



# A Review and Comparative Survey on an Efficient Brain Tumor Prediction by Using Two Pathway Group CNN Methodology with SVM for Tumor Classification in MRI Images

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**Abstract-** In a brain tumor classification physician's ability and experience is considered as an important step which depends on ability and experience of physician's. An improvement in the current methods is suggested with the identification of brain tumors for suitable treatments. It is recommended for the radiologist and physicians to classify the type of tumor. An improved method of classification in identifying the type of tumor can be done automatically. In recent years, due to noninvasive imaging and good soft tissue contrast of NMR imaging and MRI based image analysis is used in tumor segmentation. In machine learning, SVM is a one type of algorithm which is used for classification or problem of regression which will use to create the pattern for future. Brain tumor identification and growth prediction system is developing and adaptive by an efficient algorithm which is classified by using MRI images.

**Keywords:** Image Classification, MRI, Brain Tumor, Convolution Neural Network, Support Vector Machine.

## I. INTRODUCTION

The human body brain is the controlling center where neurons. The human brain activities are controlled by the nervous system. Among tumors, brain tumor is considered to be the most deadly disease. The abnormal growth in the cells of the brain leads to the development of brain tumor in the later stages. These abnormal brain cells that are termed as brain tumor are the one of the most reason for cancer killer in children and adults. In that fewer than 60% almost in 13000 people are diagnosed each year with an early stage of brain tumor, including more than 400 children and young people out of 40 people every day. According to statistical report we know that data of the second leading fatal among kids under age of 20 and in males ages 20- 39 is the main reason of brain tumor cancer where Leukemia is the first and in females the 5<sup>th</sup> cancer related fatal between the age of 20 to 39. As brain tumors is that type of critical disease which reduce life expectancy by an average of 20 years which is found that this is the highest disease occurred by any cancer in that after diagnosis only 19% of adults persist for five years.

In the early stages, the brain tumor can be cured with few chances which depends on the ability of the doctor and the will power of the patients. The classification of brain tumors are as I, II, III and IV under the microscope. Malignant tumors and benign tumors are the two types of brain tumors which are occurred in brain due to form of abnormal cells. In that there are two types of malignant tumors found in brain one is primary tumors which is start inside the brain and another one is metastasis which is spread from anywhere. As per the brain tumor is the most severe tumor due to which major cause for higher death rate happen. A method to find out the tumor and to predict brain injuries is that whether it will turn into tumor in future. In all type of brain tumors glioma tumor is known as aggressive and common brain tumor. Gliomas brain tumors highest grade with the highest mortality rate and consumption. Low grade gliomas and High grade gliomas are graded from these neoplasm with the former being less aggressive and infiltrative than the latter even during under treatment patients can't able to survive more than 14 months after diagnosis. In a current treatments use for brain tumors like surgery chemotherapy and radiotherapy or both combined one. In a clinical practice MRI is used for detect the gliomas.

## II. RELATED WORK

Mustaqeem, et. al. [1], in this paper, segmentation and morphological operations are discussed with an efficient algorithm for the detection of tumor.

M. Madheswaran, et. al. [2], in this paper, the MRI associated with the kernel using the support vector machine (SVM) is presented. The enhanced tumor classification is made. In this classification study, an accuracy of 98.83% is obtained using SVM with GRBF kernel. P. Muthu Krishnammal, et.al [3], in this paper, to detect the brain tumor, a fuzzy clustering method is used. The proposed work is based on the

automatic support system using learning machine. The early stages are analyzed using anatomical structures.

Said Charfi, et.al [4], an accurate segmentation and classification using the MR images for the brain tumor detection is proposed with the novel approach.

A.Lakshmi, et. al. [6], in this paper, the brain tumor diagnosis is done using the Computer Aided Development. The brain tumor regions are detected through segmentation. This is done using four stages namely, preprocessing, feature extraction, ANFIS Classifier and morphological operations.

Nalbalwar, et.al [7], A classification system for the brain cancer detection is proposed in this paper. The types of tumors are classified using the computer based procedures that can also detect the tumor blocks using Artificial Neural Network. Here, the astrocytoma types of brain tumors based MRI images are used.

John, et.al [8] the classification of tumors based on the real Magnetic Resonance Images into normal, non-cancerous (benign) brain tumor and cancerous (malignant) brain tumor are done on this paper.

Pantelis Georgiadis, et.al. [9], The difference between the metastatic and primary brain tumors (gliomas and meningiomas) are studied in this paper. The main objective of this work relies on the computer aided system for the design, implementation and evaluation. This process is done by taking the T1 post – contrast images with the textural features. In the proposed system, non linear least squares features transformation (LSFT) is incorporated into a modified probabilistic neural network (PNN).

Evangelia, et.al [10], this paper deals with the various steps like, region-of-interest definition, feature extraction, feature selection, and classification. The observation includes tumor shape, and intensity characteristics. It also includes the texture with rotation invariant characteristics. The support vector machine (SVM) with recursive feature elimination is used to perform the subset selection [5].

Dr.G.R.Jothi lakshmi et.al in this paper, with regular polygon adaptive volterra strain, the Mammogram improvement is reviewed. A comparative study is made between various works has been reviewed. An adaptive volterra filter and the execution measurement are used for the mammogram improvement. The measurement of the strain MSE and PSNR are measured.

Dr.G.R.Jothi lakshmi et.al in this paper, the Sin Mammogram Images has been used to study the review of characteristics in micro classification.

### III. PROPOSED METHODOLOGY

The masking methodology of the data acquisition, the input MRI brain images are used to filter out the acquired image of the MRI which segments the portion. In the proposed method, the quantitative analysis of the MRI scanned images similar to the neural network and the feature extraction are done. The various parameters of MRI scan images are used to compare and the cancer detected portion is done. From the filtered images, the extraction is done followed by the Neural Network process. The affected portions are drawn inside the bounding box using the morphological methods. Later, the separation of bounding box is done in the region enclosed. The SVM algorithm finds the accuracy estimation and the features are extracted with the image quality for the results. Figure 1 shows a system structure.

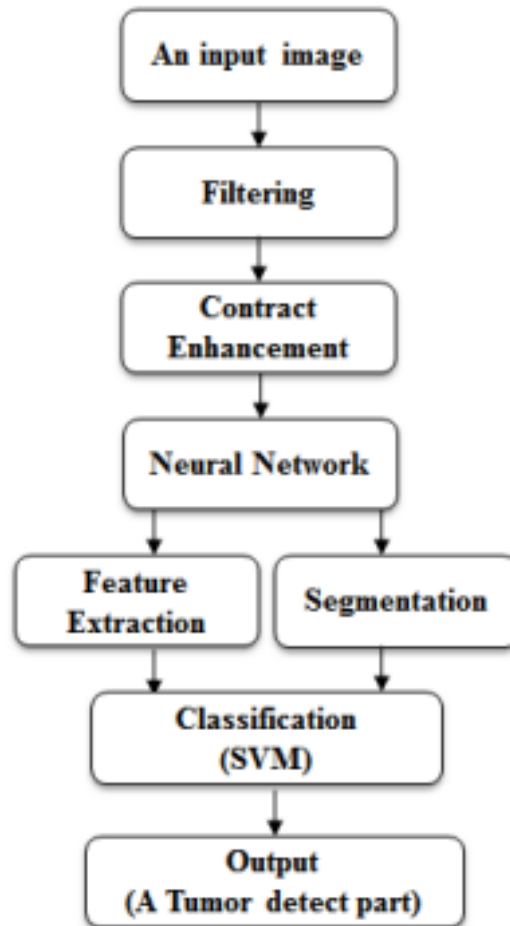


Figure 1. A System Structure

#### S.NO ALGORITHM METHODOLOGY ACHIEVEMENTS

- 1 Filtering Technique
- 2 Bilateral Transformation
- 3 Watershed Algorithm
- 4 Fuzzy C Means Clustering
- 5 Meta- Heuristic Algorithm
- 6 CNN and SVM Classification

#### IV. CONCLUSION

In this, the tumor analysis and the tumor detection of done. The semi-automated methods and the fully automated methods are done. Thus the classification of the tumor segmentation is done. The watershed region outlines are extracted using the mixed and marker controlled algorithm. In this, the degrees of belonging to each pixel in images are used. The fuzzy set establishes the pixel where the segmentation algorithm is followed by the cluster technique.

The tumor extraction and the tumor selection from the brain are performed using bat algorithm (BA). The CNN is used to segment the process and the analysis is done using the SVM classification. In the filtering technique, the automated seed selection method is performed and the tumor segmentation is done. In image processing, using the symmetrical axis, the brain tumor detection is done effectively. This method does not find any limitation.

In the region having noise and concave, the proposed method does not provide a clear segmentation. The accuracy is obtained at the outline of the boundaries of different sizes. This algorithm provides fast and better results from the preprocessed output images of the Magnetic Resonance. The detection of tumor in the MRI is done automatically. The proposed Bat Algorithm extracts better analysis compared to other

algorithm. The dataset of the abnormal sections are analyzed automatically. The nature of the tumor is easily identified using the SVM classification techniques

In the proposed work, the segmentation of the tumor images from the Magnetic Resonance Imaging (MRI) is done. The effectiveness of the tumor prediction is compared and found to be more accurate using the CNN process. The SVM classifier is used to classify the values of the tumor with the available parameters. This accuracy has proved the easiness of the treatment in the brain for identification. The SVM results in the better results of the brain tumor detection and in efficient classification of data.

#### *S. NO TITLE YEAR METHOD*

- 1 A New Method For Brain Tumor Segmentation Based On Watershed and Edge Detection Algorithm In HSV Colour Model
- 2 Deep Features Learning With Discrimination Mechanism for Brain Tumor Segmentation and Diagnosis
- 3 Brain Tumor Segmentation Using Convolution Neural Network
- 4 Fully Connected CRF with Data-Driven Prior For Multi-Class Brain Tumor Segmentation
- 5 Analysis of MRI Based Brain Tumor Identification and Segmentation Technique
- 6 An Automatic Brain Tumor Extraction System Using Different Segmentation Methods
- 7 Brain Tumor Classifications and Segmentation in MRI Images Using PNN
- 8 A New Approach For Segmentation and detection of Brain Tumor In 3D Brain MR Imaging
- 9 A Novel Segmentation Algorithm for MRI Brain Tumor Images
- 10 Development Of Automated Brain Tumor Identification Using Mri Images

#### REFERENCES

1. Mustaqeem, et al., "An Efficient Brain Tumor Detection Algorithm Using Watershed & Thresholding Based Segmentation" International Journal of Image, Graphics and Signal Processing, Vol.4, No.10, 2012, pp34-39.
2. M. Madheswaran and D. Anto, "Classification of brain MRI images using support vector machine with various Kernels"; Biomedical Research, Madheswaran /Dhas 2015 Volume 26 Issue 3.
3. P. Muthu Krishnammal, "Automated Brain Image classification using Neural Network Approach and Abnormality Analysis"; International Journal of Engineering and Technology (IJET) Vol 7 No 3 Jun-Jul 2015.
4. Said Charfi, Redouan& Lahmyed& Lalitha. "A novel approach for brain tumor detection using neural network"; International Journal of Research in Engineering & Technology (IMPACT: IJRET) ISSN(E): 2321-8843; ISSN(P): 2347-4599 Vol. 2, Issue7, Jul 2014, 93-104 © Impact Journals.
5. Ed-EdilyMohd. Azhari, Muhd. MudzakkirMohd. Hatta, ZawZawHtike, and ShoonLeiWin, an international journal of information technology convergence and services(IJITCS), vol. 4., no. 1, 2014.
6. A.LAKSHMI, Dr.T.ARIVOLI "Computer Aided Diagnosis system for brain tumor detection and segmentation"; Journal of Theoretical and Applied Information Technology 20th June 2014. Vol. 64 No.2 © 2005 - 2014 JATIT & LLS.
7. Nalbalwar, R., U. Majhi, R. Patil and S. Gonge, 2014. Detection of brain tumor by using ANN. Int. J. Res. Advent Technol., 2(4): 279-282
8. John, P., Brain tumor classification using wavelet and texture based neural network.2012,Int. J. Sci. Eng. Res., 3(10): 1-7.
9. Georgiadis P, Cavouras D, Kalatzis I, Daskalakis A, Kagadis GC, SifakiK, MalamasM, Nikiforidis G, Solomou E. Improving brain tumor characterization on MRI by probabilistic neural networks and non-linear transformation of textural features. Computer Methods and Programs in Biomedicine. 2008;89:24-32.
10. Evangelia I. Zacharaki "Classification of brain tumor type and grade using MRI texture and shape in a machine learning scheme"; MagnReson Med. 2009 Dec; 62(6):