

Detection & Classification of Alzheimer

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Aaradhya Verma & Aarya Khandelwal

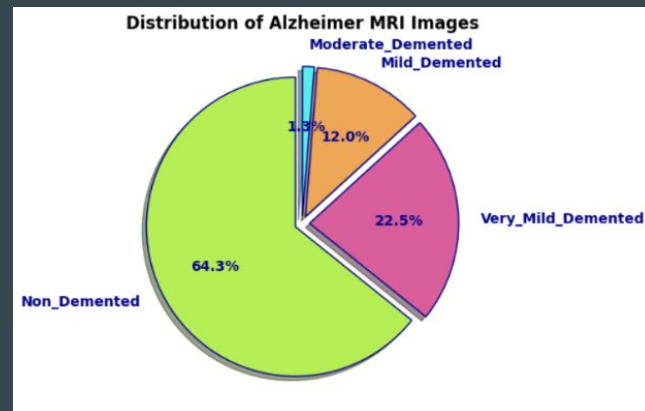
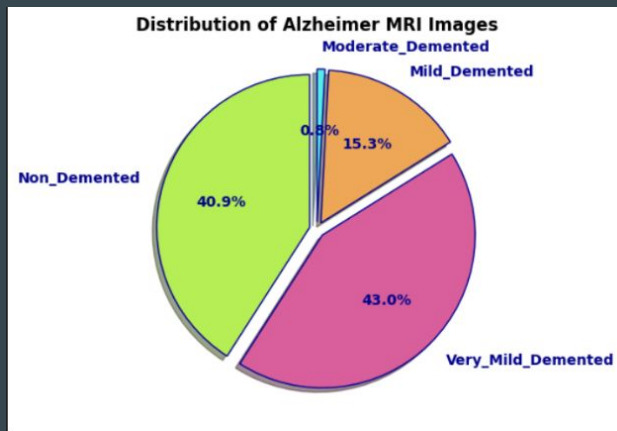
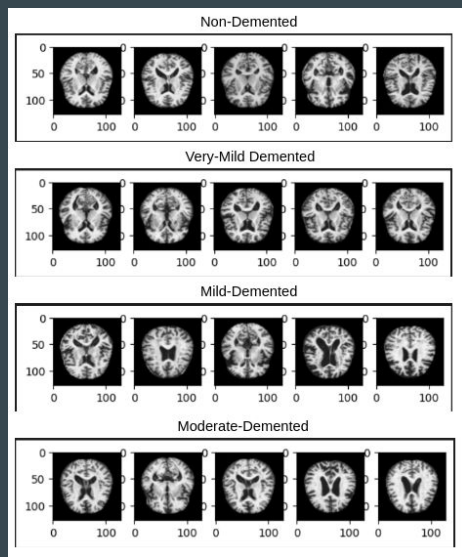
Problem Statement

Alzheimer's disease is a progressive neuro-degenerative disorder that affects millions of people worldwide, leading to cognitive decline and ultimately severe dementia.\

Early detection and accurate classification of Alzheimer's disease stages are crucial for timely intervention and treatment.

Dataset

The dataset comprises images of MRI (Magnetic Resonance Imaging) scans , each resized to 128*128 pixels.



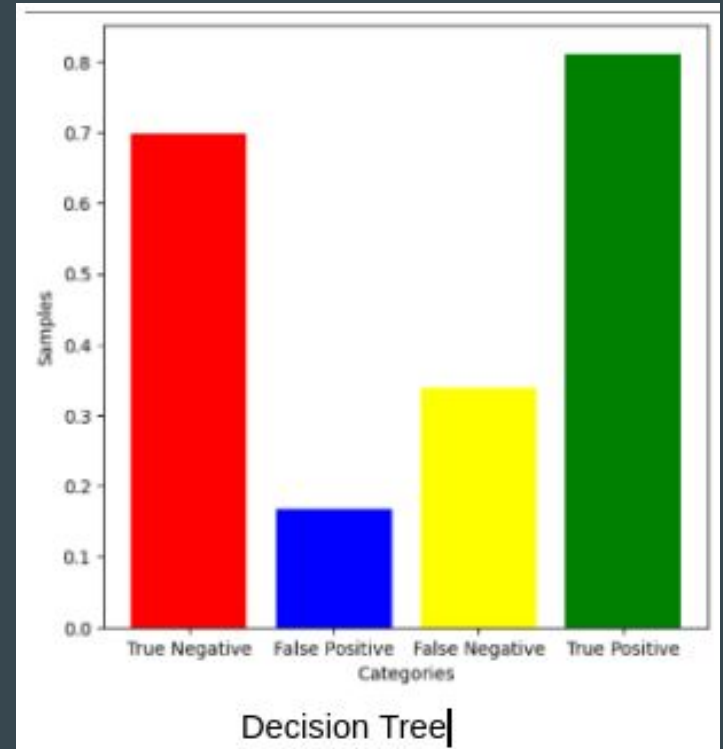
Models Applied

- **Decision Tree Classification:** versatile supervised learning algorithm used for both classification and regression tasks. It works by partitioning the data into subsets based on the features' values, creating a tree-like structure of decisions.
- **Multiclass Logistic Regression:** statistical method used for classification which extends the principles of binary logistic regression to handle multiple classes by employing a set of linear functions, one for each class, combined with the soft-max function to convert raw predictions into probabilities.
- **Random Forest Classification:** an ensemble learning method that utilizes multiple decision trees to make predictions. It operates by constructing a multitude of decision trees during training, where each tree is trained on a random subset of the training data and a random subset of the features.
- **CNN:** A convolutional neural network (CNN) is a type of deep learning algorithm inspired by the visual cortex of the brain. It excels at processing and recognizing patterns in images by applying convolutional filters that extract progressively more abstract features from the raw pixel data, enabling tasks like image classification and object detection.

Results:

- Decision Tree:

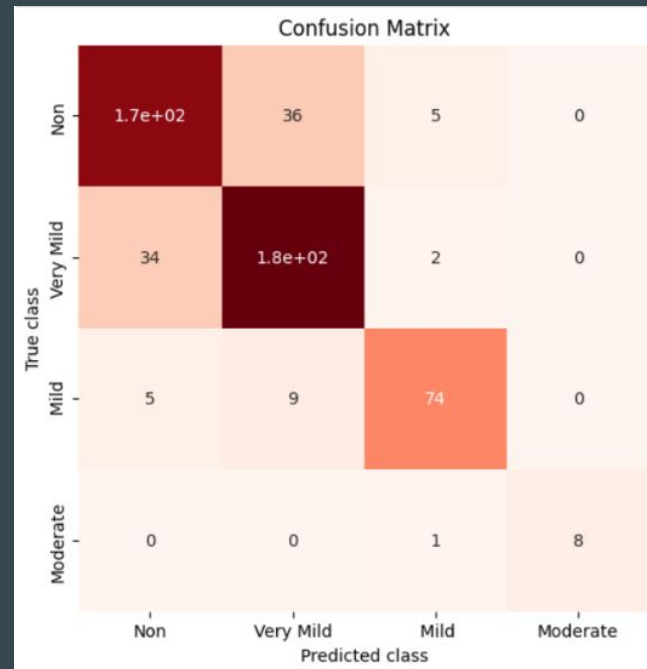
| Data | Accuracy |
|-------------------|----------|
| Non Demented | 68.817 |
| V. Mild Demented | 73.755 |
| Mild Demented | 53.773 |
| Moderate Demented | 28.570 |
| Total | 66.923 |



Results

- Logistic Regression

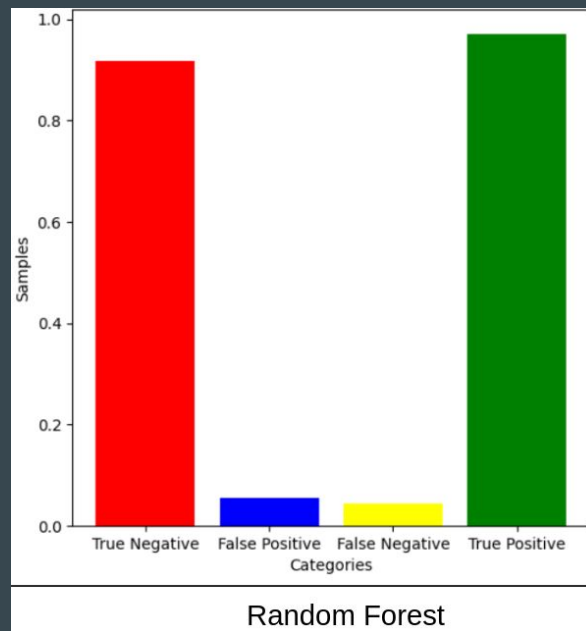
| Data | Accuracy |
|-------------------|----------|
| Non Demented | 84.44 |
| V. Mild Demented | 78.733 |
| Mild Demented | 87.7735 |
| Moderate Demented | 100.00 |
| Total | 82.307 |



Results

- Random Forest

| Data | Accuracy |
|-------------------|----------|
| Non Demented | 97.849 |
| V. Mild Demented | 99.547 |
| Mild Demented | 90.556 |
| Moderate Demented | 71.428 |
| Total | 96.730 |



Results

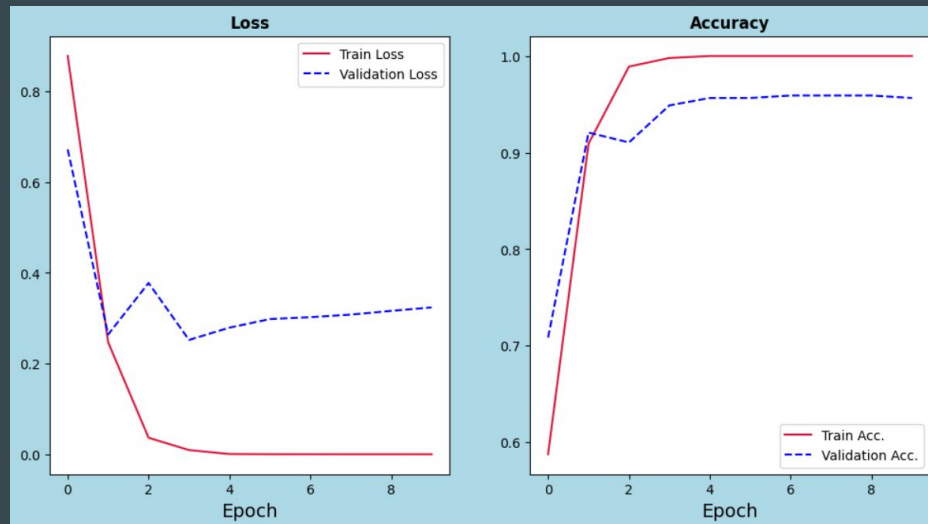
- Convolutional Neural Network

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0 | 0.95 | 0.97 | 0.96 | 155 |
| 1 | 0.95 | 0.95 | 0.95 | 174 |
| 2 | 0.95 | 0.92 | 0.93 | 60 |
| 3 | 1.00 | 1.00 | 1.00 | 2 |
| accuracy | | | 0.95 | 391 |
| macro avg | 0.96 | 0.96 | 0.96 | 391 |
| weighted avg | 0.95 | 0.95 | 0.95 | 391 |

8/8 [=====] - 0s 43ms/step

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0 | 1.00 | 0.97 | 0.98 | 146 |
| 1 | 0.90 | 1.00 | 0.95 | 57 |
| 2 | 1.00 | 0.98 | 0.99 | 44 |
| 3 | 1.00 | 1.00 | 1.00 | 2 |
| accuracy | | | 0.98 | 249 |
| macro avg | 0.98 | 0.99 | 0.98 | 249 |
| weighted avg | 0.98 | 0.98 | 0.98 | 249 |

8/8 [=====] - 0s 45ms/step - loss: 0.1122 - accuracy: 0.9759
Test accuracy: 0.9759036302566528



Thanks!