Survey Paper on Diagnose of Brain Tumor Segmentation

Alkesh M. kaba[1], Reena P. Parmar[2],

[1]*Student, Computer Department, Swamminarayan College of Engg. & Tech , Gujarat, India*
[2]*Professor, Computer Department, Swamminarayan College of Engg. & Tech , Gujarat, India*

ABSTRACT

Segmentation of tumor from magnetic resonance image (MRI) brain images is an emergent research area in the field of medical image segmentation. As segmentation of brain tumor plays an important role for necessary treatment and planning of tumor surgery. However, segmentation of the brain tumor is still a great challenge in clinics, especially automatic segmentation. Segmentation of the white matter from the brain MRI images for the study of brain activities and for the diagnosis for various brain related diseases caused by the changes and damages to regions of the brain continues on a manual time consuming segmentation technique. We present a solution for automatic segmentation of the brain MRI images; the solution contains three steps which are pre-processing the raw images, Segmentation and finally performing the Classification by of the images based on the calculated.

Keyword : - *Tumor, Segmentation, MRI, CT Scan*

I. INTRODUCTION

Brain tumor segmentation is one of the competitive task to analyse the characteristics of tumor in medical treatment planning. Segmentation of brain tumor is a vital step in the initial detection of tumor in the medical field. Segmentation of brain tumor takes into account the detachment of tumor tissues (tumor, edema and necrosis) from normal brain tissues: gray matter (GM), white matter(WM) and cerebrospinal fluid (CSF)[1].

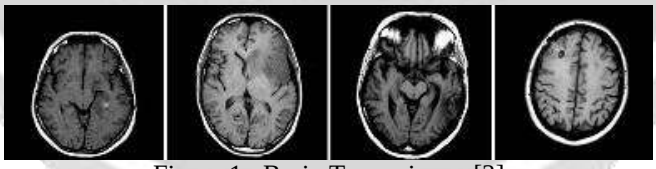

Figure 1 : Brain Tumor image[3]

Brain tumor, is the growth of abnormal cells, which can be either cancerous or non-cancerous. Depending on the type, tumors are classified as Benign Tumor and Malignant Tumor. The earlier stage of detection is necessary in such a way that to prevent the complications of loss of vision and speech which could lead to paralysis and even to death. Currently, in segmenting brain tumor multimodal MRI images are used simultaneously. The radiologist's uses multimodal MRI images because it provides the complementary information regarding on tumor area. Although it provides immense data regarding tumor area, the segmentation of tumor is defined to be the complicated and difficult task. This is because of their heterogeneity and they are visually vague. The heterogeneity of tumor makes the process tedious, since they have different shapes and sizes which appearing different location. In addition to this, noise in the brain also increases the complexity in segmenting tumor. Therefore automatic brain tumor segmentation is considered in order to provide the acceptable performance [2].

II. TYPES OF TUMOR

The Brain tumor is classified into two main types, namely:

a) Primary tumor:

Primary tumors are those which develop in the brain. The initial growth of the abnormal and the unwanted tissues in the brain is called as the primary tumor. From the brain, the tumor has been spread to various parts of the body. Depending on the concentration the primary tumor are classified in to two types[2].

1) Benign tumor: Benign tumor is a tumor where they are having their boundaries or the edges in which they does not spread over the other parts of the body. Tumor is considerably quite serious if they are meant to be in the vital areas of the brain. On another hand, Tumor can step in to the disability and even it lead to the death [2].

2) Malignant tumor: In malignant tumor are considered to be the most serious one and they develop rapidly. They affect the various vital organs which may leads to the death. About 85% of the malignant tumors are referred to as the gliomas, Gliomas refers to the tumors which have been originated from the gilial cells of the brain [2].

b) Secondary tumor

Secondary brain tumor is a tumor where the tumor in the brain is arisen from the other tumor in the body. They are mainly formed from the cells that have broken away from the primary tumor and have spread in the bloodstream to the brain. The primary source for the secondary tumor is the lung or the blood cancer [2].

III. DIAGNOSE OF BRAIN TUMOR

The various modalities are Neurologic exam, MRI, CT scan, Angiogram, Spinal tap, Biopsy, Biopsy at the same time as treatment, Stereotactic biopsy [8].

- **Neurological Exam**
  The neurological examination is a series of simple questions and tests that provide crucial information about the nervous system. It is an inexpensive, noninvasive way to determine what might be wrong. The neurological examination is divided into several components, each focusing on a different part of the nervous system mental status, cranial nerves, motor system, sensory system, the deep tendon reflexes, coordination and the cerebellum [8].
- **Magnetic Resonance Imaging (MRI)**
  MRI is basically used in the biomedical to detect and visualize finer details in the internal structure of the body. This technique is basically used to detect the differences in the tissues which have a far better technique as compared to computed tomography (CT). So this makes this technique a special one for the brain tumor detection and cancer imaging [8].
- **Computed tomography (CT) scan**
  The CT scan is an x-ray test that produces detailed cross-sectional images of your brain. Instead of taking one picture, like a regular x-ray, a CT scanner takes many pictures. CT scans are not used as often as MRI scans when looking at brain or spinal cord tumors, but they can be useful in some cases. Before the CT scan, you may get an injection of a contrast dye through an IV (intravenous) line. This helps better outline any tumors that are present [8].

IV. LITERATURE REVIEW

Research paper [4], Heena Hooda, Om Prakash Verma Tripti Singh, IEEE, Medical imaging is a technique that is extensively used to create images of human body for medical and research purposes. Magnetic Resonance Imaging (MRI) is a powerful visualization tool that permits to acquire images of internal anatomy of human body in a secure and non-invasive manner. Automatic brain tumor detection from MRI images has become one of the major areas of medical research. In this paper important task in the diagnosis of brain tumor is to determine the exact location, orientation and area of the abnormal tissues. We discuss the performance analysis of image segmentation techniques, viz., K-Means Clustering, Fuzzy C-Means Clustering and Region Growing for detection of brain tumor from sample MRI images of brain. We have mentioned performance evaluation of techniques is done on the basis of error percentage as compared to ground truth.

Research paper [5],Malsawm Dawngliana, Daizy Deb, Mousum Handique, Sudipta Roy , IEEE, Segmentation of tumor from magnetic resonance image (MRI) brain images is an emergent research area in the field of medical image segmentation. As segmentation of brain tumor plays an important role for necessary treatment and planning of tumor surgery. However, segmentation of the brain tumor is still a great challenge in clinics, specially automatic segmentation. In this paper we discuss about in hybridized multilevel thresholding and level set method for automatic segmentation of brain tumor. The innovation for this paper is to interface the initial segmentation from multilevel thresholding and extract a fine portrait using level set method with morphological operations. The results

are compared with the existing method and also with radiologist manual segmentation which confirm the effectiveness of this hybridized paradigm for brain tumor segmentation.

Research paper [6],Padmakant Dhage, Prof. M. R. Phegade, Dr. S. K. Shah,IEEE, Detection of brain tumor is one of the emerging topics of research in biomedical image processing. Accurate detection is critical, especially when the tumor morphological changes remain subtle, irregular and difficult to assess by clinical examination. This paper we discuss about the ability of watershed segmentation to separate the abnormal tissue from the normal surrounding tissue to get a real identification of involved and noninvolved area that help the surgeon to distinguish the involved area precisely. At the end of the process tumor is extracted from the MR image and its exact position and shape are determined and various parameters like perimeter, eccentricity, entropy and centroid have been calculated.

Research paper [7], Shang-Ling Jui, Shichen Zhang, Weilun Xiong, Fangxiaoqi Yu, Mingjian Fu, Dongmei Wang, Aboul Ella Hassanien and Kai Xiao, IEEE, Extraction of relevant features is of significant importance for brain tumor segmentation systems. In this paper,we discuss about in the objective of improving brain tumor segmentation accuracy, we present an improved feature extraction component to take advantage of the correlation between intracranial structure deformation and the compression from brain tumor growth. Using 3-dimensional non-rigid registration and deformation modeling techniques, the component is capable of measuring lateral ventricular (LaV) deformation in the volumetric magnetic resonance (MR) images. By verifying the location of the extracted LaV deformation feature data and applying the features on brain tumor segmentation with widely used classification algorithms, in this paper proposed component is evaluated qualitatively and quantitatively with promising results on 11 datasets comprising real patient and simulated images.

V. TUMOR SEGMENTATION

a) Thresholding

Thresholding based segmentation discriminates pixels according to their gray level value. The key parameter in the thresholding process is the choice of threshold value. This procedure determines an intensity value, called threshold, which separates the desired values. Failing to find such a threshold may lead to poor segmentation [6].

b) Clustering

Clustering is dividing of data into groups of similar objects. Each group consists of objects that are similar between themselves and dissimilar to objects of other groups. But, its major disadvantage is that it does not produce same result with each run, because the resulting clusters depend on initial random assignments and some images may not have appropriate keywords to describe them and therefore the image search becomes different [6].

c) Level Set Method

This technique represents the evolving contour using a signed function, where its zero level corresponds to the actual contour. The limitation of level set method are that the 3D level sets are relatively slow to compute and their formulation usually entails several free parameters, which can be very difficult to correctly tune for specific applications. Thus level set segmentation is not sufficient for the segmentation of the complex medical images and they must be combined with powerful initialization techniques to produce successful segmentation [6].

VI. CONCLUSION

In this literature review paper, we discuss about with the objective of enhancing brain tumor segmentation correctness with the use of features extracted from deformation caused by the reduce from brain tumor, we discussing feature extraction component for brain tumor segmentation systems. In this component, dynamically created template and 3- dimensional deformation modeling are adopted to assure the relevancy between extracted feature. The viability of the approach is demonstrated by visualizing the extracted feature, where it can be observed that the location of maximum feature data corresponds to the tumor growth. In the comparative brain MR image tumor experiments, the accuracy gains shown by statistical measures demonstrate the positive effects from the supplementary feature, thus additional validating the proposed method.

VI. REFERENCES

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