Fuzzy c-means Clustering Algorithm for Brain Tumor Segmentation

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Abstract— The medical image segmentation has become current research topic in the domain of data mining. Recently these are several numerous algorithm and variety of proposals done, in the segmentation process of brain tumors. In this paper, we propose a new algorithm, Fuzzy c-means that segments the brain tumor images. This research work mainly focused on Clustering method, specifically c-means & Fuzzy Clustering algorithm. This algorithm has been implemented and tested with MRI of Human Brain. It can get advantages of the Fuzzy c-means in the aspects of classification accuracy.

Keywords—Brain tumor segmentation, k-means Clustering, Fuzzy C-means, MRI

I. INTRODUCTION

Early detection and segmentation of Brain tumors is very important in clinical practice. Many researchers have proposed different techniques for the classification of brain tumors based on different sources of information. In this paper we propose a process for Brain tumor segmentation, focusing on the analysis of Magnetic Resonance (MR) images and computed tomography (CT) scan. The MRI scan is more comfortable than CT scan for diagnosis. It is not affect the human body because it does not use any radiation. On other hand, Brain tumor is one of the leading causes of death among people. Brain Tumor segmentation deals with the implementation of simple for detection of range and shape of tumor in brain MR images. One view of image segmentation is clustering problem that concerns how to determine which pixels in an image belong most appropriately. K-means algorithm can detect a brain tumor faster than Fuzzy C-means.

II. RELATED WORK

Numerous methods are available in medical segmentation. These methods are chosen based on the specific applications and imaging modalities.

* Classifiers

Classifiers methods are used pattern recognitions they seek to partition a feature space derived from the image using data with known labels.

Classifiers are known as unsupervised method since they required training data that are manually segmented and than used as references for automatically segmenting the new data.

*Fuzzy C-means clustering

Because of the advantages of MRI over other diagnostic imaging, the majority of research in medical Brain tumor segmentation pertain it to uses for MR images, and there are a lot of methods available for MR images segmentation. In particular the fuzzy C-means (FCM) algorithm, assign pixels to fuzzy clusters without labels. FCM allows pixels to belong to multiple clusters with varying degrees of membership. The fuzzy C-means clustering algorithm (FCM) is a soft segmentation method that has been used extensively for segmentation of MR images applications recently.

Fuzzy C-means has been a very important tool for image processing in clustering objects in an image.

FCM clustering algorithm is a soft segmentation methods that has been used extensively of segmentation of MR images applications recently.

III. METHODOLOGY

The algorithm comprises of the following steps,

1. Read the image into the MatLab environment.
2. Try to identify the number of iterations it might possibly do within a given period of time.
3. Get the size of image.
4. Begin iteration by identifying large component of data value of the pixel.
5. Stop iteration when possible identification elapses.

IV. ACCURACY

In terms of accuracy , the number of iteration is put into consideration. The more th iteration the more accuracy. The iteration of C-means can perform depend largely on the number of colours contained by image ability limited the number of fuzzy C-means , which segment based on the number of iterations.

C-means is less accurate than the other two methods,
Segmentation result on MRI
Brain using the method

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┌─────────────────────────┐
│    Image Acquisition     │
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             ▼
┌─────────────────────────┐
│      Pre-Processing      │
└─────────────────────────┘
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┌─────────────────────────┐
│       Segmentation       │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    Feature Extraction    │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    Measuring Tumor in    │
│      Current Stage       │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   Prediction of Tumor in │
│          Future          │
└─────────────────────────┘
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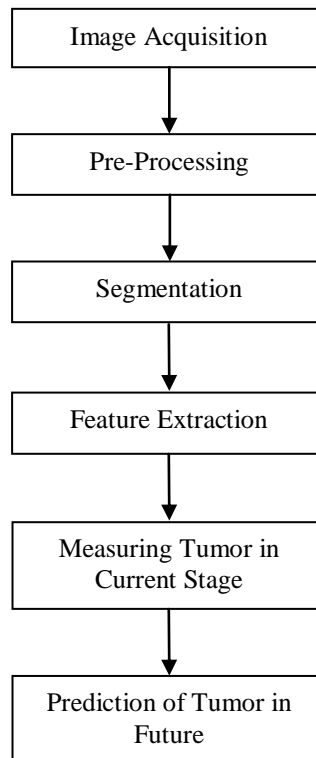
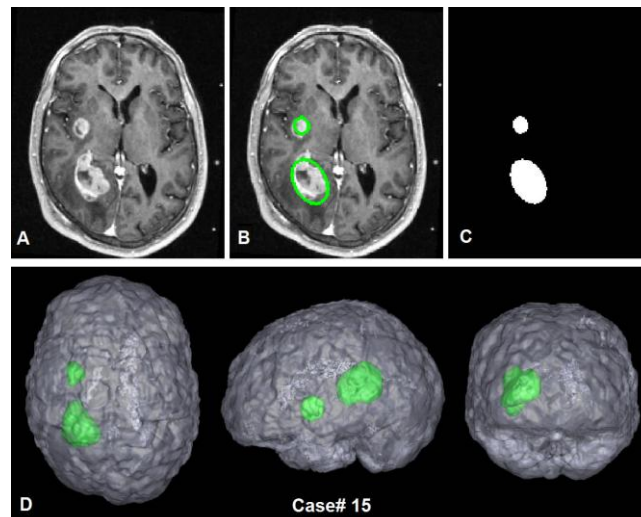Figure 1. Brain tumor Detection and Prediction

Figure 2. Brain tumor identification from MRI images.

The presentation of Brain tumor segmentation is evaluated based on sequential covering algorithm. Te MRI dataset that we have utilized image segmentation method is taken from the publicly available sources. Segmentation done by FCM algorithm**.**

V. CONCLUSION

In this paper we propose an approach of brain tumor segmentation in MR images. There are different types of tumors available. They may be in mass in brain or malignant in brain suppose if it is mass then fuzzy C-means algorithm is enough to extract the brain cells. If there is any noise present in the MR image it is removed before the fuzzy C-means process. The method with the highest iteration value and segments within the shortest period time takes, the more accuracy. Therefore fuzzy C-means takes the highest accuracy.

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