DELHI TECHNOLOGICAL UNIVERSITY
(FORMERLY DELHI COLLEGE OF ENGINEERING)

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CO (PR: PATTERN RECOGNITION)

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Report

ON

COMPARE AND CONTRAST BETWEEN THE CLASSIFIERS EXPLAINED

SUBMITTED BY:

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In Adequate Fulfillment for the Award of the Degree of

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From

DELHI TECHNOLOGICAL UNIVERSITY

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This report has been written to compare and contrast the result of the two classifiers that have been built:

1. Namingly classifiers built between digits 0 & 1.
2. Between the digits 3 & 8.

To Compare and Contrast the two, we will discuss the possible differences between the Evaluation metrics of both, which will factually explain the differences.

Evaluation metrics of both are explained below:

1.) Digits 0 & 1

A.) Confusion matrix:

Firstly we will talk about the confusion matrix,

A Confusion matrix is an N x N matrix used for evaluating the performance of a classification model, where N is the number of target classes. The matrix compares the actual target values with those predicted by the machine learning model. This gives us a holistic view of how well our classification model performs and what kinds of errors it is making.

For the classifier built between the digits 0 & 1, we get:

```
979      1
21     1114
```
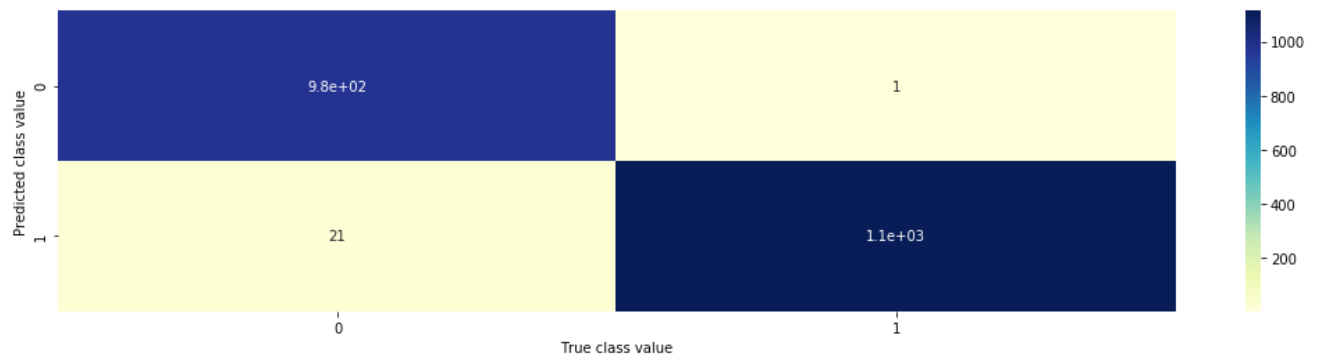
B.) Classification Accuracy

Classification accuracy is a metric that summarizes the performance of a classification model as the number of correct predictions divided by the total number of predictions. It is easy to calculate and intuitive to understand, making it the most common metric used for evaluating classifier models.

```
print("Accuracy of the model is : ", score(matrix), " %")

Accuracy of the model is :  98.95981087470449  %
```
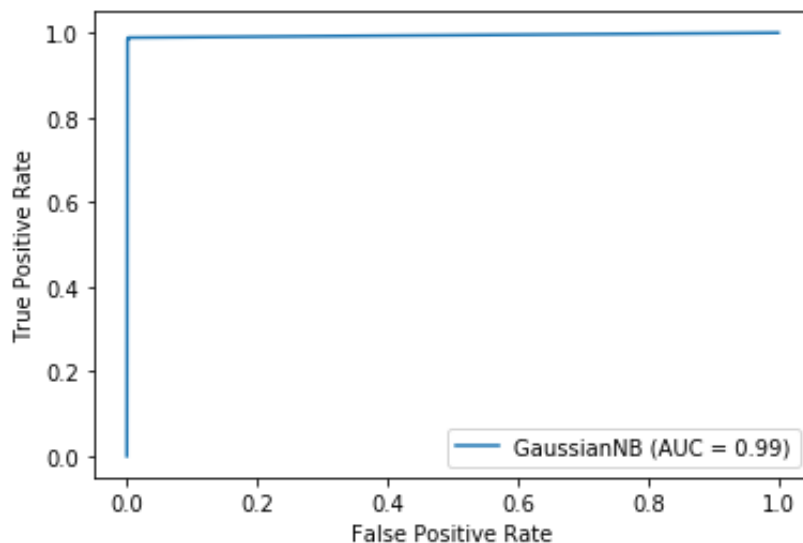
C.) Classification Report

A Classification report is used to measure the quality of predictions from a classification algorithm. ... The report shows the paramount classification metrics precision, recall and f1-score on a per-class basis. The metrics are calculated by using true and false positives, true and false negatives.

```
report = classification_report(Y_test, y_pred, target_names=["Digit 0","Digit 1"])
print(report)

              precision    recall  f1-score   support

     Digit 0       0.98      1.00      0.99       980
     Digit 1       1.00      0.98      0.99      1135

    accuracy                           0.99      2115
   macro avg       0.99      0.99      0.99      2115
weighted avg       0.99      0.99      0.99      2115
```

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D.) ROC Curve Between FAR Vs GAR

A ROC curve (receiver operating characteristic curve) is a graph showing a classification model's performance at all classification thresholds. This curve plots two parameters: True Positive Rate. False Positive Rate.
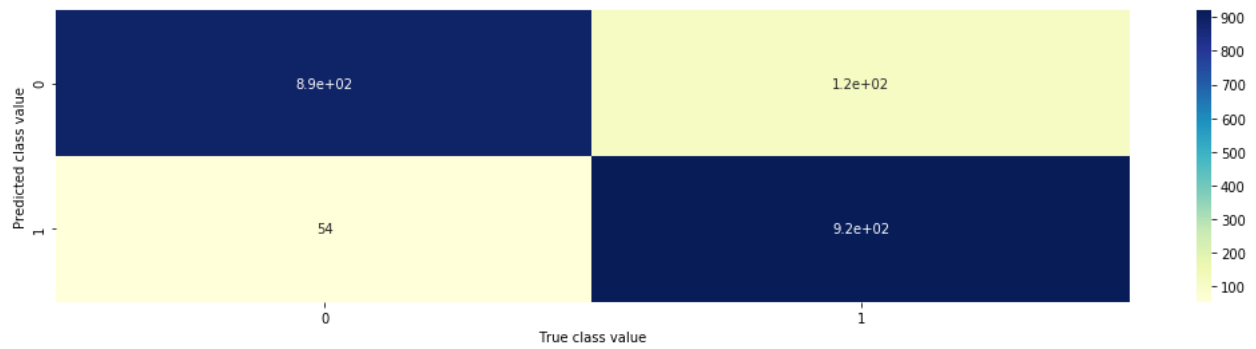

1.) Digits 3 & 8

A.) Confusion matrix:

For the classifier built between the digits 3 & 8, we get:

892	118
54	920

B.) Classification Accuracy


```
print("Accuracy of the model is : ", score(matrix), " %")

Accuracy of the model is :  91.33064516129032  %
```
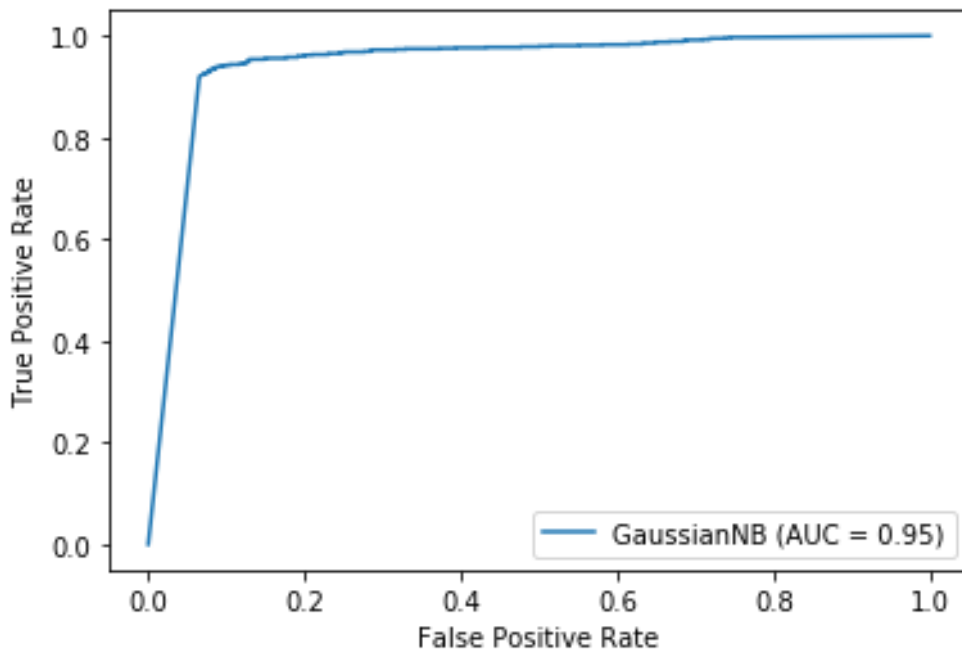
C.) Classification Report

```
[ ]  report = classification_report(Y_test, y_pred, target_names=["Digit 3","Digit 8"])
     print(report)

                  precision    recall  f1-score   support

         Digit 3       0.94      0.88      0.91      1010
         Digit 8       0.89      0.94      0.91       974

        accuracy                           0.91      1984
       macro avg       0.91      0.91      0.91      1984
    weighted avg       0.92      0.91      0.91      1984
```

D.) ROC Curve Between FAR Vs GAR

Comparison & Contrast between the two classifiers is as below:

1. Confusion Matrix : The 0-1 digit classifier recognized '0' more accurately when compared to '1'. The 3-8 digit classifier recognized '8' more accurately when compared to '3'.

2. Classification Accuracy : The classification accuracy of 0-1 digit classifier(98.95 %) was found to be higher than the classification accuracy of 3-8 digit classifier(91.33%).

3. Classification Report: The precision, recall and f1-score was higher in 0-1 digit classifier.

4. ROC Curve : The area under the ROC curve was more of 0-1 digit(0.99) classifiers than 3-8 digit classifiers(0.95) which meant that 0-1 digit classifiers distinguished between classes more effectively.