A Technique to Improve Accuracy in MRI using Fuzzy K-Means Algorithm

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Abstract

This paper is concerned with the embodiment of an ideal technique for the revelation of brain tumor and the detection of the volume and shape once exposed. In brain MR images and anticipate the disease flyer details from the given area of tumor. Brain tumor bisection is a crucial step in surgical planning and treatment planning. Tumor is abandoned of mesh in any part of the body. Tumor are of disparate types and they have disparate peculiar and disparate treatment. As it is known, brain tumor is by birth serious and liberating because of its character in the curbed space of the intractably pit.

Most research in devilled countries show that the number of people who have brain tumor were died due to the fact of defective exposure. Generally, CT scan or MRI that is aimed into intractably pit produces an outright image of brain. This method allows the segmentation of tumor tissue with accuracy and reproducibility comparable to manual segmentation using firefly. In addition, it also reduces the time for analysis and predicts the disease details from the given area of tumor. Finally implement a system using Matlab to predict Brain tumor risk level which is easier, cost reducible and time saveable.

Keywords - *Abnormalities, Magnetic Resonance Imaging (MRI), Brain tumor, Pre-processing, Clustering algorithm, fuzzy C means, Thresholding, Firefly algorithm.*

I. INTRODUCTION

If the piece of tumor is transmission to another region and developed as its own then it is known as secondary. That will boost life time about 1 to 2 years. The typically tumor cells are of two types. They are lump and deadly. The revelation of them calibration tumor is somewhat demanding to lot of tumor .In this paper we concentrate on expose of brain tumor with the guidance of Brain MRI images and forecast the epidemic details from the range of brain tumor.The expression of brain tumor form headache,vomiting,memory loss etc. Magnetic Resonance image (MRI) is a one of the procedure to scan internal plague of the body.MRI is used considering the beginning of 1980.Prescription for brain tumor depends on the category and phase of the disease, the scope and area of the tumor, and your generic strength and medical record.In most cases, the target of operation is to discard or destroy the tumor perfectly. Most brain tumor can be rectify if construct and evaluate early. A human who was troubled by any kind of tumor has an expanded risk developing of any type. A person who was two or more close relatives (mother, father, sister, brother, or child) who are important for developing brain tumor has a risk element of progress brain tumor for its own. Hardly, members of family will have a rooted disarray that makes the brain more conscious and increases the risk of brain tumor. About 5% of brain tumor may be related to hereditary (genetic) element or conditions. Another liability factor of brain tumor as well as other diseases is taking any chemo therapy. Day by day the number of brain tumor person is expanding rapidly because of unconsciousness. The developing floor for the detection is java. At the end, we are providing scheme that identify the tumor and its model and disease details from the given area of tumor to analyze the stages of brain tumor.

II. RELATED WORKS

1. Author and Title: Samir Kumar Bandhyopadhyay, TuhinUtsab Paul, "**Automatic Segmentation of Brain Tumor from Multiple Images of Brain MRI".**
Implemented Concept: This paper has proposed a system of image registration and data fusion theory for the segmentation of MR images. This system provides an efficient and fast way for diagnosis of the brain tumor using called K means algorithm.

2. Author and Title: Mutasem K. Alameda ,"**A Hybrid Firefly Algorithm with Fuzzy-c means Algorithm for MRI Brain Image Segmentation American Journal of Applied Sciences, Methodology".**
Implemented Concept: Mutasem K. Alameda proposed an approach of Hybrid algorithm (fuzzy-c means and _fireflyy algorithm). Avoid the drawbacks of fuzzy clustering, such as low convergence rate, getting stuck in the local minima.

3. Author and Title: Suman Tatiraju, AviMehta**, "Image Segmentation using k-means clustering, EM and Normalized Cuts"**
Implemented Concept: In this project, we used three algorithms namely K Means clustering, Expectation Maximization and the Normalized cuts and compare them for image segmentation.

4. Author and Title: Ajala Funmilola," **Fuzzy k-c-means Clustering Algorithm for Medical Image Segmentation"**
Implemented Concept: Funmilola et al., proposed the combination of Fuzzy K-C-means method, which carries more of Fuzzy C-means properties than that of K-means.

5. Author and Title: M.H. Fazel Zarandia, "**Systematic image processing for diagnosing brain tumors: A Type-II fuzzy expert system"**
Implemented Concept: This paper was proposed a deep study of brain tumor. It describes different type of diagnosis approaches using Fuzzy expert.
6. Author and Title: Samarjit Das,**" Systematic image processing for diagnosing brain tumor: A Type-II fuzzy expert system approach"**
Implemented Concept: In the field of pattern recognition due to the fundamental involvement of human perception and inadequacy of standard Mathematics to deal with its complex and ambiguously defined system, different fuzzy techniques have been applied as
An appropriate alternative.

7. Author and Title: Vignesh Rajesh,**" brain tumor segmentation and its area calculation in brain MRI images using k-mean clustering and fuzzy c mean algorithm"**
Implemented Concept: This paper has suggested a synergistic and an effective algorithm for the detection of brain tumor based onMedian filtering, K Means Segmentation, FCM Segmentation, and finally, threshold segmentation.

8. Author and Title: payalmistry, shagunakhauri, sayalipatil, s.p.tondare,**"Segmentation of brain Tumor and its area calculation in brain MRI images using k-mean clustering and fuzzy c- mean algorithm"**
Implemented Concept: This paper proposed k-means and C-means for brain tumor segmentation from MRI images.

9. Author and Title: Priyanka S.Jadhav, Meeta Bakuli**, "Brain tumor detection using MRI image processing"**
Implemented Concept: This paper is proposed by MRI technique.This MRI is used for taken on brain tumor image in separated and collected for more information of brain tumor.

10. Author and Title: Miss.Shrutika Santosh Hunnur, Akshata Raut, Swati Kulkarni**," Implementation of image processing for detection of brain tumor"**
Implement Concept: The paper is proposed by processing of magnetic resonance image (MRI) is one among the parts of the image processing in medical field and describes the detection of brain tumor by thresholding method.

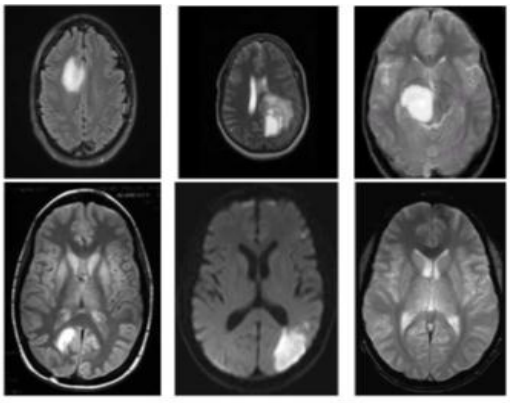
III. FUZZY K-MEANS: A PROPOSED ALGORITHM

Fuzzy k-mean algorithm steps

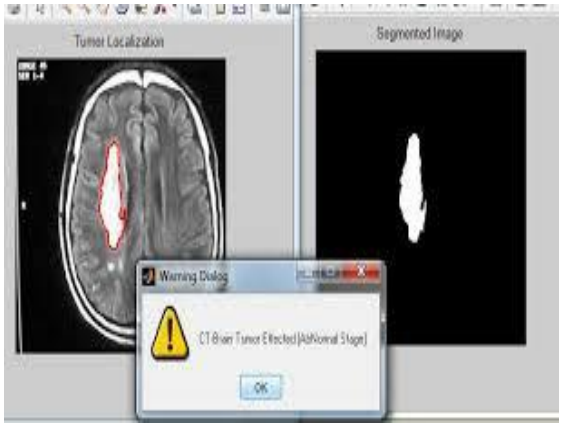
1. Browse the file path; select the image from database of MRI images to be processed (JPEG format)
2. Check if the image is RGB then convert it to gray image
3. Convert the image to double to increase the range of pixel values
4. For FKM, predefine the number of iterations and number of clusters
5. Get the size of the image
6. Convert input image matrix to a vector.
7. Randomly select the k cluster centre.
8. Calculate the fuzzy centre (vector)
9. Calculate the fuzzy membership function.
10. Repeat steps 8 and 9 until a minimum value is achieved.
11. Terminate if stopping condition is true otherwise return to step 8.
12. Combine the membership grades and class values of clusters; map and reshape the respective pixels to form the final clustered image.

IV. RESULTS AND DISCUSSION

Input of MRI images



Segmentation image



In this section, the results obtained using a database of images is presented. Start by presenting the database with which conducted in tests, and then, present the results according to the used structure as listed in Table 1.

Table: Brain Tumor Accuracy Evaluation

Brain Tumor Detection Image	Existing K-Means	Proposed Fuzzy K-Means
1	0.80	0.9976
2	0.89	0.9917
3	0.8997	0.9961
4	0.8493	0.9971
5	0.8252	0.9955

Figure 1 shows the comparison between existing and proposed algorithm with varying number of brain tumor images.

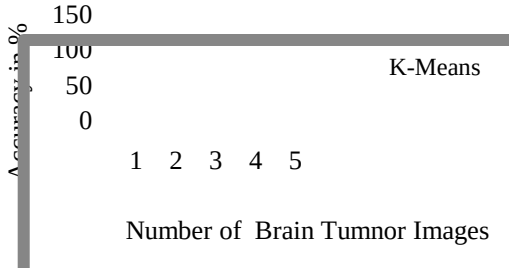


Figure 1: Classification Accuracy between K-Means and Fuzzy K-Means

V. CONCLUSION

There are different types of tumor are available .They may be as mass in brain or malignant over the brain. Suppose if it is a mass then C- means algorithm is enough to extract it from the brain cells. If there is any noise are present in the MRI image it is removed before the Fuzzy C -means process. The noise free image is given as an input to the Fuzzy C-means and tumor is extracted from the MRI image. And then segmentation using Firefly algorithm for accurate tumor shape for extraction of malignant tumor and thresholding of output in feature extraction and also identify the stages of brain tumor. Finally approximate reasoning for calculating tumor shape and position calculation and finally using the navy bias classification technique to classify the disease risk from resultant area of tumor. I.e. predict Brain tumor risk level which is easier, cost reduces able and time save able. The experimental results are compared with other algorithms. The proposed method gives more accurate result.

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