SOCIAL MEDIA TOURISM

CAPSTONE PROJECT

NOTES - II

Submitted To:

Concerned Faculty
At
Great Learning
The University of Texas at Austin

Submitted By:

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PGPDSBA online July E 2020

Laptops

Logistic Regression Training Set

```
The model score for Logistic Regression training set is 0.7491408934707904
```

Fig 1

```
The classification report for Logistic Regression training set is
              precision    recall  f1-score   support

         0.0       0.76      0.71      0.74       571
         1.0       0.74      0.79      0.76       593

    accuracy                           0.75      1164
   macro avg       0.75      0.75      0.75      1164
weighted avg       0.75      0.75      0.75      1164
```

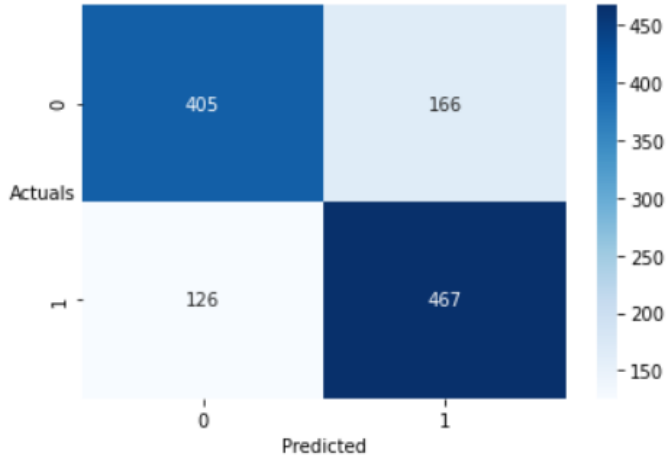

Fig 2

```
The AUC score for Logistic Regression training set is: 0.832
```

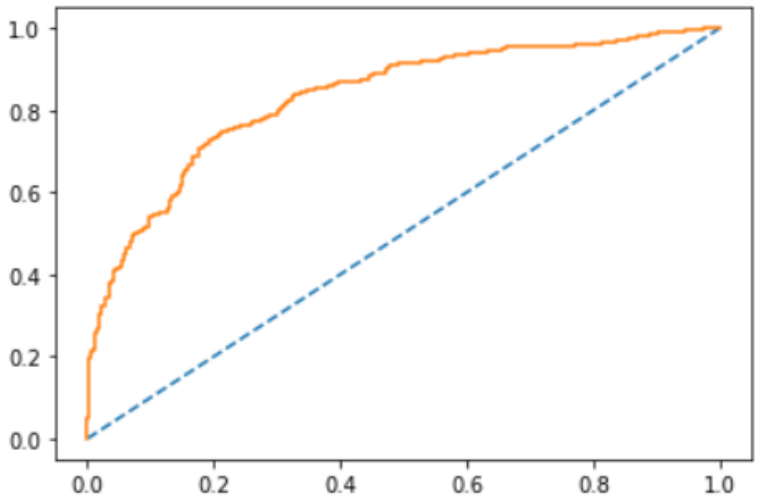

Fig 3

Logistic Regression Testing Set

```
The model score for Logistic Regression testing set is 0.752
```

Fig 4

```
The classification report for Logistic Regression testing set is
              precision    recall  f1-score   support

         0.0       0.76      0.77      0.77       261
         1.0       0.75      0.73      0.74       239

    accuracy                           0.75       500
   macro avg       0.75      0.75      0.75       500
weighted avg       0.75      0.75      0.75       500
```

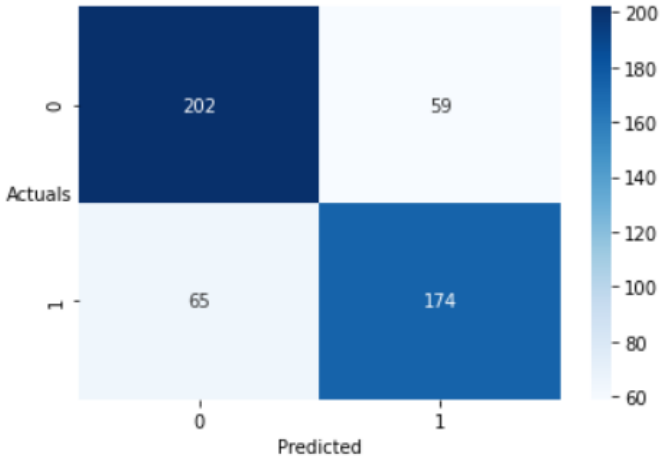

Fig 5

```
The AUC score for Logistic Regression testing set is: 0.827
```

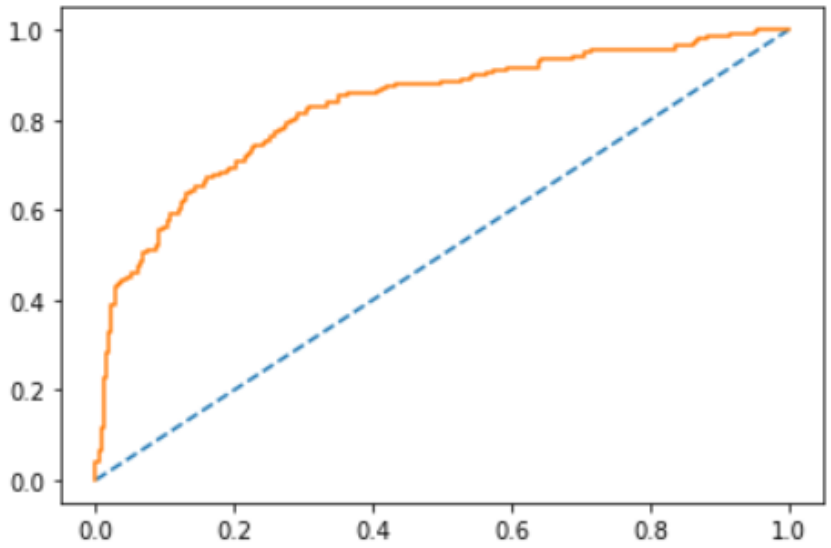

Fig 6

Linear Discriminant Analysis Training Set

```
The model score for Linear Discriminant Analysis training set is 0.7542955326460481
```

Fig 7

```
The classification report for Linear Discriminant Analysis training set is
              precision    recall  f1-score   support

         0.0       0.78      0.70      0.74       571
         1.0       0.74      0.81      0.77       593

    accuracy                           0.75      1164
   macro avg       0.76      0.75      0.75      1164
weighted avg       0.76      0.75      0.75      1164
```

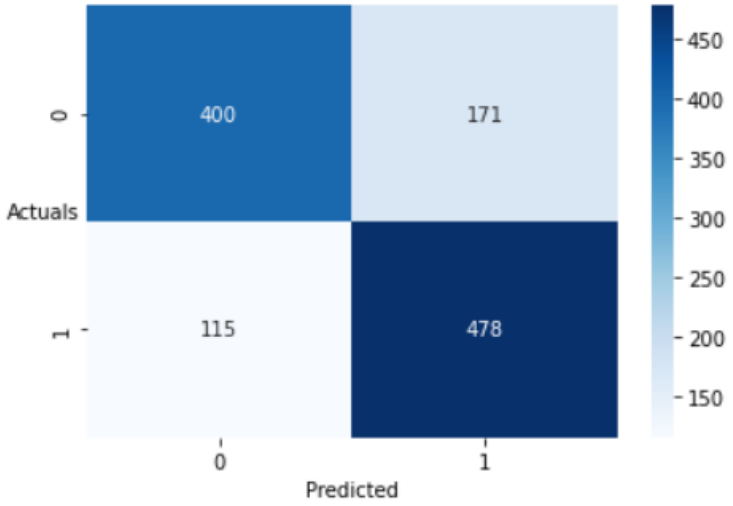

Fig 8

```
The AUC score for Linear Discriminant Analysis training set is: 0.831
```

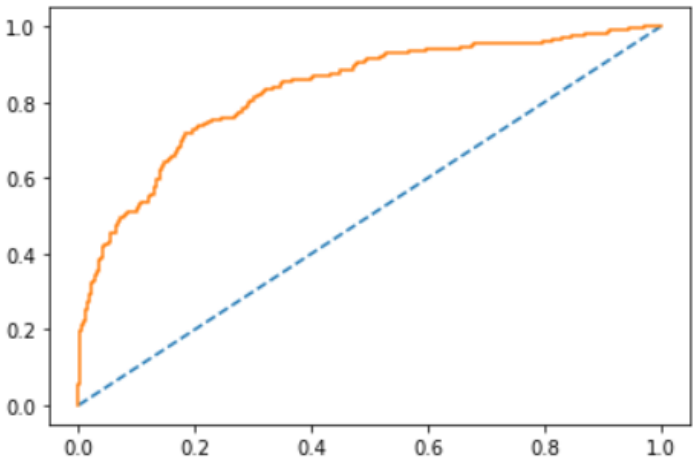

Fig 9

Linear Discriminant Analysis Testing Set

```
The model score for Linear Discriminant Analysis testing set is 0.754
```

Fig 10

```
The classification report for Linear Discriminant Analysis testing set is
              precision    recall  f1-score   support

         0.0       0.76      0.77      0.76       261
         1.0       0.74      0.74      0.74       239

    accuracy                           0.75       500
   macro avg       0.75      0.75      0.75       500
weighted avg       0.75      0.75      0.75       500
```

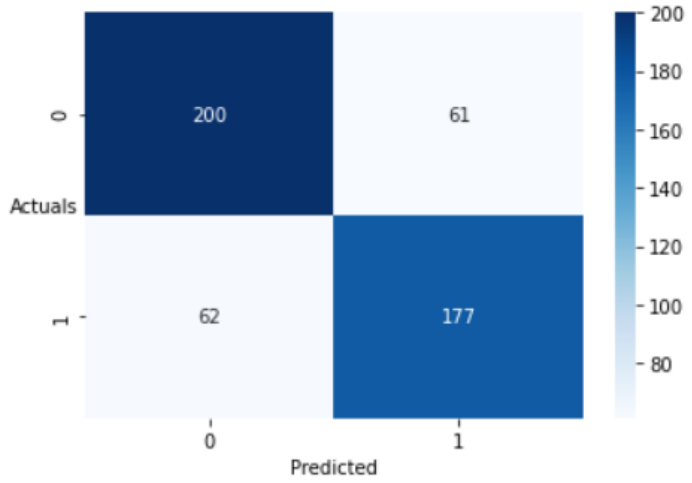

Fig 11

```
The AUC score for Linear Discriminant Analysis testing set is: 0.826
```

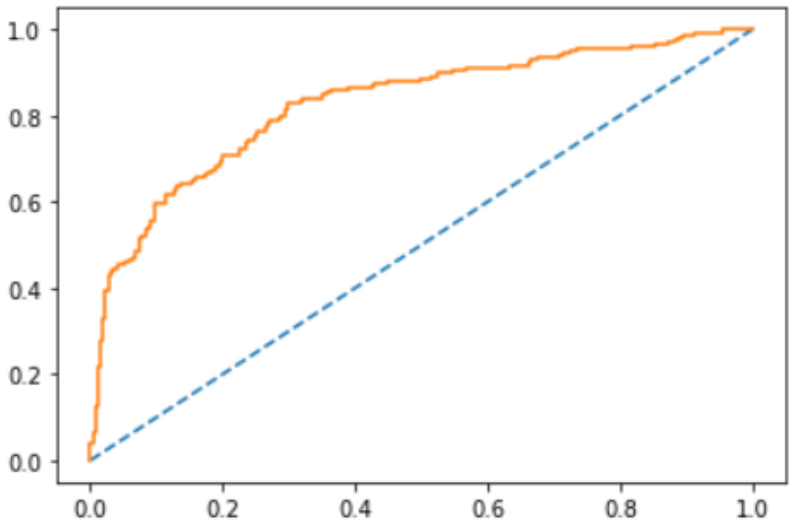

Fig 12

K- Nearest Neighbours Training Set

```
The model score for KNN training set is 0.9819587628865979
```

Fig 13

```
The classification report for KNN set is
              precision    recall  f1-score   support

         0.0       1.00      0.96      0.98       571
         1.0       0.97      1.00      0.98       593

    accuracy                           0.98      1164
   macro avg       0.98      0.98      0.98      1164
weighted avg       0.98      0.98      0.98      1164
```

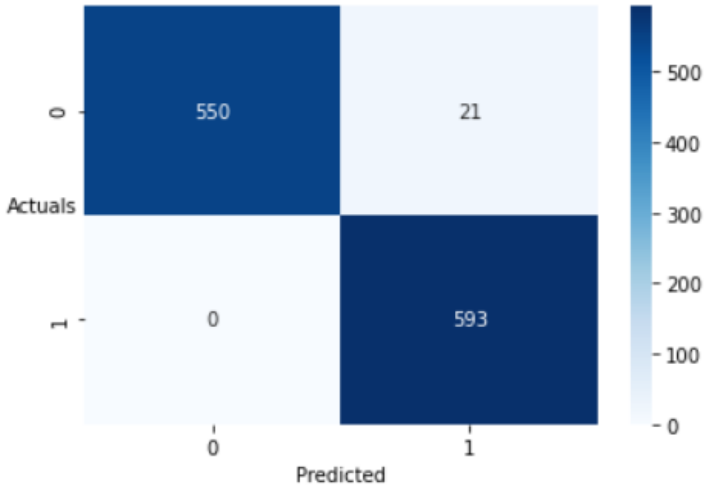

Fig 14

```
The AUC score for KNN training set is: 1.000
```

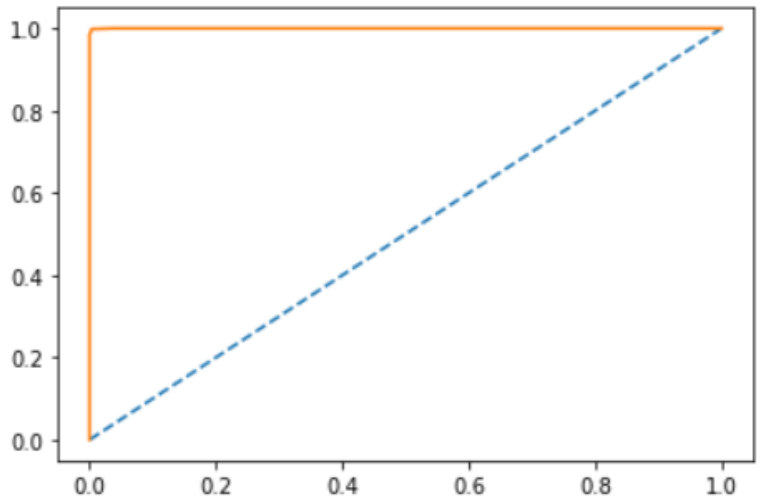

Fig 15

K- Nearest Neighbours Testing Set

```
The model score for KNN testing set is 0.95
```

Fig 16

```
The classification report for KNN testing set is
              precision    recall  f1-score   support

         0.0       1.00      0.90      0.95       261
         1.0       0.91      1.00      0.95       239

    accuracy                           0.95       500
   macro avg       0.95      0.95      0.95       500
weighted avg       0.95      0.95      0.95       500
```

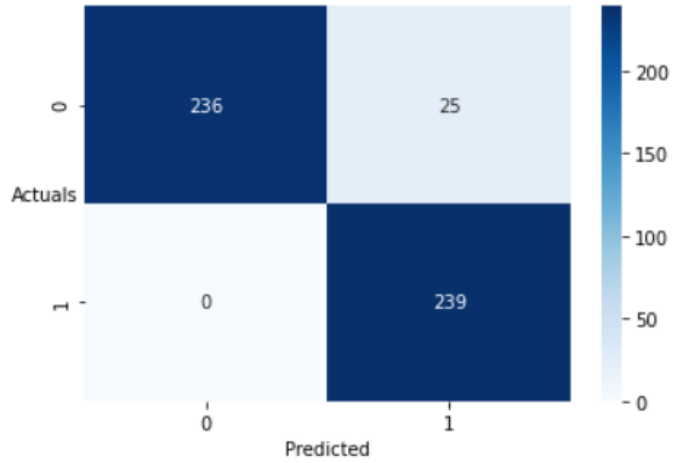

Fig 17

```
The AUC score for KNN testing set is: 1.000
```

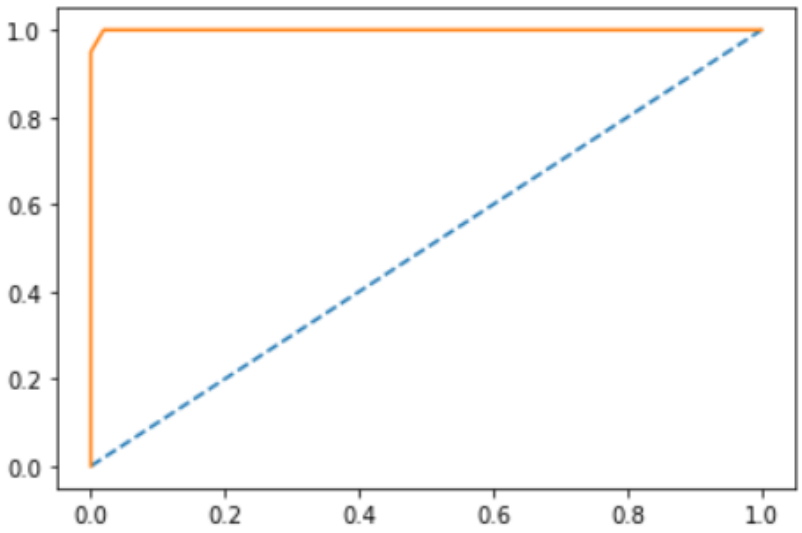

Fig 18

Naive Bayes Training Set

```
The model score for Naive Bayes Model training set is 0.718213058419244
```

Fig 19

```
The classification report for Naive Bayes Model set is
              precision    recall  f1-score   support

         0.0       0.78      0.59      0.67       571
         1.0       0.68      0.84      0.75       593

    accuracy                           0.72      1164
   macro avg       0.73      0.72      0.71      1164
weighted avg       0.73      0.72      0.71      1164
```

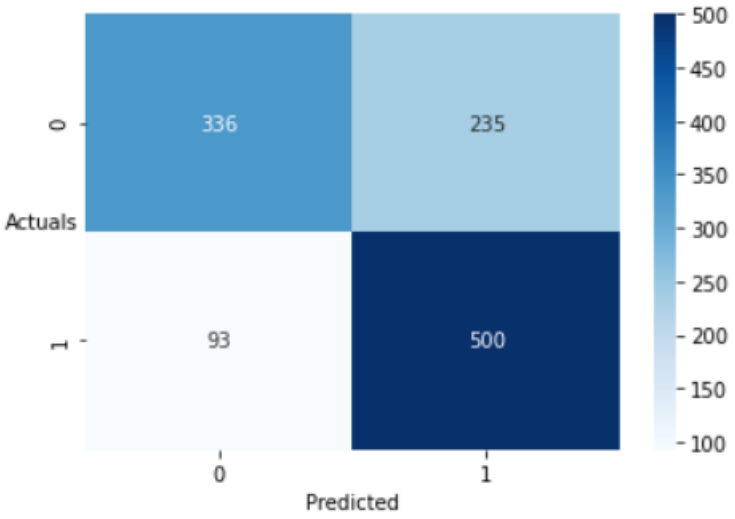

Fig 20

```
The AUC score for Naive Bayes training set is: 0.816
```

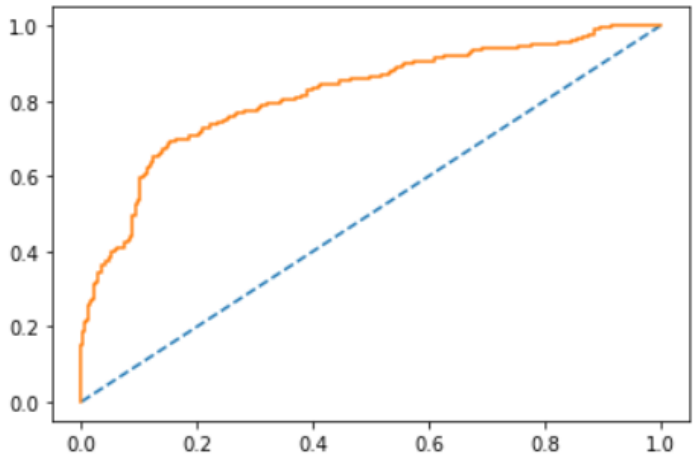

Fig 21

Naive Bayes Testing Set

```
The model score for Naive Bayes Model testing set is 0.73
```

Fig 22

```
The classification report for Naive bayes Model testing set is
              precision    recall  f1-score   support

         0.0       0.79      0.65      0.72       261
         1.0       0.68      0.82      0.74       239

    accuracy                           0.73       500
   macro avg       0.74      0.73      0.73       500
weighted avg       0.74      0.73      0.73       500
```

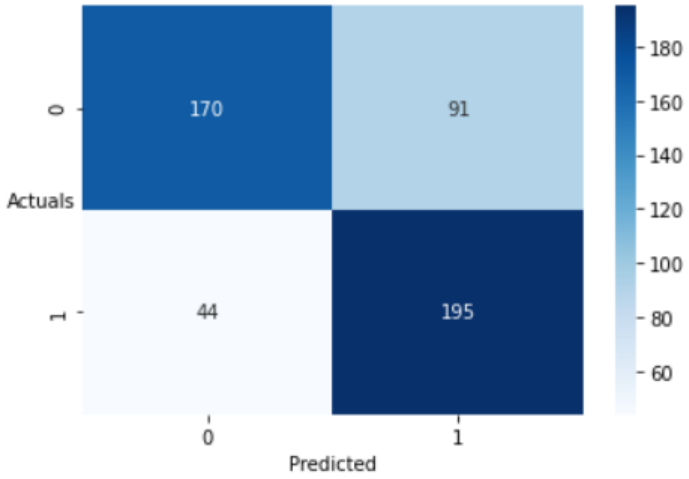

Fig 23

```
The AUC score for Naive Bayes testing set is: 0.816
```

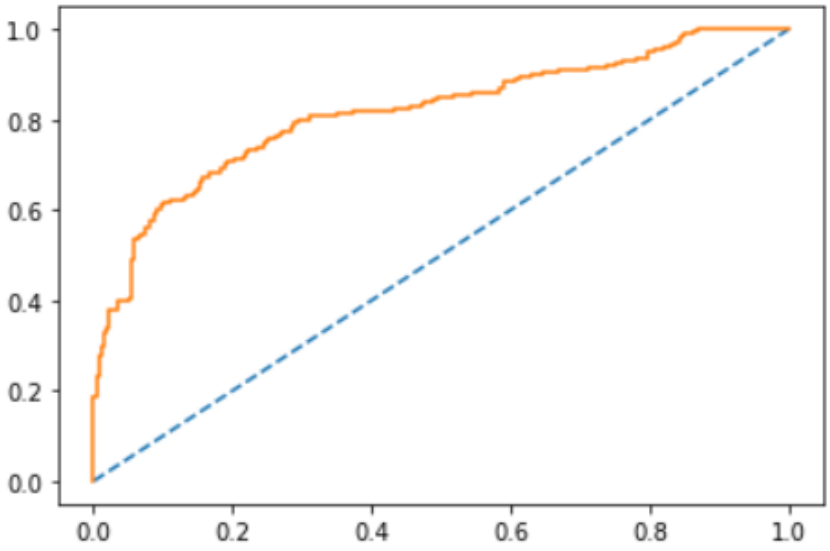

Fig 24

Decision Tree Classifier Training Set

```
The model score for Decision Tree Classifier training set is 1.0
```

Fig 25

```
The classification report for Decision Tree training set is
              precision    recall  f1-score   support

         0.0       1.00      1.00      1.00       571
         1.0       1.00      1.00      1.00       593

    accuracy                           1.00      1164
   macro avg       1.00      1.00      1.00      1164
weighted avg       1.00      1.00      1.00      1164
```

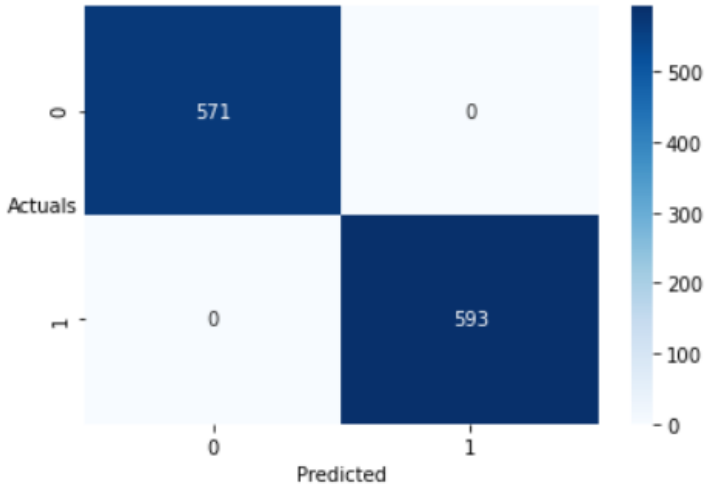

Fig 26

```
The AUC score for Decision Tree training set is: 1.000
```

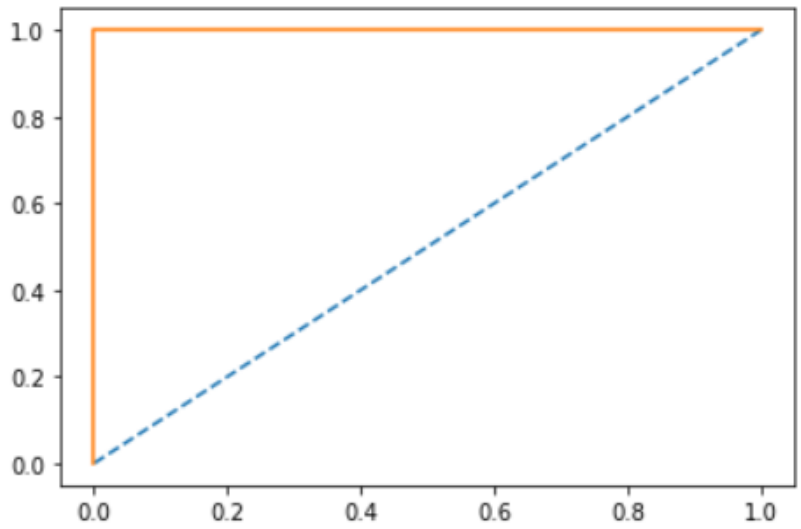

Fig 27

Decision Tree Classifier Testing Set

```
The model score for Decision Tree Classifier testing set is 0.958
```

Fig 28

```
The classification report for Decision Tree testing set is
              precision    recall  f1-score   support

         0.0       0.96      0.96      0.96       261
         1.0       0.95      0.96      0.96       239

    accuracy                           0.96       500
   macro avg       0.96      0.96      0.96       500
weighted avg       0.96      0.96      0.96       500
```

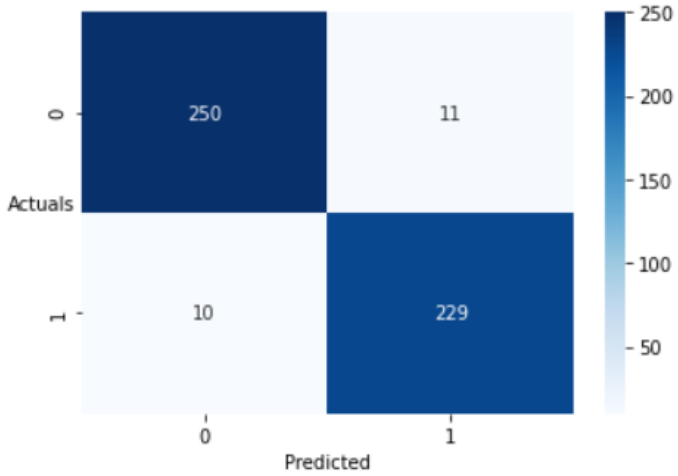

Fig 29

```
The AUC score for Decision Tree testing set is: 0.958
```

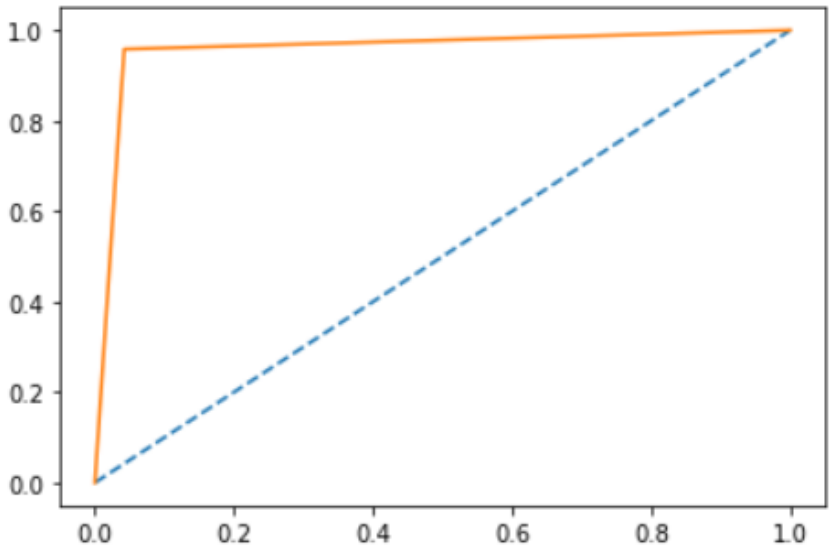

Fig 30

Random Forest Classifier Training Set

```
The model score for Random Forest Classifier training set is 1.0
```

Fig 31

```
The classification report for RFC training set is
              precision    recall  f1-score   support

         0.0       1.00      1.00      1.00       571
         1.0       1.00      1.00      1.00       593

    accuracy                           1.00      1164
   macro avg       1.00      1.00      1.00      1164
weighted avg       1.00      1.00      1.00      1164
```

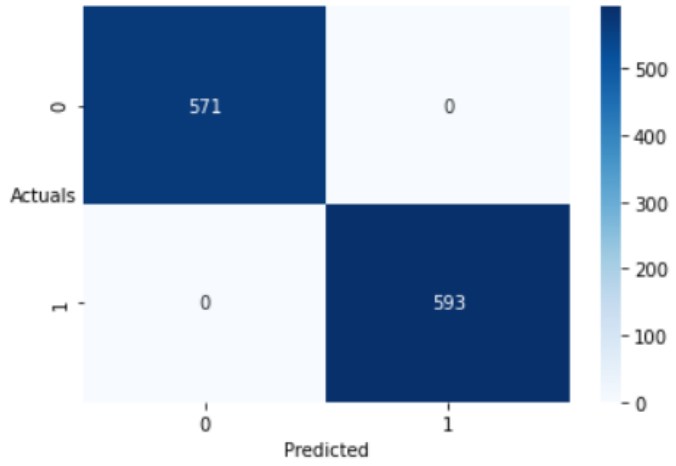

Fig 32

```
The AUC score for RFC training set is: 1.000
```

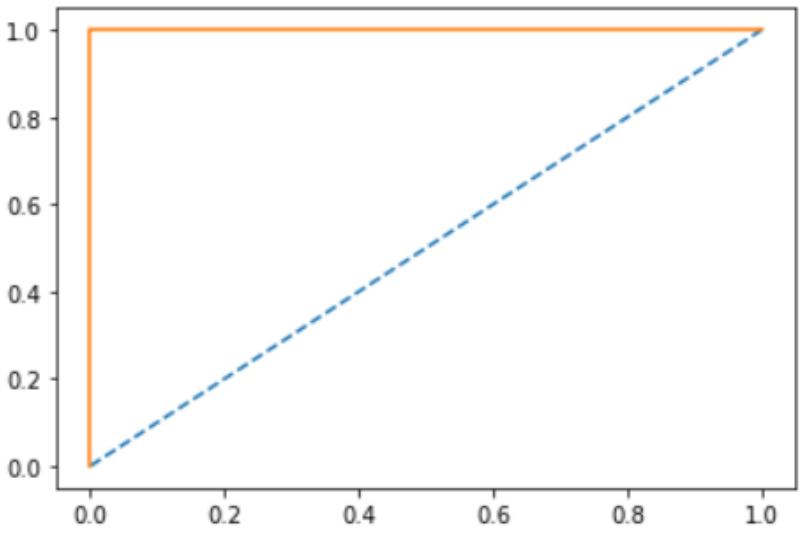

Fig 32

Random Forest Classifier Testing Set

```
The model score for Random Forest Classifier testing set is 0.9966210508531846
```

Fig 34

```
The classification report for RFC testing set is
              precision    recall  f1-score   support

         0.0       0.98      0.99      0.99       261
         1.0       0.99      0.98      0.99       239

    accuracy                           0.99       500
   macro avg       0.99      0.99      0.99       500
weighted avg       0.99      0.99      0.99       500
```

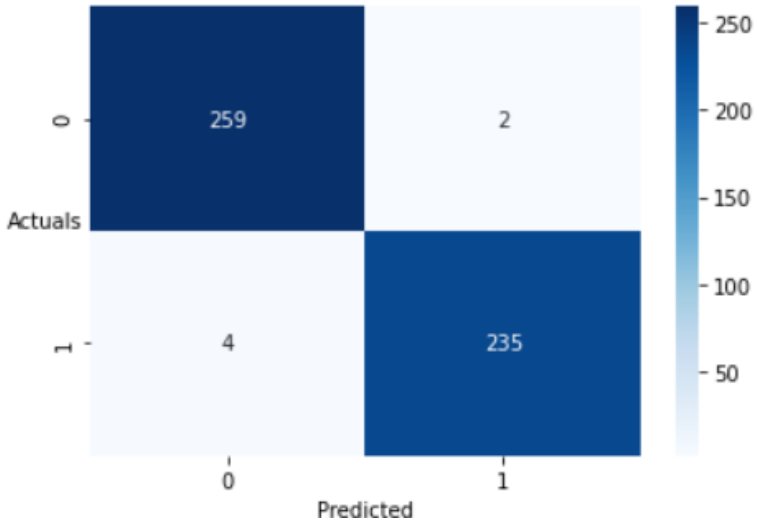

Fig 35

```
The AUC score for RFC testing set is: 1.000
```

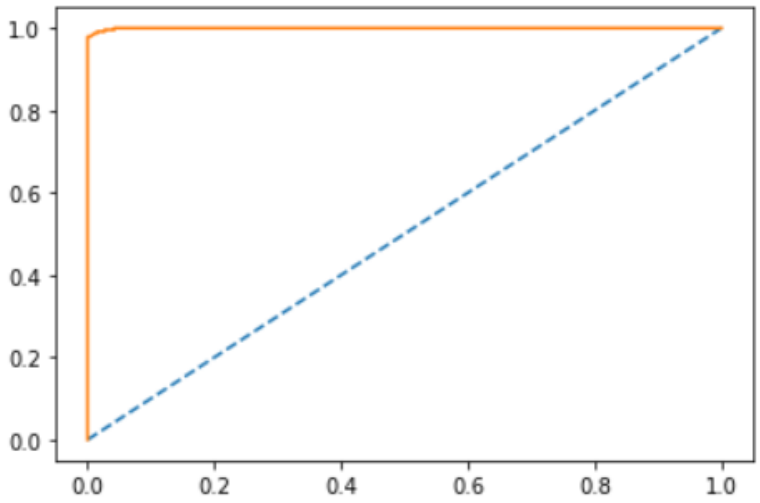

Fig 36

Model Tuning

Bagging Training Set

```
The model score for Bagging training set is 1.0
```

Fig 37

```
The classification report for Bagging training set is
              precision    recall  f1-score   support

         0.0       1.00      1.00      1.00       571
         1.0       1.00      1.00      1.00       593

    accuracy                           1.00      1164
   macro avg       1.00      1.00      1.00      1164
weighted avg       1.00      1.00      1.00      1164
```

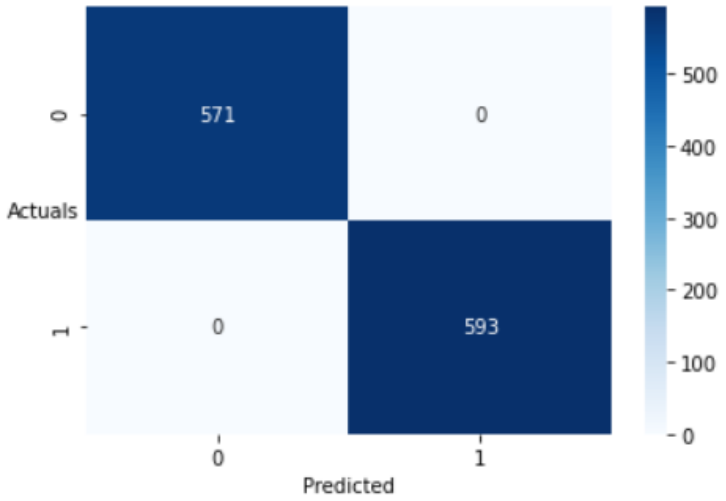

Fig 38

```
The AUC score for Bagging training set is: 1.000
```

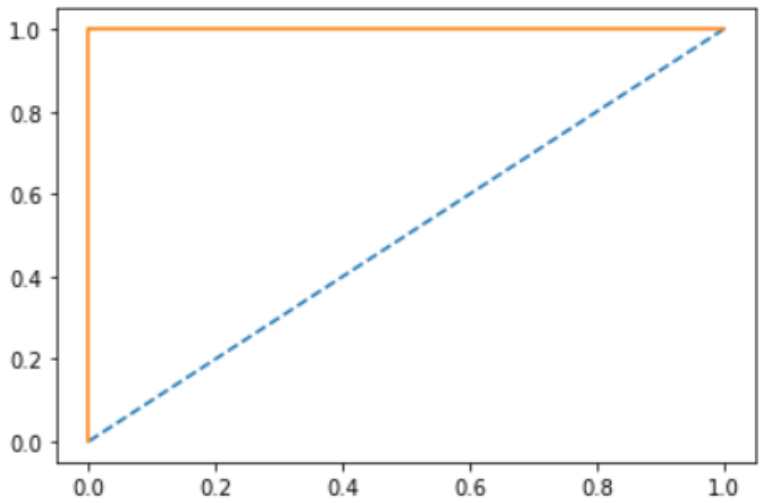

Fig 39

Bagging Testing Set

```
The model score for Bagging testing set is 0.97
```

Fig 40

```
The classification report for Bagging testing set is
              precision    recall  f1-score   support

         0.0       0.97      0.97      0.97       261
         1.0       0.97      0.97      0.97       239

    accuracy                           0.97       500
   macro avg       0.97      0.97      0.97       500
weighted avg       0.97      0.97      0.97       500
```

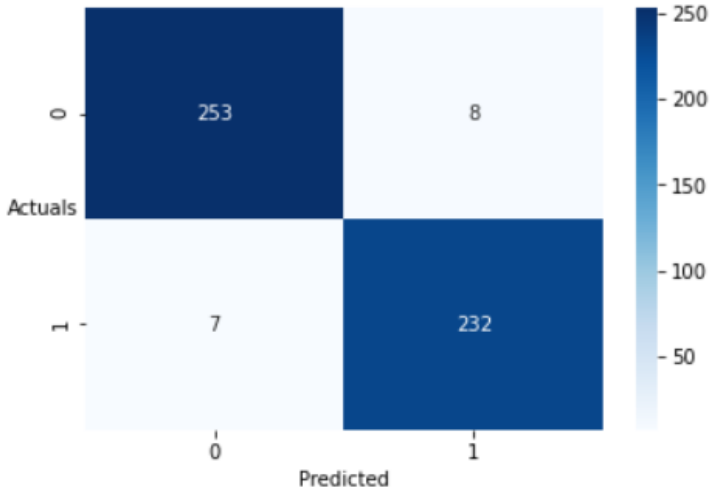

Fig 41

```
The AUC score for Bagging testing set is: 0.998
```

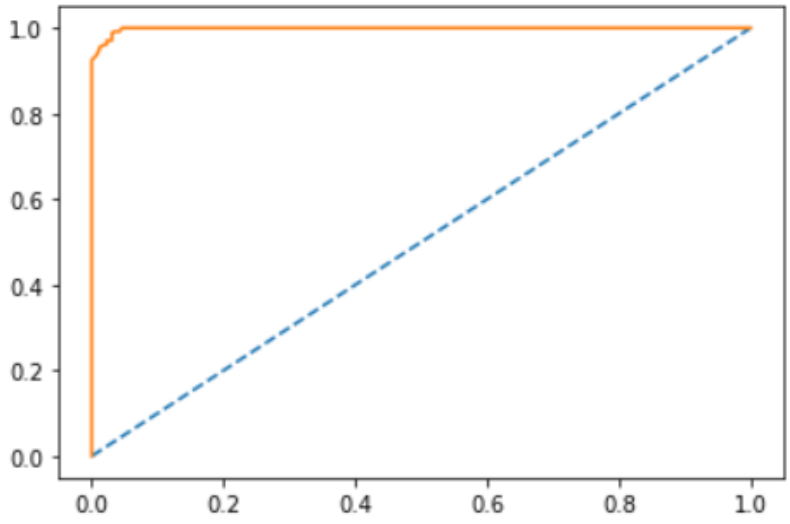

Fig 42

AdaBoosting Training Set

```
The model score for AdaBoosting training set is 0.8556701030927835
```

Fig 43

```
The classification report for Adaboosting training set is
              precision    recall  f1-score   support

         0.0       0.86      0.84      0.85       571
         1.0       0.85      0.87      0.86       593

    accuracy                           0.86      1164
   macro avg       0.86      0.86      0.86      1164
weighted avg       0.86      0.86      0.86      1164
```

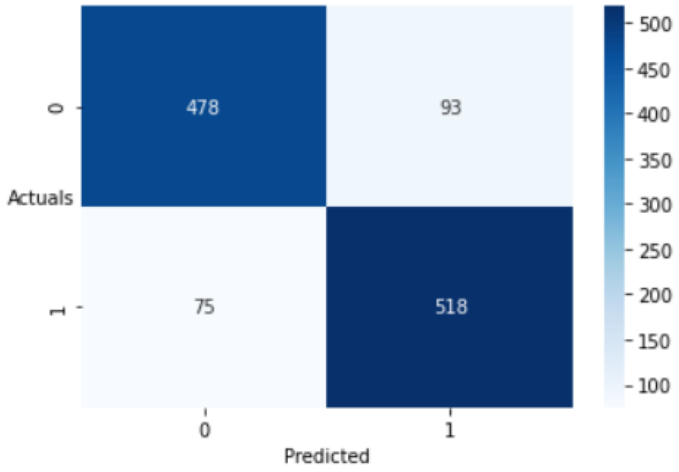

Fig 44

```
The AUC score for AdaBoosting training set is: 0.945
```

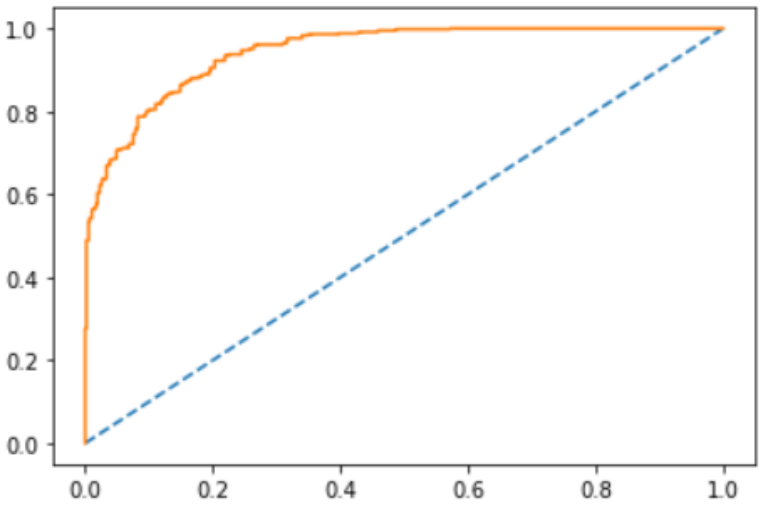

Fig 45

AdaBoosting Testing Set

```
The model score for AdaBoosting testing set is 0.832
```

Fig 46

```
The classification report for Adaboosting testing set is
              precision    recall  f1-score   support

         0.0       0.85      0.82      0.84       261
         1.0       0.81      0.84      0.83       239

    accuracy                           0.83       500
   macro avg       0.83      0.83      0.83       500
weighted avg       0.83      0.83      0.83       500
```

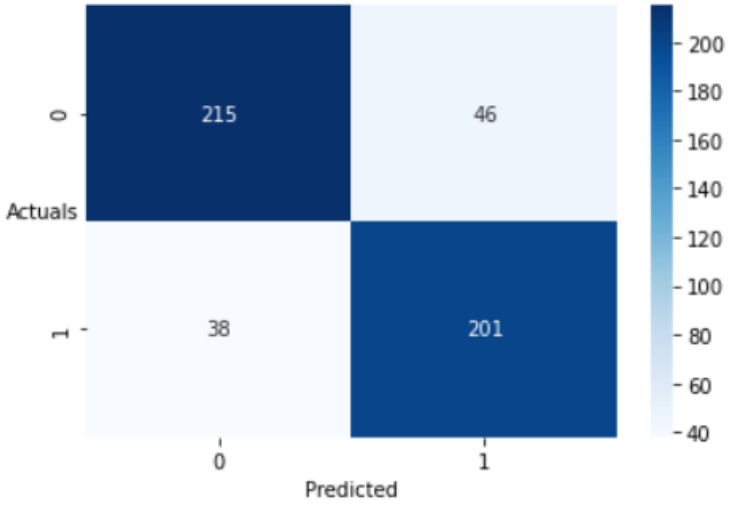

Fig 47

```
The AUC score for AdaBoosting testing set is: 0.928
```

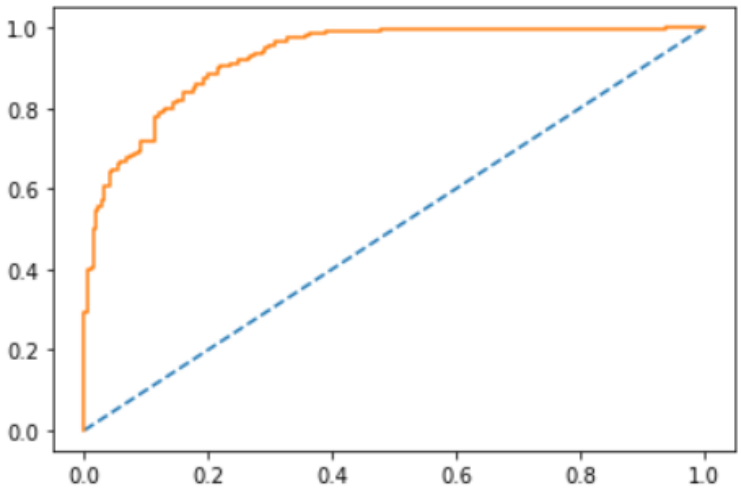

Fig 48

Gradient Boosting Training Set

```
The model score for GradientBoosting training set is 0.9390034364261168
```

Fig 49

```
The classification report for Gradientboosting training set is
              precision    recall  f1-score   support

         0.0       0.94      0.93      0.94       571
         1.0       0.94      0.95      0.94       593

    accuracy                           0.94      1164
   macro avg       0.94      0.94      0.94      1164
weighted avg       0.94      0.94      0.94      1164
```

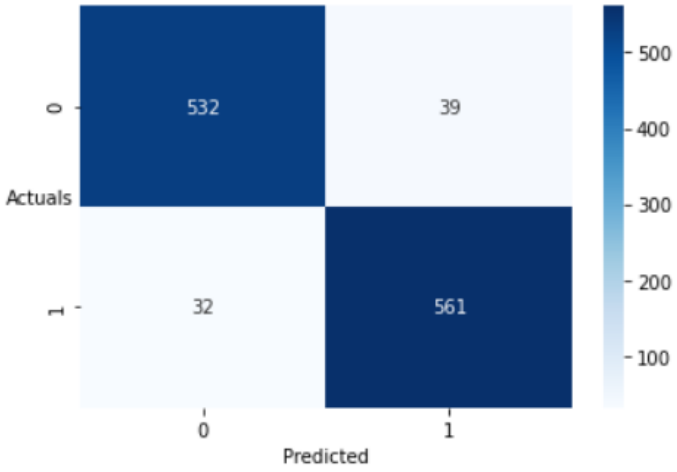

Fig 50

```
The AUC score for GradientBoosting training set is: 0.986
```

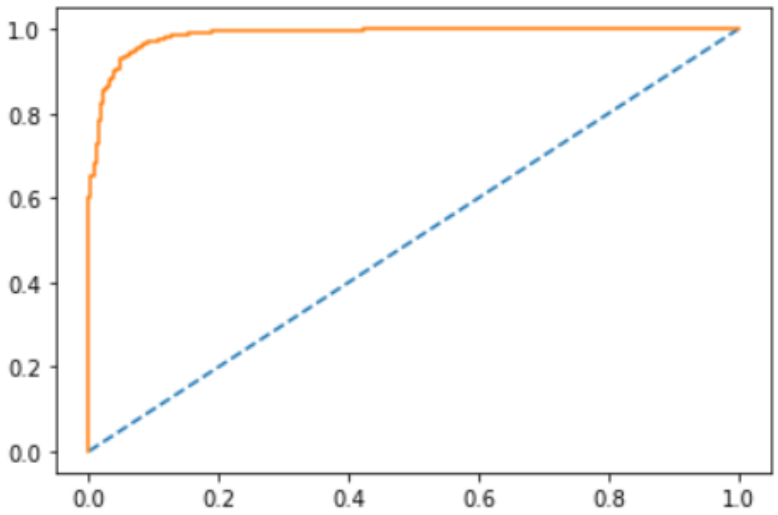

Fig 51

Gradient Boosting Testing Set

```
The model score for GradientBoosting testing set is 0.91
```

Fig 52

```
The classification report for Gradientboosting testing set is
              precision    recall  f1-score   support

         0.0       0.91      0.92      0.91       261
         1.0       0.91      0.90      0.91       239

    accuracy                           0.91       500
   macro avg       0.91      0.91      0.91       500
weighted avg       0.91      0.91      0.91       500
```

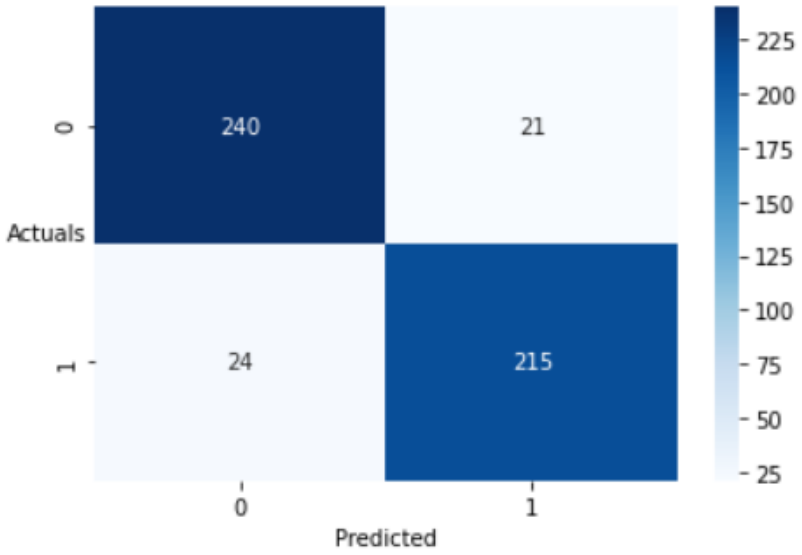

Fig 53

```
The AUC score for GradientBoosting testing set is: 0.928
```

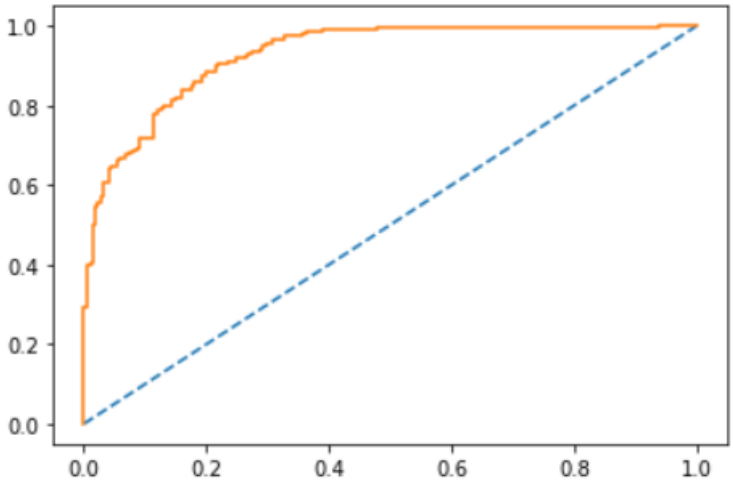

Fig 54

Model Comparison

	LR Train	LR Test	LDA Train	LDA Test	KNN Train	KNN Test	NB Train	NB Test	CART Train	CART Test	RFC Train	RFC Test	Bagging Train	Bagging Test	Ada Boosting Train	Ada Boosting Test	Gradient Boosting Train	Gradient Boosting Test
Precision	0.738	0.747	0.737	0.744	0.966	0.905	0.680	0.682	1.0	0.954	1.0	0.992	1.0	0.967	0.848	0.814	0.935	0.911
Recall	0.788	0.728	0.806	0.741	1.000	1.000	0.843	0.816	1.0	0.958	1.0	0.983	1.0	0.971	0.874	0.841	0.946	0.900
F1 Score	0.762	0.737	0.770	0.742	0.983	0.950	0.753	0.743	1.0	0.956	1.0	0.987	1.0	0.969	0.860	0.827	0.940	0.905
Accuracy	0.749	0.752	0.754	0.754	0.982	0.950	0.718	0.730	1.0	0.958	1.0	0.988	1.0	0.970	0.856	0.832	0.939	0.910
AUC Score	0.832	0.827	0.831	0.826	1.000	1.000	0.816	0.816	1.0	0.958	1.0	1.000	1.0	0.998	0.945	0.928	0.986	0.928

Fig 55

- In order to perform these models, the data was cleaned and unwanted variables were removed. This was followed by treatment of the imbalance in the data using SMOTE.
- After that the data was scaled using the standard scalar as there are variables in 1000's, 100's etc. With that, train test split was performed in which the data was divided in the ratio of 70:30 where 70% constitutes the training set.

1. Logistic Regression model and Linear Discriminant Analysis model provides very poor accuracy of 74.9% and 75.4% on train set and 75.2% and 75.4% on test set respectively. In Logistic regression it can be observed that the accuracy for test set has shown a very little improvement whereas in case of Linear Discriminant Analysis accuracy remained the same.
2. Decision Tree (CART) model and Random Forest model have provided an excellent accuracy on Training set that is 100% and applying the models to testing set, we see that the accuracy has declined a bit that is 95.8% for Decision Tree (CART) model and 98.8% for Random Forest model.
3. The AUC score of both test and train set for K- Nearest Neighbours model and Random Forest model is perfect i.e., 100%. Although, both the models are very good the recall of Random Forest model (98.3%) is slightly lower than the K-Nearest Neighbours model (100%).
4. The worst performing model in terms of all the parameters is the Naïve Bayes model which shows the accuracy of just 71.8% in train set and 73.0% in test set where as both Decision Trees (CART) model and Random Forest model have performed equally well with better AUC score, Recall and Accuracy.
5. The K-Nearest Neighbours achieved the accuracy 98.2% on training set and 98.1% on testing set. It has the Recall of 95.0% on test set.
6. Even after applying the Bagging technique the model although showed very good performance in both training as well as testing sets clocking the accuracy of 100% and 97.0% respectively.

Although, Random Forest is Test set has accuracy of 98.8% but it has produced for number of False positives which is 4. as compared to the K-nearest Neighbours having accuracy of 97.0% and producing 0 False positive cases.

Mobiles

Logistic Regression Training Set

```
The model score for Logistic Regression training set is 0.7230306864916166
```

Fig 56

```
The classification report for Logistic Regression training set is
              precision    recall  f1-score   support

         0.0       0.73      0.71      0.72      6366
         1.0       0.71      0.74      0.73      6278

    accuracy                           0.72     12644
   macro avg       0.72      0.72      0.72     12644
weighted avg       0.72      0.72      0.72     12644
```

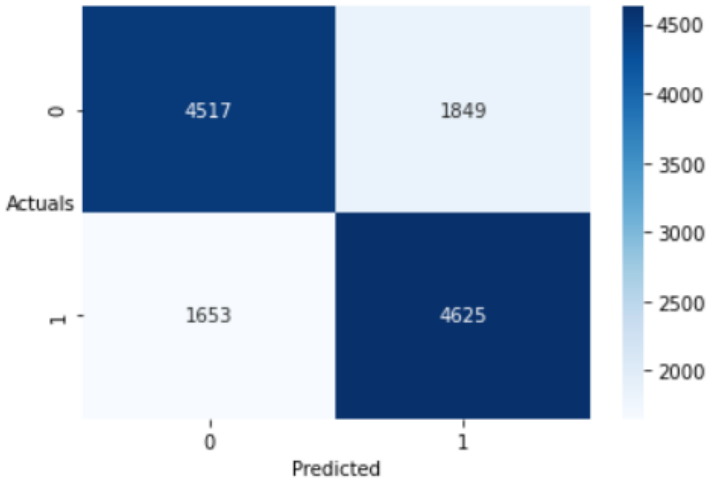

Fig 57

```
The AUC score for Logistic Regression training set is: 0.771
```

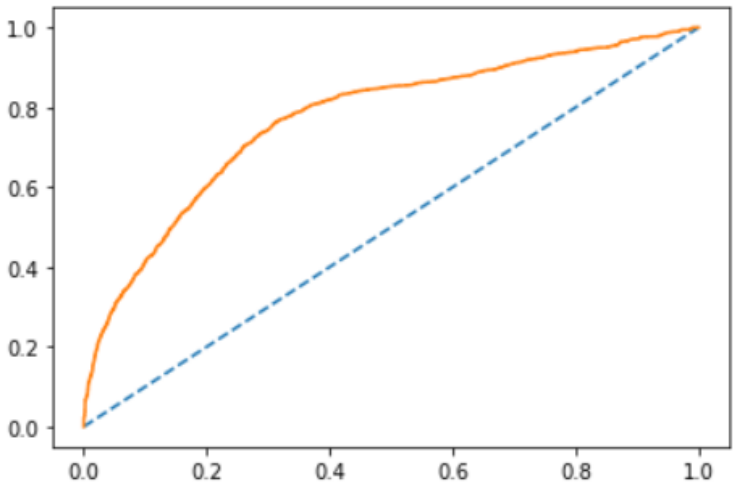

Fig 58

Logistic Regression Testing Set

```
The model score for Logistic Regression testing set is 0.7271217712177122
```

Fig 59

```
The classification report for Logistic Regression testing set is
              precision    recall  f1-score   support

         0.0       0.72      0.72      0.72      2666
         1.0       0.73      0.74      0.73      2754

    accuracy                           0.73      5420
   macro avg       0.73      0.73      0.73      5420
weighted avg       0.73      0.73      0.73      5420
```

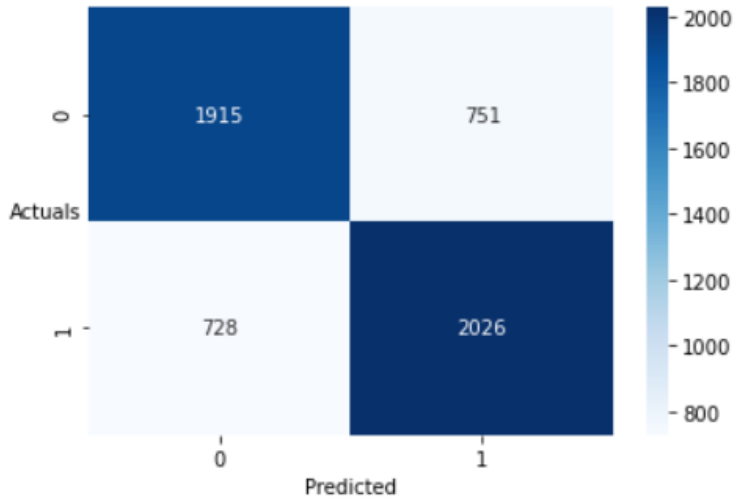

Fig 60

```
The AUC score for Logistic Regression testing set is: 0.777
```

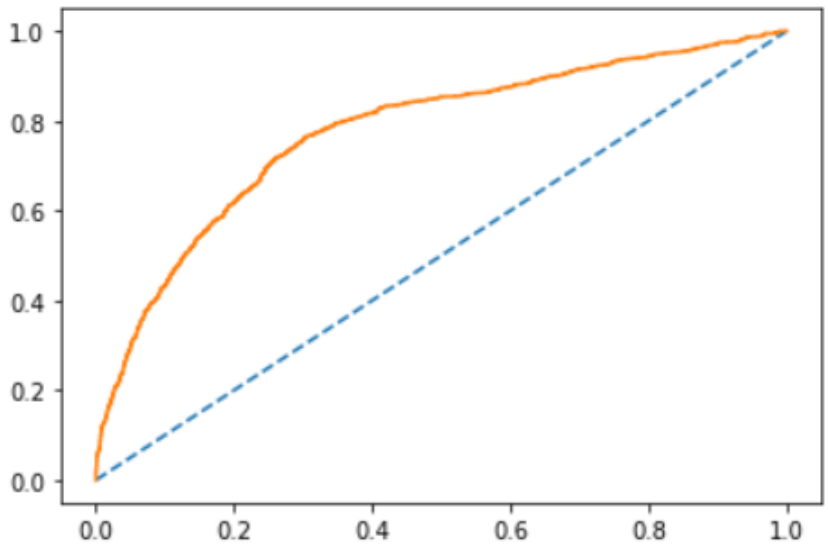

Fig 61

Linear Discriminant Analysis Training Set

```
The model score for Linear Discriminant Analysis training set is 0.7220816197405884
```

Fig 62

```
The classification report for Linear Discriminant Analysis training set is
              precision    recall  f1-score   support

         0.0       0.73      0.71      0.72      6366
         1.0       0.71      0.74      0.72      6278

    accuracy                           0.72     12644
   macro avg       0.72      0.72      0.72     12644
weighted avg       0.72      0.72      0.72     12644
```

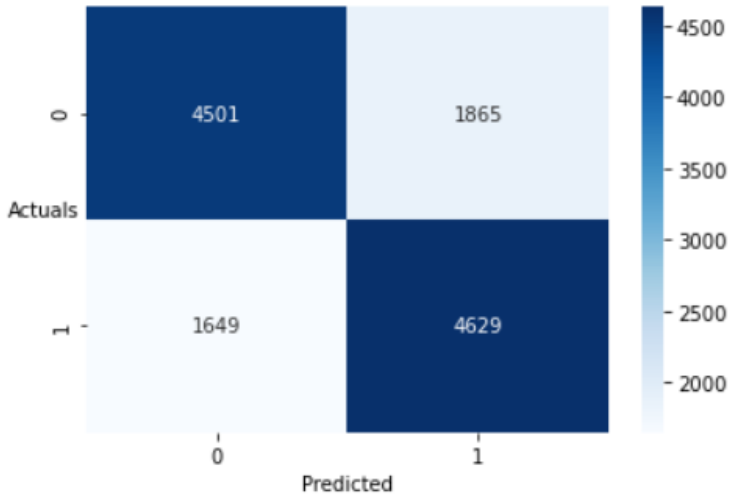

Fig 63

```
The AUC score for Linear Discriminant Analysis training set is: 0.770
```

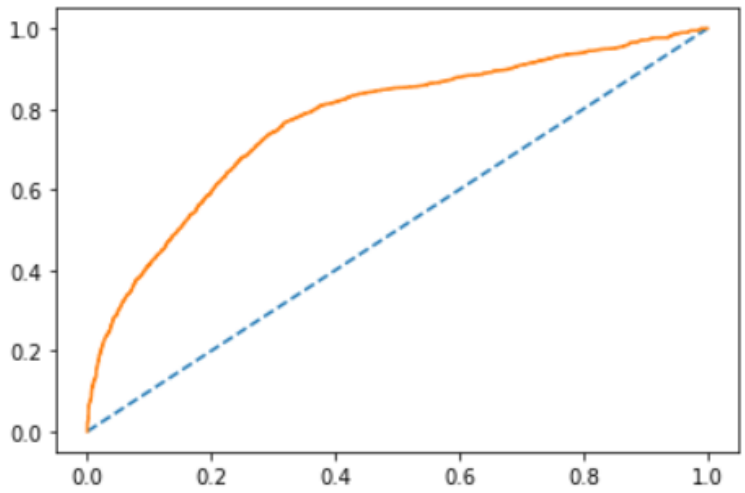

Fig 64

Linear Discriminant Analysis Testing Set

```
The model score for Linear Discriminant Analysis testing set is 0.7271217712177122
```

Fig 65

```
The classification report for Linear Discriminant Analysis testing set is
              precision    recall  f1-score   support

         0.0       0.72      0.72      0.72      2666
         1.0       0.73      0.73      0.73      2754

    accuracy                           0.73      5420
   macro avg       0.73      0.73      0.73      5420
weighted avg       0.73      0.73      0.73      5420
```

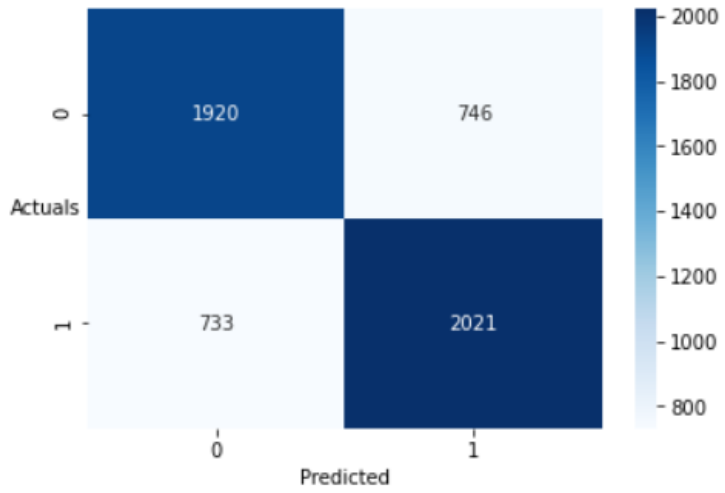

Fig 66

```
The AUC score for Linear Discriminant Analysis testing set is: 0.776
```

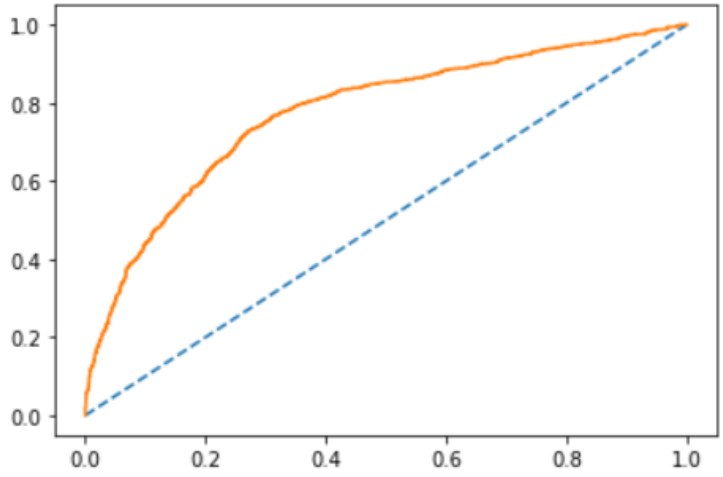

Fig 67

K- Nearest Neighbours Training Set

```
The model score for KNN training set is 0.9929610882632078
```

Fig 68

```
The classification report for KNN set is
              precision    recall  f1-score   support

         0.0       1.00      0.99      0.99      6366
         1.0       0.99      1.00      0.99      6278

    accuracy                           0.99     12644
   macro avg       0.99      0.99      0.99     12644
weighted avg       0.99      0.99      0.99     12644
```

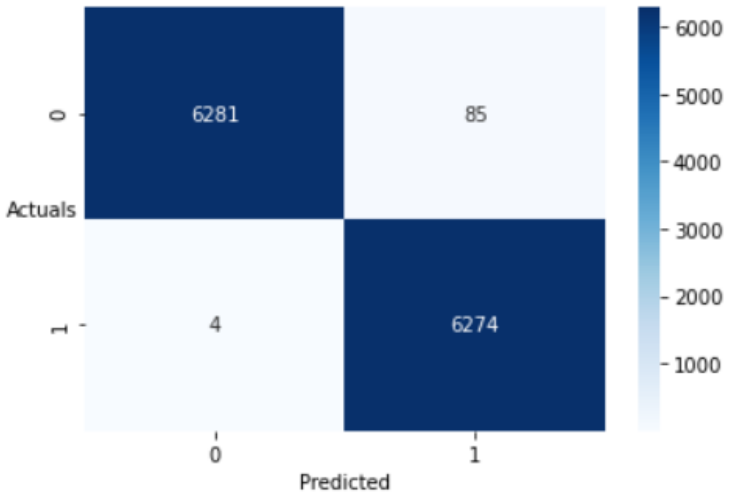

Fig 69

```
The AUC score for KNN training set is: 1.000
```

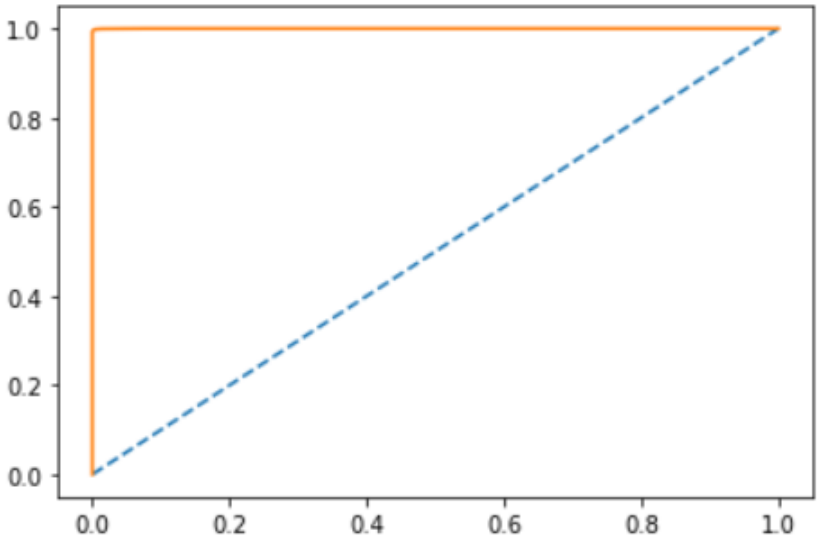

Fig 70

K- Nearest Neighbours Testing Set

```
The model score for KNN testing set is 0.9859778597785978
```

Fig 71

```
The classification report for KNN testing set is
              precision    recall  f1-score   support

         0.0       1.00      0.97      0.99      2666
         1.0       0.98      1.00      0.99      2754

    accuracy                           0.99      5420
   macro avg       0.99      0.99      0.99      5420
weighted avg       0.99      0.99      0.99      5420
```

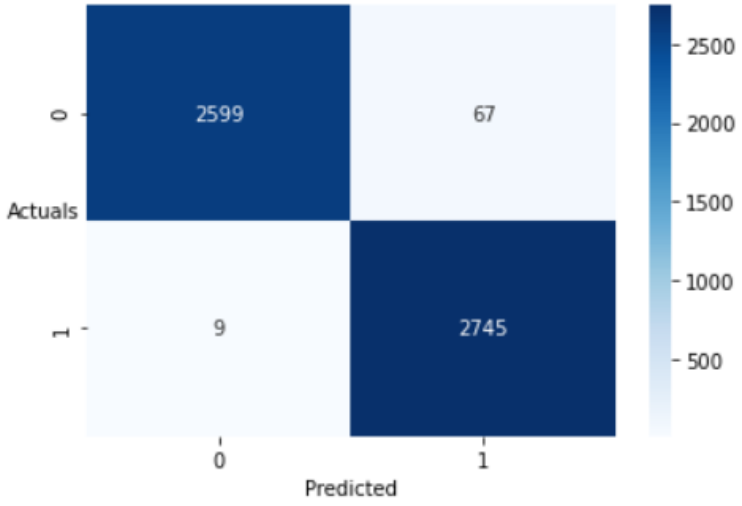

Fig 72

```
The AUC score for KNN testing set is: 0.999
```

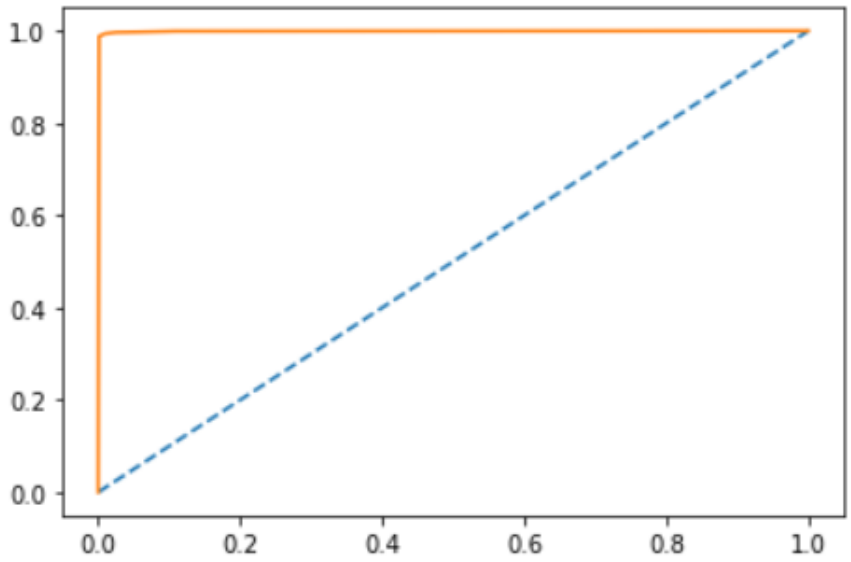

Fig 73

Naive Bayes Training Set

```
The model score for Naive Bayes Model training set is 0.6907624169566593
```

Fig 74

```
The classification report for Naive Bayes Model set is
              precision    recall  f1-score   support

         0.0       0.73      0.62      0.67      6366
         1.0       0.66      0.76      0.71      6278

    accuracy                           0.69     12644
   macro avg       0.70      0.69      0.69     12644
weighted avg       0.70      0.69      0.69     12644
```

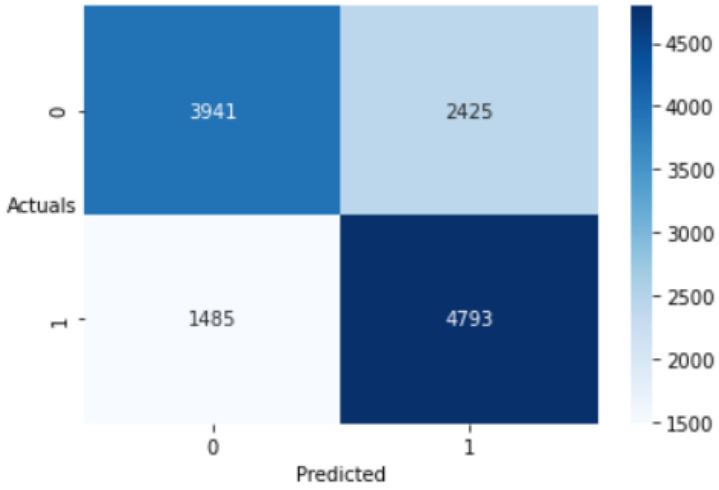

Fig 75

```
The AUC score for Naive Bayes training set is: 0.749
```

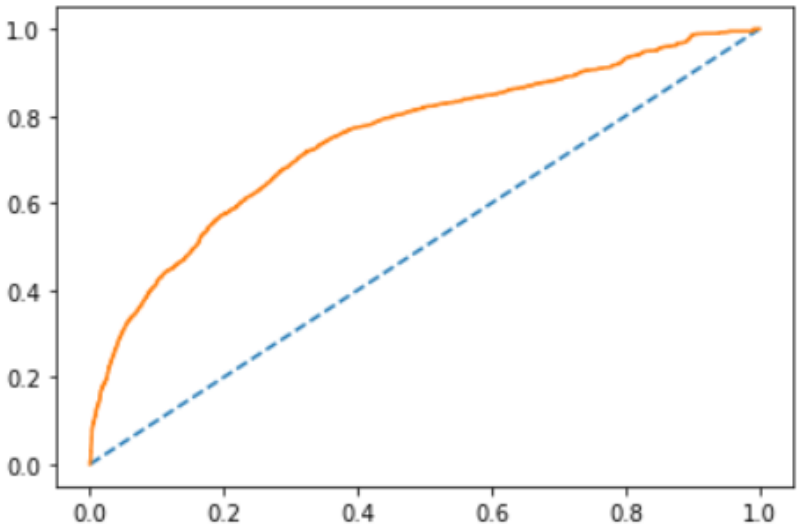

Fig 76

Naive Bayes Testing Set

```
The model score for Naive Bayes Model testing set is 0.6863468634686347
```

Fig 77

```
The classification report for Naive bayes Model testing set is
              precision    recall  f1-score   support

         0.0       0.71      0.61      0.66      2666
         1.0       0.67      0.76      0.71      2754

    accuracy                           0.69      5420
   macro avg       0.69      0.69      0.68      5420
weighted avg       0.69      0.69      0.68      5420
```

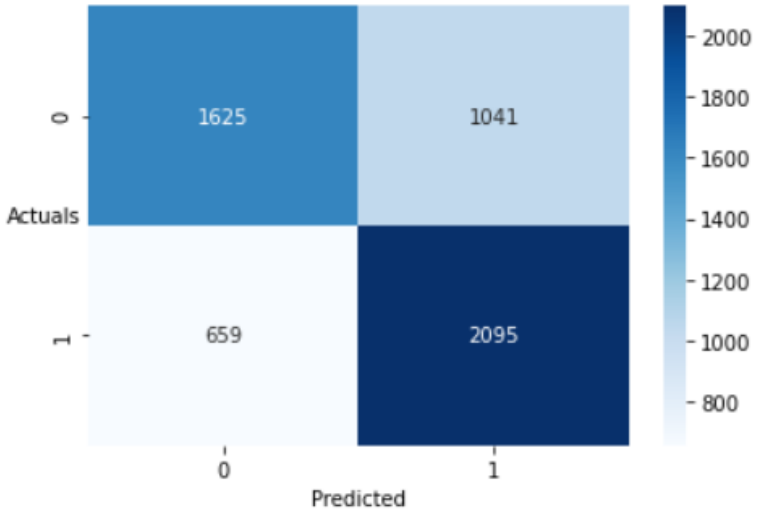

Fig 78

```
The AUC score for Naive Bayes testing set is: 0.753
```

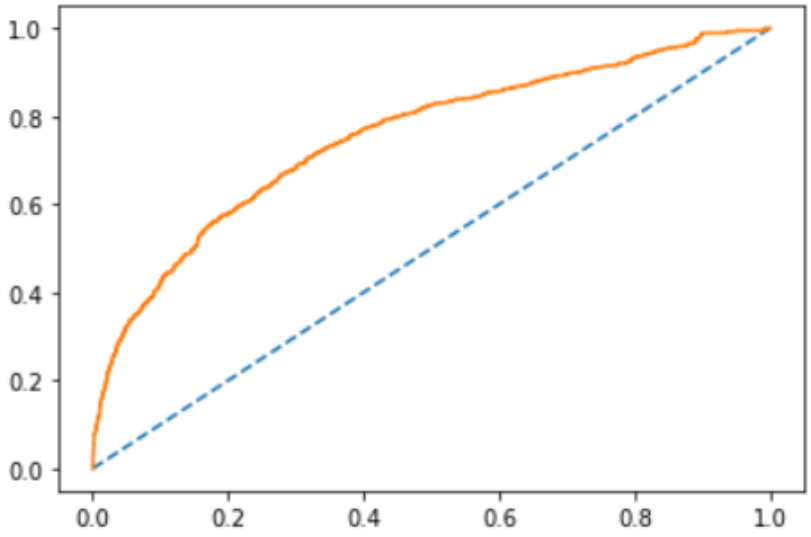

Fig 79

Decision Tree Classifier Training Set

```
The model score for Decision Tree Classifier training set is 1.0
```

Fig 80

```
The classification report for Decision Tree training set is
              precision    recall  f1-score   support

         0.0       1.00      1.00      1.00      6366
         1.0       1.00      1.00      1.00      6278

    accuracy                           1.00     12644
   macro avg       1.00      1.00      1.00     12644
weighted avg       1.00      1.00      1.00     12644
```

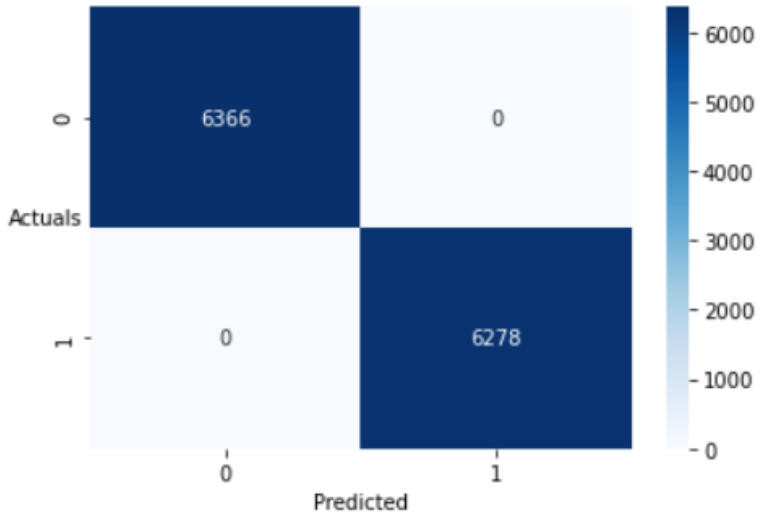

Fig 81

```
The AUC score for Decision Tree training set is: 1.000
```

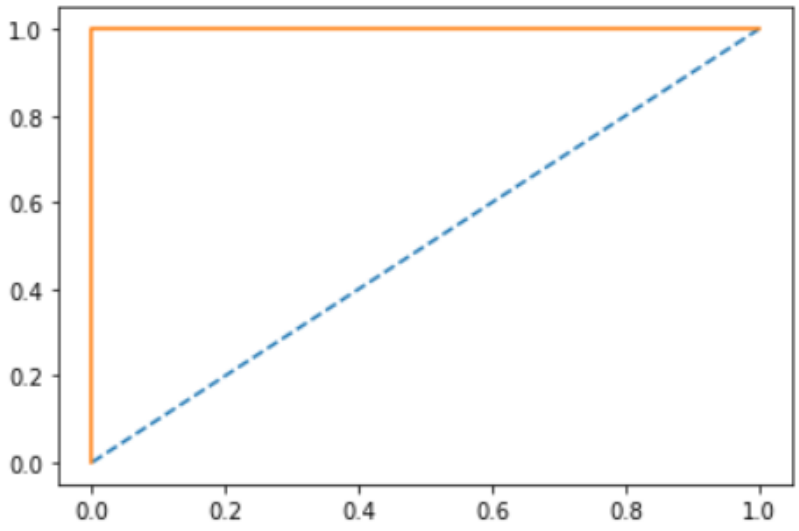

Fig 82

Decision Tree Classifier Testing Set

```
The model score for Decision Tree Classifier testing set is 0.9809963099630996
```

Fig 83

```
The classification report for Decision Tree testing set i
              precision    recall  f1-score   support

         0.0       0.98      0.98      0.98      2666
         1.0       0.98      0.98      0.98      2754

    accuracy                           0.98      5420
   macro avg       0.98      0.98      0.98      5420
weighted avg       0.98      0.98      0.98      5420
```

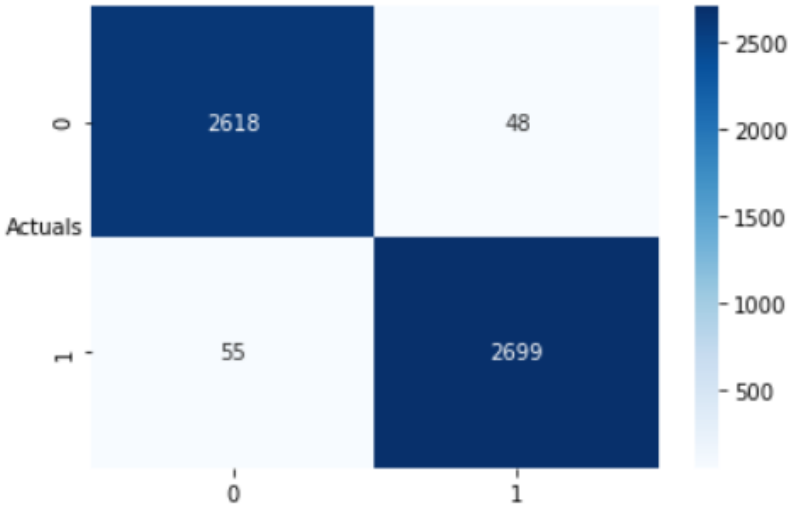

Fig 84

```
The AUC score for Decision Tree testing set is: 0.981
```

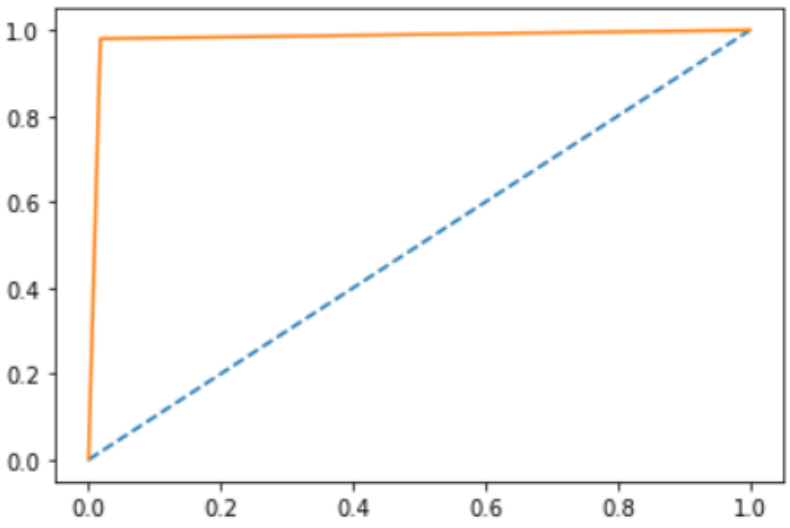

Fig 85

Random Forest Classifier Training Set

```
The model score for Random Forest Classifier training set is 1.0
```

Fig 86

```
The classification report for RFC training set is
              precision    recall  f1-score   support

         0.0       1.00      1.00      1.00      6366
         1.0       1.00      1.00      1.00      6278

    accuracy                           1.00     12644
   macro avg       1.00      1.00      1.00     12644
weighted avg       1.00      1.00      1.00     12644
```

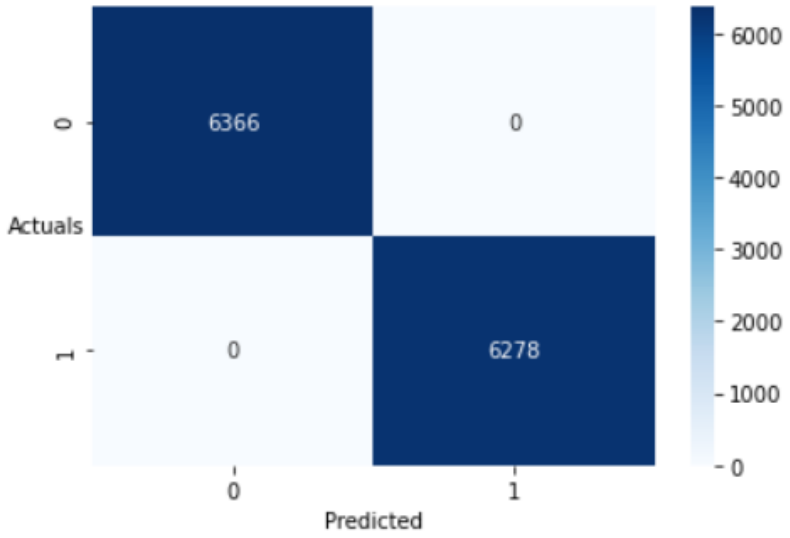

Fig 87

```
The AUC score for RFC training set is: 1.000
```

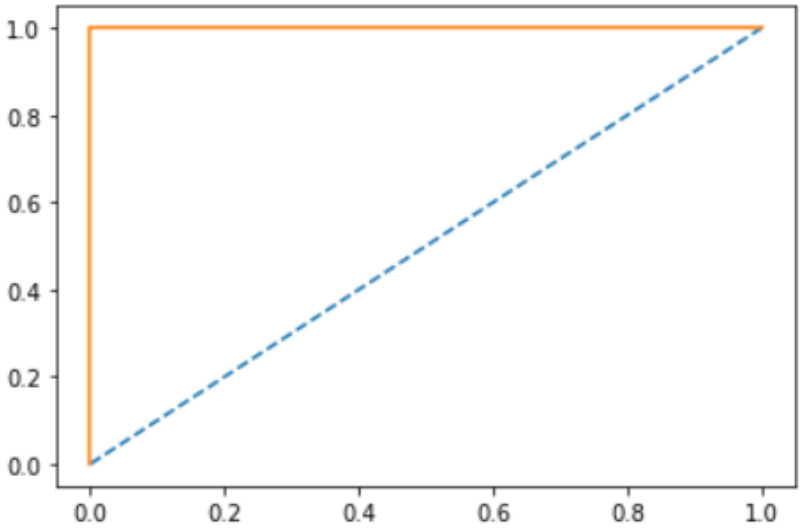

Fig 88

Random Forest Classifier Testing Set

```
The model score for Random Forest Classifier testing set is 0.9948339483394834
```

Fig 89

```
The classification report for RFC testing set is
              precision    recall  f1-score   support

         0.0       0.99      1.00      0.99      2666
         1.0       1.00      0.99      0.99      2754

    accuracy                           0.99      5420
   macro avg       0.99      0.99      0.99      5420
weighted avg       0.99      0.99      0.99      5420
```

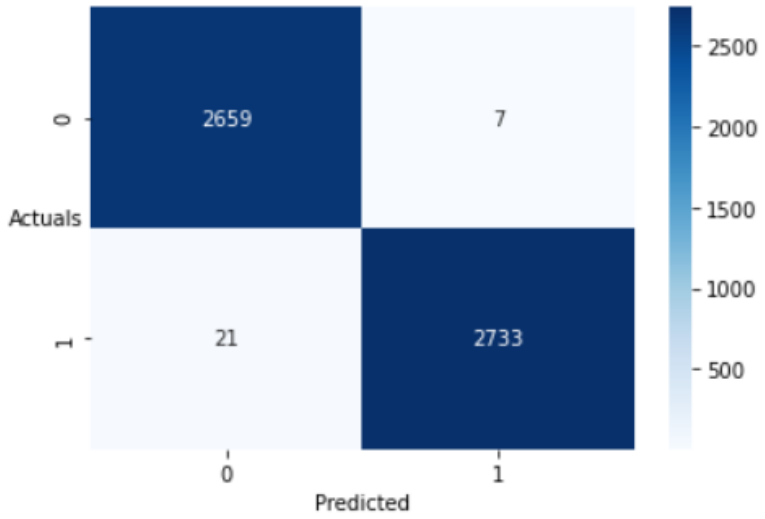

Fig 90

```
The AUC score for RFC testing set is: 1.000
```

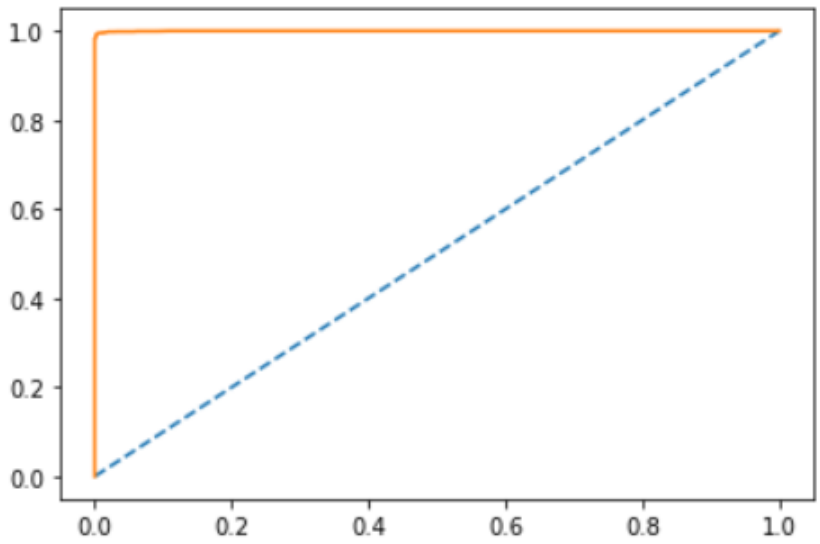

Fig 91

Model Tuning

Bagging Training Set

```
The model score for Bagging training set is 1.0
```

Fig 92

```
The classification report for Bagging training set is
              precision    recall  f1-score   support

         0.0       1.00      1.00      1.00      6366
         1.0       1.00      1.00      1.00      6278

    accuracy                           1.00     12644
   macro avg       1.00      1.00      1.00     12644
weighted avg       1.00      1.00      1.00     12644
```

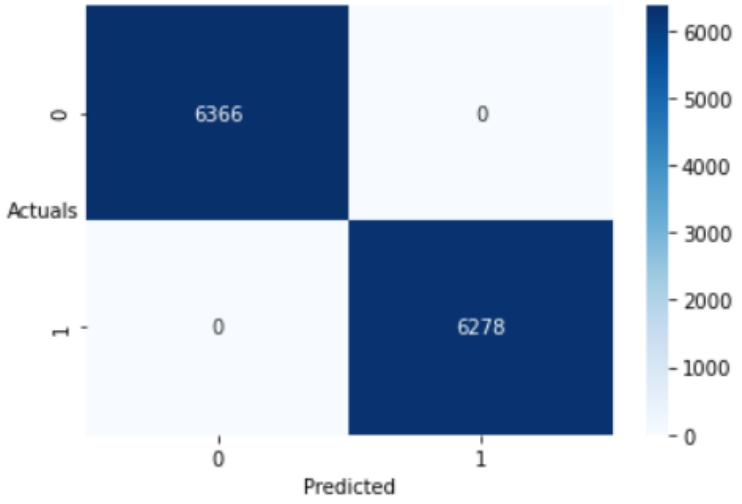

Fig 93

```
The AUC score for Bagging training set is: 1.000
```

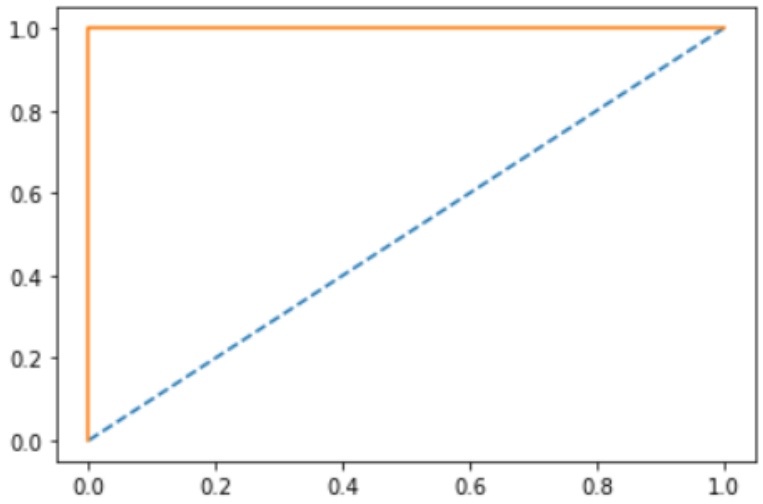

Fig 94

Bagging Testing Set

```
The model score for Bagging testing set is 0.9920664206642067
```

Fig 95

```
The classification report for Bagging testing set is
              precision    recall  f1-score   support

         0.0       0.99      0.99      0.99      2666
         1.0       0.99      0.99      0.99      2754

    accuracy                           0.99      5420
   macro avg       0.99      0.99      0.99      5420
weighted avg       0.99      0.99      0.99      5420
```

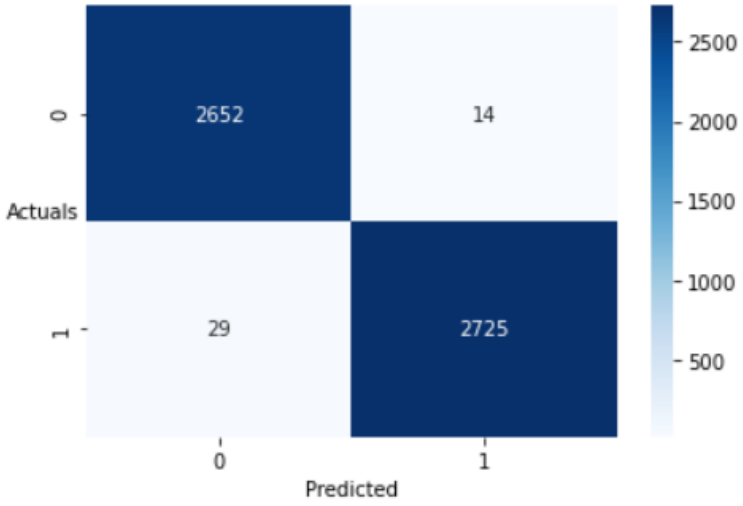

Fig 96

```
The AUC score for Bagging testing set is: 0.999
```

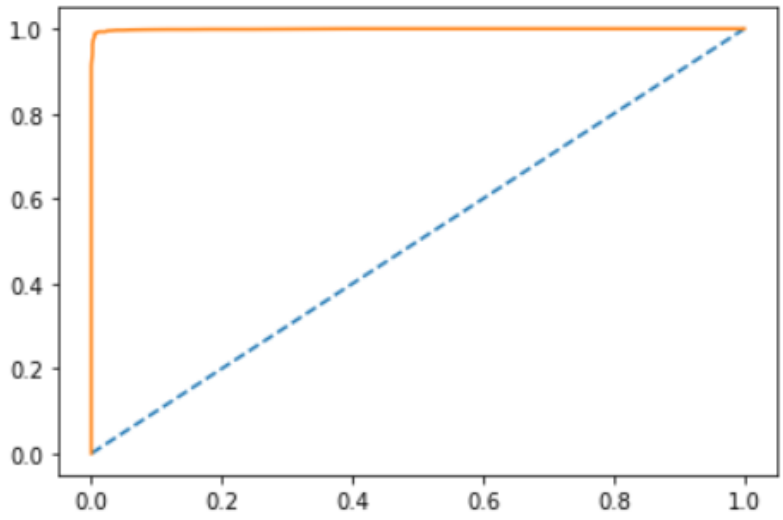

Fig 97

AdaBoosting Training Set

```
The model score for AdaBoosting training set is 0.7797374248655489
```

Fig 98

```
The classification report for Adaboosting training set is
              precision    recall  f1-score   support

         0.0       0.78      0.79      0.78      6366
         1.0       0.78      0.77      0.78      6278

    accuracy                           0.78     12644
   macro avg       0.78      0.78      0.78     12644
weighted avg       0.78      0.78      0.78     12644
```

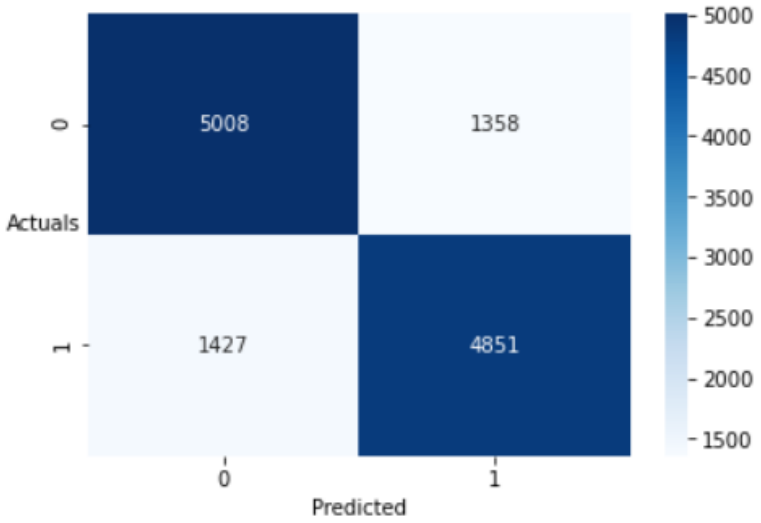

Fig 99

```
The AUC score for AdaBoosting training set is: 0.865
```

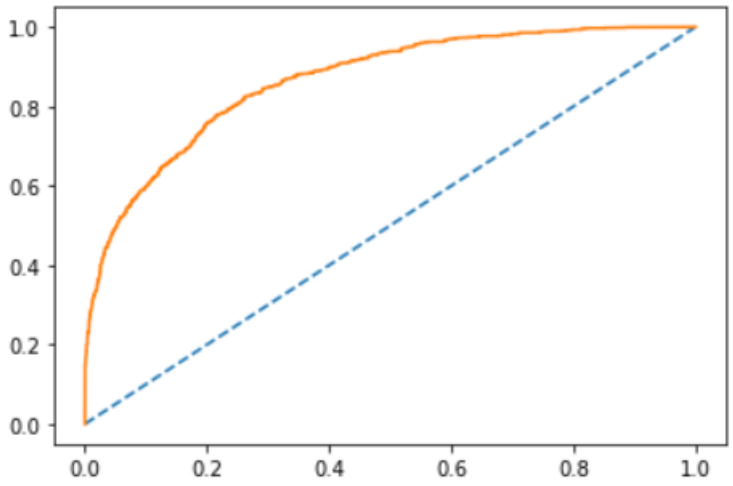

Fig 100

AdaBoosting Testing Set

```
The model score for AdaBoosting testing set is 0.7765682656826568
```

Fig 101

```
The classification report for Adaboosting testing set is
              precision    recall  f1-score   support

         0.0       0.77      0.78      0.78      2666
         1.0       0.79      0.77      0.78      2754

    accuracy                           0.78      5420
   macro avg       0.78      0.78      0.78      5420
weighted avg       0.78      0.78      0.78      5420
```

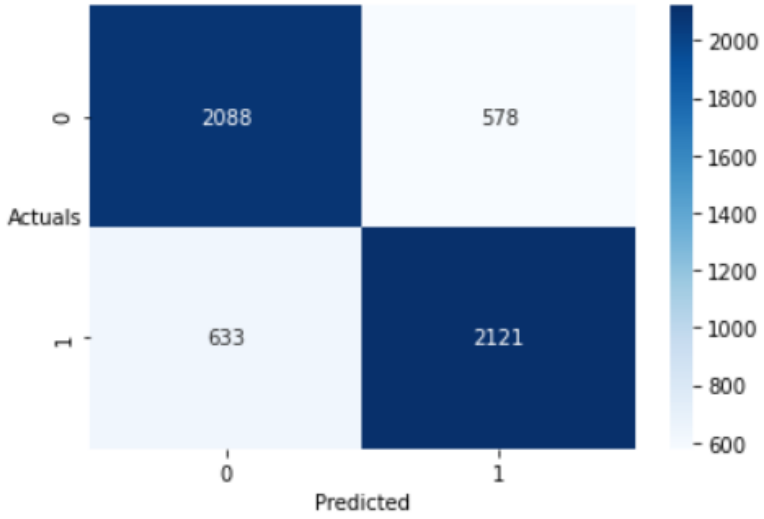

Fig 102

```
The AUC score for AdaBoosting testing set is: 0.860
```

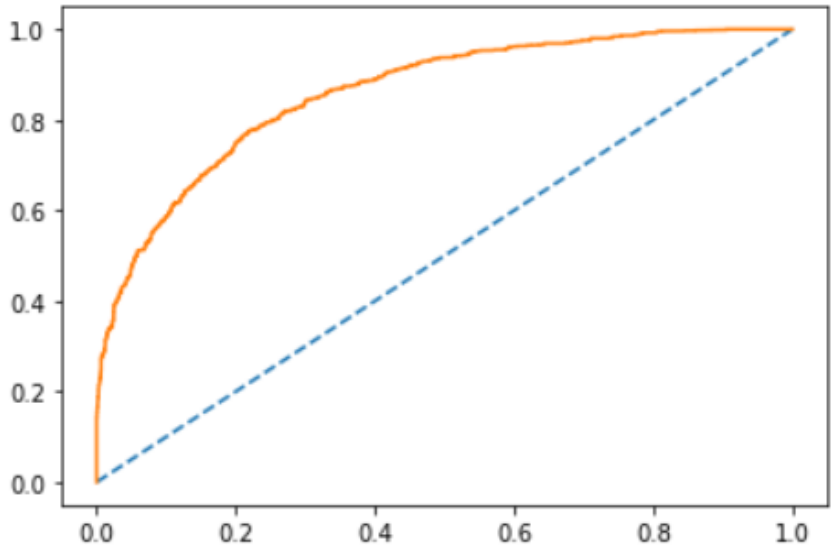

Fig 103

Gradient Boosting Training Set

```
The model score for GradientBoosting training set is 0.8260044289781715
```

Fig 104

```
The classification report for Gradientboosting training set is
              precision    recall  f1-score   support

         0.0       0.82      0.83      0.83      6366
         1.0       0.83      0.82      0.82      6278

    accuracy                           0.83     12644
   macro avg       0.83      0.83      0.83     12644
weighted avg       0.83      0.83      0.83     12644
```

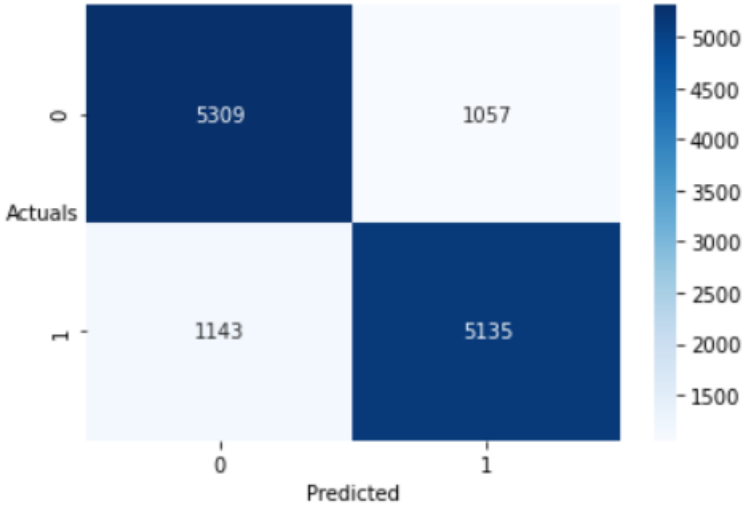

Fig 105

```
The AUC score for GradientBoosting training set is: 0.915
```

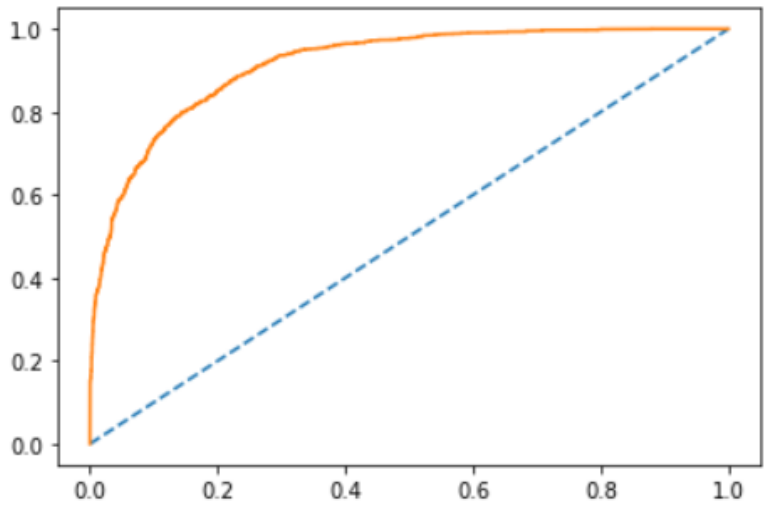

Fig 106

Gradient Boosting Testing Set

```
The model score for GradientBoosting testing set is 0.8160516605166052
```

Fig 107

```
The classification report for Gradientboosting testing set is
              precision    recall  f1-score   support

         0.0       0.80      0.83      0.82      2666
         1.0       0.83      0.80      0.82      2754

    accuracy                           0.82      5420
   macro avg       0.82      0.82      0.82      5420
weighted avg       0.82      0.82      0.82      5420
```

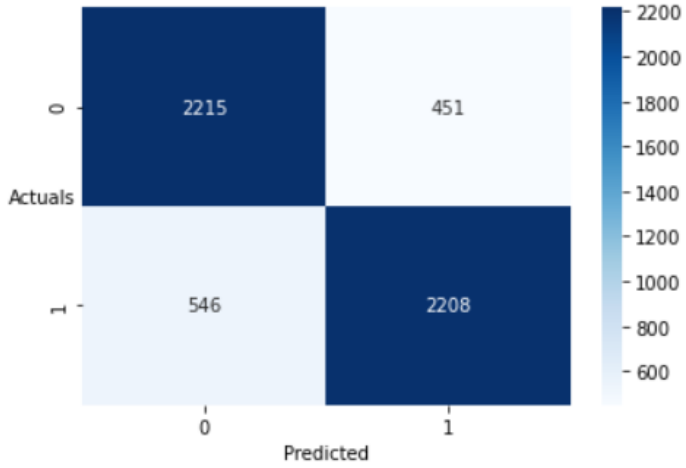

Fig 108

```
The AUC score for GradientBoosting testing set is: 0.860
```

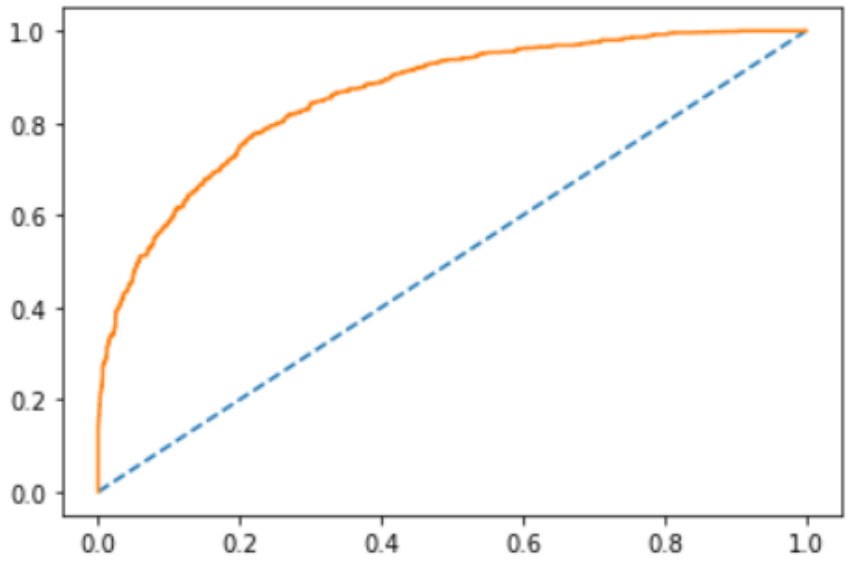

Fig 109

Model Comparison

	LR Train	LR Test	LDA Train	LDA Test	KNN Train	KNN Test	NB Train	NB Test	CART Train	CART Test	RFC Train	RFC Test	Bagging Train	Bagging Test	Ada Boosting Train	Ada Boosting Test	Gradient Boosting Train	Gradient Boosting Test
Precision	0.714	0.730	0.713	0.730	0.987	0.976	0.664	0.668	1.0	0.983	1.0	0.997	1.0	0.995	0.781	0.786	0.829	0.830
Recall	0.737	0.736	0.737	0.734	0.999	0.997	0.763	0.761	1.0	0.980	1.0	0.992	1.0	0.989	0.773	0.770	0.818	0.802
F1 Score	0.725	0.733	0.725	0.732	0.993	0.986	0.710	0.711	1.0	0.981	1.0	0.995	1.0	0.992	0.777	0.778	0.824	0.816
Accuracy	0.723	0.727	0.722	0.727	0.993	0.986	0.691	0.686	1.0	0.981	1.0	0.995	1.0	0.992	0.780	0.777	0.826	0.816
AUC Score	0.771	0.777	0.770	0.776	1.000	0.999	0.749	0.753	1.0	0.981	1.0	1.000	1.0	0.999	0.865	0.860	0.915	0.860

Fig 110

On comparing with the Laptop users as the number of rows or data points increases the accuracy of most of the models decreased.

1. Logistic Regression model and Linear Discriminant Analysis model provides very poor accuracy of 72.3% and 72.2% on train set and 72.7% and 72.7% on test set respectively. In both the cases it can be observed that the accuracy for test set has shown a very little improvement.
2. Decision Tree (CART) model and Random Forest model have provided an excellent accuracy on Training set that is 100% and applying the models to testing set, we see that the accuracy has declined a bit that is 98.1% for Decision Tree (CART) model and 99.5% for Random Forest model.
3. Although, both the models are very good the recall of Random Forest model (99.2%) is slightly lower than the K- Nearest Neighbours model (99.7%).
4. The worst performing model in terms of all the parameters is the Naïve Bayes model which shows the accuracy of just 69.1% in train set and 68.6% in test set.
5. Even after applying the Bagging technique the model although showed very good performance in both training as well as testing sets clocking the accuracy of 100% and 99.2% respectively.
6. Although, Gradient Boosting model performed better in case of Laptop using customers but for mobile using individuals the huge decline is observed in the accuracy.

Although, Random Forest is Test set has accuracy of 99.5% but it has produced for number of False positives which is 21. as compared to the K-nearest Neighbours having accuracy of 98.6% and producing 9 False positive cases.

So, in both the cases K-Nearest Neighbours is the best model.

1. Applying this model having such as high Recall of can help the company identify which customers can purchase the product in the new future. Also, this helps in better reach and target the audience accordingly.
2. This can also increase the traffic on the company's site resulting in better minimizing the click per cost expense for the company.
3. As, the higher the number of hits on website increases, more chances of purchasing the product also increases bringing in the surge in revenues for the company.