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Brain Tumor Segmentation and Detection using F-Transform

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Abstract - *For image processing, Segmentation is widely used. In that way MRI- Magnetic Resonance Imaging has become practical means for the analysis of brain tumor images. Brain tumor is one of the most life-threatening diseases and hence it's detection and segmentation should be fast and accurate. Segmentation is used to separate the abnormal tumor portion in the brain .These tumors are unsharp and faint but their intensity value vary from neighboring healthy tissues. The first step of brain tumor detection is detection and second is segmentation. In detection stage check symmetry and asymmetry of brain and in segmentation stage fuzzy transform and morphological operations are performed*.

***Key Words*: MRI image, Brain tumor, Fuzzy transform, Morphological operations.**

1. INTRODUCTION

Tumors also named as neoplasm are the masses of the tissue. Many medical imaging modalities are available today to capture the abnormality such as tumor in human body. Magnetic Resonance Imaging (MRI), Computed Tomography (CT) scan, X-ray, Ultrasound and Electrocardiogram (ECG) are some of the modalities which are used to capture the images. MRI is best appropriate and believed to be powerful technology among all others to collect ideal internal data of the human body for clinical diagnosing. In MRI images, the quantity of data is in large amount, that why the manual interpretation and its analysis becomes difficult and time consuming.

The fundamental aspect that makes segmentation of medical images difficult is the complexity and the instability of the anatomy that the being imaged.[6] Nuclear network algorithm, watershed and edge detection , fuzzy c means algorithm these are several tumor detection techniques .Canny edge detection is one of the useful feature in image segmentation. The segmentation technique is widely used by the radiologist to segment the image into several regions.

F-transform is an intelligent method to handle uncertain information .This is useful for detection of tumor boundaries. It is very easy method for detection is a promising and efficient method for edge extraction process .Developing an algorithm for the brain tumor detection and segmentation in order to overcome the accuracy problem. Two main stages of proposed algorithm:

1. Detection.

2. Segmentation.

Figure 1 shows that brain tumor. [1]

Fig.1.Presence of brain tumor

2. RELATED WORK

1. Nemir Ahmad Al-Azzawi et al, described approach for detection and extraction brain tumor from MRI scan images of brain. Asymmetry of brain is uses for detection of abnormality, after detect of the tumor. The segmentation based on F-transform (Fuzzy transform) and morphological operation are performing to delineating brain tumor boundaries and calculate the area of the tumor. The F-transform is a professional intelligent method to handle uncertain information and to extract the silent edges. Accuracy and precision are co-dependent [1].

2. D.Judehemanth et al, states that the clustering approach is widely used in biomedical application particularly brain tumor detection in MR images. Fuzzy clustering using fuzzy C-means algorithm proved to be superior over the other clustering approaches in terms of segmentation .But the major drawback of the FCM algorithm huge computational time required. computational rate is improved by modifying the cluster center and membership value updation criteria[2].

3. Paul Kleihues et al, states that histological typing of tumors of the central nervous system reflects. The progress in brain tumor classification which was achieved. The WHO

grading scheme was revised and adapted to new entities but its use, as before, remains optional[3].

4. Ishita Maiti et al, proposed watershed method is used in combination with edge detection operation for brain tumor detection. It is color based brain tumor detection using color brain MRI image in HSV color space. The RGB image is converted into HSV color image. After combining the three images final brain tumor segmented image is obtained [4].

5. AzianAzamimi Abdullah et al, proposed a brain tumor detection method based on cellular neural network. To examine the location of tumor in the brain, MRI is used. This procedure is really time and energy consuming. To overcome this problem, an automated detection method for brain tumor using CNN is developed[5].

6. Charutha S. et al, demonstrated that brain tumor is the most life threatening diseases and hence its detection should be fast and accurate. The modified texture based region growing and cellular automata edge detection are efficient techniques, incorporation of both enhance the efficiency of brain tumor detection. It is understood that the modified texture based segmentation integrated with the cellular automata edge detection is better when compare to the one with the incorporation of classical edge detection methods[6].

7. R. preetha et al, states that the boundary of tumor tissue is highly irregular. Deformable model and region based methods are extensively used for medical image segmentation, to locate the boundary of the tumor. Clustering of brain tumor images using, fuzzy C-means is robust and effective for tumor localization. Even though the proposed method has high computational complexity, it shows superior result in segmentation[7].

3. METHODOLOGY

System will introduce an edge detection based on F transform model. There are main two stages in this algorithm. It is detecting stage and segmentation stage. In segmentation stage segmentation and morphological operations are performed. The block diagram of proposed algorithm shown in fig.2

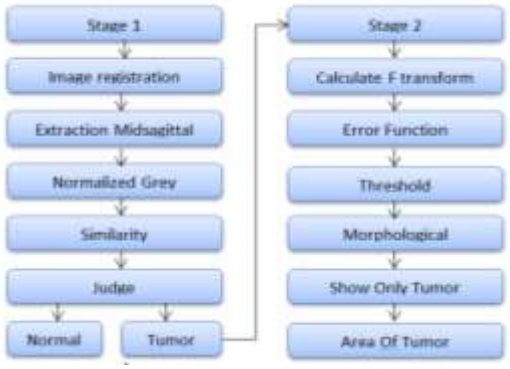

Figure 2: Block diagram of proposed algorithm

A. Detection

To ensure that the brain image in the middle so that comparison can be properly done if the cerebral hemispheres were absolutely symmetrical the intensity distribution of in hemisphere should be similar to each other, however brain is symmetrical. Brain tumors producing mass effect displace and distort the surrounding. In detection stage image registration takes place. Image registration is the process of bringing two or more images into spatial correspondence (aligning them). In the context of medical imaging, image registration allows for the concurrent use of images taken with different modalities (e.g. MRI and CT), at different times or with different patient positions. After that separate the brain into left and right hemispheres then find normalized grey level histograms. And calculate the similarity between two image grey levels.

B. Edge detection for image segmentation

Edge detection is used to determine the boundaries of the objects. The efficiency of many image processing task depends on the detecting edges. In the proposed algorithm to detect the edge based on F transform which suppress noise.

C. Morphological operations

In this paper erosion is applied to detect the tumor. First calculate the F transform, inverse F transform and error function. Then compute a global threshold that can be used to convert an intensity image. Compute the morphological operations. The extraction region is then logically operated for extraction of massive region. The area of tumor region is found by multiplying horizontal dimensions, vertical dimensions of the image with total no. of pixels in the tumor region.

4. RESULT

Similarity between two images can be calculated using correlation coefficient, root mean square error, average gradient, the variance distance and overall cross entropy.

Figure 3 shows edge of brain and MRI image separated into two sides.

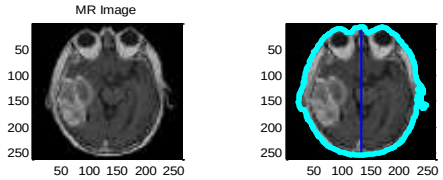

Figure 3: edge detection of brain

The area of tumor is calculated by multiplying horizontal dimensions, vertical dimensions of the image with total no. of pixels in the tumor region.

Brain tumor segmentation and detection using F-Transform shown in figure 4.

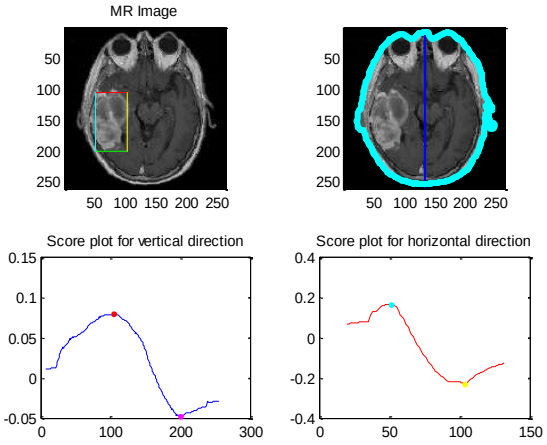

Figure 4: Final extraction of brain tumor from MRI images

5. CONCLUSION

In this paper, we have introduced automatically brain tumors detection, which are employing F-transform. As a result, the detection performance was acceptable. The speed of detection is also improved after using asymmetry of brain. With its high speed, rather good sensitivity and specificity, this algorithm can be used to process large brain image databases and provide quick outcomes in clinical setting. This brain tumor detection technique may give better result than other brain tumor detection techniques

REFERENCES

[1] Nemir Ahmed Al-Azzawi, Mohannad KadhimSabir,"An Superior Achievement of Brain Tumor Detection Using Segmentation Based on F-Transform", 978-1-4799-9907- 1/15/$31.00 ©2015 IEEE.

[2] D. J. Hemanth, et al., "Effective Fuzzy Clustering Algorithm for Abnormal MR Brain Image Segmentation," in Advance Computing Conference, 2009. IACC 2009. IEEE International, 2009, pp. 609-614.

[3] P. Kleihues, et al., "The new WHO classification of brain tumours," Brain pathology, vol.3, pp. 255-268, 1993.

[4] Maiti and M. Chakraborty, "A new method for brain tumor segmentation based on watershed and edge detection algorithms in HSV colour model," in Computing and Communication Systems (NCCCS), 2012 National Conference on, 2012, pp. 1-5.

[5] Abdullah, et al., "Implementation of an improved cellular neural network algorithm for brain tumor. detection," in Biomedical Engineering(ICoBE), 2012 International Conference on, 2012, pp. 611-615

[6] S. Charutha and M. J. Jayashree, "An efficient brain tumor detection by integrating modified texture based region growing and cellular automata edge detection," in Control, Instrumentation, Communication and Computational Technologies (ICCICCT), 2014 International Conference on, 2014, pp. 1193-1199
.

[7] R. Preetha and G. R. Suresh, "Performance Analysis of Fuzzy C Means Algorithm in Automated Detection of Brain Tumor," in Computing and Communication Technologies (WCCCT), 2014 World Congress on, 2014, pp. 30-33.