**Machine Learning: Classification Algorithms- Report**

1. **Random Forest Algorithm:**

**A screenshot of a computer

Description automatically generated**

(i)What will be the overall performance of the algorithm?

**Accuracy**= Tp+TN  / (Tp+TN  +FP+FN) = 0.90 **Given: Tp=78, TN=43, FP=6, FN=7**

(78+43)/(78+43+6+7)=121/134=0.9029

(ii)What will be the correct classification of not purchased?

**Recall**(Not purchased)= TP/(TP+FN) = 0.92

TP/(TP+FN) = 78/(78+6)=78/84= 0.92

(iii) What will be the correct classification of purchased?

**Recall**(Purchased)= TN/(TN+ FP) = =0.88

TN/(TN+ FP) = 43/(43+6)=43/49=0.8777=0.88

(iv)What is the precision value for not purchased ?

It is calculated as the ratio of true positive predictions to the sum of true positive and false positive predictions

**Precision**(not purchased)= TP /( TP + FP) = 78/(78+6)=0.9285=0.93

TP /( TP + FP) = 0.93

(v) What is the precision value for purchased ?

It is calculated as the ratio of true negative predictions to the sum of true negative and false negative predictions

**Precision**(purchased) = TN /( TN + FN) =0.86

TN /( TN + FN) = 43/(43+7)=0.86

(vi) F1 Measure( Not purchased):

The F1 score is a metric that combines both precision(not purchased) and recall(not purchased)into a single value, providing a balance between them.

**F1 score(np)** = 2\*(Precision(np)\*Recall(np)/Precision(np)+Recall(np))= 0.92

**F1 score(np)** = 2\*(0.93\*0.92)/( 0.93+0.92)= 0.9249

(vii) F1 Measure( Not purchased):

The F1 score is a metric that combines both precision(purchased) and recall(purchased)into a single value, providing a balance between them.

**F1 score(purchased)** = 2\*(Precision(p)\*Recall(p)/Precision(p)+Recallnp))=0.87

**F1 score(purchased)** = 2\*(0.86\*0.88)/(0.86+0.88) =0.8698

(viii**) Macro average** : Average performance of precision, recall and F1score (correctly and wrongly

classified)

**MA(Precision)=(**Precision(purchased)+Precision(not purchased))/2=0.89

**=(0.86+0.93)/2 = 0.89**

**MA(Recall)=(**Recall(purchased)+Recall(not purchased))/2 = 0.90

**=(0.88+0.92)/2= 0.90**

**MA(F1 score))**=(F1score(purchased) +F1score(not purchased))/2 = 0.89

**=(0.92+0.86)/2=0.89**

(ix)**Weighted Average of Precision, recall and F1 score**:

The weighted average precision in a classification scenario is calculated by taking the average of the precision scores for each class, with each class's precision weighted by its support

WA(Precision) =Precision(p)\*(total.of purchased/all tota)+Precision(np)\*(total not purchased/all total)

=0.86(49/134) + 0.93(85/134) =0.8998 = 0.90

**WA(Precision) =0.90**

WA(Recall) =Recall(p)\*(total.of purchased/all tota)+Recall(np)\*(total not purchased/all total)

=0.88(49/134) + 0.92(85/134) =0.9044 = 0.90

**WA(Recall) = 0.90**

WA(F1 score) =0.90

WA(F1 score) = F1 score (p)\*(total.of purchased/all tota)+ F1 score (np)\*(total not purchased/all total)

=0.87(49/134) + 0.92(85/134) =0.9016 = 0.90

**WA(F1 score)=0.90**

(x) **Support:**

Support of not purchased: 85

Support of purchased: 49

Total support:134