Brain tumour and tissue classification using deep learning

[1]Ahire Makarand Dattatray, [2]Danej Rushikesh Laxman, [3]Darunte Priyanka Sanjay,
[4]Nanaware Pradnya Dnyaneshwar, [5]Prof. Gade S. A.

Computer Engineering
S.N.D. College of Engineering & Research Center, Yeola.

Abstract - **In this project, we propose a brain tumor segmentation and classification method for multi-modality magnetic resonance image scans. The data from multi-modal brain tumor segmentation challenge are utilized which are co-registered and skull stripped, and the histogram matching is performed with a reference volume of high contrast. We are detecting tumor by using preprocessing, segmentation, feature extraction, optimization and lastly classification after that preprocessed images use to classify the tissue. We per- formed a leave-one out cross-validation and achieved 88 Dice overlap for the complete tumor region, 75 for the core tumor region and 95 for enhancing tumor region, which is higher than the Dice overlap reported.**

Key Words: **MRI, Capsule network.**

INTRODUCTION

The detection and diagnosis of brain tumor from MRI is crucial to decrease the rate of casualties. Brain tumor is difficult to cure, because the brain has a very complex structure and the tissues are interconnected with each other in a complicated manner. Despite many existing approaches, robust and efficient segmentation of brain tumor is still an important and challenging task. Tumor segmentation and classification is a challenging task, because tumors vary in shape, appearance and location. It is hard to fully segment and classify brain tumor from mono-modality scans, because of its complicated structure. MRI provides the ability to capture multiple images known as multimodality images, which can provide the detailed structure of brain to efficiently classify the brain tumor. shows different MRI 60 modalities of brain.

PURPOSE

- To design a detection and diagnosis of brain tumor from MRI is crucial to decrease the rate of casualties.
- Brain tumor is difficult to cure, because the brain has a very complex structure and the tissues are interconnected with each other in a complicated manner. Despite many existing approaches, robust and efficient segmentation of brain tumor is still an important and challenging task.
- Tumor segmentation and classification is a challenging task, because tumsors vary in shape, appearance and location. It is hard to fully segment and classify brain tumor from mono-modality scans, because of its complicated structure. So we overcome that problem classify the brain tissues tumor area.

EXISTING SYSTEM

- Robust and efficient segmentation of brain tumor is still an important and challenging task. Tumor segmentation and classification is a challenging task, because tumsors vary in shape, appearance and location. It is hard to fully segment and classify brain tumor from mono-modality scans, because of its complicated structure. So we overcome that problem classify the brain tissues tumor area.

DRAWBACKS OF EXISTING SYSTEM

- It is time Consuming
- Error-prone
- Its leads to wastage of Resources.

PROPOSED SYSTEM

The brain images taken as input and that images performs the preprocessing operation after the preprocessing segmentation using the k-means algorithm and on that segmented area we perform the operation feature extraction using algorithm Capsule Network Algorithm.

SYSTEM ARCHITECTURE

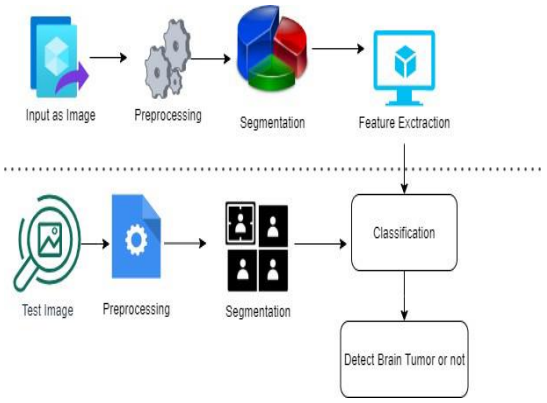


Fig -1: System Architecture Diagram

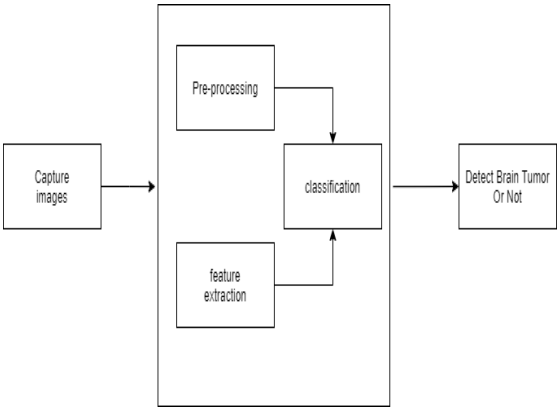
ADVANTAGES

- We perform a detailed security analysis and performance evaluation of the proposed data
- Required less time
- Increase Efficiency
- improve the accuracy.

APPLICATION:

observe an influenza virus, HIV, or other human pathogens infecting a cell, or even test new cancer treatments at the cellular level.

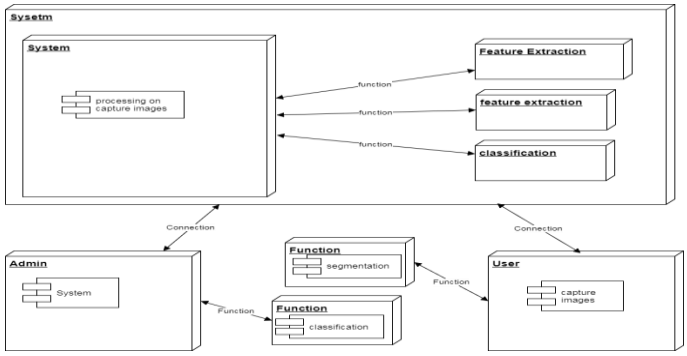
DATA FLOW DIAGRAM



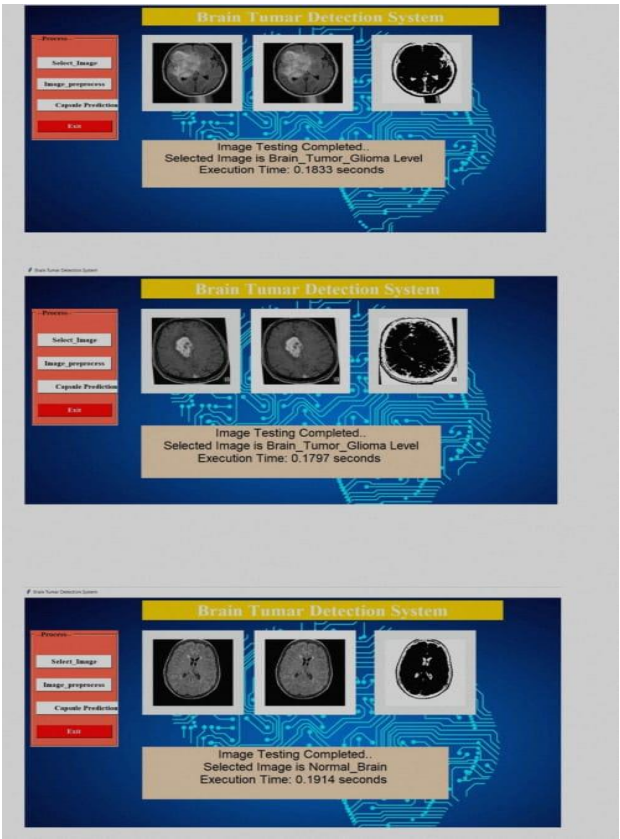
METHODOLOGY

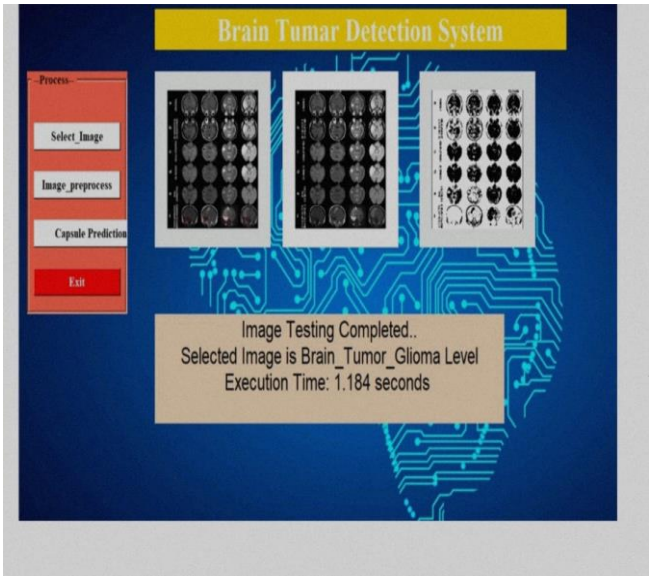
In this research work, the initial image database is collected; the obtained images are enhanced by thresholding, morphological operation, and region filling. After preprocessing, the tumor region is segmented using the BWT algorithm. The features are extracted by using the GLCM algorithm. The genetic algorithm is used for selecting the features. Finally, the SVM Naïve Bayes, BOV-based SVM classifier, and CNN classify the image accurately. The flow for identifying the brain tumors is portrayed

CLASS DIGRAM



PROJECT SCREENSHOTS:





Algorithm: Capsule Network Algorithm:

A Capsule Neural Network (CapsNet) is a machine learning system that is a type of artificial neural network (ANN) that can be used to better model hierarchical relationships. The approach is an attempt to more closely mimic biological neural organization. The idea is to add structures called "capsules" to a convolutional neural network (CNN), and to reuse output from several of those capsules to form more stable (with respect to various perturbations) representations for higher capsules. The output is a vector consisting of the probability of an observation, and a pose for that observation. This vector is similar to what is done for example when doing classification with localization in CNNs.

We can break the implementation of capsule network into following steps:

Initial convolutional layer,Primary capsule layer,Digit capsule layer,Decoder network,Loss Functions,Training and testing of model.

CONCLUSION

This paper presented an algorithm to hierarchically classify the tumor into three regions: whole tumor, core tumor and enhancing tumor. Intensity, intensity difference, neighborhood information and wavelet features are extracted and utilized on multi-modality

MRI scans with various classifiers. The use of wavelet-based texture features with RF classifier has increased the classification accuracy as evident by quantitative results of our proposed method which are comparable or higher than the state of the art.

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