# Brain Tumor Extraction System using Fuzzy c-means

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***Abstract*— Digital image processing is gaining attraction in field of research nowadays specially in medical science. For medical diagnosis scanning and inspection of inner organs of human body is possible by medical image processing technique. Brain tumor is naturaly serious and deadliest disease. Highly accurate methods are the need of the day than manual detection techniques. In this paper Brain Tumor is detected using Fuzzy c-means algorithm techniques having input from magnetic resonance imaging(MRI) . Main concern of the work is to obtain highly accurate ,less time consuming and fully automatic brain tumor detection system. It has been studied that algorithm Fuzzy c-means(FCM) gives the more accuracy. Human body is a combination of many organs and brain is the most vital and critical organ among all the other organs. It is observed that if the growth of brain tumor cells is increased rapidly than it become incurable that's why fast and accurate methods are preferred.**

***Keywords*— *Tumor, Fuzzy c-means , segmentation and Magnetic Resonance .***

## I. INTRODUCTION

Now days doctors use smart mouted systems in which doctors study the MRimages of patients manually which results in lower accuracy ,more time consuming and higher Acumen difference. Human body is a combination of many organs and brain is most vital and critical organ among all the other organs. Cells of a brain tumor grow abundantly and take up all the nutrients from healthy tissues and cells. Cause of this abundant growth of brain tumor cells results in brain failure which leads to death of a patient[1]. Researchers are tried to overcome this problem and many methods and algorithms are given by them .In the Era of Technology we need a system which is totally automatic and does not need any type of Human interference to get the results .This paper gives the system which automatically read the MRImages. Due to the no Human Interference chances of acumen difference become totally negligible which causes higher accuracy and very less time consuming[2]. Brain tumor is naturaly serious and life aggressive disease. Highly accurate methods are more preferable than manual detection techniques. Main objective of this paper is to obtain highly accurate, less time consuming and fully automatic brain tumor detection system. It has been studied that algorithm Fuzzy c-means(FCM) gives the highest accuracy more than 90%. In the Era of Technology highly automatic systems are more preferred than manual or semi-automatic systems. This results is in accurate detection of the tumor and is also considered to be very time consuming. The main consequence of this approach is that the results are highly error prone due to perception difference [3].Furthermore, brain tumors tend to have different boundaries in the different contrasts . In the case of brain tumor segmentation, several techniques exist to separate the tumor from healthy tissue, such as locating outliers of the registration of healthy atlases to the tumor , or learning textural patterns that are common to tumors [4]. Accurate measurements in brain diagnosis are quite difficult because of diverse shapes, sizes and appearances of tumors. So these are the reasons for adopting automatic brain tumor detection system.

### *A. Problem Formulation*

Abnormal growth and unmanaged division of cells in a brain is the main reason of brain tumor. Patients suffering from brain tumor having the results of tumor more than 50% than they were unable to cover from life altering disease and results are death of patients due to brain failure. So there are many problems incurred by doctors while reading MRI images of patients manually which results in higher inaccurate results with more time consumed. Problem can be tackled if brain tumor is detected at initial stage and accurately. Researchers are tried to overcome this problem and many methods and algorithms are given by them. In the present scenario, need is of automatic, fast system which is also free from human interference. Main objective of this paper is to obtain highly accurate,less time consuming and fully automatic brain tumor detection system.

### *B. Proposed Work*

As technique for extraction or can say detection of brain tumor in medical images is needed so in this paper an application which will have the option of selecting different edge detection algorithms is considered. And on basis of that one can conclude that which technique is suitable for detecting Brain tumor form medical images[4].

In our proposed work a new technique for image segmentation of medical MR images has been developed. The proposed technique works on the basis of fuzzy C-mean. In fuzzy c-mean clustering each point have some specific probability of belonging to each cluster.

## II. LITERATURE VIEW

### A. Magnetic Resonance Imaging(MRI)

MRI machines uses powerful magnetic scanners to excite and polarize hydrogen nuclei which is single proton in a nucleus.

In an atom neutrons and protons of the nucleus forms spin on an angular momentum. Radio Frequency(RF) is the base of MRI.Machines sends the radio frequency pulses to the specific organs of the body which are to be examined[5].

### *B.* Image Enhancement

MRImages which are taken from the MRI scanners sometimes found that are affected by additional noise or having the poorer visual clarity. This is the very solid reason for the need of use of image enhancement.
Enhancement technique in brain tumor detection systems is used first on MRImages. There are many methods to overcome from poor visual clarity and noise for further processing of image .In earlier techniques comparison is made between the taken image and the reference image for image enhancement to get out the result difference between the images[6].

### *C.* Image Segmentation

Image segmentation refers to the decomposition scene into its components. In this paper image segmentation is used for boundry based approaches. In image segmentation technique image is segmented into no of segments using various techniques[6]. It helps in extraction of suspicious regions from MRimages. In Boundry based extraction techniques segment the objects on the basis of their profiles[7].

### *D.* Morphological Analysis

Morphology is the study of medical images about their shapes and structures from a scientific view. Morphology works on the integral parts of the image. Binary morphology is used to complete the binary events which make extraction of objects from binary images. In Morphological analysis various techniques have been used such as Multiscale morphology and Fuzzy mathematical morphology (FMM). Erosion, Dilation ,open and close are the operators of morphology[8]. There are two fundamental operator in morphological Erosion and Dilation are one of them in image processing on which all morphological operations are based. These are originally defined for binary images and later being for gray scale images. On the other hand Opening removes the small objects from the foreground and closing removes the small holes from the foreground [9].

## III. PROPOSED METHODOLOGY

### *A. Fuzzy c- Means*

This technique is based on a fuzzy logic actually it is clustering technique used to segment the image. Clustering algorithm for fuzzy partition for optimal fuzzy. In mathematical principles fuzzy logic is used for knowledge representation based on binary logic classical degrees. For getting the intelligent human detection systems FCM allows methods in segmentation to perform the relevant tasks to approach the result. Fuzzy c-means is based on a clustering technique. In image segmentation Fuzzy c-means gives the higher accuracy among all another techniques. For the purpose of overcome the weakness of PCM method fuzzy c-means is used .Fuzzy is also called advanced version of K-means algorithms due to the assigning of objective functions[10].

### *B. FCM Parametres*

Input unlabelled data set- x={x1,x2,x3-----xn}

n is the data point in x (1)

Main output

Partion of x, which is c*n matrix U (2)

Common additional Output

Set of vectorsV={v1,v2,v3,----vn} (3)

V1 is called cluster centre

From equation (1) input values are assigned and from equation (2) and (3) output are calculated[10].

## IV. EXPERIMENTAL RESULTS

During experiment input is taken as MRimage from online respiratory in jpeg format of size(640*720). No of MRImages are taken for experimentation and good results are obtained.

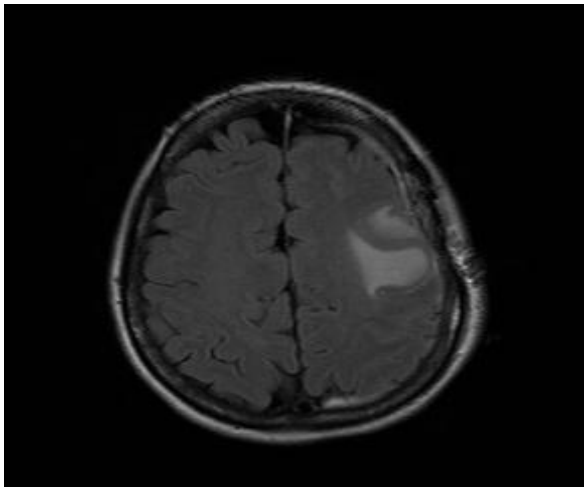

Fig.1. Input Image-1

In Fig.1 and Fig.2 represents input MRImage. By reading MRimages manually not clearer results are obtained about the size and type of Tumor. For experimentation two input images are taken to come to know about the location and type of tumor. Doctors take any type of MRImage but the condition is that format must be Jpeg.

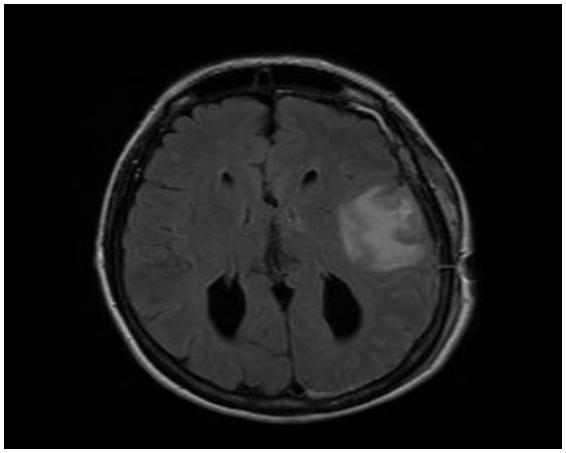

Fig.2. Input image-2

Input is given in the form of jpeg images by using command 'uigetfile' paper can browse image from any folder in the pc or laptop. There is no need to assign path manually in the MATLAB software. It is shown below in Fig-3 the MRimage chosen from a no of input images.

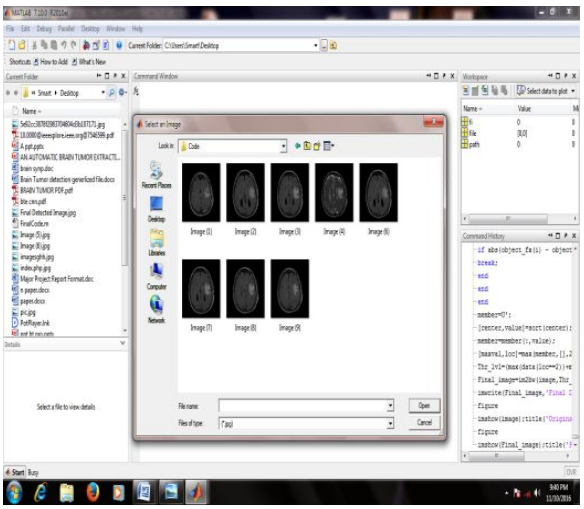

Fig.3. selection of MRImages

Maximum 999 iterations are performed for getting better results on a single MRImage. When objective function becomes constant and level of minimum improvement comes. Break command breaks the program execution and returns result in the form of accurate tumor detected with less time. In Fig.4, System performing iteration in Matlab software by running Matlab code. No of Iterations are mainly depends upon the type of input MRImage. By changing the value of impro command in Matlab code, no of iterations performed by the system can be increased or decreased. After performing iterations when objective function becomes constant output is obtained in the form of tumor detected having higher accuracy and less computational time. Which is shown in Fig.5 and Fig.6.

From the experimental results we obtain a system which is fully accurate, very less time consuming and and with negligible perception difference.

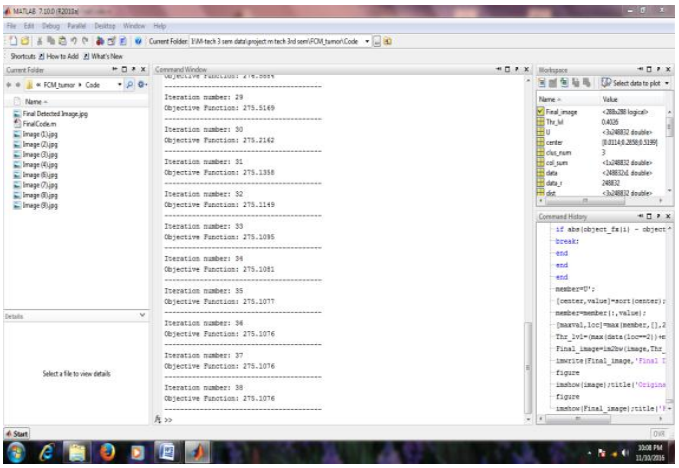

Fig.4. system performing iterations

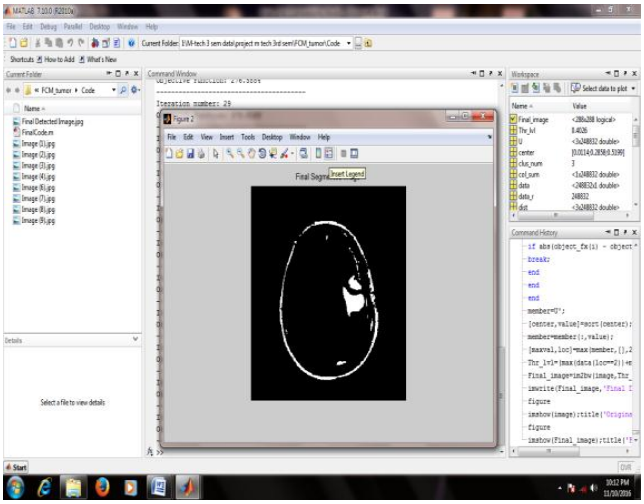

Fig.5. output of detected tumor of input image 1

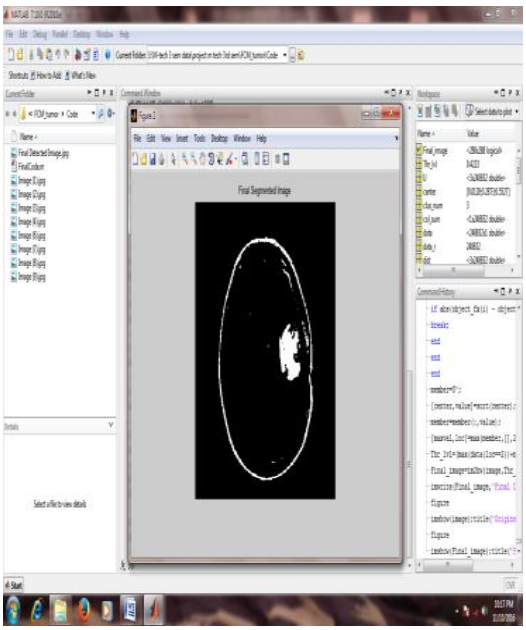

Fig.6. output of detected tumor of input image 2

## V. CONCLUSION

Using the proposed technique a highly accurate method with less time consuming is found which also reduces the manual work to be done by doctors and with minimum human interference. So highly automatic system can be made in which chances of errors are less and acumen difference is fully negligible.

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