Confusion Matrix Report

Logistic Regression-Classification

```
print(clf_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

```
print(cm)
```

```
[[74  5]
 [ 8 33]]
```

True Purchased (TP)=74
False Purchased (FP)=5
Flase Not Purchased (FNP) =8
True Not Purchased (TNP) =33

1.Accuracy :

$$\frac{TP + TNP}{TP+TNP+FP+FNP} = \frac{74+33}{74+33+5+8} = \frac{107}{120} = 0.89$$

Recall:

2. Purchased:

$$\frac{TP}{TP+FNP} = \frac{74}{74+5} = \frac{74}{79} = 0.94$$

3.Not Purchased:

$$\frac{TNP}{TNP+FNP} = \frac{33}{33+8} = \frac{33}{41} = 0.80$$

Precisioin:

4. Purchased:

$$\frac{TP}{TP+FNP} = \frac{74}{74+8} = \frac{74}{82} = 0.90$$

5.Not Purchased:

$$\frac{FP}{FP+TNP} = \frac{33}{33+5} = \frac{33}{38} = 0.87$$

F1 Score:

6. Purchased:

$$2 \text{ X } \frac{\text{Recall X Precision}}{\text{Recall + Precision}} = 2 \text{ X } \frac{0.94 \text{ X } 0.90}{0.94 + 0.90} = 2 \text{ X } \frac{0.846}{1.89} = 2 \text{ X } 0.459 = 0.92$$

7.Not Purchased:

$$2 \text{ X } \frac{\text{Recall X Precision}}{\text{Recall + Precision}} = 2 \text{ X } \frac{0.80 \text{ X } 0.87}{0.80 + 0.87} = 2 \text{ X } \frac{0.696}{1.67} = 2 \text{ X } 0.42 = 0.84$$

Macro Average:

8. Precision:

$$\frac{\text{Precision purchased + Precision not purchased}}{2} = \frac{0.90 + 0.87}{2} = 0.885$$

9.Recall:

$$\frac{\text{Recall purchased + Recall not purchased}}{2} = \frac{0.94 + 0.80}{2} = 0.87$$

10.F1 Score:

$$\frac{\textbf{F1 Score}\ \text{purchased} + \textbf{F1 Score}\ \text{not purchased}}{2} = \frac{0.92 + 0.84}{2} = 0.88$$

Weighted Average:

11. Precision:

$$\text{Precision (purchased)} \times \frac{\text{Total count of purchased}}{\text{Total counts on test set}} + \text{Precision (Not purchased)} \times \frac{\text{Total count of Not purchased}}{\text{Total counts on test set}}$$

$$0.90 \times \frac{107}{120} + 0.87 \times \frac{13}{120} = 0.90 \times 0.891 + 0.87 \times 0.108 = 0.8019 + 0.093 = 0.89$$

12.Recall:

$$\text{Recall (purchased)} \times \frac{\text{Total count of purchased}}{\text{Total counts on test set}} + \text{Recall (Not purchased)} \times \frac{\text{Total count of Not purchased}}{\text{Total counts on test set}}$$

$$0.94 \times \frac{107}{120} + 0.80 \times \frac{13}{120} = 0.94 \times 0.891 + 0.80 \times 0.108 = 0.837 + 0.086 = 0.92$$

13.F1 Score:

$$\text{F1 Score (Purchased)} \times \frac{\text{Total count of purchased}}{\text{Total counts on test set}} + \text{F1 Score (Not Purchased)} \times \frac{\text{Total count of Not purchased}}{\text{Total counts on test set}}$$

$$0.92 \times \frac{107}{120} + 0.84 \times \frac{13}{120} = 0.92 \times 0.891 + 0.80 \times 0.108 = 0.819 + 0.086 = 0.89$$