**SVM Classifier**

**CONFUSION MATRIX**

[[73 6]

[ 5 36]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.94 0.92 0.93 79

1 0.86 0.88 0.87 41

accuracy 0.91 120

macro avg 0.90 0.90 0.90 120

weighted avg 0.91 0.91 0.91 120

**DECISION TREE CLASSIFIER**

**CONFUSION MATRIX**

[[73 6]

[ 7 34]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.91 0.92 0.92 79

1 0.85 0.83 0.84 41

accuracy 0.89 120

macro avg 0.88 0.88 0.88 120

weighted avg 0.89 0.89 0.89 120

**RANDOM FOREST CLASSIFIER**

**CONFUSION MATRIX**

[[72 7]

[ 4 37]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.95 0.91 0.93 79

1 0.84 0.90 0.87 41

accuracy 0.91 120

macro avg 0.89 0.91 0.90 120

weighted avg 0.91 0.91 0.91 120

**LOGISTIC REGRESSION**

**CONFUSION MATRIX**

[[74 5]

[ 8 33]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.90 0.94 0.92 79

1 0.87 0.80 0.84 41

accuracy 0.89 120

macro avg 0.89 0.87 0.88 120

weighted avg 0.89 0.89 0.89 120

**K-NEAREST NEIGHBOR**

**CONFUSION MATRIX**

[[67 12]

[20 21]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.77 0.85 0.81 79

1 0.64 0.51 0.57 41

accuracy 0.73 120

macro avg 0.70 0.68 0.69 120

weighted avg 0.72 0.73 0.73 120

**GAUSSIAN NB**

**CONFUSION MATRIX**

[[74 5]

[ 8 33]]

**CLASSIFICATION REPORT**

Precision recall f1-score support

0 0.90 0.94 0.92 79

1 0.87 0.80 0.84 41

accuracy 0.89 120

macro avg 0.89 0.87 0.88 120

weighted avg 0.89 0.89 0.89 120

**BERNOULLIS NB**

**CONFUSION MATRIX**

[[79 0]

[41 0]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.66 1.00 0.79 79

1 0.00 0.00 0.00 41

accuracy 0.66 120

macro avg 0.33 0.50 0.40 120

weighted avg 0.43 0.66 0.52 120

**CATEGORICAL NB**

**CONFUSION MATRIX**

[[76 3]

[ 9 32]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.89 0.96 0.93 79

1 0.91 0.78 0.84 41

accuracy 0.90 120

macro avg 0.90 0.87 0.88 120

weighted avg 0.90 0.90 0.90 120

**COMPLIMENT NB**

**CONFUSION MATRIX**

[[42 37]

[20 21]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.68 0.53 0.60 79

1 0.36 0.51 0.42 41

accuracy 0.53 120

macro avg 0.52 0.52 0.51 120

weighted avg 0.57 0.52 0.54 120

**MULTINOMIAL NB**

**CONFUSION MATRIX**

[[68 11]

[28 13]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.71 0.86 0.78 79

1 0.54 0.32 0.40 41

accuracy 0.68 120

macro avg 0.62 0.59 0.59 120

weighted avg 0.65 0.68 0.65 120

**MANUAL CALCULATION REPORT**

**MULTINOMIAL NB**

**0 - NO**

**1 – YES**

**Predicted Values**

|  |  |  |
| --- | --- | --- |
|  | **NO** | **YES** |
| **NO** | **68**  **True No** | **11**  **False Yes(Should be NObut classified as Yes)** |
| **YES** | **28**  **False No(Should be Yes but classified as No)** | **13**  **True Yes** |

**Actual**

**Values**

**PRECISION**

Q: What is the % of correct classification of class to the sum of correctly classified class and respective misclassified class?

**NO**: T(NO) 68 68

= = = 0.71

T(NO)+F(N) 68+28 96

**YES:**

T(Y) 13 13

= = = 0.54

T(Y)+F(Y) 13+11 24

**RECALL**

Q: What is the % of correctly classified class to the total no of class in the dataset?

NO:

T(N) 68 68

= = = 0.86

T(N)+F(Y) 68+11 79

YES:

T(Y) 13 13

= = = 0.32

T(Y)+F(N) 28+13 41

**F1-SCORE**

What is the Performance of individual class?

NO:

2\*RECALL\*PRECISION 2\*0.71\*0.86 1.22

= = =0.78

RECALL+PRECISION 0.71+0.86 1.57

YES:

2\*RECALL\*PRECISION 2\*0.54\*0.32 0.34

= = =0.40

RECALL+PRECISION 0.54+0.32 0.86

**ACCURACY**

What is the overall Performance?

T(N)+T(Y) 68+13 96

= = = 0.68

T(N)+F(Y)+T(Y)+F(N) 68+11+28+13 120

**MACRO AVERAGE**

**Average Performane of precision:**

Precision(NO)+Precision(YES) 0.71+0.54

= =0.625

2 2

**Average Performane of Recall:**

Recall(NO)+Recall(YES) 0.86+0.32

= =0.59

2 2

**Average Performane of F1-Score:**

F1-Score(NO)+F1-Score(YES) 0.78+0.40

= =0.59

2 2

**WEIGHTED AVERAGE**

**Average Performane of precision:**

Precision(NO)\*(Total count of NO/Total Set)+Precision(YES)\* (Total count of NO/Total Set) =

**0.71\*(79/120) + 0.54\*(41/120) = 0.46+0.19 = 0.65**

**Average Performane of Recall:**

Recall(NO)\*(Total count of NO/Total Set)+Recall(YES)\* (Total count of NO/Total Set) =

**0.86\*(79/120) + 0.32\*(41/120) = 0.57+0.11 = 0.68**

**Average Performane of F1-Score:**

F1-Score(NO)\*(Total count of NO/Total Set)+F1-Score(YES)\* (Total count of NO/Total Set) =

**0.78\*(79/120) + 0.40\*(41/120) = 0.51+0.14 = 0.65**

**CLASSIFIER WITH GRID**

**SVM Classifier**

**CONFUSION MATRIX**

[[74 5]

[ 8 33]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.90 0.94 0.92 79

1 0.87 0.80 0.84 41

accuracy 0.89 120

macro avg 0.89 0.87 0.88 120

weighted avg 0.89 0.89 0.89 120

**ROC\_AUC SCORE** : 0.9564680456931152

**DECISION TREE CLASSIFIER**

**CONFUSION MATRIX**

[[70 9]

[ 6 35]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.92 0.89 0.90 79

1 0.80 0.85 0.82 41

accuracy 0.88 120

macro avg 0.86 0.87 0.86 120

weighted avg 0.88 0.88 0.88 120

**ROC\_AUC SCORE** : 0.8698672429762272

**RANDOM FOREST CLASSIFIER**

**CONFUSION MATRIX**

[[73 6]

[ 3 38]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.96 0.92 0.94 79

1 0.86 0.93 0.89 41

accuracy 0.93 120

macro avg 0.91 0.93 0.92 120

weighted avg 0.93 0.93 0.93 120

**ROC\_AUC SCORE** : 0.9640321086755171

**LOGISTIC REGRESSION**

**CONFUSION MATRIX**

[[75 4]

[11 30]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.87 0.95 0.91 79

1 0.88 0.73 0.80 41

accuracy 0.88 120

macro avg 0.88 0.84 0.85 120

weighted avg 0.88 0.88 0.87 120

**ROC\_AUC SCORE** : 0.9468971904908923

**K-NEAREST NEIGHBOR**

**CONFUSION MATRIX**

[[69 10]

[11 30]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.86 0.87 0.87 79

1 0.75 0.73 0.74 41

accuracy 0.82 120

macro avg 0.81 0.80 0.80 120

weighted avg 0.82 0.82 0.82 120

**ROC\_AUC SCORE** : 0.8585983328187712

**GAUSSIAN NB**

**CONFUSION MATRIX**

[[31 48]

[ 0 41]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 1.00 0.39 0.56 79

1 0.46 1.00 0.63 41

accuracy 0.60 120

macro avg 0.73 0.70 0.60 120

weighted avg 0.82 0.60 0.59 120

**ROC\_AUC SCORE** : 0.9598641556035814

**BERNOULLIS NB**

**CONFUSION MATRIX**

[[37 42]

[18 23]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.67 0.47 0.55 79

1 0.35 0.56 0.43 41

accuracy 0.50 120

macro avg 0.51 0.51 0.49 120

weighted avg 0.56 0.50 0.51 120

**ROC\_AUC SCORE** : 0.5146650200679223

**CATEGORICAL NB**

**CONFUSION MATRIX**

[[76 3]

[ 9 32]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.89 0.96 0.93 79

1 0.91 0.78 0.84 41

accuracy 0.90 120

macro avg 0.90 0.87 0.88 120

weighted avg 0.90 0.90 0.90 120

**ROC\_AUC SCORE** : 0.9206545230009261

**COMPLIMENT NB**

**CONFUSION MATRIX**

[[42 37]

[20 21]]

**CLASSIFICATION REPORT**

precision recall f1-score support

0 0.68 0.53 0.60 79

1 0.36 0.51 0.42 41

accuracy 0.53 120

macro avg 0.52 0.52 0.51 120

weighted avg 0.57 0.52 0.54 120

**ROC\_AUC SCORE** : 0.51497375733251

**MULTINOMIAL NB**

**CONFUSION MATRIX**

[[68 11]

[28 13]]

**CLASSIFICATION REPORT**

Precision recall f1-score support

0 0.71 0.86 0.78 79

1 0.54 0.32 0.40 41

accuracy 0.68 120

macro avg 0.62 0.59 0.59 120

weighted avg 0.65 0.68 0.65 120

**ROC\_AUC SCORE** : 0.51497375733251

Result:

The final model Random Forest with Grid which has given the result as follows has been deployed

accuracy 0.93 120

**ROC\_AUC SCORE** : 0.9640321086755171