Survey on Brain Tumor Magnetic Resonance Image Segmentation Methods

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Abstract- **The boundary of the brain tumor in the image is traced by hand but it is time consuming, complicate to detect. In recent time, MRI is the most useful method in biomedical imaging and medical image processing. MRI provides information about anatomy and determining disease, tracking the diseases. For brain tumorsegmentation, MRI plays a key role. There are number of methods already presented on braintumor segmentation. The segmentation process is determination of different tumor tissues such as active, tumor, necrosis, edema from normal tissues. The manual process of segmentation is time consuming and tedious task. So, we need technique to segmentation. In this paper describe different methods of segmentation.**

Index Terms- **brain tumor segmentation, magnetic resonance image, segmentations.**

I. INTRODUCTION

A brain tumor is an abnormal growth of the cell inside brain. A brain tumor can be cancerous or noncancerous [1]. It's mass of abnormal tissues which grow uncontrollably. There are 120 different of brain tumor, which all makes effective treatment difficult. In spite of numerous efforts and promising results in the medical imaging community, accurate and reproducible segmentation and characterization of abnormalities are still a challenging and difficult task because of the variety of the possible shapes, locations and image intensities of various types of tumors [3]. The brain tumors can be of two types primary &secondary.

Primary brain tumor starts in the brain and classified into two types: benign and malignant. Result in the death of person. Most common primarybrain tumors aregilomors, meningioma, pituitaryadenomas, and nerves health tumors [1]. The benign tumours can be removed. They do not spread to other part of body. Moles are example of benign tumor. Malignant can be more serious sometimes a threat to life. Thesetumors grow rapidly to other tissues and ultimately.
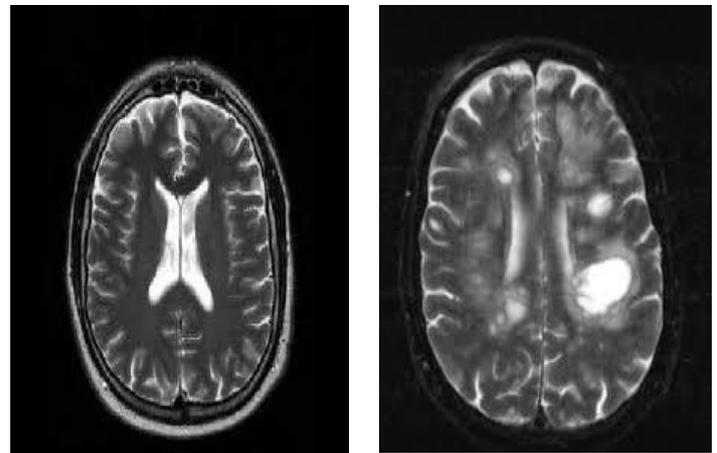

Figure- 1 Normal brain [11] Figure- 2 Abnormal brain [11]

The detection of brain tumors there are many imaging methods for diagnostics purpose are presented. These imaging techniques are Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), and Computed Tomography (CT) [5]. MRI is most efficient for the research of brain tumor detection and classification as compared to other imaging techniques.

MRI (Magnetic Resonance Image):

MRI provides real-time view (soft tissue). The MRI images can be captured in multiple body planes without changing the physical positions of the patient underare scanning process. MRI findings are based on form the image [2].Magnetic resonance image is non-invasive medical test that helps physicians diagnose and treat medical condition. MRI uses a powerful magnetic field, radio frequency pluses and computer to reduce

detailed picture of organs soft tissue bone and virtually all other internal body structures MRI does not use ionizing radiation (x-ray). The images can then be examined on a computer monitor, transmitted electronically, printed to CD.MRI mostly used to detect tumors of brain, chest, diseas of the liver, heart problems, malformations of the blood vessels and feature in the worm of a pregnant women's.

Some advantage of detecting brain Abnormality by MR images are: -

- In that no need to inject drug into the human body
- In that process not any radiation damage and is completely safe.
- Patient's body is not physically hampered for diagnosis purpose [7].

II. RELATED LITERATURES

Kailash Sinha [11] introduces k-mean clustering with watershed algorithm, optimized k-mean clustering with genetic algorithm and optimized c-mean clustering with genetic algorithm. Comparison was also made. C-mean clustering after optimization was better than other method.

Akshay M. Malviyal [13] introduces discrete wavelet transform, Gabor wavelet, threshold segmentation and then produced the accurately tumor from brain tissue.

Praveen Kumar E [4] introduces Region Glowing method and eliminates the noise and unwanted region with better output. Segmentation with prepossessing gives good quality and accurate output than the segmentation without prepossessing.

J.Vijayl [10] introduces combine segmentation and k mean clustering algorithm. K mean clustering method is fairly simple when comparedwith frequently used fuzzy clustering methods. Less execution time is achived when compared with other clustering methods used less number of iterations. Maximum lossless compression is also achived.

Kamini Verma [16] is used high bride segmentation like thresholding edge detection, watershed segmentation and detects the tumor.

Priyankal [18] introducecanny, sobel detection segmentation, k mean clustering and comparative study different techniques.

M.Shasidhar [17] using fuzzy c mean clustering. Compare with modified fuzzy c mean clustering

algorithm. Modified fuzzy c mean faster than the fuzzy c mean techniques.

Roshan G. Selkar [15] Using Watershed and thresholding algorithm and describes theComparative study about the tumor detection. Using Watershed and thresholding algorithm and describes the Comparative study about the tumor detection.Thresholding algorithm rather than Watershed algorithm and also finding the boundary extraction ofTumor by using canny edge detection operator.

III. BRAIN TUMOR SEGMENTATION METHODS

Segmentation is the process of partitioning an image into semantically interpretable regions. Main objective of review section is to present literature survey of image segmentation methods. Brain MRI image segmentation is classified as thresholding, watershed, region-growing, clustering, atlas-based, image/symmetry analysis etc.

A.Thresholding

Thresholding is the method which usedfor image segmentation.in this method, image is separated into regions. For all different regions different gray scale are used. Histogram of this image can be plotted with peaks and valleys where every peak represents a region and valleys between peaksrepresent a threshold value. Histogram thresholding divides image into two equal halves and these histograms are compared to detect brain tumor. Then, to find a proper dimension of brain tumor, cropping method is used. This thresholding is used in mammography to derive issues into normal/abnormal class.presence of issues such as intensity and noise will corrupt the histogram.

B. Watershed Segmentation

Segmentation using the watershed transforms works well if you can identify, or 'mark', the foreground objects and background locations. Segmentation function is an image whose dark regions are objects, which we are trying to segment. In this method, pixels are grouped based on their intensities. Pixels with similar intensity are grouped together. It is morphological operating tool. Morphological techniques probe an image with a small shape called structuring element which is placed at all possible regions of the image to compare with the corresponding pixels [6].

C. Region Growing

In this method, images are partition into many clusters based on similar pixels groups. Set of seeds is taken as input along with image. Then all the neighbour pixels are compared to their corresponding initial pixel. Difference between pixels intensity and groups mean intensity is used as measure of similarity pixel with smallest difference will be allocated to region. This way, all pixels are allocated to respective region.

D. Clustering

Clustering group's pixel based on some feature or characteristic. A cluster consists similar object of groups. There are two type of clustering supervised and unsupervised. In supervised, the criteria are user specified. In unsupervised, the criteria are specified by the clustering system itself.

1) K-Means Clustering:

Automation of detection and segmentation of brain tumorsin MRI images is a very challenging task due to occurrence of high degree of gray level similarity in the image [2]. K-mean clustering is iterative method. First, there are K centre pixels are choosen. Then each pixel in the image and from them to centres, all distances are calculated and according to average distance new centres are chosen. This process continues until the optimal average distance reached.

2)Fuzzy C-Means Clustering:

Fuzzy C-means clustering is a data clustering method. In this method each pixel in the image given the partial membership value this value can be ranged between 0 to 1. Member of one fuzzy set can be a member of other fuzzy set too. There is a membership function which defines fuzziness in image by membership value given to each pixel. Here, measure like distance connectivity and intensity may be used to determine classes. The effectiveness of the FCM algorithm in terms of computational burden rate is improved by modifying the
Cluster centre and membership value up dating criterion and convergence rate is compared between the conventionalFCM and the improved FCM [9].

E. Image/ Symmetry Analysis

In this method in addition to area of the region and edge information uses prior information, and also its symmetry analysis which is more consistent in pathological cases. First input image divided into two symmetry halves. Assuming that the head is not rotated and the symmetry axis is parallel to the vertical axis. Divide the image of detected brain into two part of the same size. A square block with the side length computed as one the input image is created.

That size suitable for the detection of the small and large tumors. The algorithm goes through both halves symmetrically by the block [7]. The size to ensure the over lapping of particular areas. These areas are compared with its opposite symmetric part [7].A conceptually simple supervised block-based and image-based (shape, texture and content) technique has been used to analyse MRI brain images with relatively lower computational requirements.

F. Edge Detection Based Segmentation

In this the image detects outline of an object and boundaries between objects and the background by the edge detection process. Apply derivative operator to detect edge of image. Measure strength of the edge by measuring amplitude of the gradient. The basic edge detection operator shows a matrix area gradient operation that determines the level of variance between different pixels. This method is based on marking of discontinuities in grsay level, color etc. The edge-detection operation is performed by forming a matrix centered on a pixel chosen as the center of the matrix area [12]. If the value of gradient matrix is above a given threshold value, the middle pixel is considered to be as an edge

IV. CONCLUSION

In this paper we have studied the different aspects of medical imaging diagnosis of the brain tumor using MRI. I we have presented the review of different brain image segmentation methods. The information about different kind of MRI images data which are frequently use for research studies. View above all method we conclude that clustering method is better than other method. We find more accurate, efficient as well as faster method for early detection and classification of brain.

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