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BRAIN TUMOR SEGMENTATION USING K-MEAN CLUSTERIN AND ITS STAGES IDENTIFICATION

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ABSTRACT

Brain tumor extraction and its analysis are challenging tasks in medical image processing because brain image and its structure is complicated that can be analyzed only by expert radiologists. Segmentation plays an important role in the processing of medical images. MRI(magnetic resonance imaging) has become a particularly useful medical diagnostic tool for diagnosis of brain and other medical images. This paper presents a comparative study of two segmentation methods implemented for tumor detection .The methods include k-means clustering with Fuzzy c- means clustering with genetic algorithm. k-means algorithm is sensitive to the initial cluster centers. Genetic c-mean and k-means clustering techniques are used to detect tumor in MRI of brain images. At the end of process the tumor is extracted from the MR image and its exact position and the shape are determined. The experimental results indicate that genetic c-means not only eliminate the over segmentation problem, but also provide fast and efficient clustering results.

Keyword : MRI, brain tumor, segmentation, k-means clustering, Fuzzy c-means clustering,Feature Extraction.

I.INTRODUCTION

Abnormal growth of cells within the brain or the central spinal canal or an intracranial solid neoplasm is called a brain.The main purpose of brain tumor classification is correctly classify the MR image in order to detect which type of tumor that suffered by the patients. Due to tumor there is problem of blood circulation in the brain. Therefore blood tubercells are forms. There are many kind of test are used to detect brain tumor such as MRI, Computed Tomography (CT) scan, Biopsy and many more. Among the entire test MRI has great potential for classification of tumor. In comparison with other diagnostic imaging modalities, such as computerized tomography, MRI provides superior contrast and resolution for different brain tissues.The correct classification approach leads to the right decision and provide respective treatment to the patients. The key of brain tumor cure is to detect the tumor in its early stage. So that good classification is required. There are various methods to detect brain tumor. In this paper, we studied Probabilistic Neural Network (PNN) algorithm for classification of brain tumor. Our main objective of this project is using K Means clustering algorithm. To propose an algorithm that can be better for large datasets and initial centroid.

To compare the performance. An algorithm is described for segmenting 3DMR brain image into K di_erent tissue types, which include gray, white matter and CSF, and maybe other abnormal tissues.MR images

considered can be either scale- or multi-valued. Each scale-valued image i s modeled as a collection of regions with slowly varying intensity plus a white Gaussian noise.

1.1 k-means clustering

k-means clustering is a method of vector quantization, originally from signal processing, that is popular for cluster analysis in data mining. k-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster.\

SECTION 1 :

Swapnil R. Telrandhe et.al [1] proposed a medical device because of this they found that MRI image is not sufficient for detection of tumor so they include K-means clustering with preprocessing of image.First stage in preprocessing of brain tumor image is removing the noise with the help of median filter which gives better result.

J.selvakumar et.al [2]implements algorithm which detects the range and shape of tumor.Using this algorithm it become easy to determine the size and shape of tumor.Mass tumor is extracted by K-means algorithm noise free image is a input to the K-means.

Olga Regina Pereira Bellon et.al[3] presents edge detection of images in order to provide a reliable and meaningfiul edge map,which helps to improve image segmentation by clustering techniques. Edge map can supply required information to the clustering algorithm based on features extraction.

Pavani lakshmi.a et.al [4] detect and locate early stage brain tumors from MRI data.A system which enhances the MRI data and gives the exact location and the area of the tumor required for the diagnostic and analysis of tumor easily in biomedical field.

T. Kalaiselvi and K. Somasundaram et.al[5] Fuzzy c-means (FCM) is soft segmentation technique applicable for MRI brain segmentation. The performance of this method to obtain an optimal solution depends on the initial positions of the centroids of the clusters.This paper initialize the method based on histogram to start the FCM clustering to segment the MRI brain scans.

Subhranil Koley and Aurpan Majumder et.al[6] segmentation of brain MRI for the purpose of determining the exact location of braintumor using CSM based partitional K means clustering algorithm. This algorithm is the simplest method to obtain the efficient segmentation with less computational complexity compared to other methods which have been mentioned earlier as we used only two features which are locations and gray level values of every pixel for our work.

M. Usman Akram' et.al[7] proposed a method for automatic brain tumor diagnostic system from MR images. The system consists of three stages to detect and segment a brain tumor. In the first stage,preprocessing is done to remove the noise and to sharpen the image. In the second stage,segmentation is done on the sharpened image to segment the brain tumor. In the third stage,tumor masking in order to remove the false segmented pixels. Brain tumor segmentation and detection is done using MR images. The proposed method enhanced the MR image and segments the tumor.

Kailash Sinha1 et.al[8] include k-means clustering segmentation algorithm, optimized c- means clustering with genetic algorithm. k-means algorithm is sensitive to the initial cluster centers, c-means and k-means clustering techniques are used to detect tumor in MRI of brain images Segmentation was achieved for all the proposed methods tumor detection was done. The k- means clustering segmentation algorithm, optimized k –means clustering with genetic algorithm and optimized c- means clustering.

Mark Schmidt, Ilya Levner, Russell Greiner et.al[9] *Detecting and segmenting brain tumors in Magnetic Resonance Images (MRI)* The difference in the trend observed across patients for the features might also indicate that these textural features might complement other proposed methods of texture characterization.

SECTION 2:

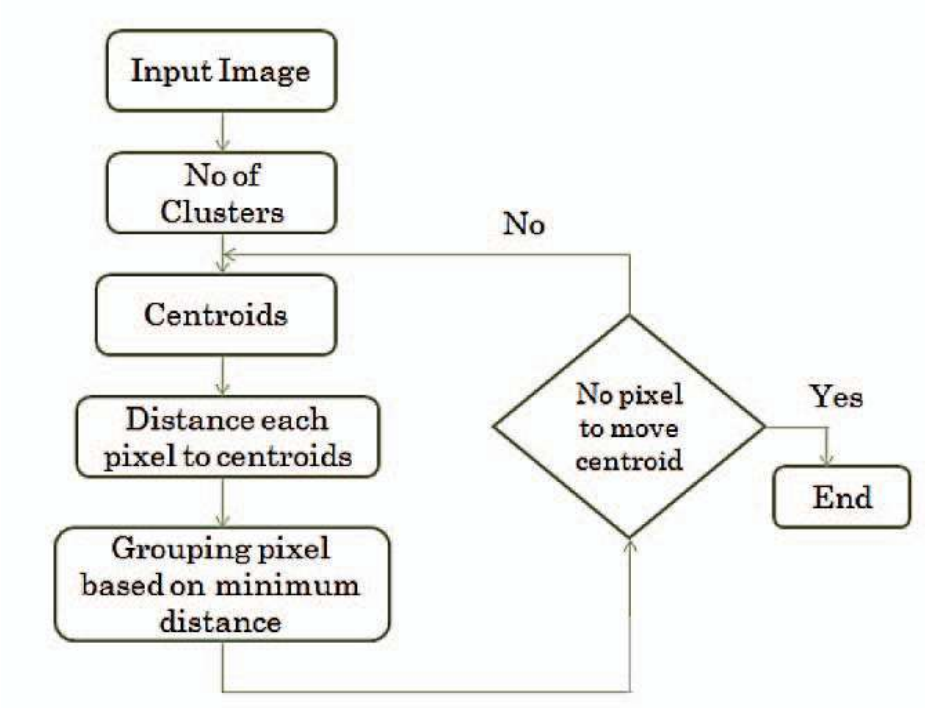

Figure 1: K-Means work flow

In adjacent figure [1]we are showing K-Means segmentation algorithm work flow. The first block shows the input image then it will convert that image into numbers of clusters, then it will find out the cluster centroid and find out the distance of each pixel from the centroid, then it will continue to grouping of pixels till it will reached the last pixel and stop.[1]

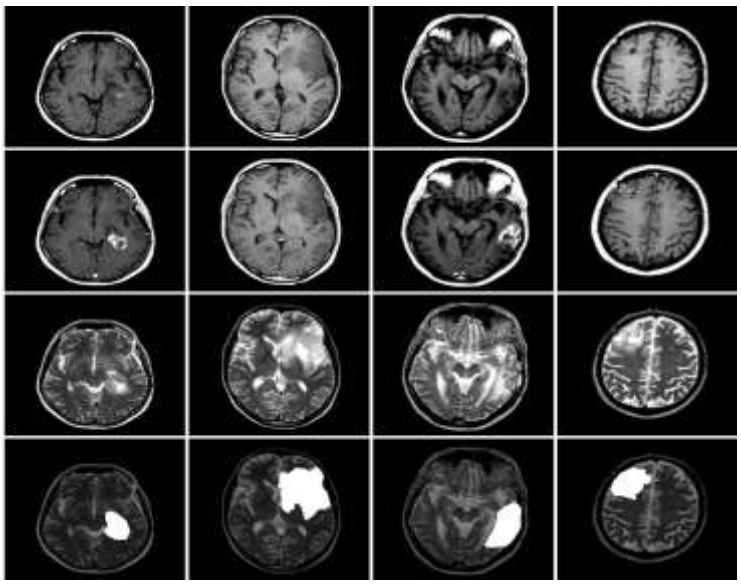

Figure2. Examples of Input and Desired Output[9]

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