RESEARCH ARTICLE OPEN ACCESS

Hybrid Approach to Detect Brain Tumor in MRI

Pragya Bansal[1], Krishan kumar[2]
Research Scholar[1], Assistant Professor[2]
Department of Computer Science and Engineering
Jan Nayak Ch. Devilal College of Engineering, Sirsa
Haryana – India

ABSTRACT

The best type of imaging to diagnose most types of brain tumors is MRI. These scans use magnetic fields and radio waves, rather than X-rays, and computers to create detailed pictures of the brain. MRI stands for magnetic resonance imaging techniques. The accurate detection of size and location of brain tumor plays a vital role in the diagnosis of tumor. It is very difficult to find the accurate location of brain tumor. The brain cancer can be counted as the most deadly and intractable disease. Tumors may be embedded in the regions of brain. In this paper we are going to introduce a hybrid technique, which helps in detection of exact tumor position and the technique is based on region prop, edamass and brightness gradient.

Keywords:- MRI, Brain Tumor, Segmentation, Region prop , Edamass, Brightness Gradient

I. INTRODUCTION

A brain tumor is a solid mass of abnormal cells within the brain. It is a set of some abnormal tissues that take place due to uncontrolled cell division[2].In the general normal cell growth, the old cells or the damaged ones gets replaced by new cells but in abnormal growth, for reasons that have yet not been diagnosed the tumor cells reproduce uncontrollably and may even turn fatal.

Types of Brain Tumor

They may be primary (starting in the brain) or secondary (spreading to the brain from another area). These tumors need different treatment options which generally vary depending on the tumor type, size and location and the tumor spread area; and the age and health of the person. Dependent upon the origin of tumor cells, Brain tumor is generally classified as Primary or secondary tumor. Primary tumor originate in brain cells whereas secondary tumor originate in another body cells and spread to brain.

- **PRIMARY TUMOR**

Primary tumors originate in the brain cells, just those which belong to the oregion Growingan or tissue where they start. A primary brain tumor starts from cells in the brain. The research has proved that 50% of all primary tumors originate from cells of the brain that support the body's nervous system. The Tumors that are related to the nervous system are called gliomas, and they originate in the brain cells. Those tumors that originate in Central nervous system constitute a heterogeneous group of diseases which may be classified as benign, slow-growing lesion or aggressive malignancies that can cause death within a matter of months if left untreated.

- **SECONDARY TUMOR**

These are made up of cells that actually originated from another part of the body and then has spread to brain cells. Secondary brain tumors are actually composed of cancer cells from somewhere else in the body that have metastasized, or spread, to the brain, such as osteosarcoma (a primary bone tumor) or rhabdomyosarcoma (a primary tumor of muscle). These lesions tend to be rather well defined and may be more easily removed by suRegion Growingery [46. It is also called a space-occupying lesion (SOL). Not all tumors are cancer, and not all cancers are tumors.

II. MAGNETIC RESONANCE IMAGING

Magnetic Resonance Imaging (MRI) is a powerful visualization technique. It allows images of the internal anatomy to be acquired in a safe and non invasive way. It is based on the principles of Nuclear Magnetic Resonance (NMR). It allows a vast array of different types of visualizations to be performed. This imaging medium has been of the particular relevance for producing images of the brain. It can be work like this due to the ability of MRI to record signals. [These signals are distinguish between different soft tissues. In imaging the brain, two MRI visualizations are used, as:

- T1-weighted
- T2-weighted images.

These are generally referred to the dominant signal, that help the measured to produce the contrast observed in the image. The areas with high fat content have a short T1 time relative to water. The T1 weighted images can be thought of as visualizing locations of the fat. In visualizing the brain tumors, a second T1-weighted image is often acquired after

a injection of contrast agent. These agents' compounds usually contain an element whose composition causes a decrease in the T1 time of nearby tissue.

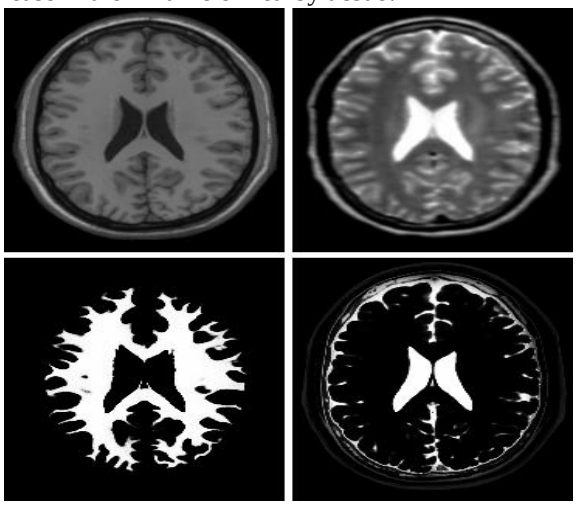

Fig 1 : signal properties.

As in the top left side the T1weighted image is shown, this image having the light regions visualize locations of the fat. The top right side contains the T2 weighted image, in this image it describes the light regions visualize locations of the water. The bottom left picture shown the white matter locations. The bottom right corner contains the cerebrospinal fluid locations. The Edema may known as swelling. it can also be observed in many types of Primary tumors and appears as hyper intense in T2 images. Treatment of primary brain tumor involves a combination of surgical resection, radiation therapy, and chemotherapy MRI is used in tumor diagnosis, monitoring tumor progression, planning treatments, and monitoring responses to treatment.

III. PROBLEM FORMULATION

Brain tumor images consist of speckle noise. The main problem in the current work is to purpose a system for identifying the brain cancer tumor from MRI. Initially the segmentation will be done for detecting the tumor. The speckle noise will be suppressed the next phase features will extracted out of the segmented image. The feature extracted of the image will represent its properties and on the analysis of values of the texture feature parameters the ultrasound image will be classified as benign and malignant brain cancer tumor. Here to solve this problem, the region based and the EDAMAS brightness gradient method is used for the detection of the tumor. They have several advantages, but line and edge information in computer vision systems are also important. The proposed method tries to combine region and skull information.

IV. METHODOLOGY

Here our main task is to detect the brain tumor from MRI images and for that we are going to integrate some detection algorithms so that we can find the proper size and position of tumor in MRI images. Here we are going to integrate three algorithms to do this task and these algorithms are brightness gradient, region prop and EDAMAS. First of all we will use brightness gradient. This algorithm uses local brightness gradients to detect boundaries. It draws boundary on the basis of brightness. Now brightness can be low or high means our object in MRI can be brighter then background or it can be less bright means there will be a difference of object and background. So here we are going to use brightness gradient to detect boundary so that we can easily detect tumor in MRI.

Fig 2: Brightness gradient

Now after detecting skull through brightness gradient we will do image segmentation and through it we will divide our MRI image into two segments so that we can properly detects the size of tumor. Then after we will apply REGION PROP and EDAMAS technique on it. Here we will integrate these both techniques and built a new algorithm which will more efficiently detect the tumor from MRI images. Here we use some features of REGION PROP for detection of position of tumor and features of EDAMASS to detect the effect of tumor on tissues and from it we can detect the proper tumor from MRI images.

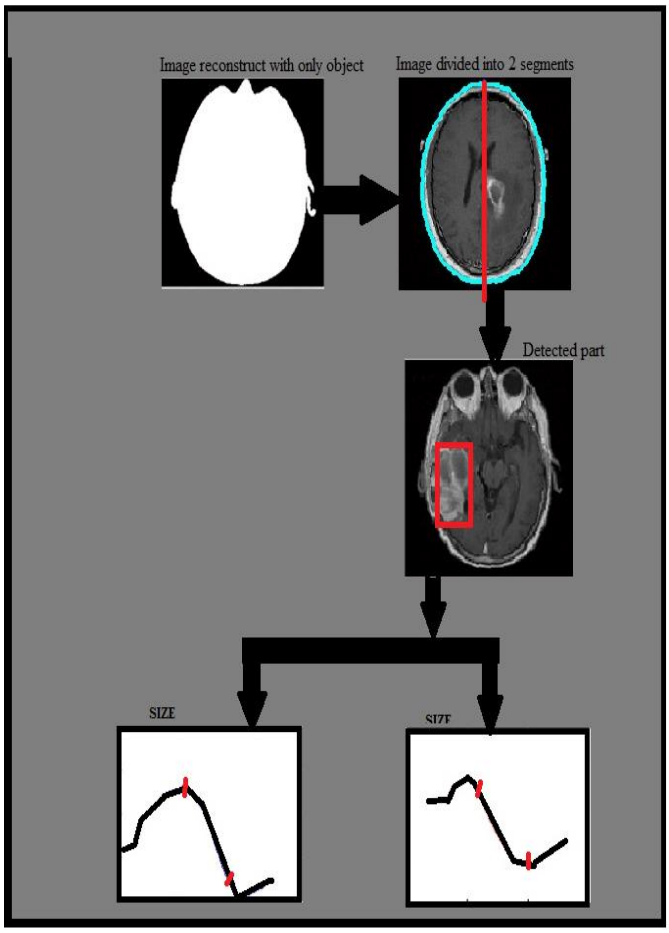

Fig3 : Working Model

This is design of our detection process in which firstly we detect skull through brightness gradient then we will do image segmentation and divide our MRI into two parts so that we can properly recognize the size and position of tumor into MRI then we apply detection algorithms and as a result it will give us proper size and position of tumor.

Algorithm

Algorithm is used for solving the problem step by step which can be implemented with help of programming in any language. The Steps of the algorithm are as following:

1. Give MRI image of brain as input.
2. Convert it to gray scale image.
3. Apply high pass filter for noise removal.
4. Apply filter to enhance the quality of image.
5. Compute the segmentation.
6. Compute the Edamas.
7. Compute the region growing.
8. Compute the mask algorithm

Finally output will be a tumour region.

V. OBJECTIVES

In the research scenario, the purposed work has the many objectives. As in the earlier systems while detecting the tumor in the brain many problems occur. These problems generally consist the noise and to find the exact location of the tumor in the brain. Our main purpose is to overcome these problems. These problems can be overcome by using the following objectives, as:

1. To purpose a system of the tumor from MRI.
2. Apply the segmentation technique.
3. To extract feature from the selected ROI
4. Classification of ROI as benign or malignant.
5. Classify the image in to two halves.
6. Find the exact location of the brain tumor.

VI. CONCLUSION

The previous chapters have introduced the problem occur during the detection in brain tumor and segmentation in MR images. The study of this problem is practically motivated, but has properties that make it an interesting and challenging Masking algorithm. It also introduced a framework that combined ideas from the prior work into a general method to perform. This task automatically. It is also used many techniques, which helps to remove the noise from the scanning images. The MR images are used in this thesis, which are helpful in finding the tumor location in the brain. In future this programme can be done more advanced so that tumour can be classified according to its type. Also tumour growth can be analysed by plotting graph which can be obtained by studying sequential images of tumour affected patient.

ACKNOWLEDGMENT

Special thank you goes to those who contributed to this paper:
Mr Krishan kumar for his valuable comments, sharing her knowledge and for their keen interest, expert guidance, valuable suggestions and persistent encouragement

REFERENCES

[1] Dr.N. NandhaGopal, Automatic Detection Of Brain Tumor Through Magnetic Resonance Image, International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 4, April 2013

[2] Dina AboulDahab, Samy S. A. Ghoniemy, Gamal M. Selim, Automated Brain Tumor Detection and Identification Using Image Processing and Probabilistic Neural Network Techniques

[3] D. Haruka and A.Teruak, "Characterization of spatiotemporal stress distribution during food fracture by image texture analysis Methods".Journal of Food Engineering , vol 81, pp.429-436, 2007.

[4] K.Selvanayaki, Dr. M. Karnan,CAD System for Automatic Detection of Brain Tumor through Magnetic Resonance Image-A Review, K. Selvanayaki etc. al. / International Journal of Engineering Science and Technology Vol. 2(10), 2010, 5890-5901

[5] Kavita, RitikaSaroha, RajaniBala, Ms. SunitaSiwach, ,Review paper on Overview of Image Processing and Image Segmentation

[6] Kadam D B,et.al, An Artificial Neural Network Approach for Brain Tumor Detection Based on Characteristics of GLCM Texture Features

[7] Kiwit JC, Floeth FW, Bock WJ. Survival in malignant glioma: analysis of prognostic factors with special regard to cytoreductive surgery. ZentralblNeurochir 1996; 57:76-88.

[8] Manoj K Kowar and Sourabh Yadav, Brain Tumor Detection and Segmentation Using Histogram Thresholding, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-1, Issue-4, April 2012 16

[9] N. Otsu, "A Threshold Selection Method from Gray-Level Histogram", IEEE Trans. Systems Man, and Cybernetics, Vol. 9, pp. 62-66, 1979

[10] VivekAngoth_, A Novel Wavelet Based Image Fusion for Brain Tumor Detection, international Journal of Computer Vision and Signal Processing, 2(1), 1-7(2013)

[11] Xie J, Jiang Y, Tsui HT. Segmentation of kidney from ultrasound images based on texture and shape priors. IEEE Trans Med Imaging 2005;24:45-57.