



Brain Tumor Analysis Using Convolutional Neural Network and Machine Learning

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Abstract: Brain tumor is a very serious brain cancer. It is present or become due to the separation of the brain cells. It can be life threatening to a person. In the recent field of this study, tells us that deep learning will help in health industry of medical diseases imaging in the Medical Diagnostic of all the diseases. CNN is mostly used in this Machine learning algorithm. In this project CNN algorithm, image processing and data augmentation of the brain images of cancerous and are not cancerous. This project will require less computational power due to the transfer learning compared to the old CNN model. This has good accuracy results than the old pre-trained models. With the help of this project the brain tumour can be easily identified.

Keywords: Convolution Neural Network, Machine Learning, Brain tumor, Algorithms.

I. INTRODUCTION

In the past few years because of AI and Deep learning, significant advancement has been made in the medical science like Medical Image processing technique which helps doctors to the diagnose disease early and easily, before that, it was tedious and time-consuming. So to resolve such kind of limitations computer-aided technology is much needed because Medical Field needs efficient and reliable techniques to diagnose life-threatening diseases like cancer, which is the leading cause of mortality globally for patients. [1] So in our study we provide a method for classification of brain tumours into cancerous and non-cancerous using data augmentation technique and convolutional neural network. The MRI images of the brain are shown in the figure 1.1.

1. Machine Learning

Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy.

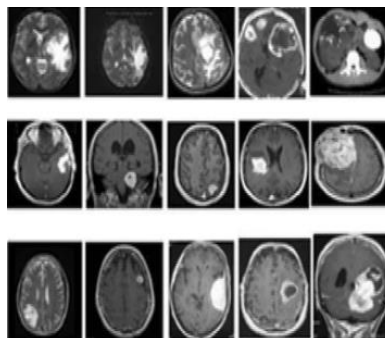


Fig 1.1 Brain MRI Images



II. OBJECTIVES

- To check the tumour in brain.
- To classify the brain tumor MRI images.
- To send tumour details to the concerned via SMS.
- To implement CNN and Machine Learning Algorithms.

III. PROBLEM STATEMENT

Brain cancer classification is an important step that depends on the physician’s knowledge and experience. An automated tumor classification system is very essential to support radiologists and physicians to identify brain tumors. However, the accuracy of current systems needs to be improved for suitable treatments.

IV. METHODOLOGY

- The data set which is already labelled will be taken from the kaggle.com which has thousands of data sets for free.
- The data is MRI Images of the brain for Tumor Detection.
- The process of scanning is divided into two phases, Training Phase and Testing Phase.
- If there is a tumor in the brain then the pop up will come and shows the type brain tumor.
- If clicked on the prediction of life time then the pop ups will show the level of tumor and the lifetime prediction then the message will be sent to the concerned.

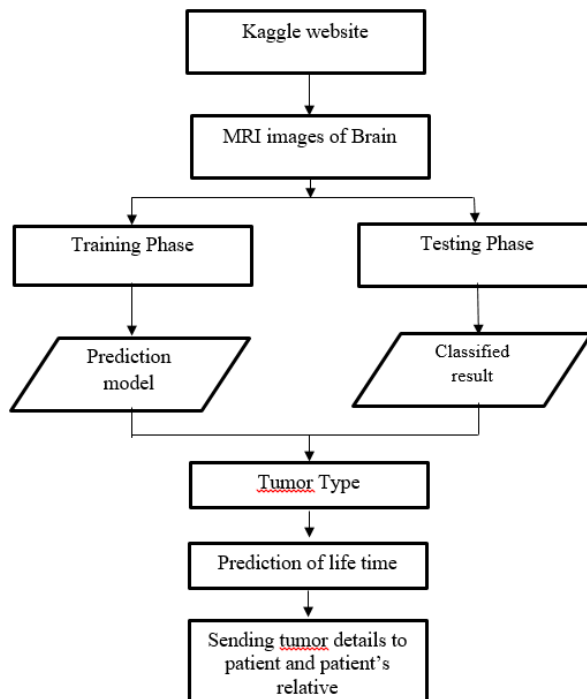


Fig 2 Flowchart

V. BLOCK DIAGRAM

The Fig 3 shows the block diagram of the Brain tumor analysis using Convolutional Neural Network and Machine Learning

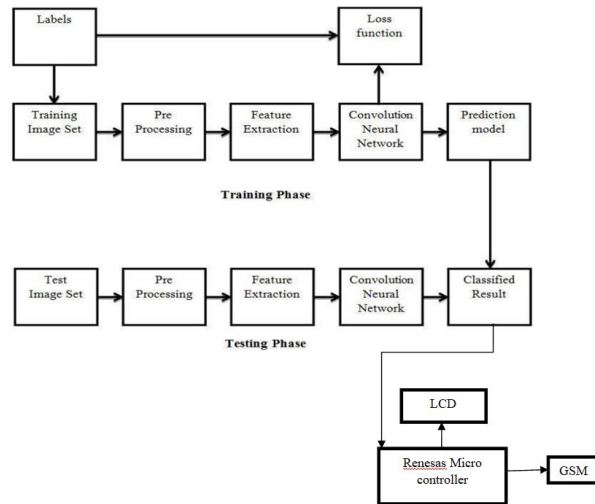


Fig 3 Block Diagram of the proposed methodology

In this project design, structured modular design concept is adopted and the system is mainly composed of Renesas microcontroller, GSM module. The CNN algorithm is implemented in laptop. In the laptop user should load the brain MRI images dataset. System will preprocess and extract features and train the model using CNN algorithm. In the testing phase user will pass the brain MRI image as input our system will predict the brain tumor is there or not, if tumor is detected then it will send the information to Arduino UNO microcontroller and send SMS to the patient using GSM module.

VI. HARDWARE AND SOFTWARE REQUIREMENTS

Software Requirements.

- Windows 10 64bit.
- Python
- Python IDLE
- Open CV Tool

Hardware Requirements.

- Arduino UNO microcontroller
- GSM
- LCD display
- RAM - 8 GB
- Hard Disk
- Processor Intel i5

VII. RESULTS AND DISCUSSION

- A brain tumor analysis algorithm using machine learning and Convolution Neural Networks is developed.
- Labeled data from Kaggle from which we get to know the tumor details of the brain is taken.
- The developed model shows the type of tumor if present.



- The details of the tumor will be sent to patient using GSM.

1. The Fig 4 shows the anaconda prompt.

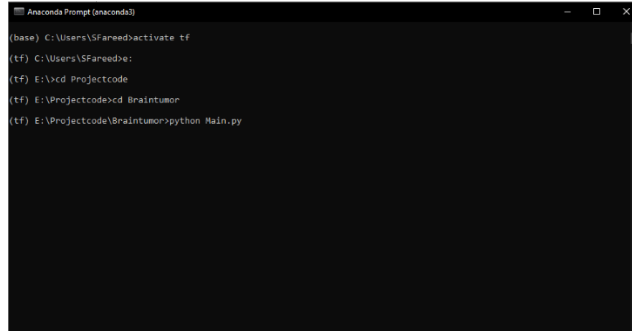


Fig 4 Anaconda Prompt

- To run the main program the Anaconda prompt is used
- Some commands are given such as ‘activate tf’ for activating the TensorFlow library, ‘cd’ for changing the directory.

Step 2: The interface of the model is shown in Fig 5

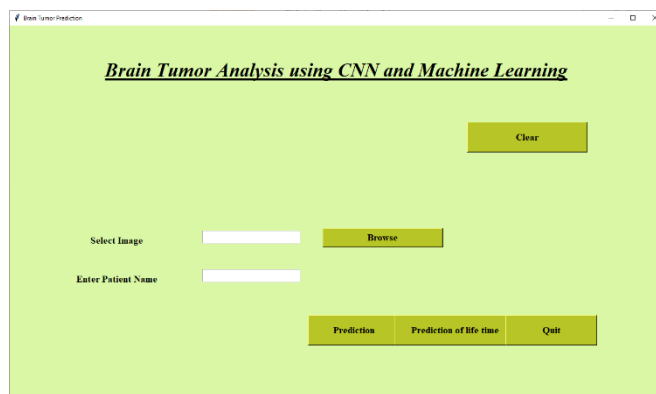


Fig 5 Interface

Step 3: Selecting of MRI Image depicted the Fig 6

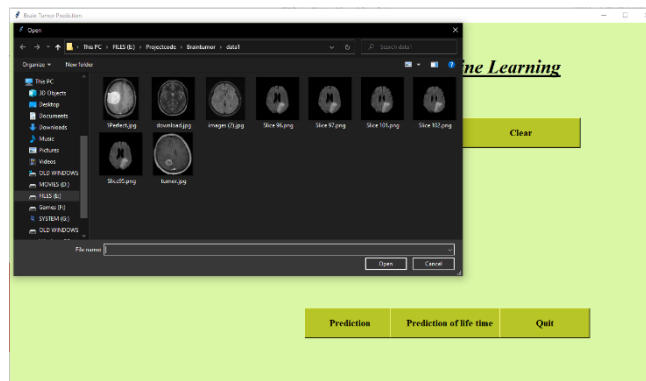


Fig 6 Selecting the MRI image



Step 4: The Fig 7 shows the type of the tumor.

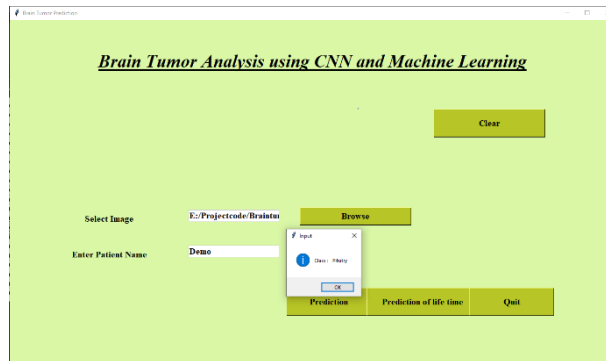


Fig 7 Showing the type of tumor

Step 5: The Fig 8 shows the level of the tumor.

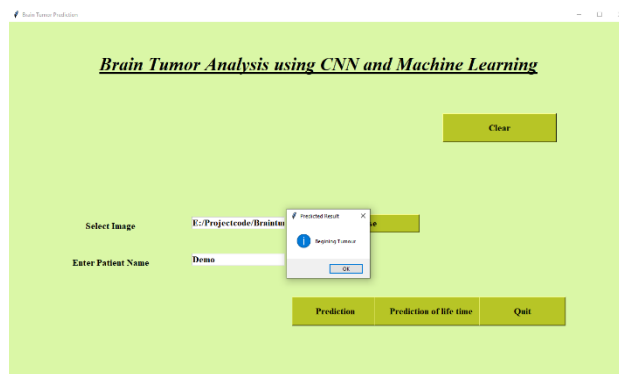


Fig 8 Showing the level of tumor

Step 6: The Fig 9 shows the prediction of lifetime.

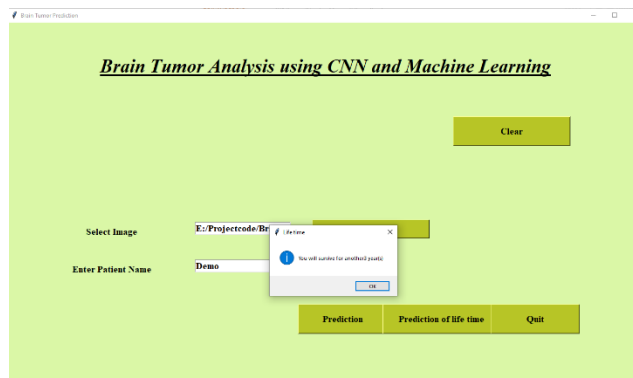


Fig 9 Prediction of lifetime



Step 7: The Fig 10 shows the results stored in CSV file.

1	Patient_Name	Tumor_Type	Survival_Time	Treatment
3	Demo	Benign Tumor	3years	Curable after surgery
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

Fig 10 Results stored in CSV file

Step 8: The Fig 11 shows the resultant intermediary images.

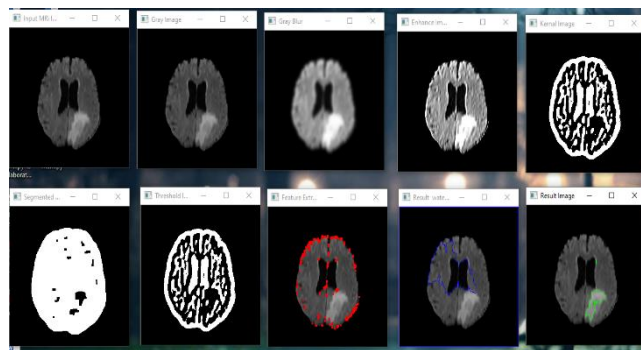


Fig 11 The resultant intermediary images

Step 9: The Fig 12 shows the hardware part of the prototype which is used to send the message to the patient.

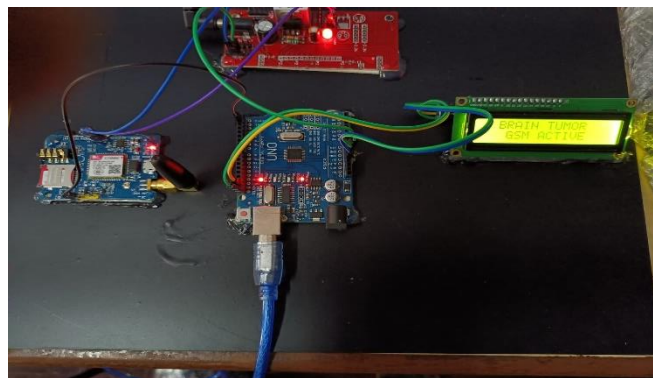


Fig 12 Hardware

**VIII. ADVANTAGES AND APPLICATIONS****Advantages**

- It saves time.
- Newer technology to detect the brain tumor.
- It is the good key for avoiding person death.
- Simple system to detect the brain tumour.

Applications

- It will be best suited application for the Medical Imaging.
- It is used in magnetic resonance imaging.
- It can be used in computed tomography.
- It can be used for 3D printing in tissue engineering.

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