



BRAIN TUMOR DETECTION USING FUZZY C MEANS SEGMENTATION

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Abstract

Tumor is an uncontrolled growth of tissue in any part of the body. The tumor is of different types and has different characteristics and corresponding different treatment. This paper deals with the implementation of simple and effective algorithm for detection of range and shape of the brain tumor cells present in the MR images. As it is known, brain tumor is inherently serious and life-threatening because of its character in the limited space of the intracranial cavity (space formed inside the skull). Normally, CT scan or MRI that is directed into intracranial cavity produces a complete image of brain. This MRI scanned image is used for the entire process. The MRI scan is more comfortable than any other scans for diagnosis. It will not affect the human body, because it doesn't practice any radiation. This MRI image is visually examined by the physician for detection & diagnosis of brain tumor. However this method of detection resists the accurate determination of stage & size of tumor. To avoid that, this project uses computer aided method for segmentation. There are different types of algorithm were developed for this segmentation purpose but they have some drawback in detection and extraction. In this paper two algorithm (k-mean clustering and fuzzy c-mean) are used which allows the segmentation of tumor tissue with accuracy and reproducibility. In addition, it also reduced the time for analysis. At the end of process, the tumor is extracted from the MR images. Normally the anatomy of the Brain can be viewed by the MRI scan or CT scan. In this paper the MRI scanned image is taken for the entire process. The MRI scan is more comfortable than CT scan for diagnosis. It is not affect the human body, because it doesn't use any radiation. It is based on the magnetic field and radio waves. There are different types of algorithm were developed for brain tumor detection. But they may have some drawback in detection and extraction. In this paper, two algorithms are used for segmentation and compare these two algorithm using various parameters.

.Key words - Brain tumor, Magnetic Resonance Imaging (MRI), Pre-processing, k-means, Fuzzy c-means.

I. INTRODUCTION

This paper deals with the concept for automatic brain tumor segmentation. A tumor may be primary or secondary. If it is the origin, then it is known as primary. If the part of the tumor spreads to another place and grows on its own, then it is known as secondary. The brain tumor affects CSF (Cerebral Spinal Fluid) and causes strokes. The physician gives the treatment for the strokes rather than the treatment for tumors. So the detection of tumor is

important for the treatment. The lifetime expectancy of the person affected by the brain tumor will increase if it is detected at an earlier stage. Normally tumor cells are of two types Mass and Malignant. The detection of malignant tumor is somewhat difficult to mass tumor. This paper focuses on the detection of mass tumor. The development platform for the detection is mat lab because it is very easy to develop and execute. At the end, we are providing systems that detect the tumor and its shape using k-means and fuzzy c-mean segmentation algorithms.

An image is an array or a matrix of square pixels (picture elements arranged in columns and rows. In image processing, the input is an image, such as a photo or video frame the output of image processing may be either an image or asset of features or parameters related to the image. The techniques for image processing involves treating the image as a two dimensional signal and then applying standard signal- processing techniques to it.

II. EXISTING SYSTEM

Image processing is any form of information processing, in which the input is an image. The existing method is based on the thresholding and

region growing. At the thresholding based segmentation the image is considered as having only two values either black or white. But the bitmap image contains 0 to 255 gray scale values. So it ignores the tumor cells also. In case of region growing based segmentation it needs more user interaction for the selection of the seed. Seed is the center of the tumor cells and this may cause intensity in homogeneity problems. And also it will not provide the acceptable result for all the images. The regional growing method ignored the spatial characteristics. Normally spatial characteristics are important for malignant tumor detection. This is the main problem of the current system, due to that we

are moving to proposed technique for brain tumor segmentation.

III. PROPOSED SYSTEM

The proposed system has mainly four modules namely: Pre-processing, segmentation using k-means and fuzzy c- means, Feature extraction, and approximate reasoning. According to the need of the next level the pre-processing step converts the image. It performs filtering of noise and other artifacts in the image and sharpening the edges in the image. RGB to gray conversion and reshaping also takes place here. It includes a median filter for noise removal. The tumor area is calculated using the binarization method. That is the image having only two values either black or white (0 or 1). Here

256*256 JPEG image is a maximum image size. The binary image can be represented as a summation of total number of white and black pixels.

Pre-processing is done by filtering. Segmentation is carried out by advanced K-means and Fuzzy C-means algorithm. The proposed method is combinations of two algorithms were established for segmentation and compare these

algorithms. But they are not decent for all kinds of the MRI images.

A. Proposed method block diagram

sharpening the edges in the image. The RGB to gray conversion and Reshaping also takes place here. It includes a median filter for noise reduction. The opportunities of arrival of noise in modern MRI scan are very less. It may arrive due to the thermal effect. The main aim of this paper is to detect and segment the tumor cells. But for the complete system it needs the process of noise removal. For better understanding the function of median filter, we added the salt and pepper noise artificially and removing it using median filter.

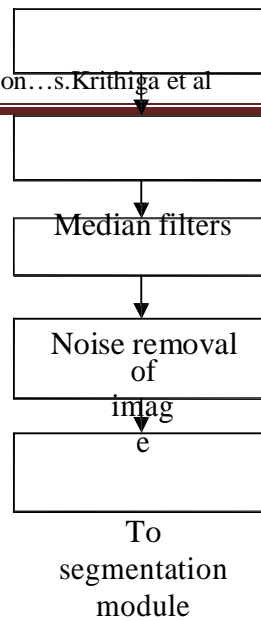
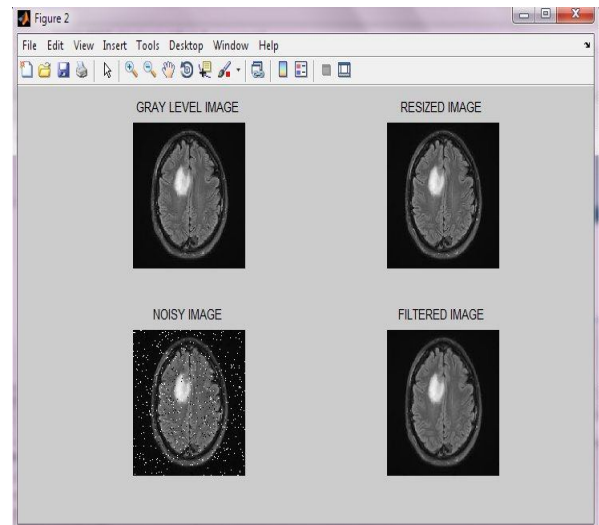


Fig.2 block diagram of pre-processing

B. Screen shot for pre-processing



data.

Where N is the number of measurement ,
 x_i is each individual measurement

\bar{x} is the mean of all measurements.



E. Signal To Noise Ratio (SNR)

The **signal-to-noise ratio** (SNR) is used in imaging as a physical measure of the sensitivity of a (digital or film) imaging system. SNR has been defined as the ratio of the average signal value to the standard deviation of the background.

$$SNR = \frac{\mu}{\sigma}$$

where μ is the signal mean or expected value σ is the standard deviation of the noise

The higher the value of SNR, the better will be the signal strength and the quality of image. If SNR value is low there will be high noise contents.

B. Entropy

Entropy is the average amount of information contained in each message received. Here, *message* stands for an event, sample or character drawn from a distribution or data stream. Entropy thus characterizes our uncertainty about our source of information. So entropy must be high to obtain large amount of information.

$$H(A) = - \sum_i P(x_i) \log_2 P(x_i)$$

Table. Parameter Analysis

PARAMETERS	K-MEANS	FCM
Standard Deviation	24.3893	23.1532
Entropy	0.1318	0.7638
Co-Variance	19.1214	0.0191
SNR	0.1565	1.23219

– \log_2

C. Variance

Variance measures how far a set of
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