

# Novel Approach for Texture-Based Segmentation and classification of Brain Tumors in MR Images

Shankaragowda B.B.

Research Scholar and Assistant Professor,  
Dept. of Master of Computer Applications,  
Bapuji Institute of Engineering and Technology  
Davangere, Karnataka, India  
*e-mail:bsgowda2007@gmail.com*

Dr. Siddappa M

Dean, Academic,  
Sri Siddhartha Institute of Technology,  
Tumakuru, Karnataka, India  
*e-mail: siddappa.p@gmail.com*

Dr. Suresha M.

Assistant Professor,  
Dept. of P G Studies and Research in Computer Science  
Kuvempu University,  
Shankaraghatta, Shivamogga, Karnataka, India  
*e-mail:suresham@kuvempu.ac.in*

**Abstract**—Brain tumor conclusion is a basic endeavor. This structure gives a profitable strategy to the finish of the Brain tumor. The proposed structure involves Texture element extraction from Brain MR images. Classify the brain images on the bases of texture characteristics using ensemble base classifier. After arrangement tumor district is removed from those pictures which are classified as malignant using Fuzzy C-Mean(FCM) gathering using Gabor wavelet features is giving the better-segmented picture. Our proposed framework performed precisely and efficiently. We accomplished exactness and classification within 99.68% and furthermore accomplished the precise after effect of segmentation extricate the tumor area from the brain MR images.

**Keywords-** Brain tumor, Ensemble base classifier, Fuzzy C-Mean (FCM), Gabor wavelet, Malignant, Magnetic resonance imaging (MRI), Segmentation, Texture characteristics.

\*\*\*\*\*

## I. INTRODUCTION

Texture Segmentation depends on apportioning a picture into various districts of comparable surfaces in view of a predetermined paradigm. The Texture division goes for limiting the limits between various Textures on one finished picture plane by ordering pixels in light of their Texture properties. There is look into centers in the field of Texture investigation, for the most part including Texture order, Texture division, Texture union, shape from the Texture, and so forth Multichannel Gabor work has been perceived to be an extremely helpful device in picture preparing, particularly for Texture examination.

## II. RELATED WORK

An arrangement of research work has been considered for the tumor Texture-based division and a portion of the ongoing strategies are talked about here.

Meenakshi Pareek, C.K.Jha, Saurabh Mukherjee [1] this paper for cerebrum tumor identification, division, and order a graphical UI (GUI) framework has been created.

Mrunal H.Suthar, Megha Gupta [2] this paper new technique is intended for MRI mind order and tumor recognition. Two distinct situations are considered in this technique. In the First

situation, Images are characterized in ordinary and tumorous classification utilizing Support Vector Machine (SVM).

Vajinath V. Bhosle, Vrushsen P. Pawar [8] this paper investigation of various strategies for the surface division in view of Gabor channel, edge recognition, content-based picture recovery, thresholding, Markov irregular fields, directed division, unsupervised division, bunching techniques, district-based and histogram-based techniques.

## III. CLASSIFICATION

Reasonable classifier requires thought of numerous components: Classification exactness and Algorithm execution.

There are fundamentally two kinds of grouping. One is known as the unsupervised arrangement and other is known as regulated grouping [9]. Unsupervised characterization is the ID of normal gatherings, or structures, inside multi-spectral data information. Administered grouping is the method regularly utilized for the quantitative examination of remote detecting picture information.

### A. Support vector machine (SVM)

Support vector machine (SVM) is a regulated learning methodology and strategies utilized for the arrangement

reason. SVM has likewise been connected to various true issues, for example, cancer diagnosis[3,5], glaucoma determination. The proposed framework utilized SVM for parallel grouping of brain MR picture as ordinary or tumor influenced.

**B. Artificial Neural Network (ANN)**

An Artificial Neural Network (ANN) us a data preparing worldview. An ANN is arranged for a particular application, for example, design acknowledgment and information order. highlights the shape, edge attributes, dimness of knobs and tried our outcomes as indications of tumor and research whether they are benign or malignant[7].

**C. Ensemble Base Classification**

Ensemble base classifier is utilized for grouping. In this procedure, various classifiers are produced. This technique enhances the execution of the general characterization.

**IV. TEXTURE SEGMENTATION**

Texture division goes for restricting the limits between various Textures on one finished picture plane by arranging pixels in view of their Texture properties. There are a few research centers in the field of Texture investigation, for the most part counting Texture order, Texture division, Texture combination, shape from Texture, and so forth Multichannel Gabor work has been perceived to be an exceptionally picture handling, particularly for Texture examination.[8,11]

**A. Gabor Filter**

Gabor filter is a straight filter whose motivation reaction is characterized by a symphonious capacity duplicated by a Gaussian capacity. Gabor filters can be connected to numerous picture preparing applications, for example, Texture division, archive examination, edge location and picture portrayal favorable position of these filters is that they fulfill the base space-data transfer capacity item per the vulnerability guideline[8]. Gabor filters are utilized to take care of issues including muddled pictures contained finished locales. The issue of fragmenting finished pictures is considered in this paper. An arrangement of Gabor filters with various frequencies and introductions might be useful for extricating helpful highlights from a picture[10,11].

**V. PROPOSED METHOD**

The proposed technique utilizes a calculation to section the MRI pictures. Read Image from the database. In the event that the picture in shading at that point changes over into grayscales. Apply Gabor channel on the picture. On the off chance that concentrate locale at that point Display the Segmented Image. else Apply Gabor filter on the picture. At long last Stored in the database. Texture Segmentation Accuracy by utilizing three Gabor Filter with limitation 99.5%.

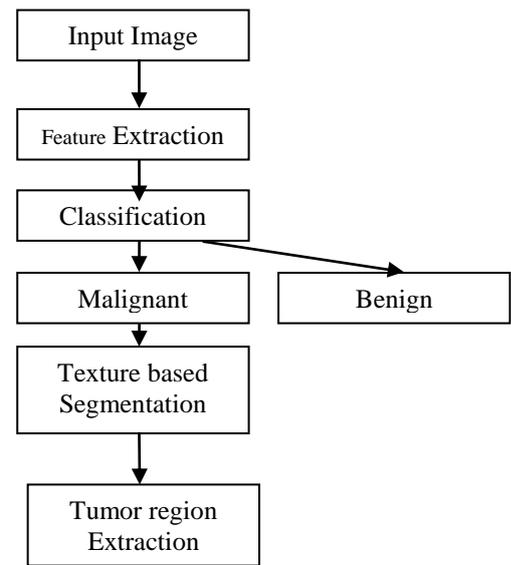


Fig. 1 Proposed System

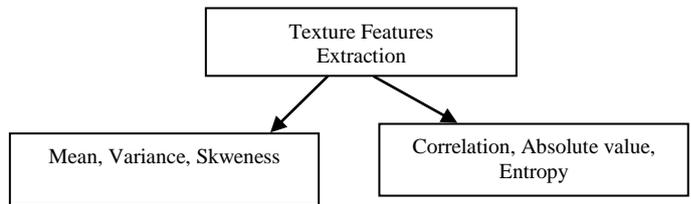


Fig. 2 Feature Extraction

**VI. RESULTS**

The proposed method has been implemented using the MATLAB 2013a environment and dataset for this study is Osirix DICOM(Digital Imaging and Communications in Medicine) and real images. ANN and SVM is an administered learning approach. It is the considerable gadget for measurable examination. SVM and ANN classifier has a quick picking up learning of in immense insights.

Ensemble Base Classification utilized for grouping for the proposed framework[6].Ensemble base classifier additionally gives higher precision for this situation likewise when contrasted with the as of late proposed technique[6]. Order stage gives the pictures which are harmful to the division period of the proposed framework precisely remove the tumor area from dangerous brain image. Fig. 4 demonstrates that tumor district which is high interestingly is precisely recognized utilizing Fuzzy C-Mean(FCM) grouping utilizing Gabor wavelet highlights is giving better sectioned image. The final product of the proposed strategy is demonstrated in Table 1.

Table 1  
 Comparison of Classification performance.

Technique	MR Images Data Accuracy(%)
Texture Combined + Ensemble Classifier	99.68
Texture Combined +ANN Classifier	97.86
Texture Combined+ SVM Classifier	97. 24

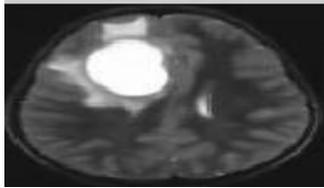


Fig. 3 Input Image



Fig4. Processed Image

## VII. CONCLUSION

The proposed structure is made for diagnosing the brain tumor from brain MR pictures. This system plays out this investigation in various stages. Texture joined with SVM, Texture joined with ANN and Texture joined with Ensemble Classifiers. Ensemble base classifier additionally gives higher precision contrasted with the as of late proposed strategy. Once the pictures are resolved as malignant these are additionally handled for tumor extraction from them. Tumor extraction is performed in the division stage. Division stage is utilizing FCM gathering using Gabor wavelet is giving the better-segmented image. Trials demonstrate that the proposed framework gives great outcomes when contrasted with the as of late proposed procedures. We accomplished precision of classification more than 99.68 % and also achieved the accurate result of segmentation extract the tumor region from the brain MR images..

## ACKNOWLEDGMENT

The authors are appreciative to all the staff individuals from the P G Studies and Research in Computer Science, Kuvempu University, Shivamogga.

## REFERENCES

- [1]. Meenakshi Pareek, C.K.Jha, Saurabh Mukherjee, "A Texture Based Approach for extraction and classification of tumor from MR Images", International Journal of Computer Application (2250-1797), Vol. 7- No. 4, pp.228-237, July-August 2017.
- [2]. Mrunal H.Suthor, Megha Gupta,"A Novel Approach for MRI Brain Image Classification & Detection", International Research Journal of Engineering and Technology (IRJET), e-ISSN:2395-0056, p-ISSN:2395-0072, Vol.: 04, Issue:01, January 2017.
- [3]. Jahnavi M.S., Kurup S., "A Novel Approach to detect brain Tumor in MRI Images using hybrid techniques with SVM Classifiers",IEEE International conference on Recent Trends in Electronics Information and Communication (RJEICT), Bangalore, India, pp. 546-549,2016.
- [4]. Monika Jain, Shivanky Jaiswal, Sandeep Maurya, Mayank Yadav," A Novel Approach for the Detection & Analysis of Brain Tumor" International Journal of Emerging Technology and Advanced Engineering(IJETAE), ISSN 2250-2459, ISO 9001:2008 Certified Journal, Vol. 5, Issue 4 April 2015.
- [5]. C. Logeswaran, P.Bharathi, M.Gowthami, " Brain Tumor Detection Using Hybrid Techniques and Support Vector Machine" International Journal of Advanced Research in Computer Science and Software Engineering, ISSN: 2277 128X, Vol. 5, Issue 5, May 2015.
- [6]. EL-Sayed A, El-Dahshan, Abdel-Badeesh M.Salem and Tamer H.Younis,A hybrid technique for automatic MRI brain images classification, Studia Univ, Babes Bolyai, Informatica, Vol. LIV, 2009.
- [7]. R.S. Raj Kumar and G. Niranjana, "Image Segmentation and Classification of MRI Brain Tumor on Cellular Automata and Neural Networks," International Journal of Research in Engineering and Advanced Technology, Volume 1, Issue 1, March 2013.
- [8]. Vajinath V Bhosle, Vrushsen P.Pawar,"Texture Segmentation: Different methods", International Journal of Soft Computing and Engineering (IJSCE), ISSN:2231-2307, Vol. 3,Issue-5, November 2013.
- [9]. D. LU & Q. WENG, " A survey of image classification methods and techniques for improving classification performance", International Journal of Remote Sensing , VI. 28, No. 5, pp 823-870, 2007.
- [10]. Liu & Wechsler, " Gabor Feature Based Classification using the Enhanced Fisher Linear Discriminant Model for Face Recognition," IEEE Trans. Image Processing, Vol. 11,pp.467-476,2002.
- [11]. Amanpreet kaur " Texture based image segmentation using Gabaor filters" International Journal of Engineering Science and Advanced Technology, Vol. 2, Issue 3, 687-689,2012.