

# Tri-Level MSG Algorithm for Detection of Brain Tumor

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**Abstract**— This method describes a Three Method algorithm called MSG to detect the brain tumor. Here M means mean of means, S means Sensitive area and G means Graph of high intensities. Elder methods consists a single algorithm to detections of brain tumor but this method provides a result by performing the AND operation among the results of three methods. If one of the methods produces a false result then entire result will be negative. This method depends upon the mean value of the image, Histogram of image and density of the pixels in an image.

**Keywords**—Mean, Graph of High Intensities Regionprops, Ismember, Strel.

## 1. INTRODUCTION

Biomedical imaging give attention to the capture of images for both diagnostic and therapeutic use. The photo shots of in vivo can be acquire with the help of biomedical sensors and processors. Biomedical imaging technologies utilize either light energy or sound energy or magnetic energy to access the information of internal organs as a image. These images used for the curing of a subject in a non invasive way. And images used for treatment evaluation.

Brain tumor builds up as the abnormal cell escalation inside the brain. Brain Tumor generally classified into two types benign and malignant tumors [1]. Malignant Tumors are high-speed mounting cancerous tissues. Benign are slow mounting, stagnant cancerous tumor. Most of the tumors cause the life risk.

Imaging of tumors amid extra correctness plays essential role in the judgment of tumors. It engages in high resolution procedure like Magnetic Resonance Imaging and Computed Tomography. MRI plays a important role in examine the body [2]. MRI is more used because imaging depends upon the every hydrogen atom present in the body. So it gives superior class of brain images with comparing with the remaining therapeutic imaging procedures like as X-Ray or Computed Tomography (CT). As a non-invasive method MRI frequently used [3]. In the MRI imaging the subject is placed in the strong magnetic field. The hydrogen atom consists on neutron hence it possess magnetic behaviour. Now all the hydrogen atoms are in the strong magnetic field, So they align uniquely along or opposite to the strong magnetic field. Now RF energy is used to disturb the hydrogen atoms. The Hydrogen atoms gain the energy from RF enters into the High energy state. After some time the RF energy put off then all Hydrogen atoms come back to the original state by releasing absorbed energy. That emitted energy processed to form MRI image.

There are various methods are projected but no one is commonly accepted for medical images. Previous methods follow the single algorithm to detect the brain tumor. In the previous methods sometimes the edge of the MRI Image is

shown as the tumor. To prevent the false tumor detection.

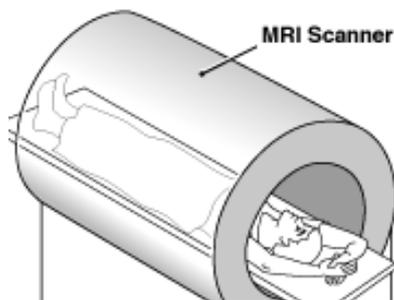


Fig. 1: Subject in Magnetic field During MRI Scanning [2]

In this paper we study about how Tri level MSG algorithm is used to detect the tumor and how image processing plays an important role in medical image analysis. The Proposing Method Uses regionprops which returns measurements for the set of belongings specified by properties for each 8-connected component (object) in the binary image, the method can use the command regionprops on adjacent regions and discontinuous regions. The function regionprops is very functional for determining the properties of things objects in a input image.

## 2. PROPOSED METHOD

If we observe clearly the MRI image of brain the image with tumor image, the image with tumor consist more white pixels then the tumor less image. These white pixels are called as high intensity pixels. The proposed method focused on those high intensity pixels. The propose Tri-level MSG algorithm consist of three subtasks. Fig. 6 shows the block diagram for the proposed method those are

- 1) Mean Calculation
- 2) Graph of intensities
- 3) Sensitive area calculation

### A. Mean Calculation

This done by comparing an image mean with a threshold value. The threshold value is stetted by calculating the mean of 30 to

50 no tumor images. Initially mean is calculated for the 30 to 50 non tumor brain MRI images. Then mean of means is calculated to determine the threshold value [4]. So the threshold value for the mean method is fixed. The image MRI image with tumor consist more white pixels than the normal MRI image, so automatically the mean of Tumor image is high with compared to the normal MRI image. Now the mean of input image is compared with the threshold value. If the mean of input image mean greater than the threshold value then tumor is present in the brain. So set the value  $a=1$ . If the mean of the input image less or equals to the threshold value then no tumor is present. Then set the value  $a=0$ .

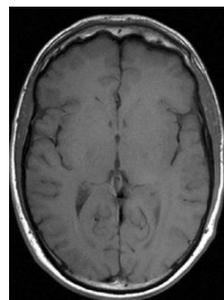


Fig. 2: Brain MRI image 01

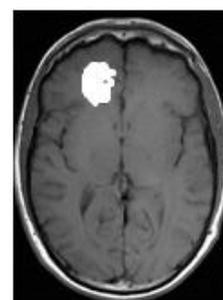


Fig. 3: Brain MRI image with tumor 01



Fig. 4: Brain MRI image 02

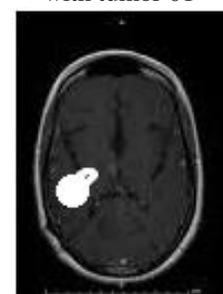


Fig. 5: Brain MRI image with tumor 02

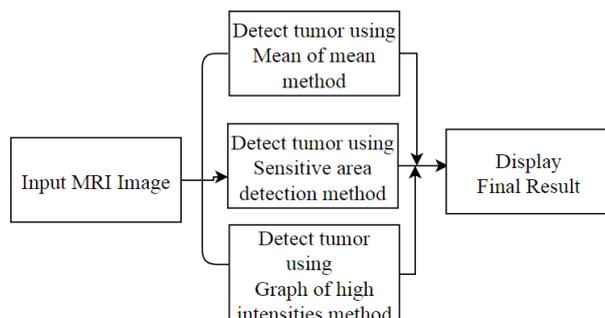


Fig. 6: Block Diagram for proposed method

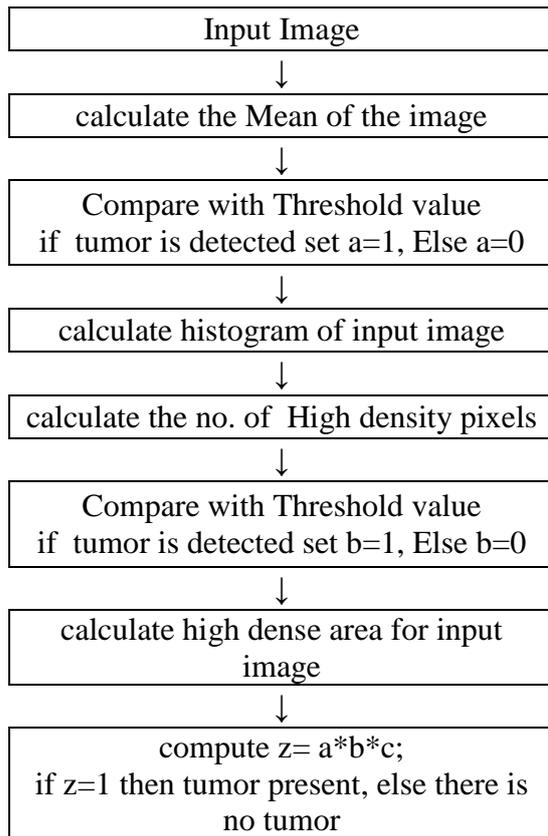


Fig. 7: Flow chart

TABLE I  
CALCULATING MEANS OF MEANS

S.no	Image	Mean
1	Image 1	42.2
2	Image 2	43.5
3	Image 3	42.4
.	.	.
.	.	.
.	.	.
30	Image 30	42.63
Mean of Means		42.06

*B. Calculating Graph of high intensities*

This method consists calculation of high intensity pixels (white color pixels) in the given input image. This is done by performing the histogram processing. As mentioned in the above method the threshold value is calculated from 30 to 50 brain MRI images. Calculate the histogram of every image.

```
x=imhist('image1.jpg');
```

Now calculate  $S=[256]+ x[255]+ x[254]+ x[253]+ x[252]+ x[251]$  for the images 1 to

TABLE II  
CALCULATING AVERAGE OF HIGH INTENSITY PIXELS

S.no	Image	S
1	Image 1	708
2	Image 2	709
3	Image 3	722
.	.	.
.	.	.
.	.	.
30	Image 30	718
Average of High Intensity Pixels		710

30 or 50. Now a threshold value is fixed by computing the average of high intensity pixels of all images.

So the threshold value for the Graph of high intensities method is fixed. The image with tumor consist more white pixels than the normal MRI image. Now the histogram of input image is calculated and no.of high intensity pixels compared with the threshold value. If the no. of high intensity pixels of input image greater than the threshold value then tumor is present in the brain. So set the value b=1. If the no. of high intensity pixels of input image less or equals to the threshold value then no tumor is present. Then set the value b=0.

*C. Sensitive area calculation*

The sensitive area means tumor detected area; it is calculated by measuring the properties of image [5]. The MAT Lab Command “regionprops” is used to Measure properties of image regions. It is done in threes steps

*Step1:* Reading an image

*Step2:* Create a Binary Image

*Step3:* Calculate Image Object Properties Using Pixel Values of Grayscale Image

*Step 4:* Calculate Required Pixel Value-Based Properties

Initially the given input image is converted to binary image. Then the binary image is labeled using “bwlabel” command. Then Image properties are calculated using “regionprops” command. The Solidity is calculated by the ratio of Area to the convex hull area.

$$\text{Solidity} = \frac{\text{Area}}{\text{Convex hull area}}$$

It is calculated using “regionprops” command. Then convex hull area set is detected from total area using “ismember” command. Then Boundaries of the tumor are detected by tracking the exteriors of an object. Holes and no holes specify whether you want into include the boundaries of holes inside other objects.

```
status=regionprops(label,'Solidity','Area');
tumor_label=find(area==max_area);
tumor=ismember(label,tumor_label);
[b,l]=bwboundaries(tumor,'noholes');
```

b=1 and c=1 then only the tumor is detected.

### 3. CONCLUSION

The Tri-Level MSG algorithm for detection of Brain Tumor is designed to detect the brain tumors. The MSG algorithm detects the tumor using three methods and produces a result by concatenating the three results. The previous methods depend upon the one algorithm to take Decision about the presence of the brain tumor. This algorithm calculates the means of images for setting a threshold mean in the first method, calculates the high density pixels count and form a threshold number in second method and identifies the sensitive area in the third method . Finally these three methods combined to produce a result. The method tested on 200 brain tumor MRI brain images. It was success in all 200 attempts. It works better than the previous methods.

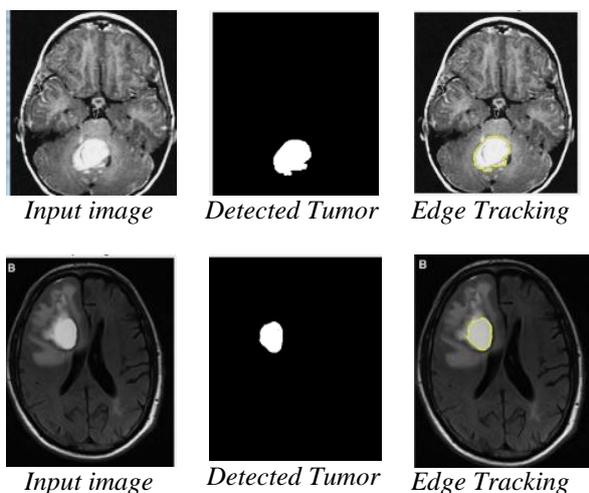


Fig. 8: Results

Calculate the white pixel area. If white area present then set c=1 else set c=0

Now computes the  $Z=a*b*c$ . If any one of the variable is equals to the zero then it take as no tumor id presented. If a=1,

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