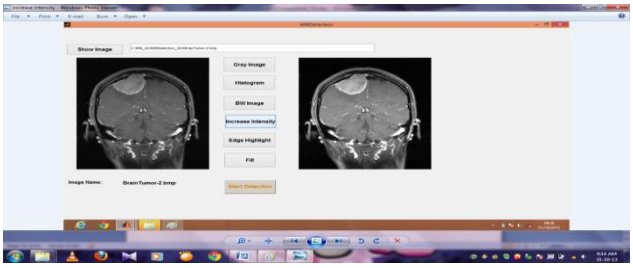


Figure 7:Edge Highlight

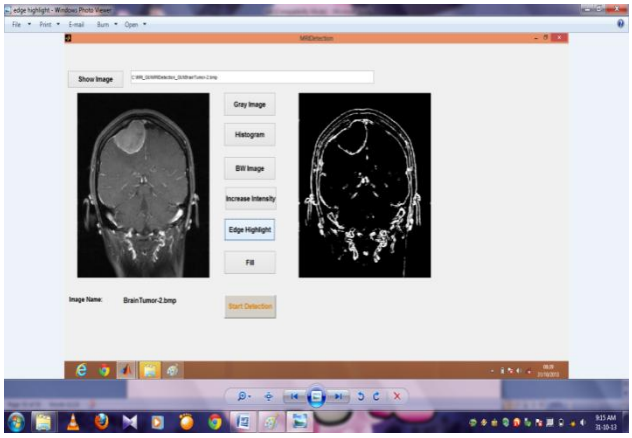


Figure 8:Fill

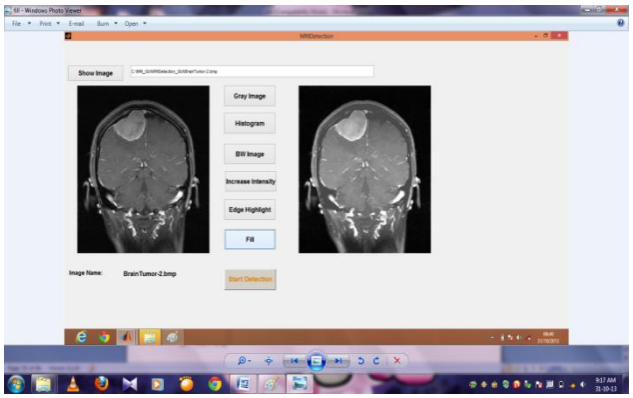


Figure 9:Start Detection

IV. CONCLUSION

The results show that the segmentation by histogram clustering by setting threshold value combined with modified histogram clustering produce clear results in detection of tumor. This method of segmentation is useful in medical image processing. In this study a technique to detect presence of brain based on thresholding technique has been developed. The segmentation of the brain is also being done while detecting the presence of the tumor. The area of the tumor which is of utmost importance to the physicians can also be calculated using the present technique.

REFERENCES

[1] F.kurugollu, "color image segmentation using histogram multithresholding and fusion," Image and Vision Comuting,Vol. 19,pp-915-928,2001.

[2] Heath LM, Hall LO, Goldgof DB and Murtagh FR (2001) Automatic segmentation of non-enhancing brain tumors in magnetic resonace images. Artificial Intelligence in Med. 21, 43-63.

[3] Mohammad ShajibKhadem, "MRI Brain image segmentation using graph cuts", Master of Science Thesis in Communication Engineering, Department of Signals and Systems, Chalmers University Of Technology, Goteborg, Sweden, 2010.

[4] Mrs.MamataS.Kalas, "An Artificial Neural Network for Detection of Biological Early Brain Cancer," Intl. Journal of Computer Applications, Vol. 1, No. 6,pp-17-23,2010.

[5] Orlando J. Tobias and RuiSeara,"Image Segmentation by Histogram Thresholding Using Fuzzy Sets," IEEE transactions on Image Processing,Vol. 11,NO. 12,PP-1457-1465,DEC 2002.

[6] S.Shen,W. A. Sandham and M. H. Granat, "PREPROCESSING AND SEG-MENTATION OF BRAIN MAGNETIC RESONANCE IMAGES," Proc of the 4th Annual IEEE Conf on Information Technology Applications in Biomedicine, UK, pp. 149-152,2003.

[7] S.Xavierarockiarajand K.Nithya, "Brain Tumor Detection Using Modified Histogram Thresholding-Quadrant Approach", Journal of Computer Applications (JCA), Volume V, Issue 1, 2012

[8] Saif D. Salman and Ahmed A. Bahrani, "Segmentation of tumor tissue in gray medical images using watershed transformation method," Intl. Journal of Advancements in Computing Technology,Vol. 2, No. 4,pp-123-127,OCT 2010.

[9] Salman YL, Assal MA, Badawi AM, Alian SM and MEI-EI Bayome (2005) Validation techniques for quantitative brain tumors measurements. IEEE Proc. Engg. Med. Biol. 7048- 7051.

[10] Wenbing Tao, Hai Jin, and Yimin Zhang, "Color Image Segmentation Based on Mean Shift and Normalized Cuts," IEEE Trans. on Systems, Man, and Cybernetic-Part B: Cybernetics, vol. 37, no. 5, pp.1382-1389, Oct. 2007.

[11] Yan Zhu and Hong Yan, "Computerized Tumor Boundary Detection Using a Hopfield Neural Network", IEEE Trans. Medical Imaging, vol. 16, no. 1, pp.55-67 Feb.1997.

[12] Yang Y, Yan X, Zheng C and Lin P (2004) A novel statistical method for segmentation of brain MRI. IEEE, 946 949.

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