Random Forest - Confusion Matrix

Test Data Count 134	**Predicted (0) Not Purchased**	**Predicted (1) Purchased**
Actual (0) Not Purchased	43 True - Not Purchased	6 False-Not Purchased
Actual (1) Purchased	7 False-Purchased	78 True - Purchased

Accuracy: What is the correct Classification of this model ?

$$= \frac{True(Purchased)+True(Not\ Purchased)}{True(Purchased)+True(Not\ Purchased)+False(Purchased)+False(Not\ purchased)}$$

$$= \frac{78+43}{78+43+7+6}$$

Accuracy = 0.90

Recall for Purchased: Out of all actual purchases, how many did we correctly identify ?

$$= \frac{True(Purchased)}{True(Purchased)+False(Not\ Purchased)}$$

$$= \frac{43}{43+6}$$

Recall for Purchased = 0.87

Recall for Not Purchased:

$$= \frac{True(Not\ Purchased)}{True(Not\ Purchased)+False(Purchased)}$$

$$= \frac{78}{78+7}$$

Recall for not Purchased = 0.92

Precision of Purchased:

Out of all predicted purchases, how many did we correctly identify ?

$$= \frac{True(Purchased)}{True(Purchased)+False(Purchased)}$$

$$= \frac{43}{43+7}$$

Precision of Purchased = 0.86

Precision of Not Purchased:

$$= \frac{True(Not\ Purchased)}{True(Not\ Purchased)+False(Not\ Purchased)}$$

$$= \frac{78}{78+6}$$

Precision of Not Purchased = 0.92

F1 score: Overall performance of Purchased

$$= 2 * \frac{Recall*Precission}{Recall+Precision}$$

$$= 2 * \frac{0.87*0.86}{0.87+0.86} = 2* \frac{0.7482}{1.73} = 2 * 0.432$$

F1 score for purchased = 0.86

F1 score: Overall performance of Not Purchased

$$= 2 * \frac{Recall*Precission}{Recall+Precision}$$

$$= 2 * \frac{0.92*0.92}{0.92+0.92} = 2* \frac{0.8464}{1.84} = 2 * 0.46$$

F1 score for Not purchased = 0.92

Macro Average: Average performance of Precision

$$\text{Macro Average} = \frac{Precision(Purchased)+Precision(Not\ Purchased)}{2}$$

$$= \frac{0.86+0.92}{2}$$

$$= \frac{1.78}{2}$$

Macro Average of Precision = 0.89

Macro Average: Average performance of Recall

$$\text{Macro Average} = \frac{Recall(Purchased)+Recall(Not\ Purchased)}{2}$$

$$= \frac{0.87+0.92}{2}$$

$$= \frac{1.79}{2}$$

Macro Average of Recall = 0.89

Macro Average: Average performance of F1-Score

$$\text{Macro Average} = \frac{F1(Purchased)+F1(Not\ Purchased)}{2}$$

$$= \frac{0.86+0.92}{2}$$

$$= \frac{1.78}{2}$$

Macro Average of F1 Score = 0.89

Weighted Average: Precision

$$\text{Weighted Average of Precision} = \text{Precision of Purchased} * \frac{\text{Total count of Purchased in Test Set}}{\text{Total count of Test set}} + \text{Precision Not Purchased} * \frac{\text{Total count of Not Purchased in Test Set}}{\text{Total count of Test set}}$$

$$= 0.86 * \frac{49}{134} + 0.92 * \frac{85}{134}$$

Weighted Average of Precision = 0.89

Weighted Average: Recall

$$= \text{Recall of Purchased} * \frac{\text{Total count of Purchased in Test Set}}{\text{Total count of Test set}} + \text{Recall Not Purchased} * \frac{\text{Total count of Not Purchased in Test Set}}{\text{Total count of Test set}}$$

$$= 0.87 * \frac{49}{134} + 0.92 * \frac{85}{134}$$

Weighted Average of Recall = 0.90

Weighted Average: F1 measure

$$= \text{F1 score of Purchased} * \frac{\text{Total count of Purchased in Test Set}}{\text{Total count of Test set}} + \text{F1 score of Not Purchased} * \frac{\text{Total count of Not Purchased in Test Set}}{\text{Total count of Test set}}$$

$$= 0.86 * \frac{49}{134} + 0.92 * \frac{85}{134}$$

Weighted Average of Recall = 0.90 =0.88