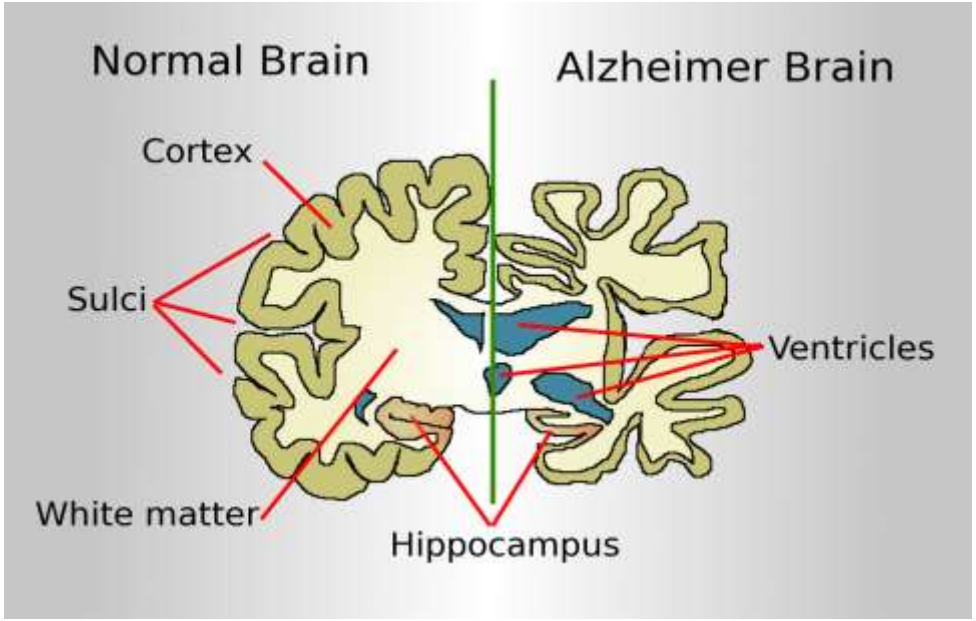
PROBLEM STATEMENT

Enhancing Alzheimer’s Detection via Advanced MRI Analysis

SCOPE OF OUR PROJECT

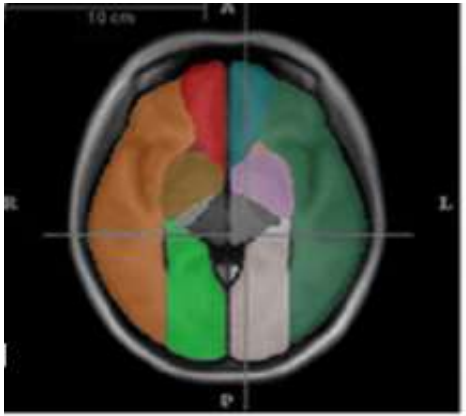
In scope:

1. Assessing via axial MRI brain scans.
2. Support for images of varying resolutions.
3. Classification of degree of Alzheimer's

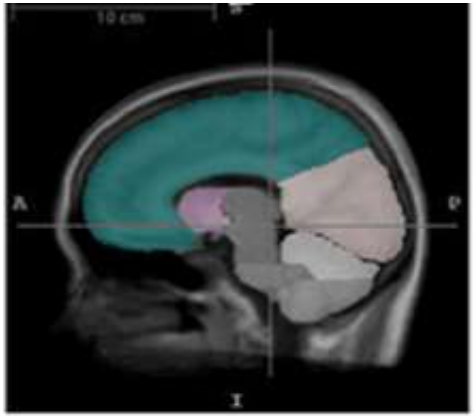


Out scope:

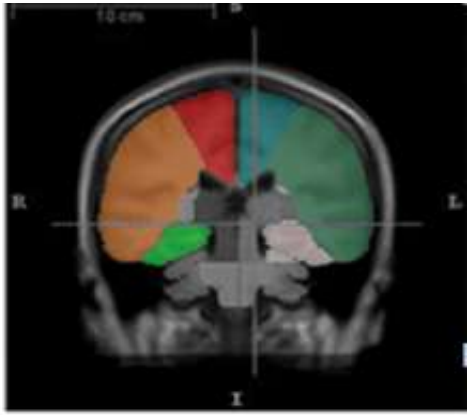
1. Coronal and sagittal views of the MRI scan (everything except axial view).
2. Genetic information acquisition and analysis for Alzheimer's disease severity assessment.



(axial)



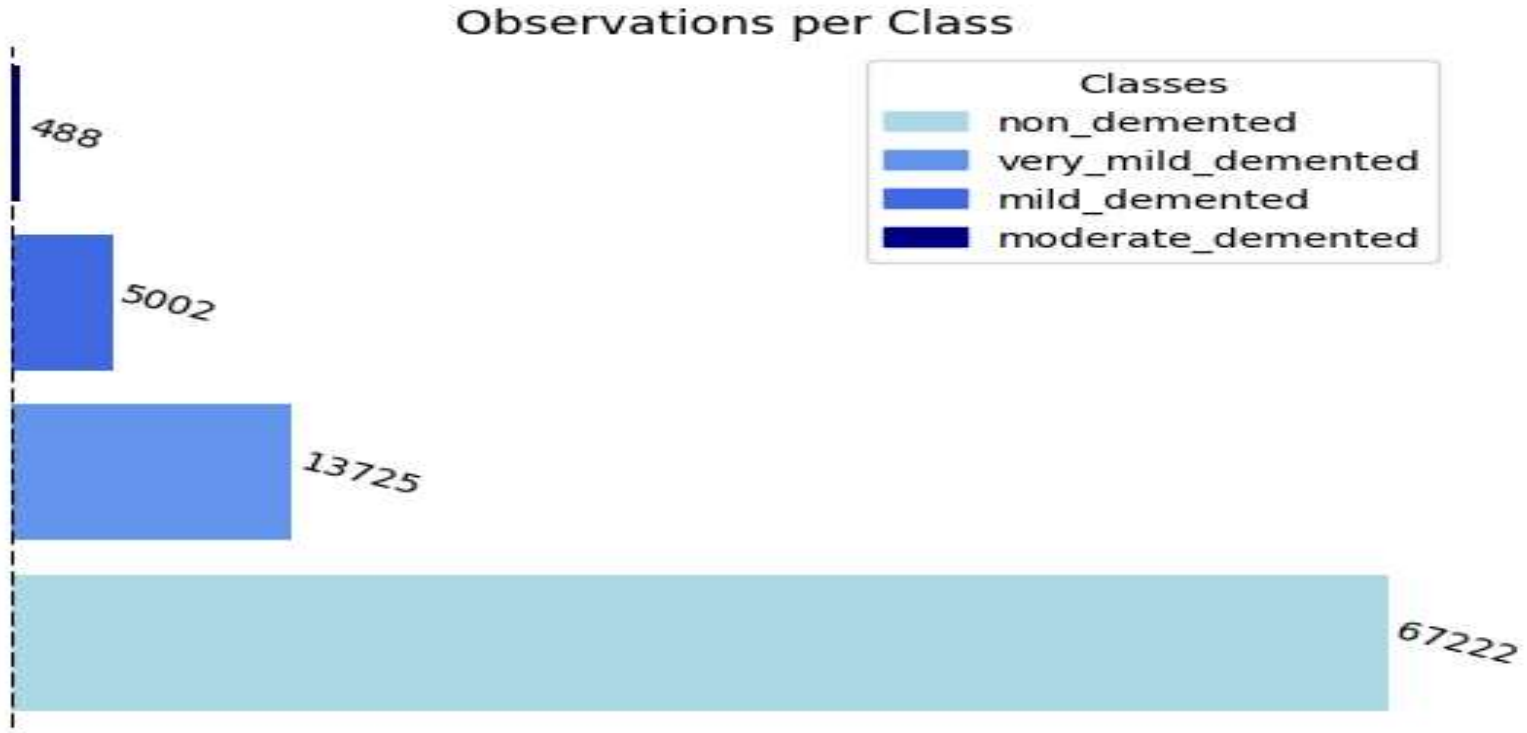
(sagittal)

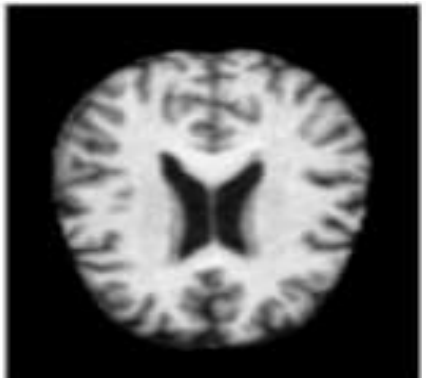
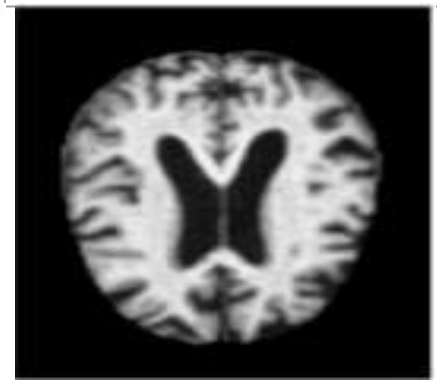
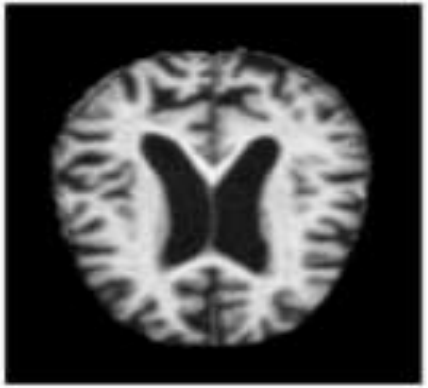


(coronal)

DATASET

The Open Access Series of Imaging Studies (OASIS) is a project that provides the public with access to neuroimaging data sets for study and analysis



Non- demented brain	Very-Mildly demented brain	Mildly demented brain	Moderately-demented brain
			

- Specific features associated with dementia-related changes (e.g., hippocampal atrophy, ventricular enlargement, white matter abnormalities) can be identified and quantified.

WORKFLOW

DATA PREPROCESSING

i) Class imbalances
- Over Sampling
- Under Sampling

ii) One hot Encoding:
- 0 -> No dementia
- 1 -> very mild dementia
- 2 -> mild dementia
- 3 -> moderate dementia

iii) Resizing image to 128 x 128px

MODELLING

Models chosen :

i) EfficientNetB0(Accuracy : 97.22%)

ii) VGG(Accuracy : 24.67%)

iii) ResNet(Accuracy : 99.65%)

RESULTS

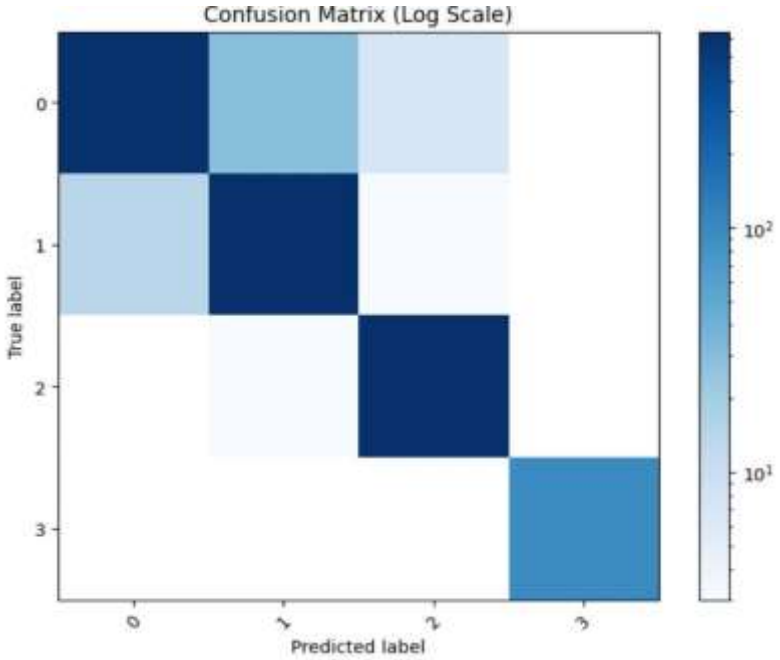
Various metrics used for testing model:

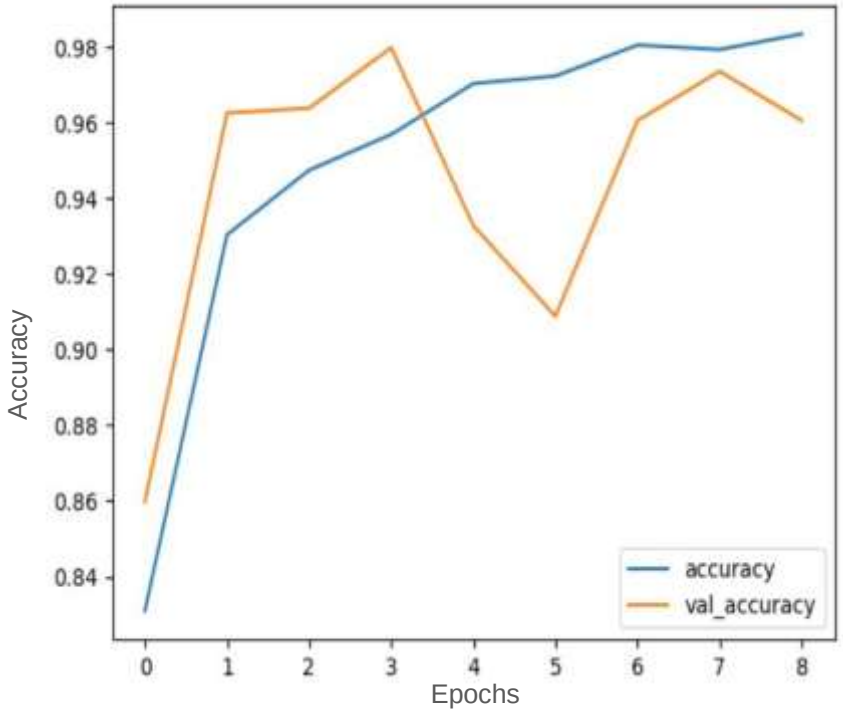
i) Confusion matrix

ii) line graph of accuracy

iii)Scott's pie

RESULTS


Confusion Matrix (Log Scale)
True label
Predicted label
0
1
2
3
10^2
10^1


Accuracy
Epochs
0.98
0.96
0.94
0.92
0.90
0.88
0.86
0.84
0
1
2
3
4
5
6
7
8
accuracy
val_accuracy

LESSONS LEARNT

- During the course of this project we picked up a few valuable lessons in the machine learning field and biomedical field such as
- Explored various models such as VGG16, Resnet and EfficientNetB0
- Learnt image processing and working to balance an imbalanced dataset.
- Deploying a machine learning model to a working application format.
- Gained insights on alzheimer's.
- The importance of technology in the biomedical industry and a vague idea of how to integrate the technological aspect to into the biomedical industry to help improve the medical field.
- The potential of Machine learning in revolutionizing healthcare.