

Brain Tumor Detection using Machine Learning Models

B.Sc. Semester VI Project
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Overview

- 1 Motivation
- 2 Domain Description
- 3 Background
- 4 Methodology
 - Image Acquisition
 - Preprocessing

Motivation

The motivation is to develop a software with better segmentation capability for use in medical imaging to detect diseases like brain tumor. Image segmentation has been identified as the key problem of medical image analysis and remains a popular and challenging area of research. Image segmentation is increasingly used in many clinical and research applications to analyze medical imaging datasets; which motivated us to present a snapshot of dynamically changing field of medical image segmentation.

The motivation of this work is to increase patient safety by providing better and more precise data for medical decision.

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Domain Description

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Domain Description

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- **Machine Learning:** Machine learning approaches address these problems by mainly using hand-crafted features (or pre-defined features).
- **Brain Scans:** Brain scan is a picture of the internal structure of the brain. A specialized machine takes a scan in the same way as a digital camera takes a photograph.

Background

We propose the use of ML algorithms to overcome the drawbacks of traditional classifiers. We investigate and compare the performance of various machine learning models, namely **CNN**, **VGG 16** and **ResNet 50** ; implemented using the frameworks Tensorflow and fast.ai.

Methodology

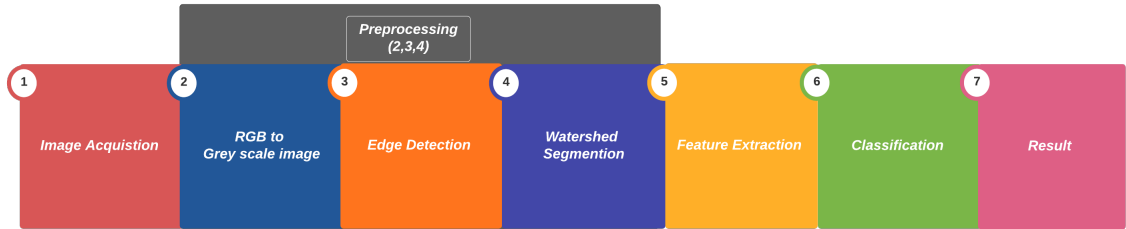
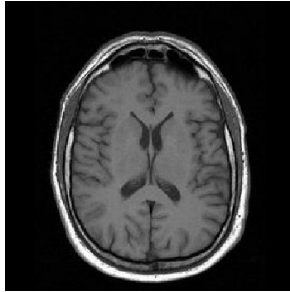


Figure: Proposed Methodology

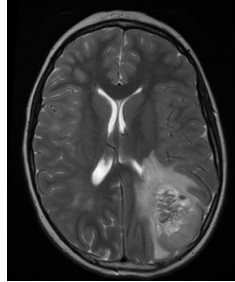
Methodology

Image Acquisition

The MRI brain images are acquired and are given as input to pre-processing stage.



(a) MRI scan shown no presence of tumor



(b) MRI scan of a tumorous cell

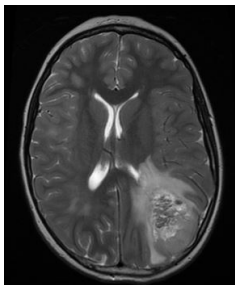
Figure: MRI Scans

Preprocessing

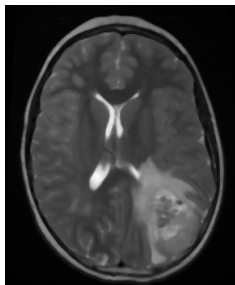
Preprocessing is needed as it provides improvement in image data which enhances some of the image features which are important for further processing.

Preprocessing includes:

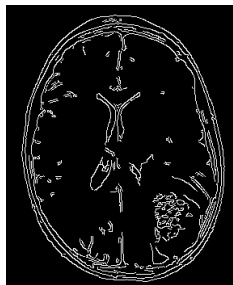
- Binarization
- Filtering
- Edge Detection
- Segmentation



(a) Original Image



(b) Filtered Image



(c) Edge Detection



(d) Segmentation

Figure: preprocessing operations