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Real-Time MRI Images based Brain Tumor Detection using Segmentation Methods

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Abstract *- Brain tumor segmentation aims to separate the different tumor tissues such as active cells and edema from normal brain tissue of white matter(WM), Gray Matter(GM). MRI based brain tumor segmentation studies are attracting more and more attention in recent years due to non-invasive imaging and good soft tissue contrast of magnetic Response Imaging (MRI) images.*

Keywords: *Brain Tumor, MRI Images, Image segmentation*

I. INTRODUCTION

Tumor are different type and have different characteris-tics and different treatment [7]. At present, brain tumor are classified as primary brain tumor and secondary brain tumor. Depending on appearance of brain tumor tissue, it can be categorized in four different ways, which are ranging from Grade I to IV. In general grade I to II are benign brain tumor (low grade);grade III and Grade IV are malignant brain tumor (high grade)[3].basically, normal brain tissue can be divided in two part: Gray Matter(GM) and White Matter (WM). Gray matter contains most of brains neuronal cell bodies. The gray matter includes regions of the brain involved in muscle control, and sensory perception such as seeing and hearing, memory, emotions, speech, decision making , and self-control. White matter is the tissue through which message pass between different area of gray matter within the central nervous system. The white matter is white because of the fatty substance (myelin) that surround the nerve fibers(axons).The myelin that connect the region of GM to each other and to the rest of body. So, such type of brain tumors can be pictured using various kind of medical imaging (MR) techniques, out of these, computed Tomography(CT) and Magnetic Response Imaging (MRI) are generally used techniques for diagnostics imaging of brain. Brain MRI/CT images are 3D images, which are analyzed by expert such as doctor or radiologist for diagnosis of brain tumor.

II. SCAN AND IMAGING TECHNIQUES

A scan first step to identify whether a brain tumor is present or not, and if present, locate exactly where it is growing. A scan creates computerized images of the brain and spinal cord by examining it from different angles. Some scan use a contrast agent to allow the doctor to see different between normal and abnormal tissue. A patient may need more than one type of scan to diagnosis a tumor, depending on its type and location.

Computed Axial Tomography (CAT or CT scan) is a computerized x-ray that can show a combinational of soft tissue, bone, and blood vessels. This often the first test a person will receive is an emergency room.

Magnetic resonance imaging can create clear and detailed three dimensional images of brain tumor.an MRI is not often used with people who have a pace maker or other metal device.

Magnetic response spectroscopy (MRI Spect or MRS), measure the levels of metabolites in the body. An MRS can detect irregular pattern of activity to help diagnosis the type of tumor, evaluate its response to therapies or determine aggressiveness of tumor.

III. MEGNETIC RESPONCE IMAGING

Raymond V. Damadian invented MRI in 1969 and was the first person to use MRI to investigate the human body. As shown in Fig., Magnetic Resonance Imaging (MRI) is a powerful visualization technique that allows images of internal anatomy to be acquired in a safe and non-invasive way. It is based on the principles of Nuclear Magnetic Resonance (NMR). This imaging medium has been of particular relevance for producing images of the brain, due to the ability of MRI to record signals that can distinguish between different soft tissues (such as gray matter and white matter).

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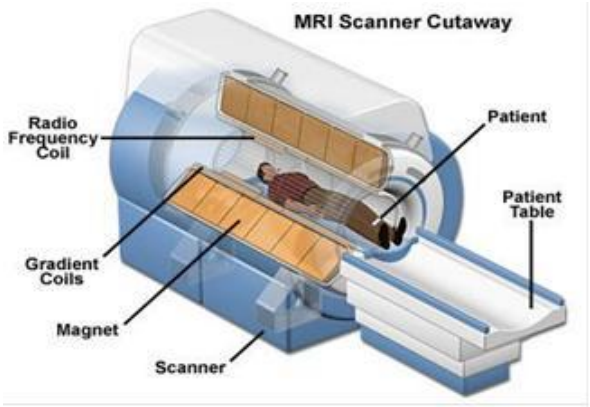

Fig. 1. MRI Scanner Cutaway [7]

IV. BRAIN TUMOR SEGMENTATION METHOD

Now a day brain tumor segmentation method can be orga-nized in to different categories based on different principle.

A. Image Acquisition

MR images are used as input and then the images are stored in MATLAB in .jpg form and converted in to a gray scale image. For experimental results both male and female patients are examined with MRI scans and their scans are stored in database of images in JPEG format.

B. Pre processing

Pre processing is done to enhance the image,to improve the finer details. Enhancement will result it more well defined edges and a sharpened image is formed.

C. Thresholding

Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images. Thresholding technique are based on the thresh-old, which are usually determined from the image histogram. In this method the desired object has all the pixel value (gray intensity, color, or other relevant feature) lying between two value of threshold.

D. Dilation

Dilation adds pixels to the boundaries of objects in an image, while erosion removes pixels on object boundaries. The number of pixels added or removed from the objects in an image depends on the size and shape of the structuring element used to process the image. In the morphological dilation and erosion operations, the state of any given pixel in the output image is determined by applying a rule to the corresponding pixel and its neighbors in the input image.

E. Median Filter

The example specified above shows that both a color distortion and the loss of the characteristic of edge preservation may occur when the median filter is applied separately to each single component of the color vectors. If all three color components are regarded at that time, an order must be defined for the sequence of color vectors that defines, e.g., when a vector is larger or smaller than another vector. Several techniques have been proposed for median filtering in color images, e.g.:

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a) An adaptive scalar median filter,

b) A vector median filter (with weighting and without weighting),

c) A reduced median filter,

d) A median filter applied to chromaticity in the HSI space,

e) A median filter based on conditional ordering in the HSV space, and

f) Vector directional filters.

Moreover, vector median filters can be joined to morphological operations considering a lexicographic order. Detailed descrip-tion about the mathematical theory on the connection may be found in.

V. RESULTS

FIG. 2. ORIGNAL IMAGE

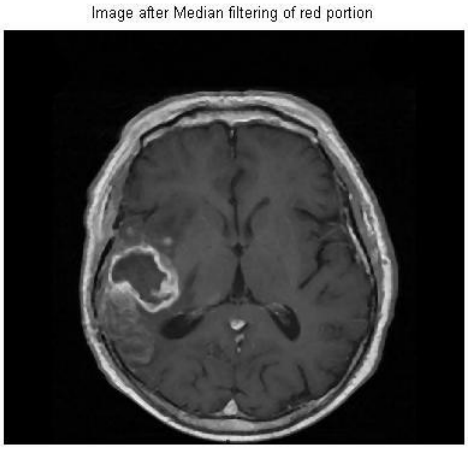

FIG. 3. MEDIAN FILTERING IMAGE

Fig. 4. Thresholding

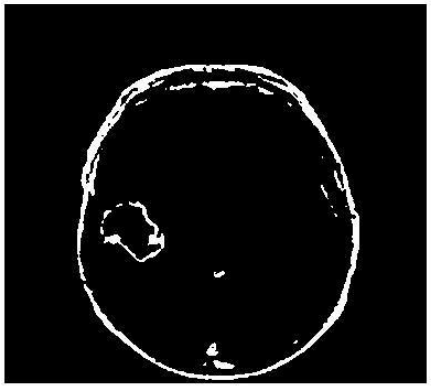

Fig. 5. Blob Analysis

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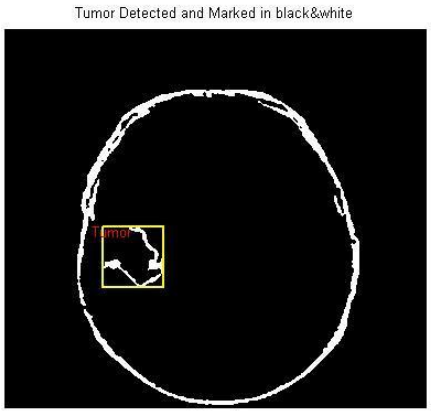

Fig. 6. Tumor Detected

VI. CONCLUSION

Image of brain has been analysed here. It has been pro-cessed, to automatically detect the tumorous portion, by ap- plying thresholding, and segmentation using blob analysis. The results are up to the mark, and are helpful for the solution we are looking for.

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