C.2 LOGISITC REGRESSION

Logistic regression is a technique used in machine learning from the field of statistics[6]. This method is used for binary classification problems. This algorithm is based on predictive analysis which is used to describe data and also it explains the relationship between one dependent binary variable and one or more nominal or ratio-level independent variables. This algorithm gives efficiency of 80.15% is shown in Fig 9.

```
LogisticRegression :


Confusion Matrix:
[[364 140]
 [ 60 444]]


Classification Report:
              precision    recall  f1-score   support

           0       0.86      0.72      0.78       504
           1       0.76      0.88      0.82       504

   micro avg       0.80      0.80      0.80      1008
   macro avg       0.81      0.80      0.80      1008
weighted avg       0.81      0.80      0.80      1008
```

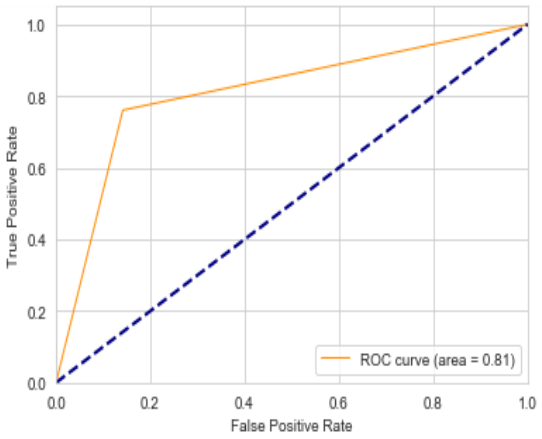


Fig 9 Logistic Regression

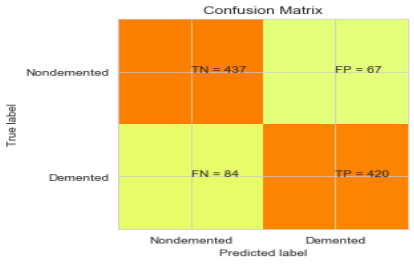
C.3 DECISION TREE

Decision tree is a type of supervised machine learning where the data is continuously split according to a certain parameter[9]. The tree can be explained by two entities, namely decision nodes and leaves[3]. The leaves are the decisions or the final outcomes. Decision tree classifier given in Fig 10 which gives an accuracy of 85.01%.

```
Classification Report:
              precision    recall  f1-score   support

           0       0.84      0.87      0.85       504
           1       0.86      0.83      0.85       504

   micro avg       0.85      0.85      0.85      1008
   macro avg       0.85      0.85      0.85      1008
weighted avg       0.85      0.85      0.85      1008
```



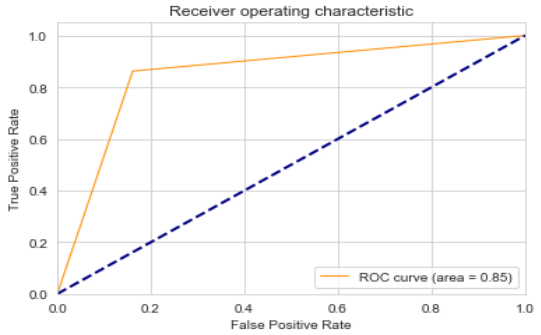


Fig 10 Decision tree

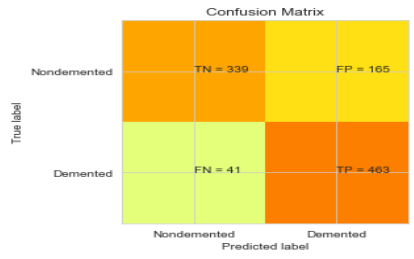
C.4 SUPPORT VECTOR MACHINE

Support vector machines (SVMs) are powerful yet flexible supervised machine learning algorithms which are used both for classification and regression[7].But generally, they are used in classification problems. The goal of SVM is to divide the datasets into classes to find a maximum marginal hyperplane (MMH)[2]. To conduct the first support vector machine (SVM)-based study comparing the diagnostic accuracy of T1-weighted magnetic resonance imaging (T1-MRI).Support vector classifier is shown in Fig 11, gives an accuracy of 79.56%.

```
Classification Report:
              precision    recall  f1-score   support

           0       0.89      0.67      0.77       504
           1       0.74      0.92      0.82       504

   micro avg       0.80      0.80      0.80      1008
   macro avg       0.81      0.80      0.79      1008
weighted avg       0.81      0.80      0.79      1008
```



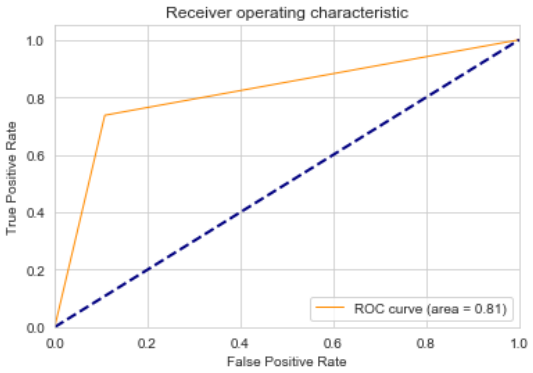


Fig 11 Support Vector Machine

C.5 GUASSIAN NAIVE BAYES

Naive Bayes is a kind of classifier which uses the Bayes Theorem. It predicts membership probabilities for each class such as the probability that given record or data point belongs to a particular class. The class with the highest probability is considered as the most likely class[8]. A frequency table for eachattribute iscreated and the likelihood of each feature is calculated is described in the Fig 12.Based on the likelihood, the conditional probabilities for each classes is determined, and the class with the maximum conditional probability is considered. The guassian naive bayes gives an accuracy of 76.28%.

```
GaussianNB :


Confusion Matrix:
[[305 199]
 [ 40 464]]


Classification Report:
              precision    recall  f1-score   support

           0       0.88      0.61      0.72       504
           1       0.70      0.92      0.80       504

   micro avg       0.76      0.76      0.76      1008
   macro avg       0.79      0.76      0.76      1008
weighted avg       0.79      0.76      0.76      1008
```

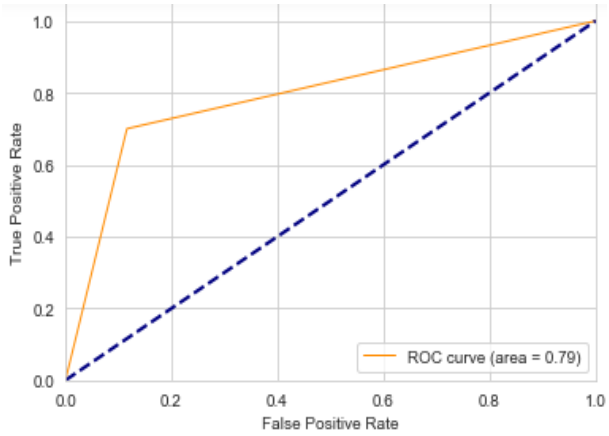


Fig 12Guassian Naïve Baise

C.6 MULTILAYER PERCEPTION

A multilayer perceptron (MLP) is a class of feedforward artificial neural network (ANN).MLP utilizes a supervised learning technique called back propagation for training. Its multiple layer and non-linear activation distinguish MLP from a linear perceptron[10]. Supervised learning technique called backpropagation for training. It can distinguish data that is not linearly separable. The MLP and ANN are used for classification of Alzheimer's Disease and Parkinson's disease (PD) subjects. The MLP classifier in Fig 13gives an accuracy of 91.07%.

```
MLPClassifier :


Confusion Matrix:
[[374 130]
 [ 16 488]]


Classification Report:
              precision    recall  f1-score   support

           0       0.96      0.74      0.84       504
           1       0.79      0.97      0.87       504

   micro avg       0.86      0.86      0.86      1008
   macro avg       0.87      0.86      0.85      1008
weighted avg       0.87      0.86      0.85      1008
```

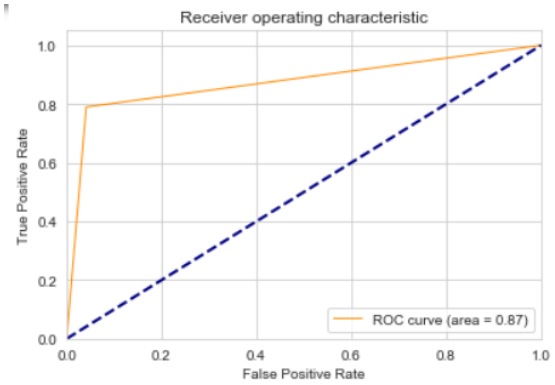


Fig 13 MLP

C.7 BAGGING

Bagging which is also known as Bootstrap aggregating, is an ensemble meta-algorithm in machine learning. This algorithm provides the stability and high efficiency in accuracy of machine learning algorithms which has been used in statistical classification and regression. This leads in decreases variance and also helps in avoiding the over fitting. AdaBoost can be used to boost the performance of any machine learning algorithm. It is best used with weak learners. These are models that achieve accuracy just above random chance on a classification problem[1].Adaboost strategy applied to the SVM built on the feature vectors. The selection are performed from the Open Access Series of Imaging Studies (OASIS) database, which is a large number of subjects compared to current reported studies. Results aremoderately encouraging from the Fig 14, as we can

obtain up to 88.78% accuracy with the Adaboost strategy in a 10-fold cross-validation.

```
AdaBoostClassifier :


Confusion Matrix:
[[426  78]
 [ 35 469]]


Classification Report:
              precision    recall  f1-score   support

           0       0.92      0.85      0.88       504
           1       0.86      0.93      0.89       504

   micro avg       0.89      0.89      0.89      1008
   macro avg       0.89      0.89      0.89      1008
weighted avg       0.89      0.89      0.89      1008
```

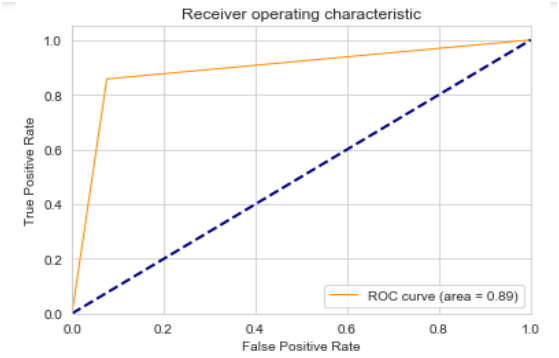


Fig 14Adaboost

D.PREDICTING WITH GRADIENT BOOSTING

Gradient boosting is a machine learning technique for regression and classification problems, which produces a prediction model in the form of ensemble of weak prediction models, typically decision tree. Specifically, our method first adopts Gradient Boosting Decision Tree (GBDT) to learn the 1H-MRS biomarkers of EOAD patients, which are then used to construct the final classifier for Alzheimer diagnosis. To validate our proposal, we have conducted comprehensive experiments for evaluation and the experimental results clearly demonstrate the effectiveness of our method. Hence, the gradient boosting is the best algorithm to predict the early alzheimer'sdisease, ig 15 provide an highest accuracy of 97.22% from the above algorithms.

	SVM		Decision Tree		Adaboost		MLP		Guassian NB		Logistic Regression		Gradient Boosting	
	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Precision	89%	74%	84%	86%	92%	86%	96%	79%	88%	70%	86%	76%	**99%**	**97%**
Recall	67%	92%	87%	83%	85%	93%	74%	97%	61%	92%	72%	88%	**97%**	**99%**
F1-Score	77%	82%	85%	85%	88%	89%	84%	87%	72%	80%	78%	82%	**98%**	**98%**

Fig 15 Precision, Recall, F1-Score of Demented represented as 1 and Non-demented represented as 0, Gradient Boosting gives more accuracy while comparing with other classification report

```
Confusion Matrix:
[[488  16]
 [  4 500]]


Classification Report:
              precision    recall  f1-score   support

           0       0.99      0.97      0.98       504
           1       0.97      0.99      0.98       504

   micro avg       0.98      0.98      0.98      1008
   macro avg       0.98      0.98      0.98      1008
weighted avg       0.98      0.98      0.98      1008
```

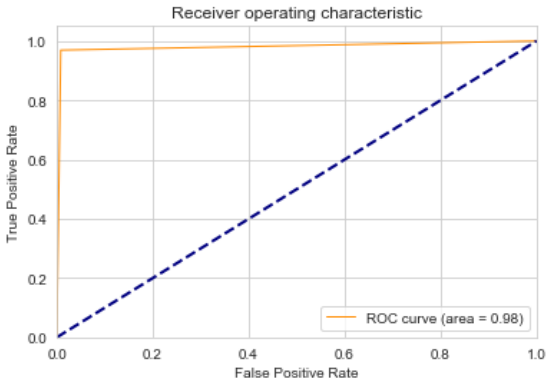


Fig 16 Gradient Boosting

V. RESULT AND DISCUSSION

The implementation of the proposed solution begins with installation of anaconda software. This process is followed by launching Jupyter notebook which helps to import the certain necessary packages i.e, pandas, numpy, sklearn etc. After importing all the packages, various machine learning are implemented for identifying an algorithm with high accuracy. The algorithm which is found to be more accurate is embedded with GUI (Graphical User Interface) backend for database connectivity.

In our proposed system we have obtained a better accuracy with the help of Gradient boosting algorithms through which better result will be obtained comparatively with other algorithms.

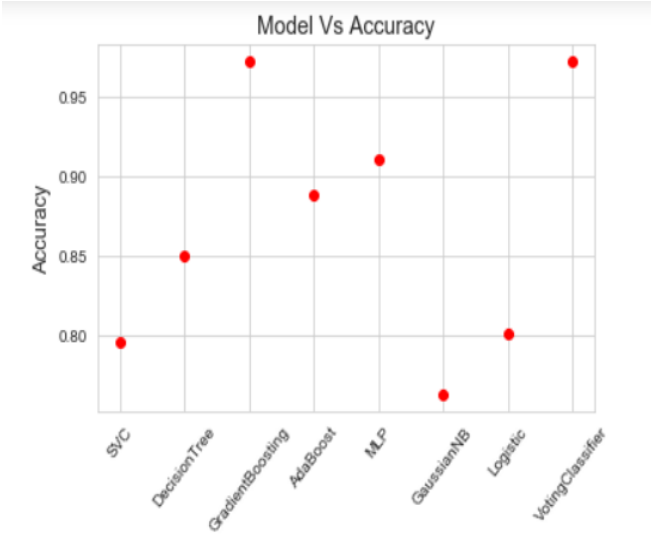


Fig.8 Comparative analysis

VI. CONCLUSION AND FUTURE ENHANCEMEN

To conclude, the analysis of attributes by which alzheimer's disease can be predicted earlier. By employing data through datasets, the correlation between attributes like CDR, eTIV and alzheimer's disease are monitored in a regular interval. Through this paper, the Gradient Boosting algorithm is discovered in order to predicts the disease with more accuracy. The advantage of Gradient Boosting alogorithm, gives more flexibility without obtaining the processed data. Furthermore, the future enhancement can be made by using clustering algorithm which may give better solution.

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