International Journal of Combined Research & Development (IJCRD)
eISSN:2321-225X;pISSN:2321-2241 Volume: 7; Issue: 1; January -2018

# A NOVEL METHOD OF BRAIN TUMOR DETECTION AND THE CLASSIFICATION USING FCM AND SVM

ANUSHA.B[1], MR. MANJUNATH.S[2], MANJU DEVI[3]

[1,2,3]Department of Electronics Communication and Engineering,
The Oxford College of Engineering, Bangalore, Karnataka, India,
[1] anusha.92.bs@gmail.com, [2]manjuvs08@gmail.com, [3] manju3devi@gmail.com

***Abstract*— Here we are implementing a new method of brain tumour classification from MRI images. Brain tumour extraction and its analysis are challenging tasks in medical image processing because brain image and its structure is complicated that can be analysed only by expert radiologists. Segmentation plays an important role in the processing of medical images. In our project we are using fuzzy c-means algorithm for clustering and the image is classified by using artificial neural network. Wavelet based feature extraction is used as feature extraction. In this algorithm the image is enhanced using enhancement techniques such as contrast improvement, and mid-range stretch. Double thresholding and morphological operations are used for skull striping. The proposed method is compared with existing method and performance is analysed.**

***Keywords*— *Data Mining, MRI, Fuzzy C-means clustering, Gray level run length matrix (GLRLM), Support Vector Machine (SVM)***

## I INTRODUCTION

Information mining is a basic and hearty equipment to separate the info from Brobdingn agian dataset. Characterization is a branch0of0data0mining0field. In this0field0numerous characterization methods square measure accessible for restorative photos, for example, fake neural system (ANN), fluffy c-implies (FCM), bolster vector machine (SVM), choice tree and Bayesian arrangement. Various specialists have been actualised the characterization ways for therapeutic photos arrangement. Without additional ruckus various therapeutic imaging procedures, for example, positron discharge picturing (PET), x-beam, registered tomography (CT), attractive reverberation imaging (MRI), for tumour location nevertheless tomography imaging system is the nice in

The MRI photos were upgraded utilizing distinction modification and Mid-range Stretch procedures. After the image was improved, division step should be doable effortlessly. Division is a procedure to extricate suspicious space from photos. In this paper Segmentation strategy was finished by Fuzzy C-Mean (FCM) bunching. Before applying FCM bunching system, skull marking has been finished. Highlight extraction intends to acquire the info of picture. The technique utilizes Gray Level Run Length Matrix (GLRLM) to concentrate highlights.

The lessened GLRLM components square measure conceded to bolster vector machine for making ready and testing. The cerebrum tomography photos were organized utilizing SVM systems that square measure loosely used for data dissecting and style perceiving. It makes a hyper plane in the middle of data sets to point out which category it's an area with. The primary target of this work is to make up a [*fr1] and half procedure, which will prepare the mind tomography photos effectively and fruitfully by suggests that of Fuzzy C-means and bolster vector machine (SVM). This work is an effective order strategy is to tell apart the tumour in tomography pictures.

SCOPE OF THE PROJECT:

- MRI is the most imperative method, in recognizing the cerebrum neoplasm. In this paper information creating by removal techniques area unit used for order of MRI photos.
- Another 0.5 and half strategy taking into account the factory-made neural system (ANN) and down like c-implies for mind neoplasm arrangement is projected.

- In this calculation the picture is upgraded utilizing improvement ways, for example, contrast amendment, and mid-range stretch. Two fold thresholding and morphological operations are used for os marking. Fluffy c-implies (FCM) bunching is used for the division of image the image} to differentiate the suspicious district in mind MRI picture. Dark level run length framework (GLRLM) is utilized for extraction of highlight from the mind image.
- artificial neural system (ANN) strategy is connected to group the neural structure MRI photos, which provide precise and a lot of compelling result for arrangement of mind MRI photos.

## II METHODOLOGY

- The proposed procedure contains of associate degree arrangement of stages starting from gathering mind tomography footage. The principle steps are appeared in Figure one. This crossover strategy includes the accompanying elementary steps, for example, improvement, skull marking, division, highlight extraction and preparing the factory-made neural system (ANN) utilizing tomography footage with GLRLM highlights, putting away the information and testing. All the above same steps are enclosed in testing stage, utilizing the new tomography footage with GLRLM parts to factory-made neural system (ANN) and neural structure MRI footage a characterised.
- This study utilized dataset of a hundred and twenty patients tomography neural structure footage and classified them as standard and uncommon. The picture is handled through: User case Diagram

Attainment of images
Enhancement of MRI images
Skull striping
Fuzzy c-means
Feature Extraction
SVM Classifier

**Attainment of images**

Brain MRI images were collected from different medical centers. These brain MRI images were converted into two dimensional matrices using MATLAB (R2013a).

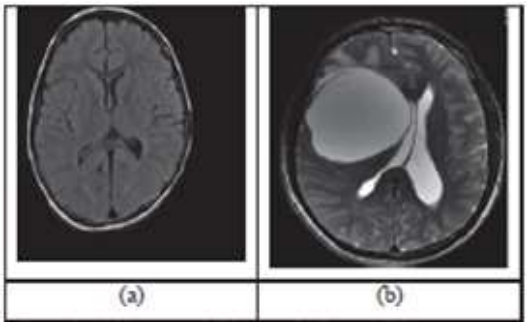



***Figure 2: (a) Non-tumor MRI image (b) Tumor MRI image***

**Contrast enhancement**

Contrast upgrades enhance the detectable quality of articles in the scene by up the splendour distinction amongst things and their experiences. Contrast upgrades square measure normally dead as a differentiation stretch took when by a tonal improvement, in spite of the fact that these may each be performed in one stage.

A complexity stretch enhances the brilliance contrasts systematically over the dynamic scope of the image, though tonal upgrades enhance the splendour contrasts in the shadow (dim), midtone (grays), or highlight (splendid) districts to the detriment of the shine contrasts in alternate locales.

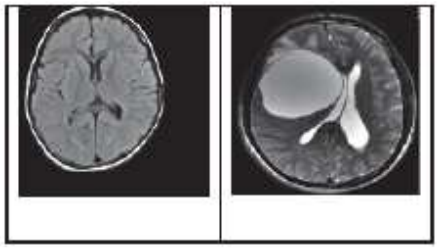


***Figure 2: (a) Enhanced Non-tumor image (b) Enhanced Tumor image***

**Skull stripping**

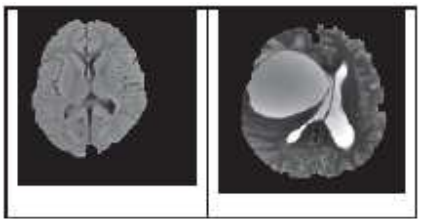


***Figure 3: (a) Skull masking Non-tumor image (b) Skull masking Tumor image***

**Double thresholding**

It is a division procedure. This procedure, change over the image into parallel form, that is dark scale image to double picture. This strategy creates the veil by setting each element in the scope of zero.1*255-0.88*255 to 1 implies white and remaining pixels to zero implies dark. Non mind tissues pixels were disposed of in MRI image. Here two limits higher and lower are thought-about therefore it is called two fold thresholding system.

**Erosion**

Disintegration is one of the 2 essential administrators within the territory of numerical morphology, the other being enlargement. It is commonly connected to double footage, yet there are renditions that work on gray scale footage. The essential impact0of0the0administrator on a parallel picture0is0to disintegrate away the limits of locales of nearer read pixels (i.e. white pixels, normally) . In this way territories of nearer read pixels shrivel, and openings inside those zones get to be larger.

**Region filling**

Area filling Next we have a tendency to build up a easy calculation for venue filling in light-weight of set enlargements, complementation, and crossing points. Starting with a purpose p within the limit, the goal is to fill the whole area with 'dark'. In the event that we receive the tradition that each one non-limit (foundation) focuses are named 'white', then we dole out associate estimation of "dark" to p to start out. The accompanying methodology then fills the venue with 'dark'.

This technique is employed to fill the openings within the pictures. After the disintegration, dissolved pictures are stuffed utilizing space filling calculation. Here the related foundation pixels are modified over into frontal space pixels in order that the gaps gift within the dissolved photos are expelled in neural structure0MRI0image.

**Fuzzy systems**

• Fuzzy frameworks and models are equipped for speaking to different, estimated, and off base data
• Fuzzy rationale offers a strategy to formalize thinking once managing unclear terms. Not each selection is either valid or false. Fluffy explanation takes into account enrolment capacities, or degrees of honesty and lies.

Application zone for fluffy frameworks

• Quality control
• Error diagnostics
• Control hypothesis
• Pattern acknowledgment

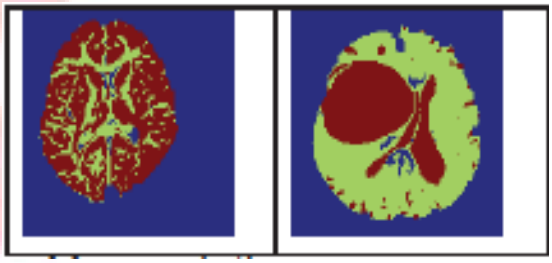


***Figure 4: fuzzy c-mean algorithm***

**Segmentation**

The technique of separating a picture into multiple slices and object region. The skull stripes pictures reused in image segmentation. This provides good result0for0tumor segmentation. In this work, fuzzy c-means algorithm was used in MRI image segmentation. Fuzzy C-Means (FCM) algorithm is used to search out the suspicious region from brain MRI image. This fuzzy c-means clustering methodology provides good segmentation result.

In this work, fuzzy c-means algorithm was used in MRI image segmentation. Fuzzy C-Means (FCM) algorithm is used to find out the suspicious region from brain MRI image. This fuzzy c-means clustering method provides good segmentation result.

**Feature extraction using GLRLM**

Highlight extraction is a system to locate the applicable parts from footage, which area unit used to comprehend the images easier. This information set footage area unit modified over into compacted structure is known as highlight extraction. It can reduce the work for additional making ready, for example, picture arrangement. Here the GLRLM highlight extraction procedure is utilized. GLRLM is utilized when the down like c-implies calculation. Infer the dark level run length grid (GLRLM) for two level high return sub teams of the separate ripple deteriorated image with one for separation and zero,45,90 and one hundred thirty five degrees [8]. Here element extraction is separating the applicable parts that prompt comprehend the mind MRI footage well.

**Support Vector Machine (SVM)**

It is an honest instrument for information examination and characterization. SVM classifier has a quick learning speed even in intensive info. SVM is utilized for 2 or a lot of category order problems. Bolster Vector Machine depends on the origination of choice planes. A choice plane is one that isolates between associate arrangements of things having various category participations. The Classification and discovery of cerebrum growth was finished by utilizing the Support Vector Machine strategy. Characterization is done to acknowledge the tumor category gift within the image. The utilization of SVM includes two elementary strides of making ready and testing.

**Performance measures**

Grouping, the affectability, specificity and precision were computed utilizing beneath recipes:
•True Positive (TP): Abnormal cerebrum accurately distinguished as uncommon.
•True Negative (TN): Normal neural structure accurately recognized as ought to be expected.
•False Positive (FP): Normal mind erroneously distinguished as uncommon.
•False Negative (FN): Abnormal cerebrum mistakenly distinguished0as0ought to be expected.

1) Sensitivity= TP/(TP+FN) *100%
2) Specificity= TN/(TN+FP) * 100%
3) Accuracy= (TP+ TN)/(TP+ TN+FP+FN)* 100

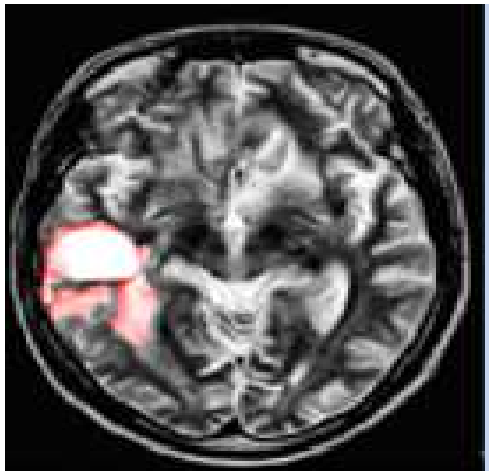
## IV RESULT

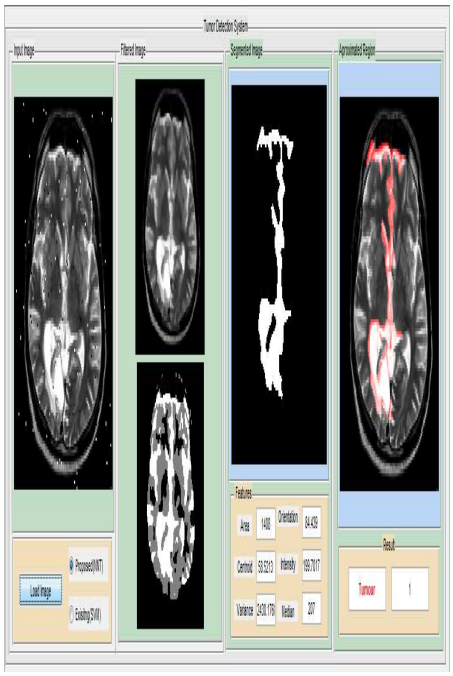
In this paper, neural network technique with fuzzy c-means is used for segmentation and classification of brain MRI images. Real data set of 120 patients MRI brain images have been used to detect 'tumor' and 'non-tumor' MRI images. The soft tissues in brain MRI images are segmented with Double Thresholding, Morphological operations and fuzzy c-means algorithm for clustering and gray level run length matrix for feature extraction. The neural network classifier is trained using 96 brain MRI images, after that the remaining 24 brain MRI images was used for testing the trained SVM. First neural network is trained by using 96 MRI brain image training set. Once the neural network is trained, the classification accuracy is validated using the testing set. The result for classification provides accurate for large data sets.

Test for some collected images.

Abnormal image

Image 1





Normal image

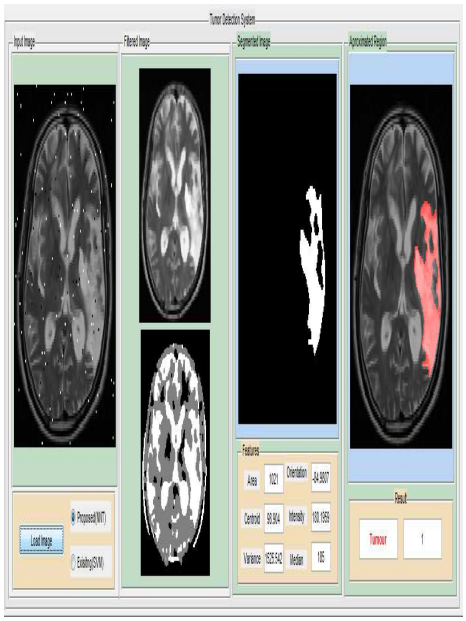
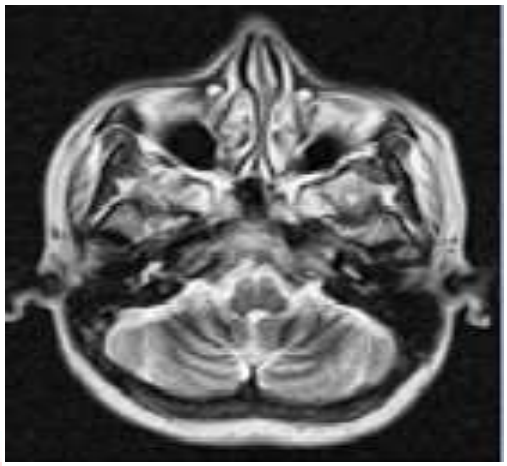
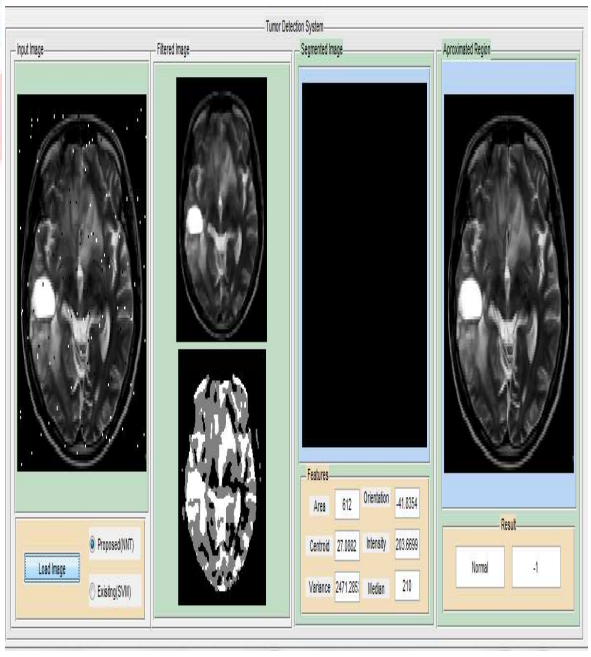


Image 2





## V CONCLUSION

In this proposed system brain MRI images proved to be a significant way to detect the brain tumor. The hybrid methodology of combining support vector machine and fuzzy c-means clustering for classification gives accurate result for identifying the brain tumor. For future work, to get better accuracy rate and less error rate a hybrid neural network algorithm is to be proposed. In future work, different data mining techniques can be used to train using different kernel functions in order to improve the performance of the classifiers and the data sets can also be increased.

## VI. REFERENCES

[1] Prakash Mahindrakar and Dr. M. Hanumanthappa, "Data Mining In Healthcare: A Survey of Techniques and Algorithms with Its Limitations and Challenges", Int. Journal of Engineering Research and Applications, ISSN : 2248-9622, Vol. 3, Issue 6, Nov-Dec 2013, pp.937-941

[2] Kailash Sinha, G.R.Sinha, "Efficient Segmentation Methods for Tumor Detection in MRI Images", 2014 IEEE Student's Conference on Electrical, Electronics and Computer Science, 978-1-4799-2526-1/14/$31.00 ©2014 IEEE

[3] R.S.RajKumar and G.Niranjana, "Image Segmentation and Classification of MRI Brain Tumor Based on Cellular Automata and Neural Networks", IJREAT International Journal of Research in Engineering & Advanced Technology, Volume 1, Issue 1, March, 2013 ISSN: 2320

[4] H. B. Nandpuru, Dr. S. S. Salankar, Prof. V. R. Bora, MRI brain cancer classification using support vector machine. 2014 IEEE Student