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A Review on Tumor Detection in Medical Images

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Abstract - *Today image handling assumes an imperative part in medical field and medical imaging is a developing and testing field. Medical imaging is invaluable in finding of the infection. Many people suffer from brain tumor it is a serious and dangerous disease. Medical imaging provides proper diagnosis of brain tumor. There are numerous systems to identify brain tumor from MRI images. These strategies face challenges like finding the location and size of the tumor. To detect the tumor from the brain is most important and difficult part, image segmentation is used for this. Already, various algorithms are developed for image segmentation. In this review paper cover the basic terminologies of brain tumor and MRI images, and also survey of various brain tumor segmentation startegies.*

Key Words: Brain Tumor, Magnetic Resonance Image and Image Segmentation.

1. INTRODUCTION

Main organ in human nervous system is human brain it is located in human head and covered by skull. The function of the human brain is to control the overall parts of the human body. It is a one kind of organ that allows human to adapt and endure varying environmental condition. The human brain enables human to execute action and share thoughts and feeling. In this section we describe the structure of the brain for the understanding of basic things [4]. Primary brain tumor originates in the brain itself, in benign it can be non-cancerous and malignant (cancerous). Benign tumors grow slowly, and one type of brain tumor is gliomas. It originates from non-neuronal brain cells called atrocities. Some primary tumors are less aggressive but these can exercise much pressure on the brain and make it dysfunctional, and more aggressive tumor grow more quickly and spread to other tissues. The biological characteristics of the tumors are different.

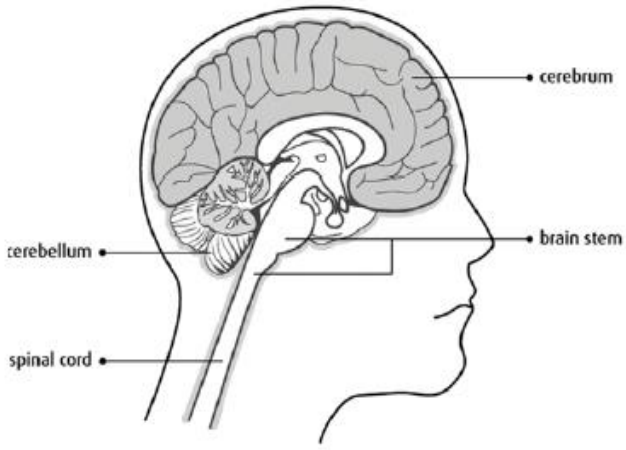

Figure 1: Human Brain Structures.

Secondary brain tumors originate through other parts of the body. These tumors have cancer cells somewhere else in the body that have metastasis or spread to the brain. Secondary brain tumor are always malignant. The secondary brain tumor caused mainly due to lungs cancer, kidney cancer, bladder cancer etc. [6].

2. MAGNETIC RESONANCE IMAGING

MRI is the most perfect technique in radio because with the help of MRI we are able to visualize the details of internal structures. MRI images observe different soft tissues of the human body and are capable to contrast between these tissues.

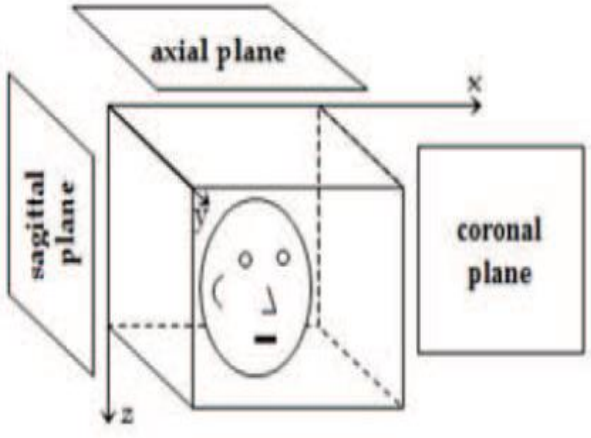

Figure 2: Brain MRI Images.

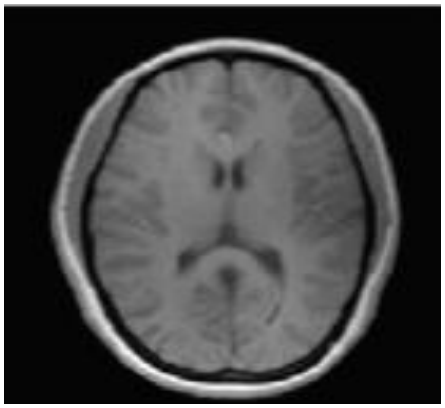

Figure 3: Axial Plane.

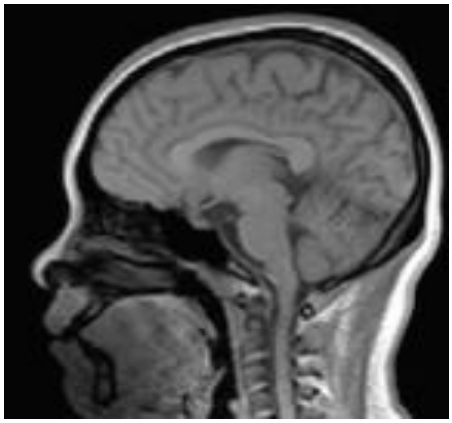

Figure 4: Sagittal Plane.

MRI images have better quality as compared other medical imaging techniques such as Computer tomography or X-rays, MRI is able to give internal structure of the body to be visualized with some details [7].

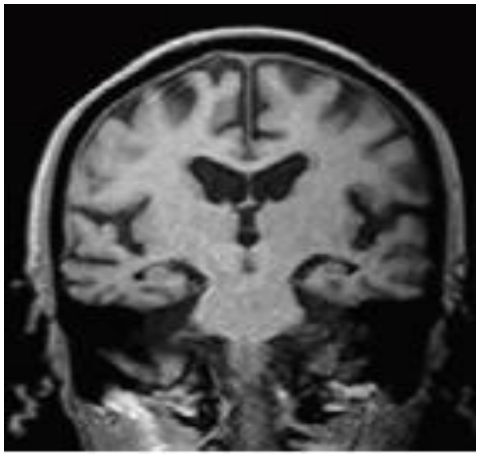

Figure 5: Coronal Plane.

With the help of MRI test are achieve three types of brain MRI images of the same body a) T1-weighted b) T2-weighted and c) Proton density images. MRI images are captured into three Planes or coordinates axial plane, coronal plane and sagittal plane as shown in Figure 2, 3, 4 and 5[7].

3. IMAGE SEGMENTATION

Image Segmentation is the procedure of partition a digital image into numerous regions or sets of pixels. Basically, in picture segments are diverse items which have a similar texture or color. The image segmentation results are a set of regions that cover the whole image together and a set of contours extracted from the image [11]. All of the pixels in a region are similar with respect to some characteristics such as color, intensity, or texture. Neighboring regions are considerably different with respect to the same individuality. The different approaches are

1) By finding limits between regions based on discontinuities in intensity levels.
2) Thresholds based on the distribution of pixel properties, such as intensity values
3) Based on finding the regions directly.

Image segmentation divides an image into meaning full structure. Image segmentation is a technique used in various applications like image analysis, object representation, visualization [8]. Often a digital image is divided into multiple

region through image segmentation. The main goal of the segmentation is to convert an image into meaningful object. It makes easier to analyze an image. In medical field image segmentation plays an important role in clinical diagnosis, most of the medical images have poor contrasts, many types of noise, or diffusive boundaries [9]. Preprocessing steps involve noise removal from these images [10]. Image segmentation algorithms are work on two fundamental properties of image intensity values: 1.Image discontinuity and 2.Image similarity [11]. Based this segmentation is performed in two ways, first changes the intensity of a pixel in an image, such as edges and corners. The second one is based on partitioning an image into region .On the basis of these, there are many segmentation techniques which are broadly use.

Maksoud et al. used hybrid segmentation techniques, and proposed well-formed image segmentation approach. K-Means clustering algorithms are integrated with fuzzy C-Means [12] algorithm. This technique provides accurate brain tumor detection. It takes the benefit of the K-Mean clustering algorithm for image segmentation in the aspects of minimal computation time and the advantages of Fuzzy C-Means aspects of accuracy. With the help of K-Means clustering algorithm brain tumor is detected faster than fuzzy C-Means but fuzzy C-Means give information of cells accurately. Those images that are affected by noise, outliers, and other imaging artifacts are not segmented correctly by FCM. In future work of proposed method, the 3D evaluation of the brain tumor detection using 3D slice will be carried out [13].

Melegy et al. worked on a fuzzy approach for the segmentation of normal and pathological brain from MRI images. This method is based on fuzzy c-means algorithms and was used for automatic segmentation of the normal and pathological brain. PIGFCM segmentation algorithm segmented the brain tissues as gray matter, white matter, cerebrospinal fluid. Prior information based on the expertise was used for tissues segmentation. Pathological brain had some additional classes like abnormal tissues such as necrosis and edema. Authors have worked on both simulated and real images [14].

Huang et al. proposed a method to segment the tumor as a classification problem. Numerous brain tumor segmentation is still a challenging task, such as high diversity in tumor appearance, ambiguity in tumor boundaries. To solve this problem author proposed a novel automatic tumor segmentation method for MRI image. LIPC classification based method was used to classify each voxel into different classes. LIPC divides the data into different class model. LIPC used local independent projection for classification model. Author evaluated the proposed method using both synthetic and publically available MRI image data [15].

5. CONCLUSIONS

In this paper, a portion of the current research work done on the brain tumor detection and segmentation is reviewed. Different techniques used by various researchers to detect the brain tumor from the MRI images are described. This paper depicts the outline of the brain and brain tumor and also describes the MRI images. Some conventional strategies and other segmentation procedures are depicted. By this review found that automation of brain tumor detection and segmentation from the MRI images is a standout amongst the most dynamic research zones.

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