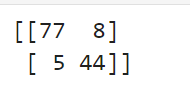
**Machine Learning Classification (Random Forest)**

**Confusion Matrix:**

****

True Purchased=77

False Purchased=8

False Not Purchased=5

True Not Purchased=44

**Evaluation Metrics using Confusion Metrics:**

1.Accuracy

2.Recall

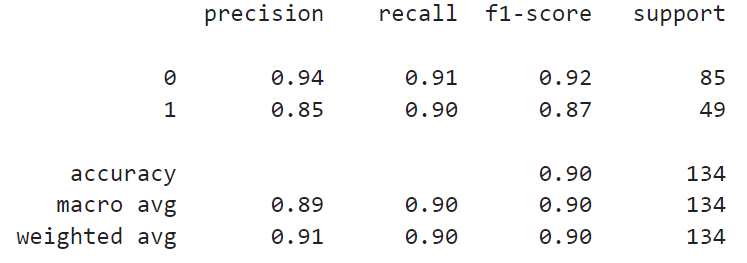
3.Precision

4.F1 Score

5.Macro Average

6.Weighted Average

**Classification Report:**

****

**Manual Calculation for Classification Report:**

**{Purchased=P, Not Purchased=NP} #Note**

**1.Accuracy**

Accuracy=T(p)+T(Np)/T(p)+T(NP)+F(P)+F(NP)

=77+44/77+44+8+5

=121/134

=0.90

**2.Recall**

T(P)/T(P)+F(P)=77/77+8

=77/85

=0.90

#Percentage of correct classification of (Purchased) to the total input of (Purchased) in the test set.

T(NP)/T(NP)+F(NP)=44/44+5

=44/49

=0.89

#Percentage of correct classification of (Not Purchased) to the total input of (Not Purchased) in the test set.

**3.Precision**

T(P)/T(P)+F(NP)=77/77+5

=77/82

=0.93

T(NP)/T(NP)+F(P)=44/44+8

=44/52

=0.84

**4.F1 Score**

**#**Overall Performance of Purchased

2\*Recall\*Precision/Recall+Precision

2\*0.90\*0.93/0.90+0.93

2\*0.837/1.83=1.674/1.83=0.91

**#**Overall Performance of Not Purchased

2\*Recall\*Precision/Recall+Precision

2\*0.89\*0.84/0.89+0.84

2\*0.7476/1.73=1.4952/1.73=0.86

**5.Macro Average**

**Precision**

**#**Average Performance of Precision

Precision(P)+Precision(NP)/2

0.93+0.84/2=0.88

**Recall**

**#**Average Performance of Recall

Recall(P)+ Recall (NP)/2

0.90+0.89/2=0.895

**F1 Score**

**#**Average Performance of F1 Score

F1 Score(P)+ F1 Score(NP)/2

0.91+0.86/2=0.88

**6.Weighted Average**

**Precision**

**#**Sum of product of proportion rate of each class

Precision(P)\*77/134+Precision(NP)\*44/134

0.93\*0.57+0.84\*0.32=0.79

**Recall**

**#**Average Performance of Recall

Recall(P) \*77/134+ Recall (NP)\* 44/134

0.90\*0.5746+0.89\*0.328=0.5171+0.291=0.80

**F1 Score**

**#**Average Performance of F1 Score

F1 Score(P) \*77/134+ F1 Score(NP)\* 44/134

0.91\*0.574+0.86\*0.328=0.5223+0.2820=0.80