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Brain MRI Segmentation using Graph Cut Method

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ABSTRACT

Image segmentation denotes a process of partitioning an image into distinct regions. Clustering methods have been extensively investigated and used among a large variety of segmentation approaches. MATLAB is widely used software for the study of brain tumor detection from MRI scan images. The process includes image pre-processing, image segmentation, feature extraction and classification technique. This present work proposes a method to detect the tumor regions effectively from the brain MRI scan images. In this paper, Graph Cut Method algorithm to Detect Tumour regions is proposed for medical image segmentation. A new unsupervised MR image segmentation method based on Graph Cut algorithm for the Segmentation is presented.

This paper describes a segmentation method consists of two phases. In the first phase, the MRI brain image is acquired from the patient database from which artifacts and noise are removed. In the second phase (MR) image segmentation is to accurately identify the principal tissue structures in these image volumes.

Keywords: Graph Cut Algorithm, Image Analysis, Segmentation, Tumour Detection

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I. INTRODUCTION

The brain is a soft, delicate, non-replaceable and spongy mass of tissue. It is a stable place for patterns to enter and stabilize among each other. A tumour is a mass of tissue that grows out of control of the normal forces that regulates growth. BRAIN TUMOUR is a group of abnormal cells that grows in side or around the brain.IT can directly destroy all healthy brain cells. It can also indirectly damage healthy cells by crowding other parts of the brain and causing inflammation, brain swelling and pressure within the skull

II. METHODOLOGY.

A. Image Acquisition

Images of a patient obtained by MRI scan are displayed as an array of pixelsand stored in Mat lab7.0.Here, grayscale or intensity images are displayed of default size 256 x 256. A grayscale image can be specified by giving a large matrix whose entries are numbers between0 and 255, with 0 corresponding, say, to black, and 255 to white. A black and white image can also be specified by giving a large matrix with integer entries. The lowest entry corresponds to black, the highest in white. All MR images were acquired on a 0.5T open interventional MRI system(Signa sp). MR Images were transformed into a Linux network through LAN (KMCH Hospital, India). (All image shad 1 mm slice thickness with 1×1 mm in plane resolution.

B. PRE-PROCESSING

Noise presented in the image can reduce the capacity of region growing filter to grow large regions or may result as a fault edges. When faced with noisy images,it is usually convenient to preprocess the image by using weighted median filters. Weighted Median (WM) filters have the robustness and edge preserving capability of the classical median filter. WM filters belong to the broad class of nonlinear filters called stack filters. This enables the use of the tools developed for the latter class in characterizing and analyzing the behavior and properties of WM filters, e.g.noise attenuation capability. The fact that WM filters are threshold functions allows the use of neural network training methods to obtain adaptive WM filters.

C. Segmentation Using Graph Cut Algorithm:
A graph is an abstract representation of a set of objects, where several pairs of the objects are connected by links. It is a mathematical structure and is used to model pairwise relations between objects from a certain collection. The goal is to segment the main objects out of an image using a segmentation method based on graph cuts. A graph-based approach makes use of efficient solutions of the maxflow / min cut problem between source and sink nodes in directed graphs. To take advantage of this we generate a s-t-graph as follows: The set of nodes is equal to the set of pixels in the image.

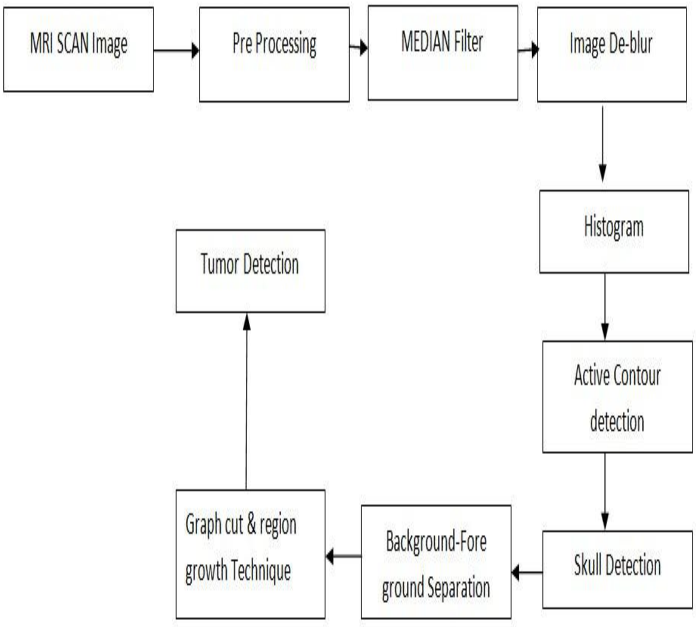


Fig: BLOCK DIAGRAM

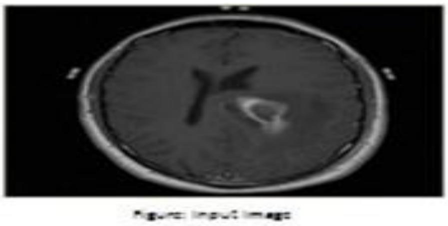
Algorithm.
Step1: Read image using * function which has properties to select any image
Step2: After that detecting the skull
Step3: Region props function used which draw the region of an image just 2-3 sec than after that we display that MR image using display function, the image show in a particular subplot in which we given the axis value using axis function.
Step4: After that we create the mask for in which we have further steps.

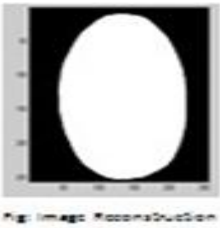
- Left image, we call this original/test image
- Mask for original image
- Reference image, here it is the right side function.

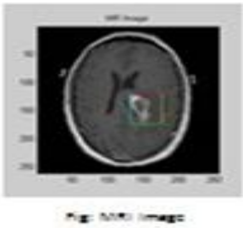
Step5: When all results will declare means final o/p show we create two types,scanning vertical and horizontal this can be done using round function.
Step6: After that we made a histogram for particular figure which we want, the use age of histogram is that it is block is a Signal Processing Block set block. Draw the block for particular detection in which the process in the descriptors is

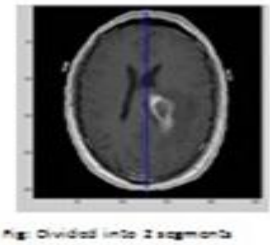
- Compute the image gradients
- Round off
- Within the big square, select the pixels with the circle and put into the histogram. No need to do rotation which is very expensive

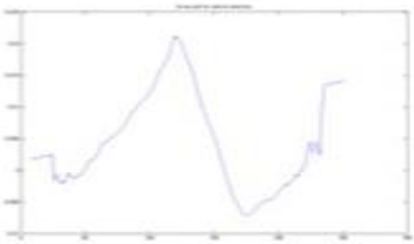
Step7: The main function in which we find the max and min score function for vertical using top and down parameter.
Step8: After that find the disease in the image using left, right search function, in which we used transpose function of images and masks.
Step9: Than horizontal scan start and follows the same process start after vertical scan Step10: After that region props coding + skulls coding + compute BC. And then find area rather than length of on an object or disease.











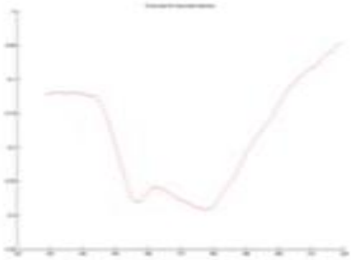


Fig 1: Input image Fig 2: Image Reconstruction Fig 3: MRI Image Fig 4: Divided into 2 segments
Fig 5: Score in horizontal direction Fig 6: Score in Vertical direction

III. CONCLUSION

Segmentation based on graph cuts works very well for most of the images, for some issues it becomes more laborious. This means if we want to base the segmentation on the gradient of an image we need more detailed user seeds if the boundaries of the object don't dilate clearly enough from the edges in the background.

REFERENCES

[1]. Aaron Lefohn, Joshua Cates, Ross Whitaker,:"Interactive GPU-Based level sets for 3D Brain Tumor Segmentation",April 16,2003.

[2]. Ahalt, S.C., A.K. Krishnamurthy, P. Chen and D.E.Melton, 1990. "Competitive learning algorithms for Vector quantization", Neural Networks 3 (3): 277-290.

[3]. Alirezaie, J., M.E. Jernigan and C. Nahmias, 1997."Neural Network based segmentation of MagneticResonance Images of the Brain", IEEE Trans. Nuclear Science, 44 (2): 194-198.

[4]. Dunn, J.C., 1973." A fuzzy relative of the ISODATA process and its use in detecting compact, well Separated clusters",JournalofCybernetics, 3: 32-15.

[5]. Fu, K.S. and J.K. Mui, 1981." A survey on image segmentation", Pattern ecognition, 13: 3-16.

[6]. Fadi N.Karameh, Munther A.Dahleh,:" Automated Classification of EEG signals in brain tumor diagnostics",Proceedings of the American Control Conference Chicago, IIlinois, June 2000.

[7]. Haralick, R.M. and L.G. Shapiro, 1985. "Survey ,imagesegmentation techniques", Computer Vision, Graphics Image Process, 29: 100-132[9]

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