

# BRAIN TUMOR DETECTION USING THRESHOLD SEGMENTATION AND MORPHOLOGY OPERATION

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**Abstract:** In this paper focuses on detection and segmentation of the brain tumor. Brain tumor is a form of abnormal cells. That can disrupt the function of the brain. In India, every year most of the persons are diagnosed with brain tumor. Tumor is several types and have some different characteristics. Nowadays brain tumor is serious and life threatening issues. MRI image play important role to diagnose brain tumor. Threshold segmentation algorithm are applied for segmentation brain tumor. Morphological operation used to easy to extract the brain tumor cell perfectly. This technique will help to diagnose brain tumor affected area, size also calculated.

**Keywords:** Brain Tumor, Detection, Segmentation, Threshold, Morphological Operartion.

## 1. INTRODUCTION

Magnetic resonance imaging (MRI) plays a important role in the detection of brain tumors. Brain tumor detection is completely difficult because of various shape, size, location and appearance of tumor in brain. Some common types of brain tumor are Oligodendroglioma, glioblastoma, Gliomas and Eningiomas. The brain tumor detection is very hard in beginning stage because it cannot find the accurate estimation of tumor. Thus, the brain tumor detection still remains challenging issue due to complex shape of brain than other breast, heart, lung, kidney, bone cancer detections in medical fields. Tumor segmentation from MRI image is an important process but it is time-consuming and difficult task often performed manually by medical experts. Radiologists and other medical experts spend a considerable amount of time segmenting medical images when a large number of MRI brain images are analyzed. Moreover, accurately labeling brain tumors may lead to missing recognition. Throughout the few years, completely different segmentation ways are used for tumor detection however it's a long method and additionally provides incorrect results. And most of them fail

because of unknown noises, poor image contrast, in similarity and weak boundaries that are regular in medical images. In this paper, detect the brain tumor from MRI brain images perfectly in order to enhance the performance of the image segmentation especially in the field of brain tissue segmentation. pre-processing of the image is the first step it removes noises and smoothens the input MRI brain image. And, segmentation is carried out using thresholding technique. Finally, brain tumor affected area and location are calculated. The purpose of the system is to assist doctors and radiologists who examine and determine the symptoms of a brain tumors in the biomedical field by using image processing techniques. Therefore, once it gets recognize brain tumor, it gives to start the proper treatment and it may be curable. Image segmentation can be carried out in a number of ways. Some of these are Region based segmentation, Edge detection segmentation, segmentation based on clustering and so on. Although these algorithms give good results but we need to have fast and more efficient techniques for medical image segmentation. In our work we have done segmentation using region based segmentation. threshold segmentation is a simplest method of image segmentation. This is a method effective way to partitioning an image into foreground and back ground. image segmentation that isolate objects by convert gray scale image to binary image. In this threshold method to use extract the tumor in MRI brain images.

## 2. RELATED WORK

Brain tumor is a major issue in human life. Brain tumor is a very critical and life-threatening issue. brain tumor detection to use MRI images. The MRI images have noise it not to view the clear display. This noise could be removed using various techniques such as Gaussian noise, Salt-and-pepper noise, median filter, and est. This noise free image is the input to the threshold segmentation process, which uses approximate reasoning, for calculating

shape and position of the tumor. Image processing can be described as an active research area where MR image processing is a very difficult field. Image segmentation plays an important role in image processing as it is used in the extraction of affected parts from the MRI (magnetic resonance imaging) images. The paper proposed segmentation of the human brain MRI image using threshold segmentation algorithm, followed by the morphological operation using to extract the tumor cell. In Area calculation to use binarization method to calculate the tumor affected area. In the paper for solving complex MRI segmentation problem Their algorithm can be used to automatically detect and segment the brain tumor. To remove noise, Pre-processing of the image is done by converting the RGB image into gray-scale image and then passing the same image noise removing filter.

### 3. PROPOSED METHOD

In this paper, a user-friendly computer aided system for brain MRI image segmentation for detection of tumor as well as it's area calculation using threshold segmentation algorithm has been proposed using python OpenCV library. The flow diagram is shown and each block is described,

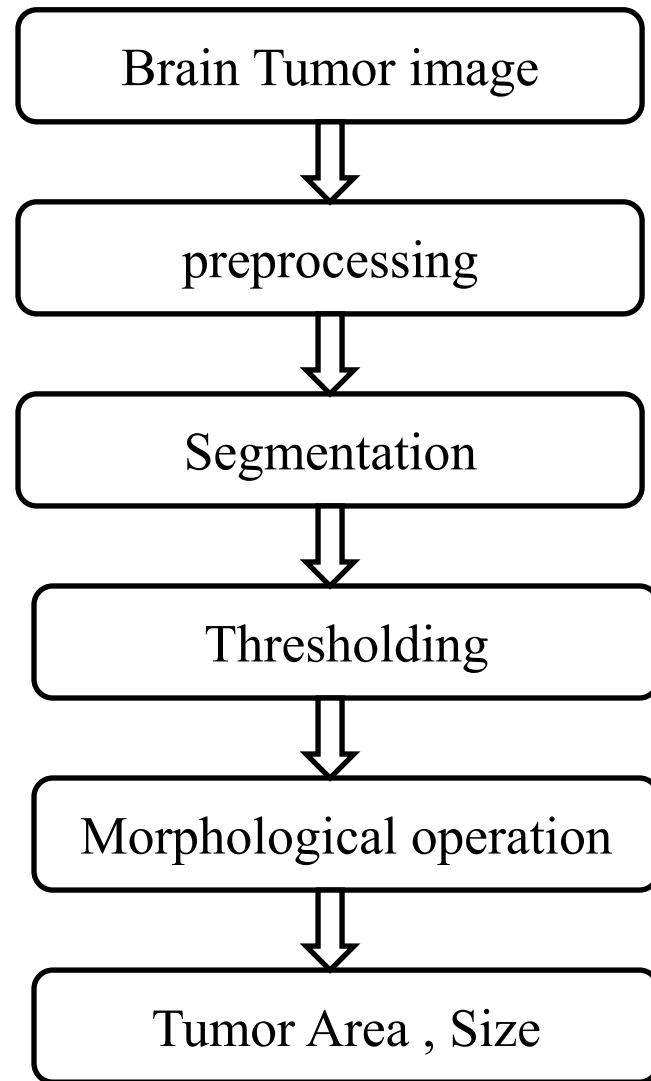


Fig.3.1. DataFlowDiagram

### 4. IMAGE ACQUISITION

Here, Images are acquired using MRI scan image of the brain the input is gray-scale images . The range of values for gray-scale image is from 0 (black) to 255 (white).

### 5. PRE-PROCESSING

This step helps in improving the Standard of the image, making it more suitable for further processing. Here, we convert the RGB input image to gray-scale. It also includes steps like Image enhancement, contrast improvement and image sharpening.

## 6. NOISE REMOVAL

Noise removal is the important process of image processing. In this processing improving the image quality. So, the first step is to remove the noise present in the MRI image. The methods used for noise reduction can be linear or non-linear. In Linear filters, for noise reduction, the pixel value is updated by weighted average of neighbourhoods. This method reduces the image quality. On the other hand in non-linear method, the edges are preserved but the fine structures are degraded. Here, we are using a Gaussian blur filter and median filter. Gaussian blur filter is non linear filter, it blur the image and reduced the noise. The median filter is a nonlinear filtering, often used to remove noise from an image or signal.

## 7. THRESHOLD SEGMENTATION

Segmentation require separating an image into regions corresponding to objects. Threshold is the simplest method of segmenting image[8]. Threshold can be used to convert Gray-Scale image to binary images. The simplest property that pixels in a pixels can share is intensity. So, a natural way to segment such pixels is through threshold, the separation of light and dark pixels. Threshold convert the gray images to binary image, its value to convert the zero's and one's. Threshold have a many types. One of the approach is OTSU threshold. Otsu's threshold technique includes iterating via all the feasible threshold values and calculating a measure of unfold for the pixel ranges every aspect of the threshold, i.e. the pixels that both fall in foreground or background. The intention is to discover the threshold value of foreground and background of the binary images.

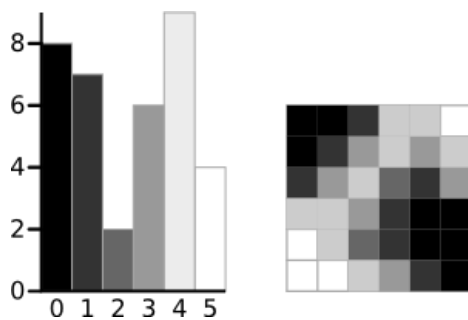


Fig.7.1 OTSU Threshold

## 8. FEATURE EXTRACTION

Morphological operation is used for feature extraction, which involves the find the pixel value zero or one in the test is successful completed then extracting the location of the input image. After this morphological Opening processing then extract the brain tumor is easily. Feature extraction is done by morphological operation.

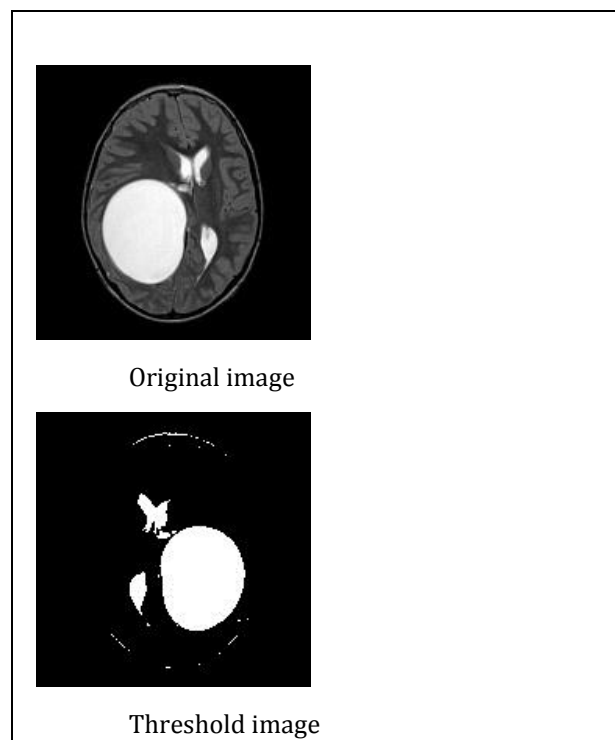
## 9. TUMOR AREA CALCULATION

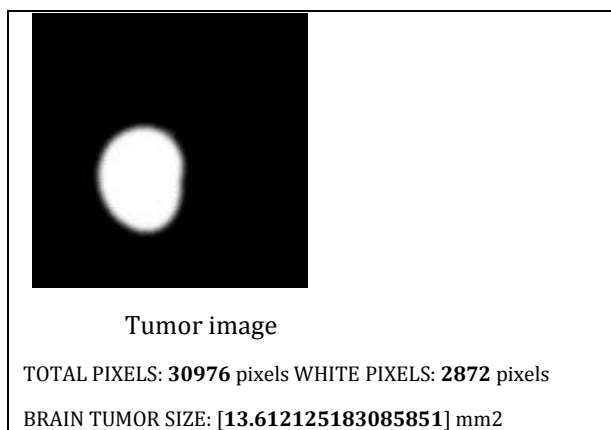
Number of white pixels (0) in the binary image is used to calculate the tumor area. Binarization method is used for this calculation. The image taken here is a binary image, so it has only black and white pixels and the maximum size is 256X256. A value 0 is assigned to black pixel and a value 1 is assigned to white pixel.  $f(1) = \text{white pixel (assigned as 1)}$   $f(0) = \text{black pixel (assigned as 0)}$  The area calculation formula is as follows:

Size of tumor is  $S = [( \sqrt{P} ) * 0.264] \text{mm}^2$  Where, P = number of white pixels and value of 1Pixel = 0.264 m

## 10. RESULT

The Brain Tumor can be found by using Python interpreted OpenCV (Open source computer vision) Library . In this method to used easily extracting the Brain Tumor.





**Fig10.1** Output

## 11. CONCLUSION

In this project, brain tumor detection and its area calculation using Threshold algorithm has been proposed using Python interpreted and OpenCV Library. Faster input output and manipulation of parameters is possible which results in faster and more efficient method for detection of tumor. The results are clearly more accurate and faster and we were able to detect the tumor and calculate its area for different brain MRI images.

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