

## Machine Learning and Deep Learning Approaches for Brain Tumor Identification

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### Abstract

Brain is the controlling centre of our body. As time changes, more modern and new mind diseases are being observed and identified. Accordingly, due to the range of brain diseases that are present, recent diagnosis or detection structures have been tough and nonetheless an open hassle for its studies. Detection of brain sickness in early stage could make a huge difference in an attempt to treat them. Current diagnosis systems are getting difficult and detection systems are still an open hassle for studies.

**Keywords:** MRI image; Brain tumor; Image pre processing; Matlab software

### Introduction

Over the last couple of years, Brain-Computer Interface (BCI) has become one of the maximum preferred fields of studies, due to its limitless packages which incorporates mind fingerprinting, detection and prevention of neurological illnesses, adaptive e-studying, fatigue, strain, and melancholy tracking and so forth. BCI provides a powerful conversation passage to a brain and a tool through taking snap shots the maximum relevant function required for the reputation quo. Some of the programs of BCI which are given above, the detection of neurological illnesses have been changed into an necessary study subject because of its growing importance which want no longer be cited. Due to the complicated shape of the brain that changes with age and pathological statistics, it has been very tough to stumble on neurodegenerative illnesses. It is very masses critical to diagnose the ones illnesses of their early degrees.

### Literature Review

In [1], author proposed a dimensionality reduction using SVM and this experiment achieved 98% accuracy with very selective feature. This also showcases the key importance of appropriate feature selection.

In [2], author discusses on unsupervised machine learning technique of clustering similar MR images. This work based on plotting similar pixel vectors in identifying relevant classes. Majorly discussed algorithms for unsupervised approaches are K-Means clustering, fuzzy c-means, SOM - Self organised map and PCNN (pulse coupled neural network).

In [3], author discusses improvements in classification phase of Brian tumor detection. Author discusses on Feed Forward neural network and K Nearest Neighbour classification algorithms. Focusing on these classification algorithms resulted with good accuracy

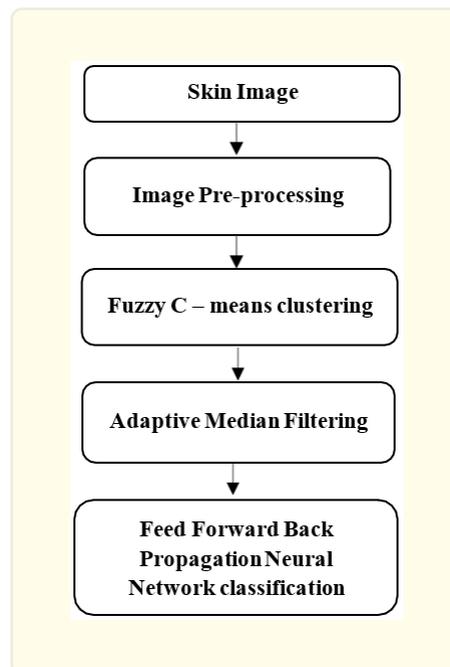
of 97% and 98%. It was also proposed to use this methodology with various types of MR images.

In [4], author proposes approach based on Deep Convolution Neural Network to overcome problem due to over-fitting. Author proposes max-out and drop-out layers and evaluated approach with BRATS2013 dataset. Model was trained with train to test ratio of 80:20 with dice similarity coefficient, sensitivity and specificity.

In [5], proposed a hybrid scheme for categorizing brain tumor into normal, benign, and malignant using genetic algorithm (GA) and support vector machine (SVM).

## Methodology

In this system diagnosis and detection of brain illnesses at an early stage could make a huge difference in attempting to treat them [6]. Brain tumors varies, based totally on the look and it is difficult to distinguish tumors and regular brain tissues. For this reason, the extraction of tumor cells will become very hard. Guide detection structures were accomplished earlier by Radiologists. In our proposed method, we used Fuzzy C means clustering and adaptive median filtering to perform pre-processing of brain images [7]. After that class completed the FFBNN - Feed forward back Propagation Neural network to categorize the brain tumor.



## Proposed Method

In our proposed method, we used Fuzzy C means clustering and adaptive median filtering to perform pre-processing of brain images [8]. After that classification become completed using FFBNN - Feed forward back Propagation Neural network to classify the brain tumor.

## Conclusion

To conclude we have provided a survey on the four most risky mind ailment detection methods the usage of gadget and deep gaining knowledge of. The survey famous some crucial insights into modern ML/DL strategies within the medical subject used in these days's brain disease research [9]. With the passage of time, identification, characteristic extraction, and category methods have become extra

tough. Researchers across the world are working tough to improve those procedures by way of exploring unique viable ways. one of the main crucial elements is to improve category accuracy. For this, the number of schooling statistics needs to be increased because the more the statistics is concerned, the more accurate the results [10]. The usage of hybrid algorithms and a aggregate of supervised with unsupervised and ML with DL methods are promising to offer higher results.

Even, various nice tunings can every now and then offer promising upgrades.

## Reference

1. G Dornhege., et al. "Towards Brain-Computing Interfacing". Cambridge, MA, USA: MIT Press (2007).
2. J Paul and TS Sivarani. "Computer aided diagnosis of brain tumor using novel classification techniques". J. Ambient Intell. Humanized Comput (2020): 1-11.
3. J Godyń., et al. "Therapeutic strategies for Alzheimer's disease in clinical trials". Pharmacol Rep 68.1 (2016): 127-138.
4. RT Merrell. "Brain tumors". Dis Mon 58.12 (2012): 678-689.
5. YM Hart. "Diagnosis and management of epilepsy". Medical 44.8 (2016): 488-494.
6. D Calne. "Is idiopathic parkinsonism the consequence of an event or a process?". Neurology 44.1 (1994): 5-10.
7. NK Chauhan and K Singh. "A review on conventional machine learning vs deep learning". in Proc. Int. Conf. Comput., Power Commun. Technol. (GUCON) (2018): 347-352.
8. Alzheimer's Disease Neuroimaging Initiative (ADNI) (2020). [Online].
9. DL Beekly., et al. "The national alzheimer's coordinating center (NACC) database: An alzheimer disease database". Alzheimer Disease Associated Disorders 18.4 (2004): 270-277.
10. DS Marcus., et al. "Open access series of imaging studies (OASIS): Cross-sectional MRI data in young, middle aged, nondemented, and demented older adults". J. Cognit. Neurosci 19.9 (2007): 1498-1507.

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