Looking Beyond Science 2022

Project Report

Project Title: Brain Tumor Detection using Convolutional Neural Networks(CNN)

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Problem definition:

Tumors in the brain area are very tricky to detect for doctors all around the world. Also detection and decision on if an MRI scan of the patient's brain has a tumor is vital for the patient's life as the brain is a very important part of human anatomy. The several Problems faced by doctors are as follows

1. Brain tumors are very heterogeneous – each is different in size, shape and location.
2. Tumor boundaries are often unclear or irregular, with discontinuities.
3. Human Errors while identifying tumors in Grayscale MRI images of the brain.
4. The Manual and physical process of detection is very inefficient and time consuming which could cost patients their vital time.
5. In addition, hospitals all have different scanners and image protocols, which complicates standardization and data quality.

Inputs:

Datasets of MRI images of different type of tumors

Functionality:

The model functions by
1. Taking the images provided in the dataset and performing preprocessing on it in order to normalize, resize, crop, change contouring etc on the image.
2. Data Augmentation is performed in order to generate several images from existing ones with Different image properties (in case dataset has less images)

3. Images divided into test and training data and a baseline 4 layer MLP network is established. Further computations are done with testing different networks to identify tumor regions in image

All expected outcomes:

1. Brain Tumor Detection in MRI images with greater than 85% accuracy.
2. Predicting Brain Tumor size and location and in the brain image
3. Predicting Tumor type and tumor treatment methods.