

# IDENTIFICATION OF BRAIN TUMOR USING IMAGE PROCESSING TECHNIQUES

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## ABSTRACT

Brain tumor is the most usually happening melanoma in the midst of human beings, so learning of brain tumor is significant. Brain tumor at premature phase is very tricky chore for doctors to classify. MRI images are more close to clutter and additional ecological intrusion. So it becomes difficult for doctors to recognize tumor and their causes. In this paper, a place of image segmentation algorithms which gives a suitable consequence on brain tumor images is proposed. The segmentation, detection, and extraction of infected tumor area from magnetic resonance (MR) images are a prime apprehension but a deadly and time taking task achieved by radiologists or medical authority, and their exactness depends on their familiarity. The original image is converted into grayscale image in order to classify the darkness and the bright side of the image so that it becomes easy to identify the affected area and is implemented using MATLAB.

**Keywords:** Brain, Grayscale image, MRI, Segmentation, Tumor.

## 1. INTRODUCTION

The Brain Tumor is distressing a lot of natives universal. It is not only partial with the elderly people but also noticeable in the early on time. Brain Tumor is the atypical enlargement of cell surrounded by the brain skull which restricts the performance of the brain. Early recognition of the brain tumor is probable with the development of machine learning (ML) and image processing (IP). At current, dealing out of medical images is a mounting and imperative pasture. It comprises of numerous diverse category of imaging progression. The expertise allows us to perceive even the negligible fault in the human stiff. Anomalous intensification of tissues in the brain which influence appropriate brain purpose is well thought-out as a brain tumor. The foremost target of medical image processing is to recognize precise and momentous data using images with the smallest fault achievable. MRI is primarily used to acquire images of the individual carcass and cancerous tissues for the reason that of its elevated decree and improved excellence images evaluated with other imaging expertise. Brain tumor recognition from side to side MRI images is a tricky chore because of the intricacy of the brain.

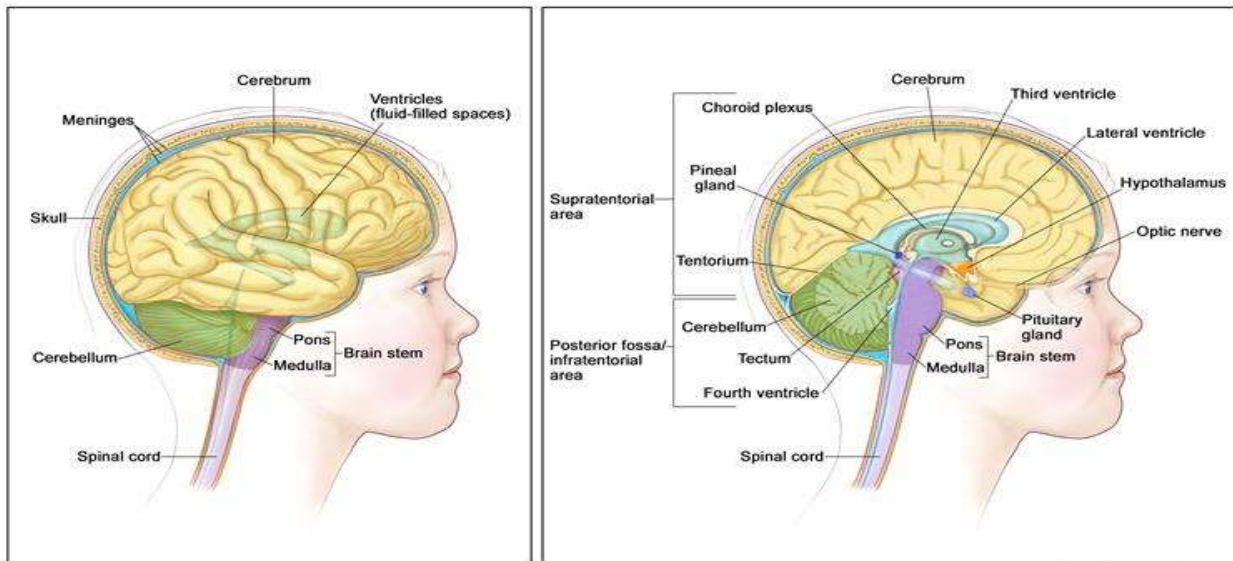
Imaging expertise has evolution enormously in current existence. Dissimilar sort of images can be shaped just by a singly-click and diverse image dispensation method can be completed to these imagery to learning in element about it. Machine erudition expertise has also been used to solve abundant real-world harms particularly in medication. Image-based tumor recognition uses one or more algorithms as the chief reproduction. With progress in camera intelligence and computational expertise, advances in tumor recognition using these skins have been an particularly lively examine area in the intellectual medicinal community.

## 2. DIFFERENT TYPES OF TUMOR:

**2.1 BENIGN TUMOR:** This tumor requires all three of the malignant possessions of a cancer. Therefore, by description, a benign tumor does not develop in an unlimited, aggressive manner, does not invade surrounding tissues, and does not extend to non-adjacent tissues. Common examples of benign tumors comprise moles and uterine fibroids.

**2.2 MALIGNANT:** Malignancy is the propensity of a medicinal stipulation, particularly tumors, to be converted into progressively worse and to potentially consequence in demise. It is distinguished by the possessions of anaplasia, invasiveness, and metastasis. Malignant is a equivalent adjectival medicinal expression used to illustrate a stern and increasingly deterioration illness. The expression is most recognizable as a explanation of cancer.

**2.3 PREMALIGNANT:** A before cancer stipulation (or premalignant situation) is an illness, set of symptoms, or pronouncement that, if left unprocessed, possibly will escort to cancer. It is a comprehensive condition connected with a considerably augmented danger of cancer



**Fig** Tumor detection

## 2.4 MRI:

It is first and foremost a medicinal imaging performance used in radiology to envisage thorough interior organization and imperfect purpose of the body. Magnetic resonance imaging (MRI), or nuclear magnetic resonance imaging (NMRI), provides much greater contrast between the different soft tissues of the body than computed tomography (CT) does, making it especially useful in neurological (brain), musculoskeletal, cardiovascular, and oncological (cancer) imaging. Dissimilar to CT, MRI uses no ionizing emission. To a certain extent, it uses a influential attractive pasture to bring into line the nuclear magnetization of hydrogen atoms in water in the body. Radio frequency (RF) fields are used to methodically alter the arrangement of this magnetization. This causes the hydrogen nuclei to construct a revolving compelling field noticeable by the scanner. This gesture can be influenced by supplementary magnetic fields to construct up adequate data to construct an image of the body.

Computerized brain tumor recognition from MRI images is one of the most demanding errands in today's up to date Medical imaging delve into. Automatic detection requires brain image segmentation, which is the process of partitioning the image into distinct regions, is one of the most important and challenging aspect of computer aided clinical diagnostic tools. Noises at hand in the Brain MRI images are multiplicative noises and lessening of these noises is complicated job. The minuscule anatomical particulars should not be shattered by the procedure of noise removal from clinical point of view. These makes accurate segmentation of brain images a challenge. However, accurate segmentation of the MRI images is very important and crucial for the exact diagnosis by computer aided clinical tools.

## 3. LITERATURE SURVEY:

**Swapnil R Telreandhe, Amit Pimpalkar et al (2016)** In this paper we propose adaptive brain tumor detection, Image processing is used in the medical tools for detection of tumor, only MRI images are not able to identify the tumorous region in this paper we are using K-Means segmentation with preprocessing of image which contains de-noising by Median filter and skull masking is used. Also we are using object labeling for more detailed information of tumor region.

**Luxit Kapoor and Sanjeev Thakur (2015)** Biomedical Image Processing is a growing and demanding field. It comprises of many different types of imaging methods likes CT scans, X-Ray and MRI. The primary goal of medical imaging is to extract meaningful and accurate information from these images with the least error possible. Out of the various types of medical imaging processes available to us, MRI is the most reliable and safe. It does not involve exposing the body to any sorts of harmful radiation.

**P.V Naganjaeyulu and K. Satyya Prasad et al (2014)** Medical image techniques are used to mage the inner portions of the human body for medical diagnosis. In this paper, we present an automated method to detect and segment the brain tumor regions. The proposed method consists of three main steps, initial segmentation, modeling of energy function and optimize the energy function. To make our segmentation more reliable we use information present in the T1 and FLAIR MRI images.

**Rajeshwari G Tayade et al (2016)** This paper includes the different techniques such as k-means, Fuzzy C-Means and region growing algorithm, curve let transform, multifractional Brownian motion(mBm), Proximal Support Vector Machines(PSVM) etc. for brain tumor detection from MRI images.

**Samriti, Mr. Paramveer Singh (2016)** In this paper the medical image processing brain tumor detection is a challenging task. Image of brain is difficult to understand. Noise and delay affects the image accuracy. In this technique MRI (magnetic resonance imaging) has become a useful medical diagnostic tool for diagnosis of brain and other medical images. Image segmentation is a major area of medical image processing. The main objective of this paper is to delay using watershed and contrast technique.

**Mansa S Mane, Nikita J Kulkarni and Santosh N Randive (2014)** Brain is a spongy mass of tissues protected under skull which controls entire body motion through signals. Detection of brain tumor area is crucial for irregular shapes and their diverse volumes. This paper discusses on study of various brain tumor detection and segmentation techniques

**Vipin Y. Borole et al (2015)** MRI Image provides better results than CT, Ultrasound, and X-ray. In this the various preprocessing, post processing and methods like; (Filtering, contrast enhancement, Edge detection) and post processing techniques like; (Histogram, Threshold, Segmentation, Morphological operation) through image processing (IP) tool is available in MATLAB for detection of brain tumor images (MRI-Images) are discussed.

#### 4. RESEARCH PROBLEM

Otsu Method is used for the discovery of the tumor in the image which automatically carry out the clustering based image Thresholding. The algorithm suppose that the image contains two classes of pixels following bi-modal histogram, it then calculates the optimum threshold separating the two classes so that their combined spread is minimal, or equivalently, so that their inter-class variance is maximal. Consequently, Otsu's method is roughly a one-dimensional and not fitting for big size images. It took lots of hypothesis while calculating the tumor and the histogram we get in our result is also come bi-modal.

#### 5. PREPROCESSING:

In preprocessing several essential image improvement and noise decrease techniques are implemented. Apart from that dissimilar ways to notice edges and responsibility segmentations have also been used. The purpose of these steps is essentially to perk up the image and the image quality to get more surety and ease in detecting the tumor. The basic steps in preprocessing are the following:-

- Image is transformed to gray scale image in first pace.
- Noise is detached if any
- The get hold of image is then passed through a high pass filter to detect edges
- Then obtained image is added to original image to enhance it.

#### 5.1 PROCESSING:

In processing the following different steps are followed:-

##### 5.1.1 PREPROCESSING

The pre-processing is used to interpret the contribution image into the MATLAB and also to get rid of the clutter there in the image. In this process noise is detached by using median sift. 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.

##### 5.1.2 EDGE Detection by ANE

Filters out clamor in innovative image before trying to situate and perceive any edges. Narrate the edge discovery to a pathway that can be traced in an image. After edge directions are known, non highest restraint has to be functional. Since it uses the Gaussian filter it smoothes the image to good eminence. The two main purpose of using canny filter is

1. Organize the quantity of detail which appears in the edge image.
2. Hold back clutter.

### 5.1.3 THRESHOLD SEGMENTATION:

Segmentation is completed on source of a threshold, due to which entire image is transformed into binary image. Basic matlab commands for Thresholding are used for this segmentation.

### 5.1.4 WATERSHED SEGMENTATION:

It is the finest technique to section an image to divide a tumor but it undergoes from over and under segmentation, due to which we have used it as a ensure to our output. We have not used watershed segmentation on our input, rather it is only used on our output to check of the result is correct or not and it give the correct answer every time as is shown below.

### 5.1.5 MORPHOLOGICAL OPERATORS:

After that some morphological operations are applied on the image after converting it into binary form. The basic reason of the operations is to show only that fraction of the image which has the tumor that is the part of the image having additional intensity.

### 5.1.6 Shunts:

The symptoms of brain tumors are frequently comprised of reason by a increase in heaviness inside the brain. It arises after the tumor wedge the stream of the cerebrospinal fluid (CSF) around the brain. A shunt possibly will be slot in to deplete surplus fluid as of the brain. This will discontinue any supplementary ascend in intracranial anxiety.

A shunt is a extended, emaciated pipe that is positioned in the brain and then strand under the skin to an additional fraction of the body, usually into the covering of the abdominal crater. The tube allows excess fluid from the brain to drain into the abdominal cavity where the body reabsorbs it. The shunt has controller in place so that liquefied can exhaust away from the brain but not back towards it. The shunt is not able to be seen exterior of the remains and you could not be talented to experience it.

### 5.1.7 Steroid therapy

Steroids are basically the treatment that is used to decrease the puffiness which frequently environs brain tumors. Even though steroids don't indulge the tumor itself, they help to improve symptoms and make you feel better. They may be used before or after surgery, or during or after radiotherapy.

### 5.1.8 Side effects of steroids

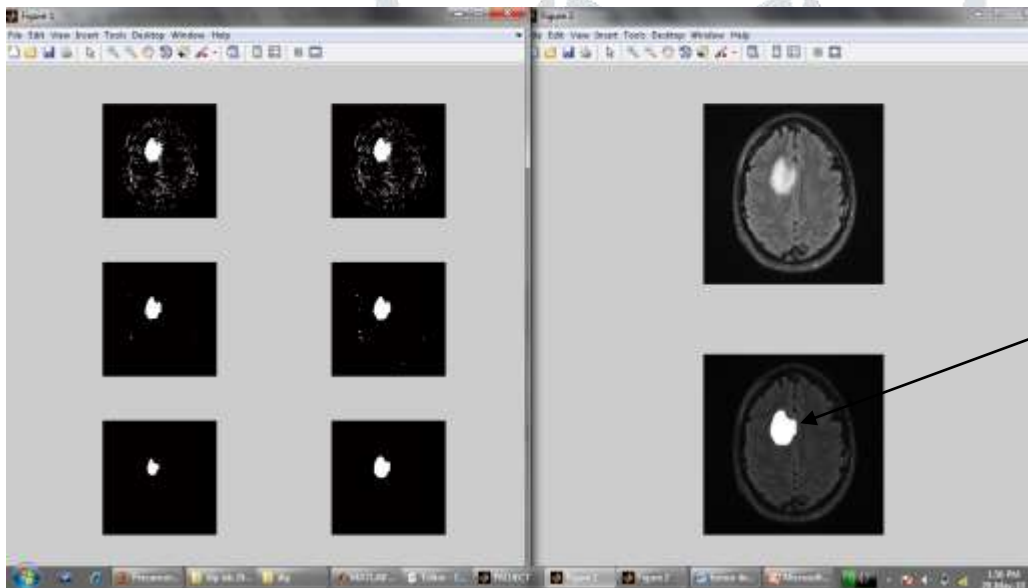
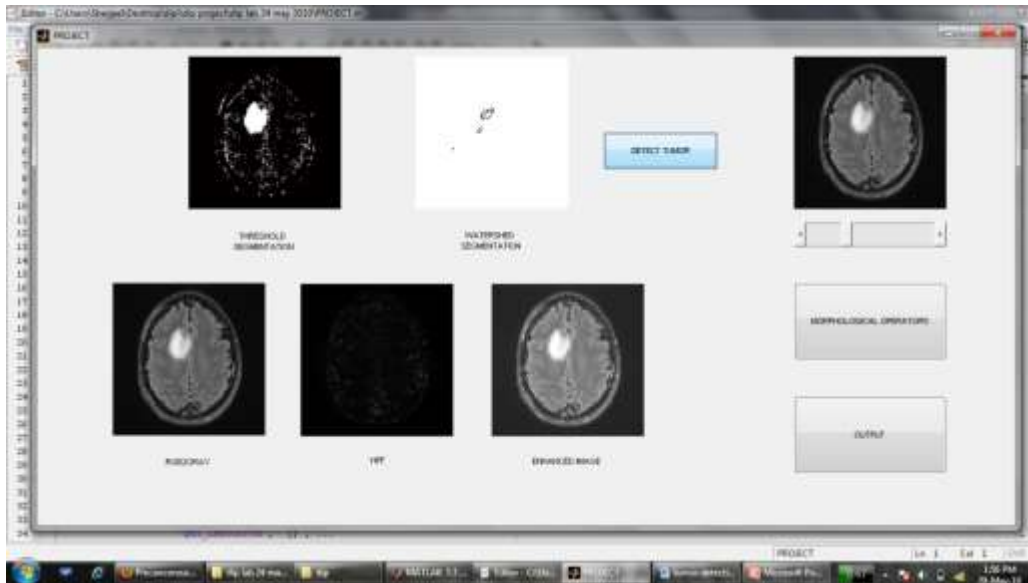
If a steroid is taken for some instance, you may have momentary side property. These can comprise set on burden, dyspepsia, hoist blood heaviness and a somewhat better menace of receiving illness. Some populace also has temperament transform, suffer low or dejected, and come across it tricky to search out to slumber. If steroids are taken for a long time, it might perceive to put on burden or the thigh brute force are delicate. The skin might bump more straightforwardly and undergo skinny.

These special effects may perhaps appear unbreakable to tolerate at the instant, but it's imperative to have down pat that they are transitory and will progressively vanish as the steroid dose is lowered. While you are enclose steroid conduct we need to hold a steroid card to demonstrate the kind of steroid and the quantity being taken.

It's significant not to discontinue taking steroids abruptly as this can formulate illness. The doctor will steadily decrease the amount.

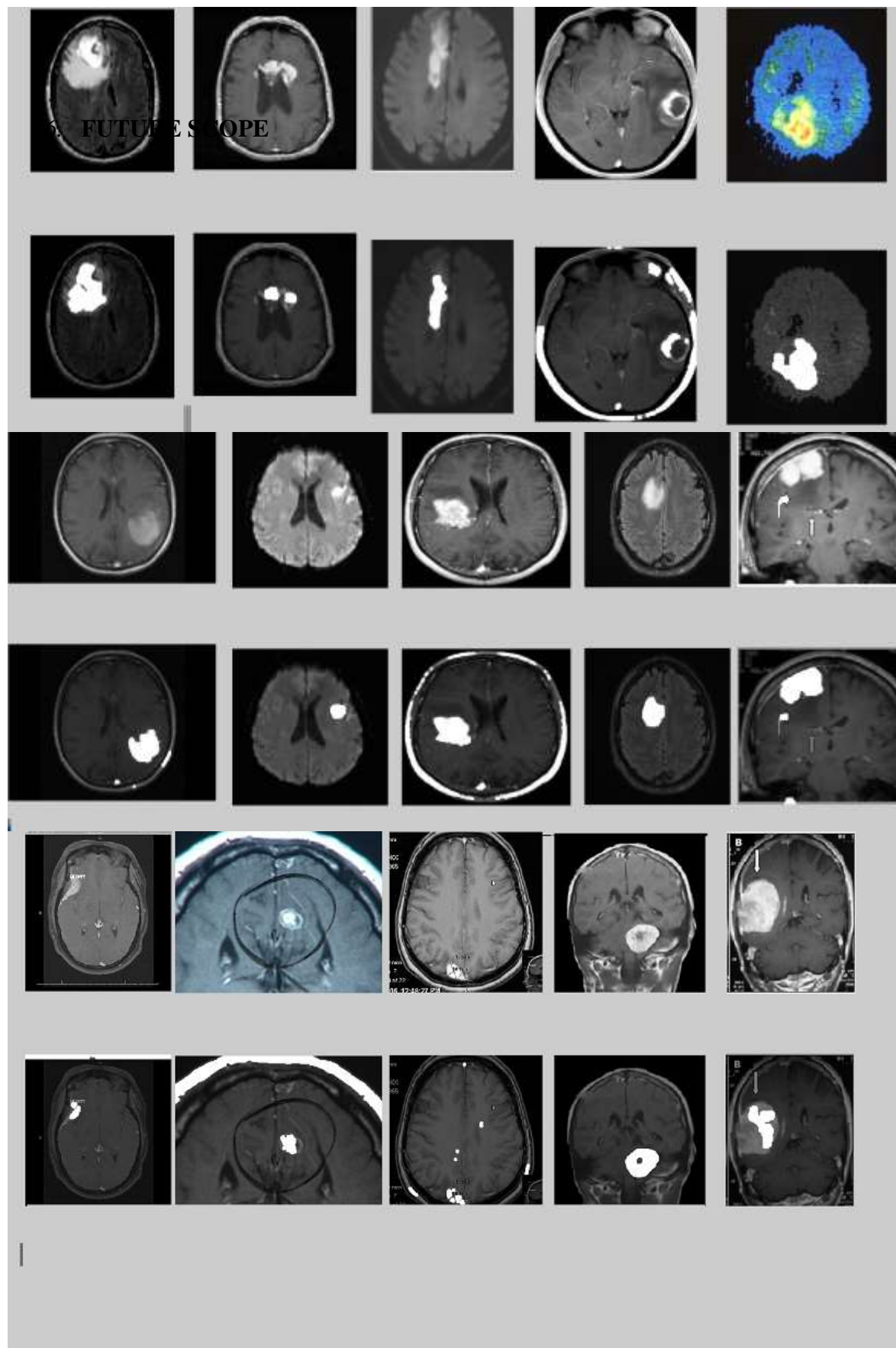
## OUTPUTS/RESULTS:

We have mapped the resultant tumor image onto the original grayscale image for presentation purposes.



TUMOR

**OTHER RESULTS:**



## Future Scope

The future scope for this paper in the tumor disease prediction and detection using the grayscale image pre-processing have a good impact on clearing the doubts raised during previous excises. This method removed the noise part before image processing and after noise is removed, the algorithm is used in this research. This is a multi dimension and there is very less assumption while calculating the edge. After completion of algorithm here we are extracting the tumor part from the image so that it would help in medical field.

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