

Brain Tumor Segmentation and Area Calculation using Convolutional Neural Networks

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Abstract

Project task is to create a neural network model with Convolutional Neural Network (CNN) that, given an input data, can return a simplified is whether or not patient have a tumour and its area calculation. I imagine alternative systems I could use and tests conduct in the future for the process.

1. Approach

1.1. Introduction

Artificial Intelligence (AI) plays a huge role in our daily lives and undoubtedly determines every aspect of the medical field [1]. Considering get easy access to the data and manage itself, time-saving and will able to get accuracy results effect of tending to use Machine learning and Deep learning in modern technology. In the medical system, there are many areas in which we can see that AI is doing exactly its job. This project will further explain the technical aspects of Magnetic Resonance Imaging (MRI) and Convolutional Neural Network (CNN).

1.2. Convolutional Neural Network (CNN)

In this report, to get results I hope to use a Convolutional Neural Network (CNN) which is known as a class of deep neural networks, commonly used to analyzing visual imagery. In this point, I have not yet decided how many convolutional layers and pooling layers to use. It depends on accuracy of results.

1.3. Architecture

Considering this matter, I have implemented resnet architecture in Python from the beginning and in addition have used NumPy, Keras, Scikit-learn and TensorFlow libraries.

2. Experiments

2.1. Data

I will train our models using the Brain MRI images together with abnormality segmentation masks, which is the our data set and contains 110 directories and 2 files. For validation and testing, I will use the Brain MRI data set which has 7860 images, for validation and testing.

2.2. Data Preprocessing

Considering the database given earlier, I had to find out if I have a balance data set and how many patients are healthy? Then data visualization was performed. After Plot randomly selected MRI scan images from only sick patients followed by the corresponding mask, both MRI image and the corresponding mask in red colour on next of each other was visualized.

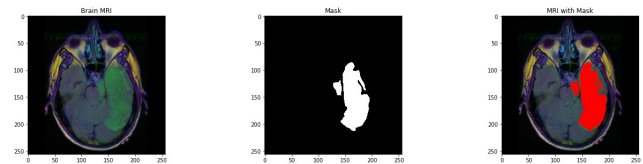


Figure 1. MRI image and the corresponding mask in red color

3. Future Work

The entirety of the project involves constructing the neural network and CNN model defined in Section 1.2 and 1.3. Inspired by the structure of the code, the task of segmentation that performs will whether or not the patient have a tumour and its area calculation as well.

References

- [1] Thomas Davenport and Ravi Kalakota. The potential for artificial intelligence in healthcare. *Future health-care journal*, 6(2):94, 2019.