An Approach to Diagnosis Brain tumor in MRI Using K means Clustering Algorithm

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Abstract:- The brain is a vital organ of human body. It acts as control structure of our body, speech, feelings and thoughts which are located in the brain. Magnetic resonance imaging (MRI) method is one of the techniques to scan and capture the internal disease of the body. In this paper proposed method has been given to diagnosis brain tumor in MRI with good accuracy. K means clustering is proposed which helps to identify brain tumor exactly then the tumor has been extracted from the MRI.

Keywords-MRI, Brain tumor, K means cluster, clustering techniques

1. INTRODUCTION

Brain tumors spread due to abnormal, uncontrolled growth of cells. Primary tumors are originating in the brain. Secondary tumors are originating from other parts of the body. The symptoms of brain tumors include headache, vomiting, memory loss, etc... MRI helps to provide visual details about the body structure and brain. MRI tool can be used to find the blood circulation inside the brain. So, MRI becomes vital role in medical role for diagnosing brain tumor and other disease.

1.1 MRI scan

MRI is a new technique and it has been used since the beginning of 1980s. MRI uses radio waves and magnetic to capture pictures of brain and other structure of the body. MRI is better than CT scan by displaying the pictures clearly and having good diagnosis quality.

1.2 Applications of MRI Images

A MRI sweep might be utilized as an amazingly faultless system for sickness recognition all around the body and is frequently utilized after the other testing neglects to give sufficient data to affirm a patient's finding. In the head, trauma to the mind might be seen as draining or swelling. Different variations from the norm frequently discovered incorporate cerebrum aneurysms, stroke, tumors of the mind, and also tumors or irritation of the spine.

Neurosurgeons utilize a MRI examine in characterizing cerebrum life systems as well as in assessing the uprightness of the spinal string after trauma. It is additionally utilized when recognizing issues connected with the vertebrae or invertebrate plates of the spine. A MRI sweep can assess the structure of the heart and aorta, where it can distinguish aneurysms or tears. MRI sweeps are not the first line of imaging test for these issues or in instances of trauma. It gives profitable data on organs and organs inside the midriff, and precise data about the structure of the joints, delicate tissues, and bones of the body. Frequently, surgery might be conceded or all the more exactly steered in the wake of knowing the outcomes of a MRI filter.

2. RELATED WORK

A. S. Bhide et al., [1] centered about Brain Division utilizing Fuzzy C means bunching to catch tumor Area. They utilized distance across and chart based technique to catch the volume of the mind.

NehaTirpude et al., [2] Proposed Robotized Location and Extraction of Mind Tumor from MRI Pictures to concentrate the tumor parcel precisely.

AvijitDasgupta [3] investigated boundary of brain tumor utilizing fluffy C-implies procedure. This procedure was great and proficient division system

AnamMustaqeem et al., [4] inspected cerebrum tumor identification by utilizing watershed and thresholding based division. This strategy was exceptionally helpful to discover careful size and area of the tumor. At the same time this procedure was not that much impact in dark and white picture of the mind.

PurnitaMajumder et al., [5] discovered stage identification and divided in cerebrum tumor MR pictures with 3d evaluation. They utilized two calculations that are propelled k-implies and fluffy c-means are utilized within the division work. To perceive the tumor shape, position and phase of tumor in MRI picture edge identification technique is utilized.

SarbaniDatta et al., [6] Clarified preprocess the two-dimensional attractive reverberation pictures of the mind and accordingly identify the tumor utilizing edge identification strategy and shade based division calculation. In this paper shade-based division utilizing K-means bunching for cerebrum tumor location is proposed. The technique will help the specialists for finding in a finer manner by lessening the

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subjectivity and miss rate in cerebrum MR pictures and in this way will improve the tumor identification correctness in less time.

M. Rakesh et al., [7] Expounded Picture Division and Discovery of Tumor Protests in MR Mind Pictures Utilizing Fluffy C-Implies Calculation. The adjusted FCM calculation is focused around the idea of clamping where the dimensionality of the info is much diminished. The adjusted FCM calculation utilizes a decreased dataset, the merging rate is exceptionally enhanced when contrasted and the tried and true FCM. At the same time the principle disservice is that FCM system is lengthy.

Alyaa H. Ali et al., [8] located cerebrum tumor for MRI utilizing crossover technique wavelet and grouping calculation. K-mean grouping strategy was utilized with distinctive classes and gave best comes about. Despite the fact that the wavelet convert is not sufficient to prepare a great outcome for the mind tumor location.

R. Manikandan et al., [9] Utilized Bunch Based Division of Attractive Thunder A picture of Mind Tumor Recognition The target range is divided and assessment of this apparatus is certain and helps the specialists in conclusion, medicine arrangement making and state of the tumor observing.

3. PROPOSED METHOD

The proposed segmentation of the brain MRI images for detection of tumors using clustering techniques. A cluster can be defined as a group of pixels where all the pixels in certain group defined by a similar relationship. Clustering is also known as unsupervised classification technique. The name unsupervised classification because the algorithm automatically classifies objects based on user given criteria.

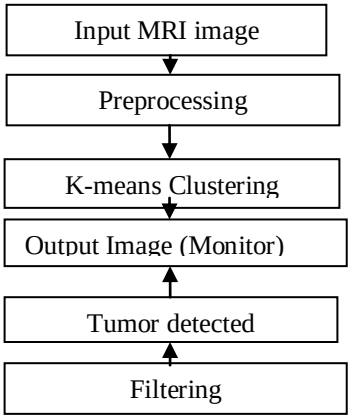

Figure: 1 Proposed Block Diagram

Here K-means clustering algorithm for segmentation of the image followed by morphological filtering is used for tumor detection from the brain MRI images. The proposed block diagram is as shown.

MRI scans of the human brain forms the input images for our system where the grey scale MRI input images are given as the input. The preprocessing stage will convert the RGB input image to grey scale. Noise present if any, will be removed using a median filter. The preprocessed image is given for image segmentation using K-means clustering algorithm. As there are chances of occurrence of misclustered regions after the application of K-means clustering algorithm, the proposed brain tumor filtering which is performed after the image is segmented by K-means clustering algorithm.

3.1 Proposed Algorithm

The proposed algorithm explained as follows:

1. Let $X_1,\ldots, X_M$ are data points in the input image, let k be the number of clusters it is given by the user.
2. Choose $C_1,\ldots,C_k$cluster centers
3. Distance between each pixel and each cluster center is found
4. The distance function is given by

J= $|X_i - C_j$for i=1,…N and for j=1,…,k, where $X_i - C_j$

5. Distribute the data points x among the k clusters using the relation

$x \in Cj$ if $|x-cj| < |x-ci|$ for i=1,2,…,k, $i \neq j$, where denotes the set of data points whose cluster centre is cj

6. Repeat from Step 5 to Step 7 till convergence is met
7. After segmentation and detection of the desired region, there are chances for misclustered regions to hence occur after the segmentation algorithm, morphological filtering is performed for enhancement of the tumor detected portion. Here structuring element used is disk shaped.

3.2 Brain Tumor Filtering (BTF)

Filtering is the examination of shapes and structures from a sensible perspective. Filter channels are organized from the central filter operations. An arranging segment is prevalently required for any filter operation. Filter operations take a shot at two pictures, arranging segment and the illumination picture. Arranging segments are little pictures that are used to test an illumination picture for properties of interest. Origin of a sorting out part is portrayed by the center pixel of the sorting out part. In morphology, the sorting out part portrayed will pass over a zone of the information picture where this portion is portrayed by the neighborhood window of the sorting out part and the sorting out part either fits or not fits the information picture. Wherever the fit happens, analyzing picture that addresses the data picture's structure is got and camouflage of the geometric attributes of the data picture that doesn't fit the getting sorted out part's neighborhood happens. Two major filter operations are deterioration and extension where breaking down realizes the decreasing of the articles in the picture perceived moreover extending realizes thickening of the articles in the picture. Extension uses the most amazing worth of every single one of pixels in the neighborhood of the information picture portrayed by the sorting out part and crumbling uses the most diminished worth of each and every one of pixels in the region of the information picture.

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4. RESULT AND DISCUSSION

Some of the brain MR images containing tumor taken for testing our proposed algorithm are shown.

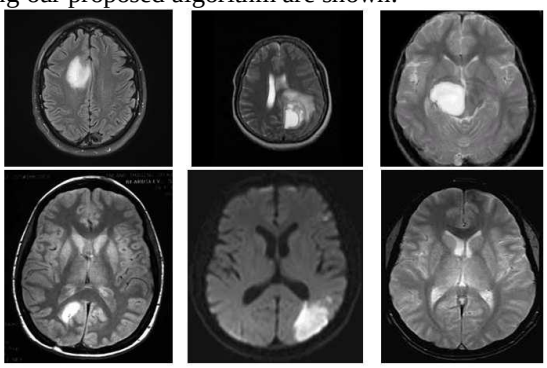

Fig-2: Brain MR images containing tumor

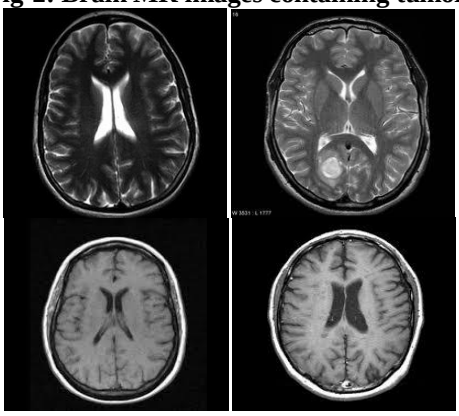

Figure: 3 Brain MR Images containing tumor

The brain tumor location is found out by applying ourproposed algorithm using Java Simulator. A GUI(Graphical User Interface) is created to make the system userfriendly.Collect the required input brain MR image from thedatabase which is shown in Fig 2. In our design we have taken the number of clusters as four. Fig 3 shows the final clusteringof brain MR image after being processed by our algorithm. Fig4 shows the final tumor detected portion from brain MR Image.

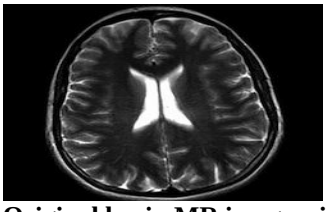

Figure: 4 Original brain MR image with tumor

5. CONCLUSION

Filter of brain image is basic in surgical arranging and medication arranging in 1the field of drug. In this work, the proposed workstation helped framework for brain MR picture division for recognition of tumor area utilizing K - means bunching calculation took after by filtering. It could filter tumor from diverse mind MRI pictures from database.

6. REFERENCES

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