IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Design And Implementation Of Ct Scan Image Enhancement For Tumar Detection

MS. S. VASANTHIRIYA[1], DR. N. KALIAMMAL[2], M. SABARINATHAN[3], M. SATHYAPRAKASH[4] , K. PRADEEP[5]

1 ASSISTANT PROFESSOR, 2 PROFESSOR 3,4,5 UG SCHOLAR

ELECTRONICS AND COMMUNICATION ENGINEERING

MUTHAYAMMAL ENGINEERING COLLEGE, NAMAKKAL, TAMILNADU, INDIA

ABSTRACT

Functional magnetic resonance imaging or functional MRI (fMRI) is a functional neuro imaging procedure using MRI technology that measures brain activity by detecting associated changes in blood flow, uses the Blood-oxygen-level dependent (BOLD) contrast. Current results from neuroscience suggest a modular organization of the brain. To understand the complex interaction patterns among brain regions. In proposed system uses CNN algorithm, an efficient algorithm for partitioning segmentation. A brain region is defined as a set of subjects sharing a similar interaction pattern among their brain regions. An extensive experimental evaluation on benchmark data demonstrates the effectiveness and efficiency of our approach. The results on two real fMRI studies demonstrate the potential of riemanian approach to contribute to a better understanding of normal brain function and the alternations characteristic for psychiatric disorders it means that Mental disorders are generally defined by a combination of how a person feels, acts, thinks or perceives. This may be associated with particular regions or functions of the brain or rest of the nervous system, often in a social context. This is not suitable for different regions of the time series. So we propose the statistical region merging algorithm, used for image segmentation. The algorithm is used to evaluate the values within a regional span and grouped together based on the merging criteria resulting a smaller list. So, we collect more number of information from that information we compare the result and already present in database result. So we analysis person is normal or abnormal or if the person affected by any disease or not.

Keywords: Functional Magnetic Resonance Imaging (fMRI) **,** Blood-Oxygen-Level Dependent (BOLD) Signal **,**Convolutional Neural Network (CNN) **,** Statistical Region Merging (SRM) **,** Psychiatric Disorder Analysis

1. INTRODUCTION

Medical imaging is a technique used to create visual representations of the internal structures of the human body for clinical analysis and medical intervention. It helps in revealing organs and tissues hidden beneath the skin and bones and plays a crucial role in diagnosing and treating diseases. Medical imaging also helps in building databases of normal anatomy and physiology to identify abnormalities. Imaging of removed organs and tissues is generally considered part of pathology rather than medical imaging. As a discipline, medical imaging is a part of biological imaging and includes radiology. Radiology uses technologies such as X-ray radiography, magnetic resonance imaging (MRI), and medical ultrasonography. Other imaging techniques include endoscopy, elastography, tactile imaging, thermography, medical photography, and functional imaging methods like positron emission tomography (PET). In clinical practice, medical imaging usually refers to radiology that uses imperceptible forms of light. Radiologists are the medical professionals responsible for interpreting these images. Visible-light medical imaging includes digital photographs and videos that can be viewed without special equipment. Dermatology and wound care commonly use visible-light imaging techniques. Diagnostic radiography focuses on the technical process of acquiring medical images. Radiographers or radiologic technologists usually perform image acquisition. Some interventional imaging procedures are carried out directly by radiologists. Medical imaging is also a field of scientific research and engineering. Research on imaging instruments and image acquisition is handled by biomedical engineering and medical physics. Image modeling, processing, and quantification involve computer science.

2.LITERATURE SURVEY

Methil & Aryan (2021) This paper proposes a time-series clustering method based on global structural features rather than point-wise distance measures. Statistical features such as trend, seasonality, skewness, kurtosis, nonlinearity, and self-similarity are extracted to reduce dimensionality and improve robustness to noise and missing data. The method is validated on benchmark datasets and shows effective clustering using algorithms like SOM and hierarchical clustering.

Aminetal.(2021) This comprehensive survey reviews machine learning techniques used for brain tumor detection and classification from medical images. It discusses experimental designs involving multiple subjects, conditions, and studies, emphasizing contrast-based analysis for evaluating task-specific effects. The paper highlights strengths, challenges, and future research directions in automated brain tumor diagnosis systems.

Gurunathan & Krishnan (2022) This work presents a hybrid CNN–GLCM approach for brain tumor detection and grade classification. The study emphasizes feature extraction to reduce data size and computational complexity in large datasets. Various time-series and image feature extraction techniques are discussed to improve classification accuracy and processing efficiency.

Poornimasre Jegannathan (2021) This paper explores the use of convolutional neural networks for brain tumor detection from medical images. It highlights the capability of fMRI to capture both spatial and temporal brain activity with reasonable resolution. The study discusses the limitations of integrating fMRI with EEG/MEG and suggests future potential in advanced neural mapping techniques.

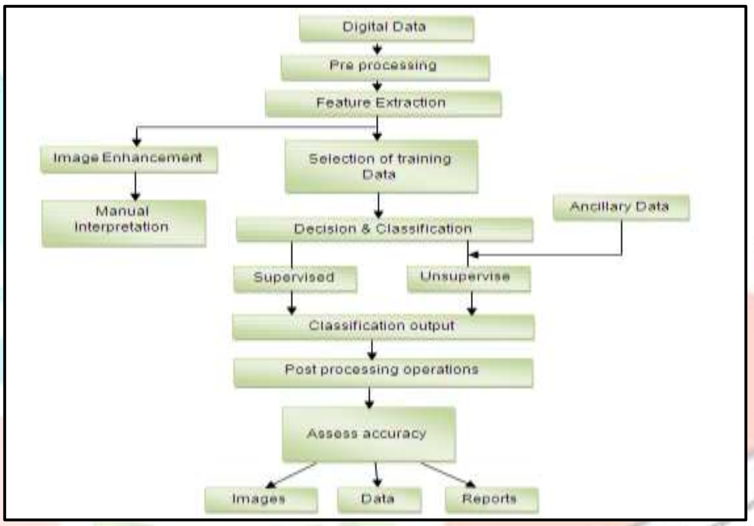
Yadav & Jadhav (2019) This paper analyzes deep convolutional neural networks for medical image classification in disease diagnosis. It discusses the computational behavior of clustering algorithms like k-means, showing that their running time is polynomial under smoothed analysis. The study emphasizes that while k-means is fast in practice, it does not guarantee globally optimal clustering results.

3. EXISTING SYSTEM

Human brain activity is very complex and far from being fully understood. Many psychiatric disorders like Schizophrenia and Somatoform Pain Disorder can so far neither be identified by biomarkers, nor by physiological or histological abnormalities of the brain. Aberrant brain activity often is the only resource to understand psychiatric disorders. Functional magnetic resonance imaging (fMRI) opens the opportunity to study human brain function in a noninvasive way. The basic signal of fMRI relies on the blood-oxygen-level-dependent (BOLD) effect, which allows indirectly imaging brain activity by changes in the blood flow related to the energy consumption of brain cells. In a typical fMRI experiment, the subject Performs some cognitive task while in the scanner. Recently, resting-state fMRI has attracted considerable attention in the neuroscience community. Interaction K-means (IKM) simultaneously Clusters the data and discovers the relevant cluster specific interaction patterns. The algorithm IKM is a general technique for clustering multivariate time series and not limited to fMRI data. Besides fMRI, multivariate time series are prevalent in many other applications. Increasing amounts of motion stream data are collected in multimedia applications. Gesture sensing devices, such as a Cyber Glove usually contain multiple sensors to capture human movements. Human motion stream data can also be extracted from video streams. In this application, it makes sense to regard each movement as a data object. A cluster analysis of motion stream data potentially identifies. Clusters with similar movements, usually performed by different persons.

4. PROPOSED SYSTEM

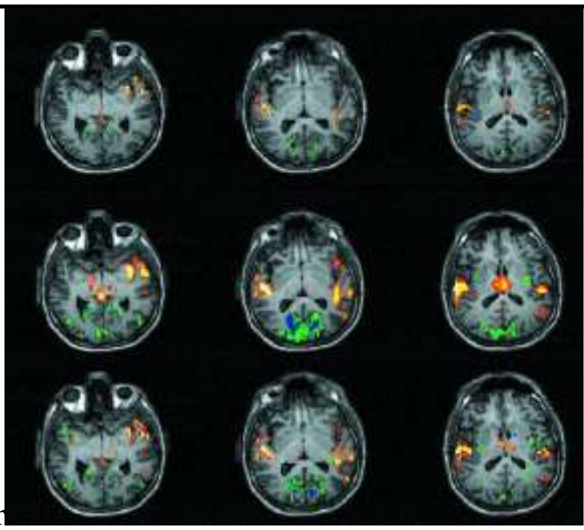
Human brain activity is very complex and far from being fully understood. Many psychiatric disorders like Schizophrenia and Somatoform Pain Disorder can so far neither be identified by biomarkers, nor by physiological or histological abnormalities of the brain. Aberrant brain activity often is the only resource to understand psychiatric disorders. Functional magnetic resonance imaging (fMRI) opens the opportunity to study human brain function in a noninvasive way. The basic signal of fMRI relies on the blood-oxygen-level-dependent (BOLD) effect, which allows indirectly imaging brain activity by changes in the blood flow related to the energy consumption of brain cells. Brain tissues are segmented using Conditional Random field approach. It presents a new CNN for segmenting SWI venography datasets. The CNN model aggregates multiple first- and second-order potentials. Specifically, appearance, shape, location, auto-logistic (Ising) interaction and data-dependent interaction potentials are combined to produce robust, complete and fully automated SWI venogram segmentation. In a typical fMRI experiment, the subject to perform some cognitive task while in the scanner. And implement statistical region merging approach to group the similar regions. It is the reconstruction of regions on the observed image, based on an unknown theoretical (true) image on which the true regions we seek are statistical regions whose borders are defined from a simple axiom. Second, we show the existence of a particular blend of statistics and algorithmic to process observed images generated with this model, by region merging, with two statistical properties. With high probability, the algorithm suffers only one source of error for image segmentation: over merging, that is, the fact that some observed region may contain more than one true region. The algorithm does not suffer neither under merging, nor the most frequent hybrid cases where observed regions may partially span several true regions.



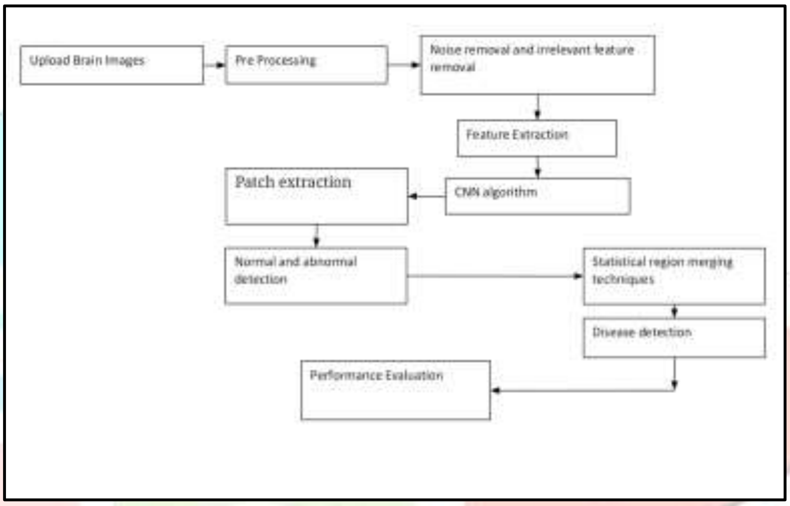
5. MODULES DESCRIPTION

5.1 BRAIN IMAGE ACQUISITION

Functional magnetic resonance imaging (fMRI) is a neuroimaging technique that uses MRI technology to measure brain activity by detecting changes in blood flow related to neuronal activation. It is based on the principle that increased neural activity leads to increased cerebral blood flow. The most common fMRI method uses blood-oxygen-level dependent (BOLD) contrast, which maps brain activity by observing differences between oxygen-rich and oxygen-poor blood. fMRI is widely used in brain mapping because it is noninvasive and does not involve radiation, surgery, or injections. Brain activation is displayed using color-coded maps showing the strength and location of neural activity. Although fMRI offers high spatial resolution, its temporal resolution is limited to a few seconds. It can be combined with other techniques such as EEG and NIRS for better analysis. fMRI evolved from traditional MRI, which provides structural brain images using magnetic fields and radiofrequency pulses. The key principle behind fMRI is the hemodynamic response, where oxygenated blood replaces deoxygenated blood in active brain regions, allowing functional brain changes to be measured.

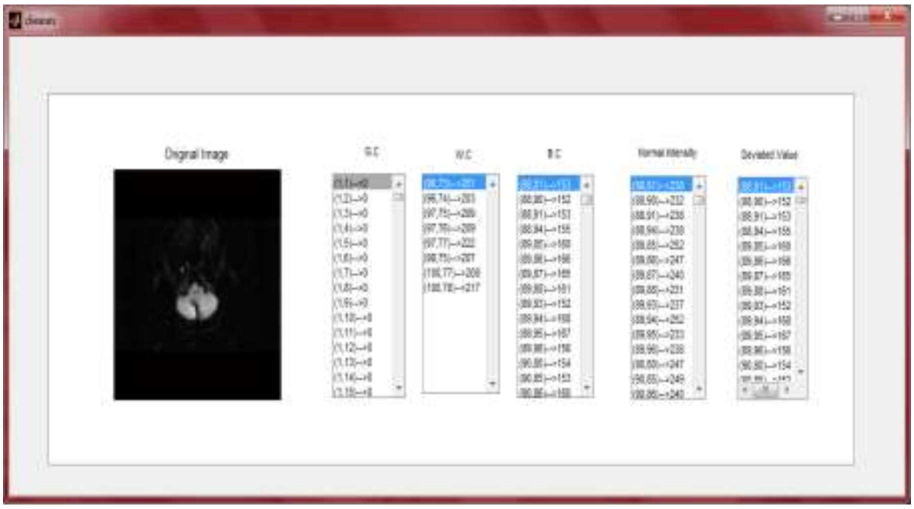


5.2 BLOCK DIAGRAM



6. RESULT

The proposed CT scan image enhancement system significantly improves image clarity by reducing noise and enhancing contrast, making tumor regions more distinguishable. Advanced preprocessing techniques such as filtering and histogram-based enhancement enable better visualization of soft tissues and abnormal growths. The enhanced images improve the accuracy of tumor detection by segmentation and classification algorithms. Experimental results show higher detection accuracy and reduced false positives compared to unenhanced CT images. Overall, the system proves to be effective and reliable for supporting early and accurate tumor diagnosis.



7. CONCLUSION

In this project implement, a novel segmentation notion for multivariate time series. We define a segment as asset of objects sharing a specific interaction pattern among the dimensions. In addition, To propose CNN, an efficient algorithm for interaction-based segmentation. Our experimental evaluation demonstrates that the interaction-based cluster notion is a valuable complement to existing methods for clustering multivariate time series. CNN approach achieves good results on synthetic data and on real world data from various domains, but it cluster only the multivariate time series only so lot of in information loss and it not efficient to cluster the brain images especially results on EEG and fMRI data. So we propose to consider different models for different regions of the time series using statistical region clustering. We intend to work on methods for suitable initialization of CNN since existing strategies for K-means cannot be straightforwardly transferred to CNN because of the special cluster notion. We are also investigating in feature selection for interaction-based segmentation. From segmentation with statistical region clustering can cluster the different brain region for gathering the more information. Here the statistical region clustering, it can be consider the different regions of brain and then cluster different brain region, and merging the cluster image with database image finally provide the result about the human being is normal or abnormal. Then provide diseases in brain images with improved accuracy rate.

8. REFERENCES

1. Methil, Aryan. (2021). Brain Tumor Detection using Deep Learning and Image Processing. 100-108. 10.1109/ICAIS50930.2021.9395823.
2. Amin, J., Sharif, M., Haldorai, A. et al. Brain tumor detection and classification using machine learning: a comprehensive survey. Complex Intell. Syst. (2021).
3. Gurunathan, A., Krishnan, B. A Hybrid CNN-GLCM Classifier For Detection And Grade Classification Of Brain Tumor. Brain Imaging and Behavior (2022).
   Brain Tumor Detection using Convolutional Neural Network By Poornimasre Jegannathan in Turkish Journal of Computer and Mathematics Education Vol.12 No.11 (2021), 686-692.
4. Yadav, S.S., Jadhav, S.M. Deep convolutional neural network based medical image classification for disease diagnosis. J Big Data 6, 113 (2019).
5. Ranjbarzadeh, R., Bagherian Kasgari, A., Jafarzadeh Ghoushchi, S. et al. Brain tumor segmentation based on deep learning and an attention mechanism using MRI multi-modalities brain images. Sci Rep 11, 10930 (2021). https://doi.org/10.1038/s41598-021-90428-8
6. N Saranya et al 2021 J. Phys.: Conf. Ser. 1916 012206.
7. Seetha J, Raja S. S. Brain Tumor Classification Using Convolutional Neural Networks. Biomed Pharmacol J 2018;11(3).
8. Arabahmadi M, Farahbakhsh R, Rezazadeh J. Deep Learning for Smart Healthcare—A Survey on Brain Tumor Detection from Medical Imaging. Sensors. 2022; 22(5):1960.
9. Arkapravo Chattopadhyay, Mausumi Maitra,MRI-based brain tumour image detection using CNN based deep learning method,Neuroscience Informatics,Volume 2, Issue 4,2022.
10. Díaz-Pernas, F.J.; Martínez-Zarzuela, M.; Antón-Rodríguez, M.; González-Ortega, D. A Deep Learning Approach for Brain Tumor Classification and Segmentation Using a Multiscale Convolutional Neural Network. Healthcare 2021, 9, 153.
11. Brain Tumor Classification in MRI Images Using En-CNN in international journal of intelligent engineering & systems Vol.14, No.4, 2021.

12. Omar Adil Kamil, Shaymaa W. Al-Shammari, IoT Framework for Brain Tumor Classification Using Optimized CNN-MRFO Model, American Journal of Bioinformatics Research, Vol. 11 No. 1, 2021, pp. 32-37. doi: 10.5923/j.bioinformatics.20211101.02.
13. A Survey On Brain Tumor Detection Based On Structural MRI Using Machine Learning And Deep Learning Techniques. Dhanashri Joshi, Hemlata Channe INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 9, ISSUE 04, APRIL 2020.