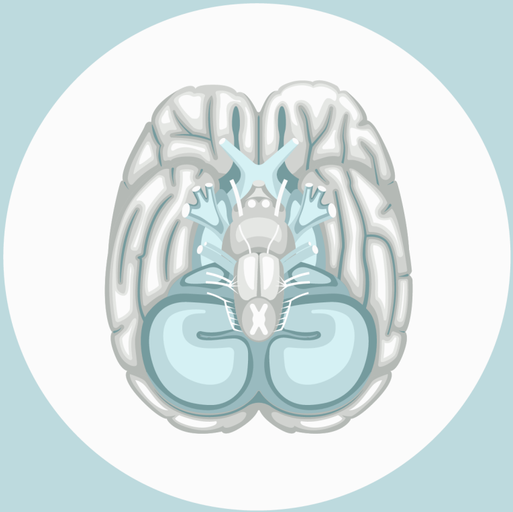


NeuroDetect
Brain Tumour Detection System

By Mayur Bhai

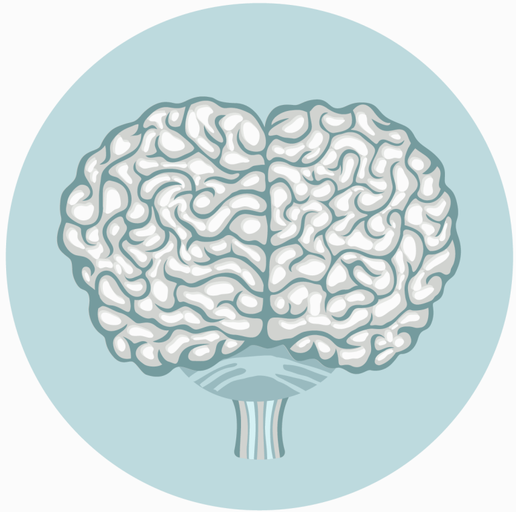
Refresher

Background

Brain tumours are challenging to detect in the early stages. Early detection is crucial, helping medical professionals select effective treatment options and saving lives.

Importance

Using machine learning, how can we identify tumours in MRI scans to improve early detection, prevent further complications, and accelerate treatment planning?



MRI Scans

Dataset contains 7023 MRI images of brain tumours classified into 4 groups:

- Glioma
- Meningioma
- Pituitary
- Non Tumour

Data Source

Dataset is a combination of three datasets, which were combined and collected from Kaggle.

EDA/Exploration

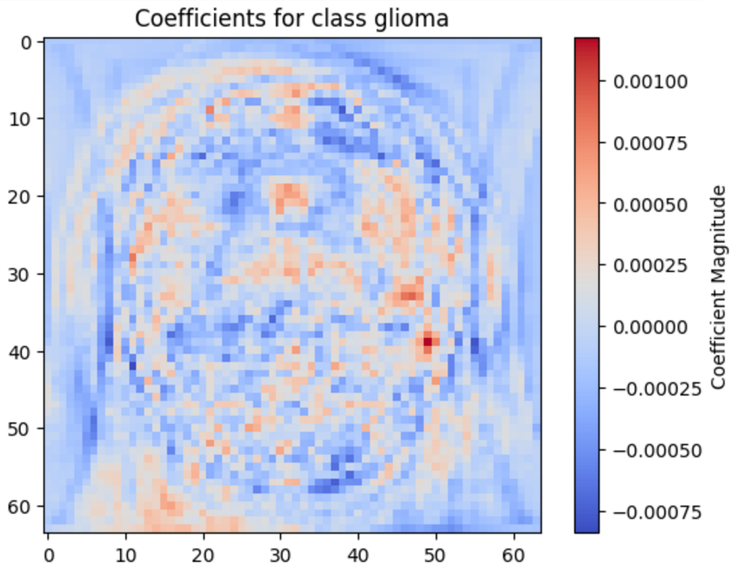
Image data distribution across classes is relatively even, removes the skewed predictions and biases

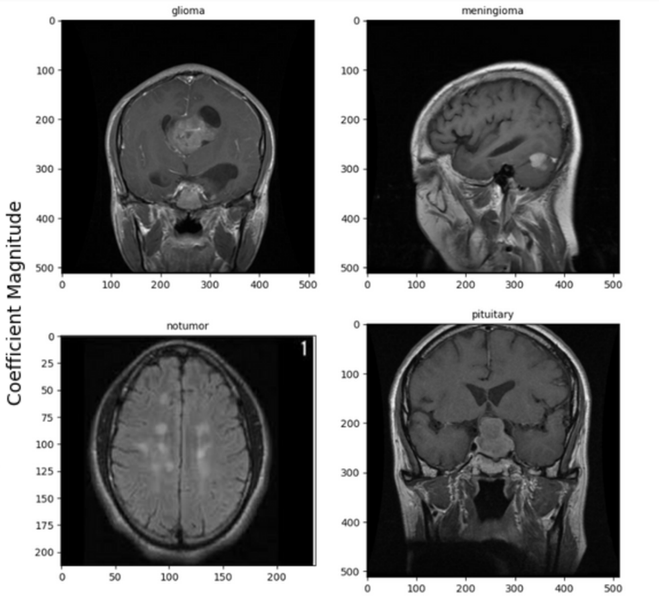
Scans are taken from different angles and brain segments.

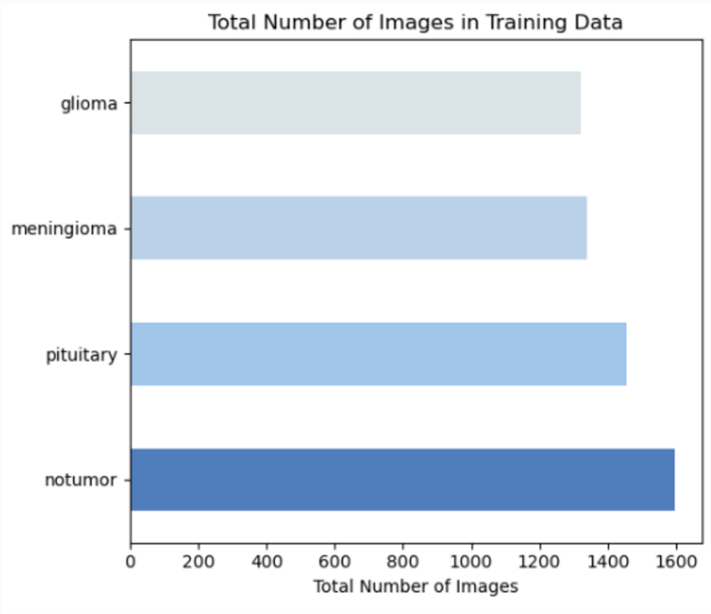
Variations in image dimensions. Not all images are the same size.

- No uniform resolution between images, majority are resolution of (512x512)
- Will have to resize so they are all the same size

Logistic Regression coefficient image gives us a good idea on what the model evaluates in an image







Baseline Model

Logistic Regression

Standard logistic regression model used for simple classification. A good start for any classification problem.

Support Vector Machine (SVM)

Supervised learning model to solve complex problems. Performs outlier detection problems and boundaries between data points.

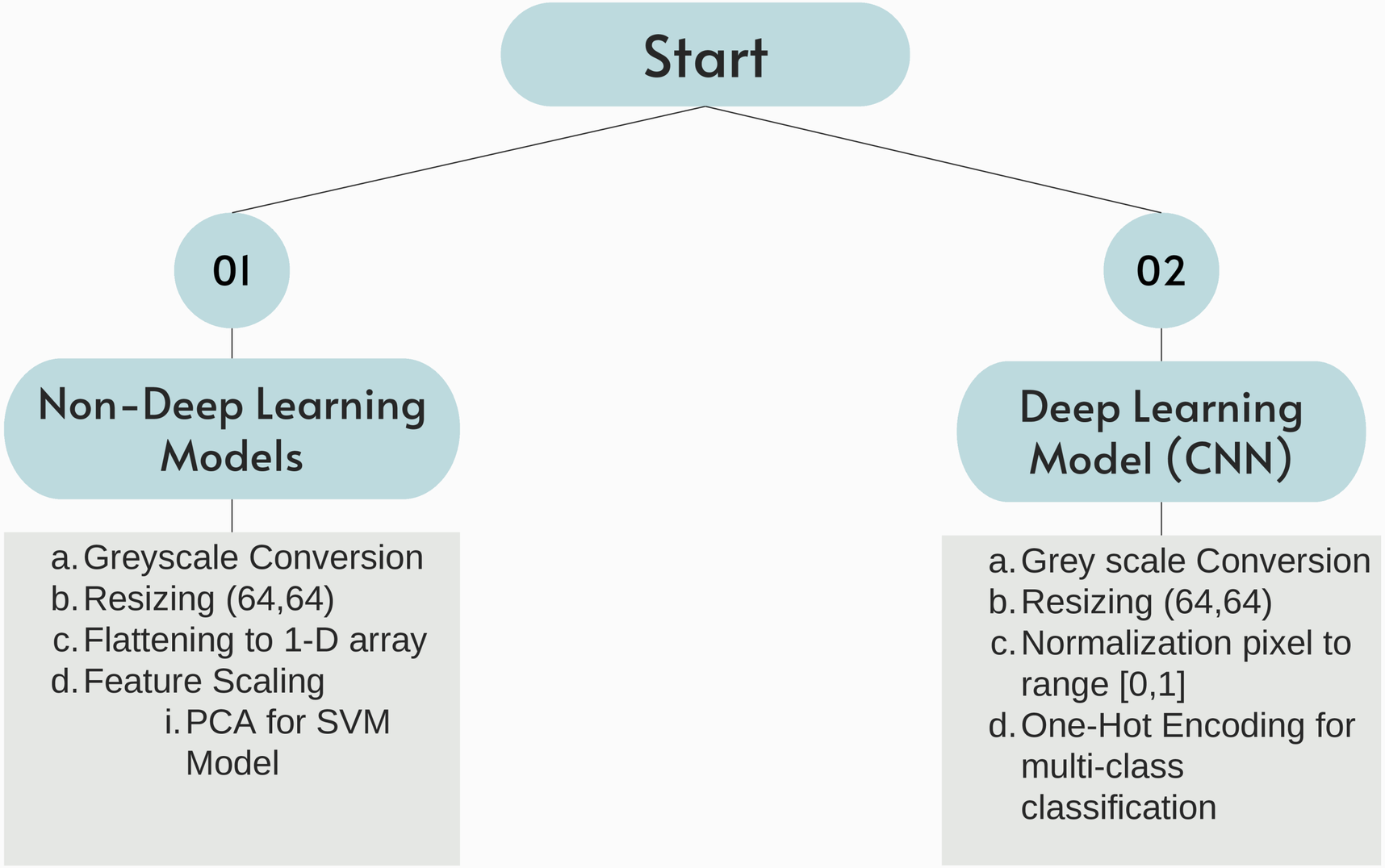
Random Forest

Mainly to demonstrate how multiple decision tree model works on image classification. Examine how model may choosing the best path amidst multiple options.

Convolutional Neural Network (CNN)

The standard model when it comes to any image classification problems. A very simple CNN model was created (4 layers max) to make it a fair comparison with the other models.

Preprocessing



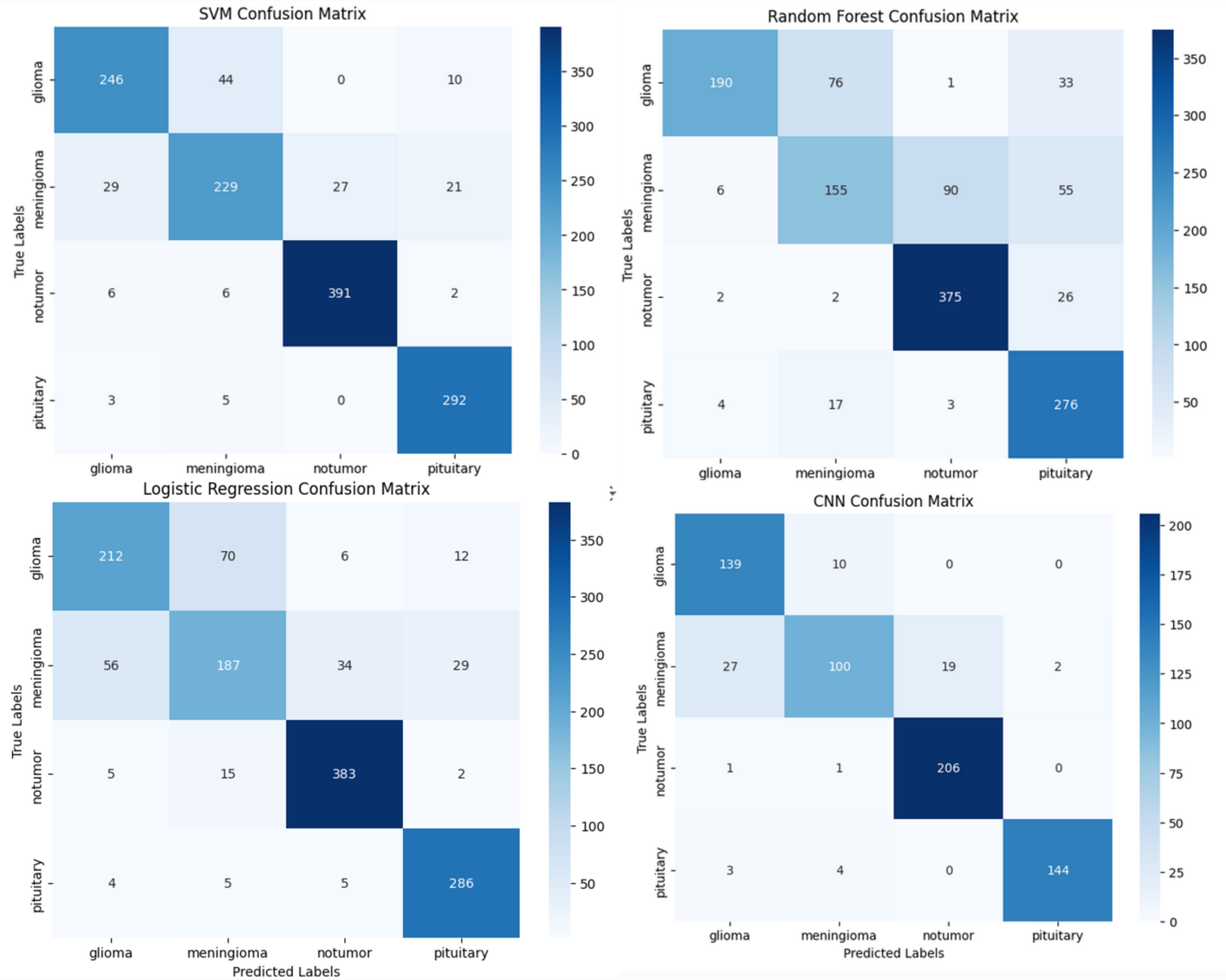
Baseline Model Accuracy

	Train Accuracy	Test Accuracy
Logistic Regression	89.74%	81.46%
Support Vector Machine (SVM)	92.49%	88.33%
Random Forest	83.96%	75.97%
Convolutional Neural Network (CNN)	95.95%	90.69%

Baseline Model Recall Score

	No Tumor Recall	Pituitary Recall	Glioma Recall	Meningioma Recall
Logistic Regression	95%	95%	71%	61%
Support Vector Machine (SVM)	97%	97%	82%	75%
Random Forest	93%	92%	63%	51%
Convolutional Neural Network (CNN)	99%	95%	93%	68%

Confusion Matrix



Next Seps

Data Preprocessing

Preprocess image data by resize image dimensions so they are consistent and normalize pixel values

Model Selection/Baseline Model

Compare various baseline model's performance and select the best model to move forward. Proceed with CNN model.

Advance Model Hyperparameter Tuning

Select CNN model for advance modelling. Hyperparameter tuning to make our model more robust (adding NN layers)

Thank You

Do you have any questions?