# An Implimentation on Brain Tumor Mri Image Segmentation and Detection Techniques

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## ABSTRACT

Image process is an energetic analysis space during which medical image process may be a extremely difficult field. Medical imaging techniques area unit wont to image the inner parts of the form for diagnosing. Tumor may be a serious life sterilisation illness condition. Image segmentation plays a major role in image process because it helps within the extraction of suspicious regions from the medical pictures. during this paper we've got planned segmentation of brain MRI image victimisation K-means clump formula followed by morphological filtering that avoids the misclustered regions that may inevitably be fashioned when segmentation of the brain MRI image for detection of tumour location.

**Keywords:** Image Segmentation, MRI, K-means clustering, Morphological filtering.

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## INTRODUCTION:

Information is sent through pictures. Image process could be a method wherever input image is processed to induce output conjointly as a picture. Main aim of all image process techniques is to acknowledge the image or object into account easier visually [1].All the pictures utilized in today's world area unit within the digital format. Medical pictures area unit pictures that show the physical attributes distribution. Medical imaging modalities as in magnetic resonance imaging, CT scan largely rely upon engineering to come up with or show digital pictures of the inner organs of the anatomy that helps the doctors to check the inner parts of the body. CT scanner, Ultrasound and resonance Imaging took over typical x-ray imaging, by permitting the doctors see the body's dimension [21].

### Magnetic Resonance Imaging

Protons associate degreed neutrons of the nucleus of associate degree atom has an momentum that is understood as a spin. These spins can cancel once the amount of subatomic particles in an exceedingly nucleus is even. Nuclei with odd range can have a resultant spin .This forms the premise of resonance imaging. A resonance imaging (MRI) scanner uses powerful magnets to

polarise and excite H nuclei (single proton) in human tissue, that produces a proof that may be detected and it's encoded spatially, leading to pictures of the body. The magnetic resonance imaging machine emits oftenness (RF) pulse that specifically binds solely to H. The system sends the heartbeat to it specific space of the body that has to be examined. because of the RF pulse, protons in this space absorb the energy required to form them spin in an exceedingly completely different direction. this can be meant by the resonance of magnetic resonance imaging. The RF pulse makes the protons spin at the larmour frequency, in an exceedingly specific direction. This frequency is found supported the actual tissue being imaged and therefore the strength of the most magnetic flux. magnetic resonance imaging uses 3 electromagnetic fields: static field that could be a terribly robust static magnetic flux that polarizes the H nuclei; gradient field that could be a weaker time-varying field used for spacial encoding; and a weak oftenness field for manipulation of the H nuclei to supply measurable signals, that ar collected through oftenness antenna.

**Challenges**

The brain is that the anterior most a part of the central system. tumor is Associate in Nursing intracranial solid growth. Tumors ar created by Associate in Nursing abnormal and uncontrolled cellular division within the brain. during this work, we've used axial read of the brain image (2D) from tomography scan as a result of tomography scan is a smaller amount harmful than CT brain scan. A patient is subjected to totally different diagnostic strategies to work out the reason for the symptoms mentioned by him. Techniques like acting a diagnostic assay, acting imaging, like taking a tomography or CT scan of the brain are going to be done. In biopsy, pathologists take a specimen of the brain tissue into account for checking the presence of tumour. A diagnostician appearance at the tissue cells beneath a magnifier to ascertain for presence of abnormality. although diagnostic assay can show the presence of tumour and its pathology, once doctors choose surgery, they need to apprehend the tumour extent and therefore the precise location of tumour within the brain, which might be found by taking tomography scan of the patient as tomography doesn’t involve the employment of harmful radiations when put next to CT scan. ancient methodology in hospitals is to section the medical image into account, manually and this relies on however well the Dr. will understand the image into account to urge the specified region extracted out, that is formed troublesome thanks to minute variations and similitude between the initial and affected biological half within the image. The shortage of radiologists and therefore the the} giant volume of tomography to be analyzed build these readings labor intensive and also price valuable. It conjointly depends on the experience of the technician examining the pictures

[10]. Estimates conjointly indicate that between ten and half-hour of tumors ar incomprehensible by the radiologists throughout the routine screening.

During the acquisition of medical pictures, there ar potentialities that the medical image one gets may be degraded thanks to issues that may occur throughout the acquisition stage. therefore the original image might not be appropriate for analysis. Image segmentation may be outlined because the partition or segmentation of a digital image into similar regions with a main aim to modify the image into account into one thing that's a lot of purposeful and easier to research visually. Image segmentation is that the main important method within the majority of medical image analysis. Image segmentation strategies may be classified as thresholding, region primarily based, supervised and unsupervised classification techniques.

Various approaches are dispensed within the field of tumor detection. Sindhushree. K.S, et al[14] have developed a tumor segmentation methodology and valid segmentation on 2 dimensional tomography information. Also, detected tumors ar drawn in third-dimensional read. High pass filtering, bar chart feat, thresholding, morphological operations and segmentation exploitation connected element labeling was dispensed to observe tumour. the 2 dimensional extracted tumour pictures were reconstructed into 3 dimensional volumetrical information and therefore the the} volume of the tumour was also calculated. M.C. Jobin Christ and R.M.S. Parvathi[6] planned a strategy that integrates K suggests that clump with marker controlled watershed segmentation rule and integrates Fuzzy C suggests that clump with marker controlled watershed segmentation rule severally for medical image segmentation. The planned methodology may be a 2 stage method. 1st K-means clump (Fuzzy C Means) is employed to urge a primary segmentation of the input image, and second marker controlled watershed segmentation rule is applied to the first segmentation to urge the ultimate segmental image.

P.Vasuda, S.Satheesh [12], planned a method to observe tumors from adult male pictures exploitation fuzzy clump technique. This rule uses fuzzy C-means however the most important downside of this rule is that the procedure time needed. Classifiers {are also|also ar|are} called supervised strategies since they need coaching information that are manually segmental so used as references for mechanically segmenting new information. the employment of an equivalent coaching information for classifying an outsized variety of images, might cause biased result. Supervised segmentation methodology needs tidy quantity of coaching and testing information that relatively complicates the process[13].

## PROPOSED METHODOLOGY

We have 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 [1]. Clustering is also known as unsupervised classification technique. The name unsupervised classification because the algorithm automatically classifies objects based on user given criteria. 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.

The X-ray diffraction of the compound were recorded at room temperature using X –ray diffractometer ( Rigaku, minifiex ) with Cu K α radiation ( $\lambda = 1.54\ A^{O}$ ) in wide range of Bragg angle 2θ ($20^{o} < 2\theta < 90^{o}$) at a scanning rate of $0.02^{o}$ / sec. The XRD pattern was indexed using a program called TEROR from the CRYSFIRE. To measure the electrical properties of compounds, air drying silver paint was applied on both the large aces of the samples to serve as electrodes. Electrical and dielectric studies as Dielectric constant (ε) , tangent loss (δ) and conductivity (σ) were measured as a function of frequency (42 Hz - 5 MHz ) at different temperatures (27-450 $^{O}$C.) using a HIOKI- LCR Bridge (model no. 3532 -50) Hi-Tester, Japan.

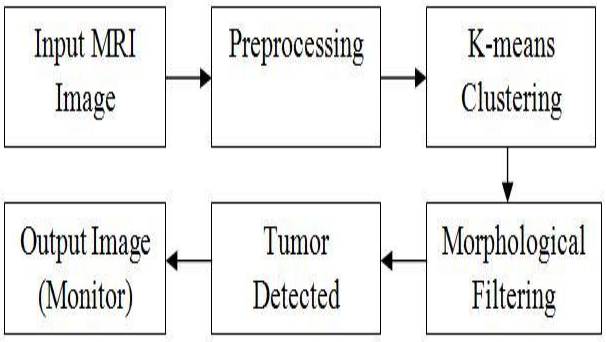


**Fig 1 Proposed block diagram**

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[15], we have proposed morphological filtering which is performed after the image is segmented by K-means clustering algorithm.

**Proposed Algorithm**

The algorithm that we have proposed is as follows:

1. Let $x_1,\ldots, x_M$ are N data points in the input image, let k be the number of clusters which is given by the user.
2. Choose $c_1,\ldots, c_K$ cluster centres.
3. Distance between each pixel and each cluster centre is found.
4. The distance function is given by J=| $x_i$-$c_j$| for i=1,…,N and for j=1,…,k, where |$x_i$ $c_j$| the absolute difference of the distance between a data point and the cluster centre indicates the distance of the N data points from their respective cluster centers.
5. Distribute the datapoints x among the k clusters using the relation x∈$C_i$ if |x-$c_i$|<|x-$c_j$| for i=1,2,…,k, i ≠j, where $C_i$ denotes the set of data points whose cluster centre is $c_i$.
6. Updated cluster centre is given as, $c_i=\frac{1}{m_i}\sum_{x_i \in C_i} x_i$ for i=1,…,k, where is the number of objects in the dataset $C_i$ ,where $C_i$ is the cluster and $C_i$ is the centre of cluster $C_i$ .
7. Repeat from Step 5 to Step 8 till convergence is met.
8. After segmentation and detection of the desired region, there are chances for misclustered regions to occur after the segmentation algorithm, hence morphological filtering is performed for enhancement of the tumor detected portion. Here structuring element used is disk shaped.

**Morphological Filtering**.

Morphology is the study of shapes and structures from a scientific perspective. Morphological filters are formed from the basic morphology operations. A structuring element is mainly required for any morphological operation. Morphological operations operate on two images, structuring element and the input image. Structuring elements are small images that are used to probe an input image for properties of interest. Origin of a structuring element is defined by the centre pixel of the structuring element. In morphology, the structuring element defined will pass over a section of the input image where this section is defined by the neighbourhood window of the structuring element and the structuring element either fits or not fits the input image. Wherever the fit takes place, corresponding image that represents the input image's structure is got and

suppression of the geometric features of the input image that doesn't fit the structuring element's neighbourhood takes place. Two main morphology operations are erosion and dilation where erosion results in the thinning of the objects in the image considered and dilation results in thickening of the objects in the image. Dilation uses the highest value of all the pixels in the neighbourhood of the input image defined by the structuring element and erosion uses the lowest value of all the pixels in the neighbourhood of the input image.

## SIMULATION RESULTS

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

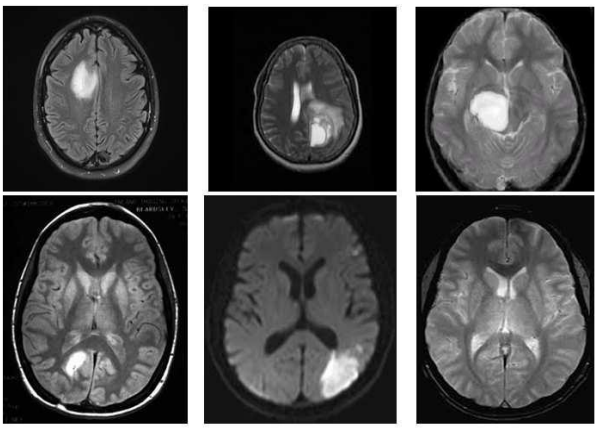

**Fig 2 Brain MR images containing tumor**

The brain tumor location is found out by applying our proposed algorithm using Matlab Simulator. A GUI (Graphical User Interface) is created to make the system user-friendly. Collect the required input brain MR image from the database which is shown in Fig 2. In our design we have taken the number of clusters as four. Fig 4 shows the final clustering of brain MR image after being processed by our algorithm. Fig 5 shows the final tumor detected portion from brain MR imag.

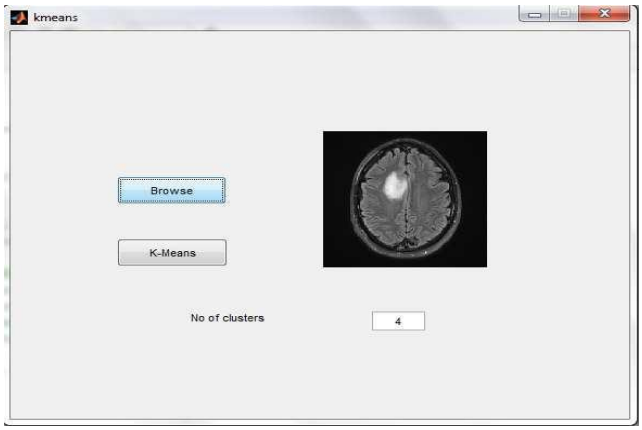


**Fig 3 Original brain MR image with tumor**

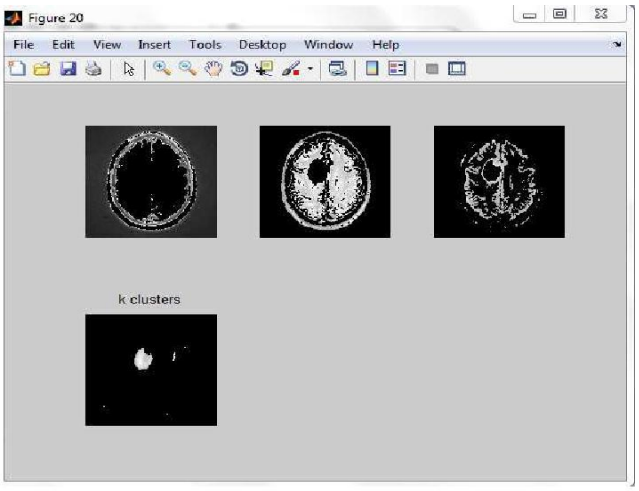


**Fig 4 Clustering of brain tumor MR image**

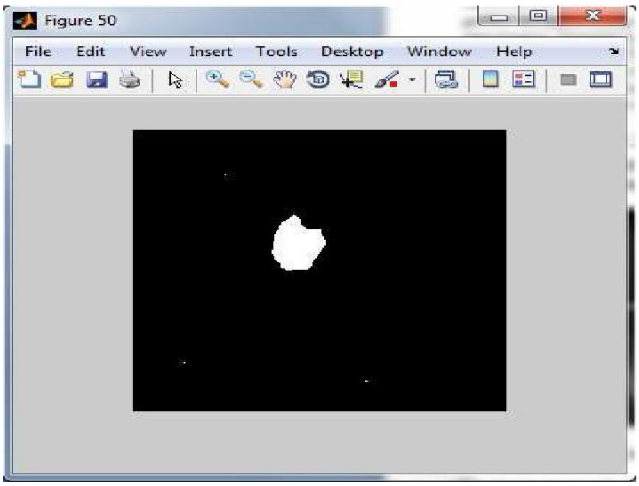


**Fig 5 Tumor detected**

## CONCLUSION

Segmentation of brain image is imperative in surgical planning and treatment planning in the field of medicine. In this work, we have proposed a computer aided system for brain MR image segmentation for detection of tumor location using K - means clustering algorithm followed by morphological filtering. We were able to segment tumor from different brain MRI images from our database.

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