Classification of Brain Cancer Detection by using Magnetic Resonance Imaging

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***Abstract*— Human system is made up of many organs, of all brain is the first and the leading controller of the human system. Overload cells growing in an uncontrolled manner in brain is called as brain tumor. MRI brain tumor image can be evaluated only by expert physicians. In medical image processing brain tumor detection is one of the challenging tasks. Sometime MRI brain images corrupted by some noise. In this paper we specially focus on detecting tumor from brain MRI images. Proposed algorithm performs pre-processing operations on brain MRI images to remove noise from MRI images with the help of median filter, logarithmic transform and then by applying segmentation for detecting tumor from brain MRI image by using thresholding. Using thresholding techniques extraction of the tumor takes place and then calculates the tumor area. An online database is used and for result analysis used receiver operating characteristic ROC curve, and this algorithm achieves 80% with respect to sensitivity and specificity 20%. The proposed algorithm is very useful to gives more information about the tumor which is very helpful to the doctor for subjective analysis.**

Keywords—Magnetic Resonance Imaging (MRI), Logarithimic Transform (LT), Receiver operating characteristic (ROC).

I. INTRODUCTION

In Medical Diagnostic, Magnetic Resonance Imaging plays a major role. Magnetic resonance imaging (MRI) is a test that uses a magnetic field and pulses of radio wave energy to make pictures of organs and structures inside the body. In many cases MRI gives different information about structures in the body than can be seen with an X-ray, ultrasound, or computed tomography (CT) scan [1, 2]. Brain tumor detection approach in medical magnetic resonance imaging is very important in order to perform Diagnostic image analysis. Due to the involvement of various kinds of abnormalities, pathology, radiologist's perception and image analysis at diagnosis stage, manual segmentation of brain tumor from MR image seems to be a difficult and time consuming task. Brain tumor is the most commonly occurring spite among human beings, so study of brain tumor is important [1]. In this paper our proposed method is an image segmentation method to identify or detect tumor from the brain cancer image using magnetic resonance imaging.

II. METHODOLOGY

Our proposed methodology is a four-step process the block based approach is used to analyze MRI brain tumor images. In this approach, the brain tumor is detected. The involved methodology is given below,

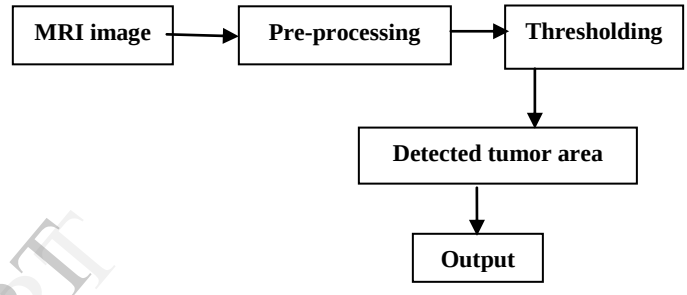

Fig. 1. Purposed Method

For detecting the tumor we have used image processing techniques, like for enhancement of brain MRI images here is used logarithmic transformation function, for highlighting the brain tumor then threshold function is used and for detecting the tumor watershed Segmentation is used. After completing this procedures 80 % Results are found.

III. PREPROCESSING

In preprocessing, after getting input MRI image, noise is found in the image .To remove noise and to detect exact location of tumor, thresholding technique is used. Here remove the noise from image and enhanced their quality by using image processing techniques.

A. logarithmic transform

In biomedical image processing of images face some different problems such as darkness & blurring in images, etc. To solve this problem logarithmic transform gives more extended values of dark pixels and convert values for a bright pixels. It compresses the dynamic range of images with large variations in pixel values [1, 2, and 7]. Logarithmic transform can be calculated by using this equation.

$$s = c \log (1 + r) \text{..... (I)}$$

Where c is a constant, r is pixel value of image. And it is assumed that $r \geq 0$. This transformation uses a narrow range of low-level gray scale intensities into a wider range of output values. And similarly record the wide range of high-level grey scale intensities into a narrow range of high level output values. The opposite of this applies for inverse-log transform.

B. Thresholding

Thresholding is nothing but a conversion of binary image into gray scale image. It is also a very useful method for detecting the object of the image. Thresholding techniques [6, 8, and 10] are image segmentations techniques based on image-space regions. The fundamental principle of thresholding techniques is based on the characteristics of the image. In brightness threshold, all the pixels brighter than a specified brightness level are taken as 1 and the rest are left 0. In this way we got a new binary image is formed with useful objects image as 1 and unwanted as background 0. Sufficient contrast on objects and background is necessary to do the thresholding. The simplest property that pixels in a region can share is intensity. A natural way to separate such regions is through thresholding, to light and dark- regions. Thresholding creates binary images from grey level ones by turning all pixels below some threshold to zero and all pixels above that threshold to one. Thresholding is the transformation of an input image to an output binary image gas represented by the next formula, where g(x, y) is a threshold version of f(x, y) at some global threshold.

IV. EXPERIMENTAL RESULTS

The proposed Algorithm was tested with different MRI Brain cancer images. The proposed Algorithm was tested with the brain having different intensity, shape and size. Proposed method was successful to competently extract the tumor part from the brain tumor images. The method was tested using MATLAB 2012a. Experimental results for the MRI brain cancer kinds of images are shown below.

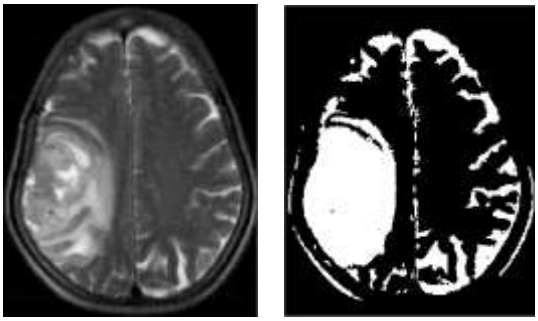

Fig. 2. Example of a Thresholding

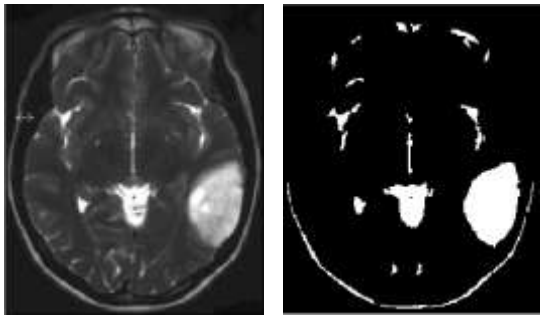

Fig.3.Example of Thresholding

TABLE I. RECEIVER OPERATING CHARACTERISTIC

Sr no	Receiver Operating Characteristic					
	Image name	*Ground truth*	*TP*	*TN*	*FP*	*FN*
1	000001	Tumor present	Yes	-	-	-
2	000002	Tumor present	Yes	-	-	-
3	000003	Tumor present	-	-	yes	-
4	000004	Tumor present	Yes	-	-	-
5	000005	Tumor present	Yes	-	-	-
6	000006	Tumor present	Yes	-	-	-
7	000007	Tumor present	No	-	-	Yes
8	000008	Tumor present	yes	-	-	-
9	000009	Tumor present	yes	-	-	-
10	000010	Tumor present	Yes	-	-	-

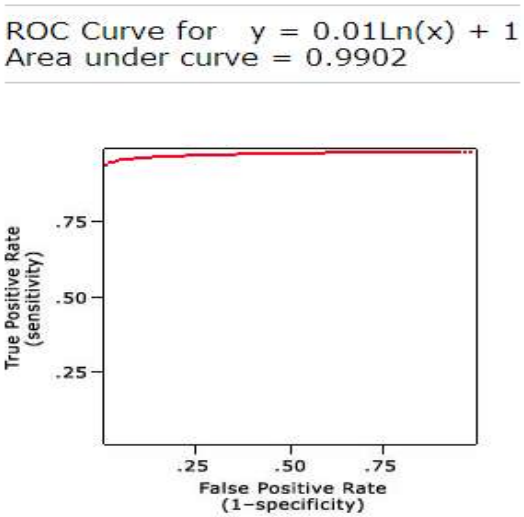

Fig.4. Receiver Operating Characteristic

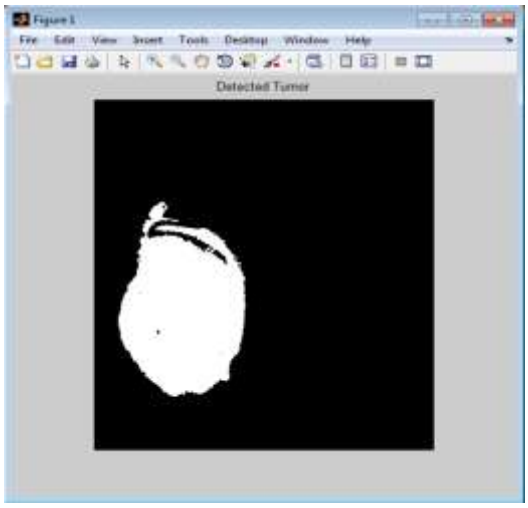

Fig.4. Separated tumor from MRI image

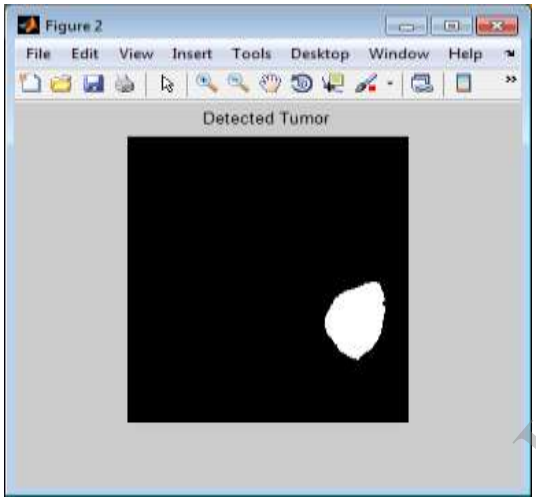

Fig.5. Separated tumor from MRI image

V. CONCLUSION & FUTURE WORK

In this purposed work different medical images, like MRI brain & MRI brain cancer images are taken for detecting tumor. The Proposed algorithm is developed with the help of mat lab and image processing techniques. For result analysis receiver operating characteristic curve (ROC) is used and this algorithm achieves sensitivity equal to 80 % and specificity equal to 23 % and accuracy is 0.9902. ROC curve which is helpful for the classification of the research work and also it gives the accuracy. In future we will take a large database and try to give more accuracy as compare to this one which will work on any type MRI brain tumor & with objective analysis.

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