MRI Image Classification of Brain Tumor Using Deep Neural Network and Deployment Using Web Framework

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Abstract: A brain tumor is a mass or growth of abnormal cells in our brain. Many different types of brain tumors exist. Some brain tumors are noncancerous (benign), and some brain tumors are cancerous (malignant). Brain tumors can begin in your brain (primary brain tumors), or cancer can begin in other parts of your body and spread to your brain (secondary, or metastatic, brain tumors). Brain tumor treatment options depend on the type of brain tumor you have, as well as its size and location. The classification of brain tumors is performed by biopsy, which is not usually conducted before definitive brain surgery. The improvement of technology and machine learning can help radiologists in tumor diagnostics without invasive measures. A machine-learning algorithm that has achieved substantial results in image classification is the convolutional neural network (CNN). It is predicted that the success of the obtained results will increase if the CNN method is supported by adding extra feature extraction methods and classify successfully brain tumor normal and abnormal image.

Keywords: brain tumor, deep learning, Tensor Flow, CNN

1. Introduction

The classification of brain tumors is performed by biopsy, which is not usually conducted before definitive brain surgery. The improvement of technology and machine learning can help radiologists in tumor diagnostics without invasive measures\cite{6}. A machine-learning algorithm that has achieved substantial results in image segmentation and classification is the convolutional neural network (CNN). The classification was performed using a T1-weighted contrast-enhanced MRI image database which contains three tumor types. As input, we used whole images, so it was not necessary to perform any preprocessing or segmentation of the tumors\cite{7},

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Samples of more number of images are collected that comprised of different classes such as normal and abnormal. Different number of images is collected for each class that was classified into input images. We proposed a Deep Learning (DL) based brain tumor prediction method to prevent disease by cultivating. The DL method used in the study is the Convolution Neural Network (CNN)[10]. It is predicted that the success of the obtained results will increase if the CNN method is supported by adding extra feature [8] extraction methods and classify successfully brain tumor. To deployment these processes by show the prediction result in local host web application. 

2. Architecture

![Architecture Diagram](image)

The images which are both tumorous and non-tumorous are trained in the dataset using deep learning algorithm. When the user uploads a new image, it can easily identify whether the image is tumorous or not using the trained dataset. It is done in Django framework with slight 3 database. The user uploads the image in .h5 format (hierarchical data format[9]) which is the supported format in the python framework.

3. Methodology

3.1 Loading the given Brain Tumor image (module01)

The data set is imported using keras preprocessing image data generator function also we create size, rescale, range, zoom range, horizontal flip. Then we import our image dataset from folder through the data generator function. Then we make folders as train, test, and validation also we set target size, batch size and class-mode from this function we have to train of brain tumor.
3.2 Training the given Tumor image using Convolution Neural Network (module02)

The dataset that is the images brain tumor and normal is collected and the LeNet CNN is applied on the model and the accuracy and graph is collected.

3.3 Working of the Algorithm and .h5 file generation (module03)

In this module we train the neural network by giving the images by giving more epochs to train better and the .h5 file (Hierarchical Data Format) is generated and the model is loaded and is tested by giving input.

3.4 Deployment of brain tumor model in Django Framework and predicting output (module04)

In this module we create a web application using Django framework by using sqlite3 database. Our .h5 file is deployed in the web application here the image is uploaded and after uploading the model predicts whether the giving image has tumor or not.

4. Conclusion

It focused how image from given dataset (trained dataset) in field and past data set used predict the pattern of brain tumor using CNN model. This brings some of the following insights about tumor prediction. We had applied different type of CNN compared the accuracy and saw that LeNet makes better classification and the .h5 file is taken from there and that is deployed in Django framework for better user interface.

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