Smart Brain Tumor Prediction System

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***Abstract*- Brain is the regulatory unit in human body. It controls the functions such as memory, vision, hearing, knowledge, personality, problem solving, etc. The main reason for brain tumor is the abandoned progress of brain cells. Many health organizations have recognized brain tumor as the second foremost dispute that causes many human deaths all around the world. Identification of brain tumor at a premature stage offers opportunity of effective medical treatment. Use of Magnetic Resonance Imaging images have been recognized as more detailed and more consistent images when compared to Computed Tomography images. In this project we are predicting the brain tumor using machine learning algorithms. there are various techniques to detect brain tumor or neoplasms. The most competent and effective algorithm that we will be using in this project is CNN (Convolutional Neural Network).It is a Deep Learning Algorithm that is Used for Image Processing Starting with Pre-processing brain images then, segmenting them, feature extraction of unwanted noisy and blurry part, clustering and detection of the tumor are the methodologies of our Project.**

***Index Terms*- Brain Tumor Prediction, MRI Images, CNN, Image Processing and Deep Learning.**

I. INTRODUCTION

A brain excrescence is understood by the scientific community as the growth of abnormal cells in the brain, some of which can lead to cancer. The traditional system to descry brain excrescences is nuclear glamorous resonance (MRI). Having the MRI images, information about the unbridled growth of towel in the brain is linked. In several exploration papers, brain excrescence discovery is done through the operation of Machine Learning and Deep Learning algorithms. When these systems are applied to MRI images, brain excrescence vaticination is done veritably snappily and lesser delicacy helps to deliver treatment to cases. These prognostications also help the radiologist to make quick opinions. the discovery and opinion of brain excrescence from MRI is pivotal to drop the rate of casualties. Brain excrescence is delicate to cure, because the brain has a veritably complex structure and the apkins are connected with each other in a complicated manner. Despite numerous living approaches, robust and effective segmentation of brain excrescence is still an important and grueling task. Excrescence segmentation and bracket is a grueling task, because excrescences vary in shape, appearance, and position. It's hard to completely member and classify brain excrescence from mono-modality reviews, because of its complicated structure. MRI provides the capability to capture multiple images known as multimodality images, which can give the detailed structure of brain to efficiently classify the brain excrescence. This design deals with such a system, which uses computer, grounded procedures to descry excrescence blocks and classify the type of excrescence using complication Neural Network Algorithm for MRI images of different cases. Different types of image processing ways like image segmentation, image improvement and point birth are used for the brain excrescence discovery in the MRI images of the cancer- affected cases. Detecting Brain excrescence using Image Processing ways its involves the four stages is Image Pre-Processing, Image segmentation, point birth, and Bracket. Image processing and neural network ways are used for ameliorate the performance of detecting and classifying brain excrescence in MRI images.

II. MOTIVATION

Brain Excrescence discovery/ segmentation is the most grueling, as well as essential, task in numerous medical- image operations, because it generally involves a significant quantum of data information. There are numerous types of excrescences (sizes and shapes). the medical interpreters must validate the limits and the regions of the brain excrescence as well as determine where specifically it lies and the exact affected locales. Beforehand discovery of excrescence will help in curing the complaint a little briskly and may leads in saving life.

III. AIMS AND OBJECTIVES

AIM – The main goal is to detect the abnormality of the brain from MRI images to classify the brain tumor at early stage.

OBJECTIVES –

[1] To provide doctors good software to identify tumor and their causes.
[2] Save patient's time.
[3] Provide a solution appropriately at early stages.
[4] Get timely consultation.

IV. LITERATURE SURVEY

1. According to Author P. Dhawan and S. Kaur (2019): In their study, a deep learning approach was employed to classify brain tumors based on MRI scans. The authors used a convolutional neural network (CNN) architecture and achieved high accuracy

in differentiating between tumor and non-tumor regions. The model's ability to handle large datasets and generalize well was emphasized.

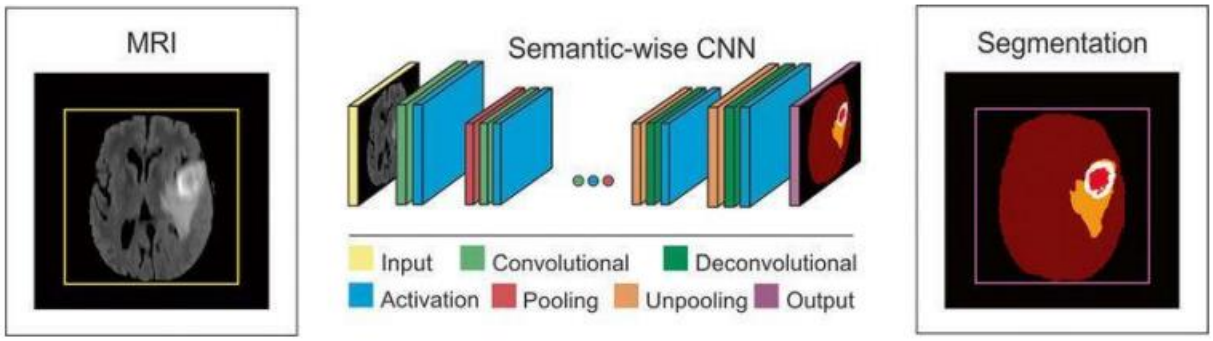
2. According to Author N. V. Bhatkar et al. (2020): They explored various machine learning algorithms, including decision trees, support vector machines (SVMs), and random forests, to classify brain tumors. They evaluated different feature extraction techniques and found that SVM with principal component analysis (PCA) performed well in terms of accuracy, sensitivity, and specificity.
3. According to S. H. Selvaraj et al. (2020): Their research proposed a convolutional autoencoder-based framework for brain tumor detection and classification. The model was trained on MRI images, and the encoded features were used for classification. The study demonstrated the effectiveness of this approach in accurately identifying brain tumor regions.
4. According to C. Zhang et al. (2021): Their study focused on brain tumor segmentation and survival prediction using deep neural networks. The authors developed a network architecture combining a U-Net for segmentation and a Cox proportional hazards model for survival prediction. The model achieved competitive performance in both tasks.
5. According to J. Xing et al. (2021): The authors investigated the use of radiomics and machine learning techniques for brain tumor segmentation and survival prediction. They extracted radiomic features from MRI images and employed support vector regression for survival prediction. The study demonstrated the potential of radiomics for personalized treatment strategies.

V. PROPOSED SYSTEM

In our system we have used CNN (Convolutional Neural Network) Algorithm for classifying the brain tumor area. The proposed system has mainly five modules. Dataset, Pre-processing, Segmentation, Feature Extraction, Build CNN model train Deep Neural network for epochs, and classification. In dataset we can take multiple MRI images and take one as input image. In pre-processing image to encoded the label and resize the image. In split the data we set the image as 80% Training Data and 20% Testing Data. Then build CNN model train deep neural network for epochs. Then classified the image as yes or no if tumor is positive then it returns yes and the tumor is negative the it returns no with its type.

Steps -

- Pre- processing
- Feature Extraction
- Classification (CNN)
- Output
- Working of CNN model



CNN is a important algorithm for image processing. These algorithms are presently the stylish algorithms we've for the automated processing of images. Images contain data of RGB combination. Matplotlib can be used to import an image into memory from a train. The computer doesn't see an image, all it sees is an array of figures. Color images are stored in 3- dimensional arrays. The first two confines correspond to the height and range of the image(the number of pixels). The last dimension corresponds to the red, green, and blue colors present in each pixel. Convolutional Neural Networks specialized for operations in image & videotape recognition. CNN is substantially used in image analysis tasks like Image recognition, Object discovery & Segmentation.

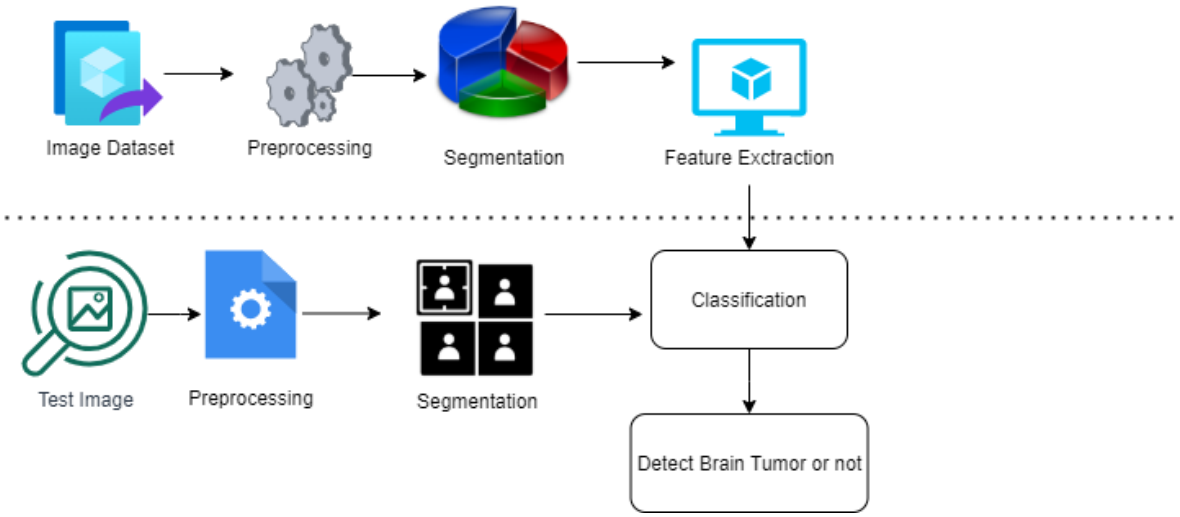
Layer of CNN model:

- Convolution 2D
- MAX Pooling2D
- Dropout
- Flatten
- Dense
- Activation

- Convolution 2D: In the Convolution 2D extract the featured from input image. It given the output in matrix form
- MAX Pooling2D: In the MAX polling 2D it takes the largest element from rectified feature map.
- Dropout: Dropout is randomly selected neurons are ignored during training.
- Flatten: Flatten feed output into fully connected layer. It gives data in list form.

- Dense: A Linear operation in which every input is connected to every output by weight. It followed by nonlinear activation function.
- Activation: It used Sigmoid function and predict the probability 0 and 1.
- In the compile model we used binary cross entropy because we have two layers 0 and 1.
- We used Adam optimizer in compile model.
- Adam: -Adaptive moment estimation. It used for non-convex optimization problem like straight forward to implement.
  - Computationally efficient.
  - Little memory requirement.

Methodology:



SYSTEM REQUIREMENTS-

Hardware Requirements –

RAM - 8 GB
Hard Disk – 40GB
Processor - Intel i5 Processor
Operating System - Windows 10

Software Requirement –

Operating system - Windows 10, 4GB RAM 50GB HDD.
Coding Language - Python
IDE - Spyder

V. ACKNOWLEDGMENT

It gives us great pleasure in presenting the preliminary project report on 'Smart Brain Tumor Prediction System Using Machine Learning Algorithm'.We would like to take this opportunity to thank our internal guide Prof. V.V. Kalunge for giving us all the help and guidance we needed. We are grateful to them for their kind support. Their valuable suggestions were very helpful.

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