

# Manual Calculation Report For Social Network Ads

```
LogisticRegression()  
LogisticRegression()
```

```
1 y_pred=c.predict(x_test)  
2 from sklearn.metrics import confusion_matrix  
3 cm=confusion_matrix(y_test,y_pred)  
4 cm  
✓ 0.0s  
array([[79,  6],  
       [ 5, 44]])
```

```
✓  
1 from sklearn.metrics import classification_report  
2 cr=classification_report(y_test,y_pred)  
3 print(cr)  
✓ 0.0s
```

|              | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0            | 0.94      | 0.93   | 0.93     | 85      |
| 1            | 0.88      | 0.90   | 0.89     | 49      |
| accuracy     |           |        | 0.92     | 134     |
| macro avg    | 0.91      | 0.91   | 0.91     | 134     |
| weighted avg | 0.92      | 0.92   | 0.92     | 134     |

Total number of purchased:85

Total number of not purchased:49

## Recall:

### For Not purchased classification

$$\begin{aligned} \text{TP}/(\text{TP}+\text{FP}) &= 79/(79+6) = 79/85 \\ &= 0.929 = \mathbf{0.93} \end{aligned}$$

### For purchased classification

$$\begin{aligned} &= 44/(44+5) = 44/49 \\ &= 0.897 = \mathbf{0.90} \end{aligned}$$

## Precision :

For Not purchased classification

$$TP/(TP+FP) = 79/(79+5) = \mathbf{0.94}$$

For purchased classification

$$= 44/(44+6) = \mathbf{0.88}$$

## F1 Score:

$2(\text{Recall} * \text{precision} / (\text{recall} + \text{precision}))$

For Not purchased classification

$$= 2(0.93 * 0.94 / (0.93 + 0.94))$$

$$= 2(0.8742 / 1.87) = 2 * 0.467 = \mathbf{0.934}$$

For purchased classification

$$= 2(0.90 * 0.88 / (0.90 + 0.88)) = 2(0.792 / 1.78) = 2 * 0.444 = \mathbf{0.89}$$

## Accuracy:

$$TP+TN/(TP+TN+FP+FN)$$

$$= 79+44/(79+44+6+5) = 123/134 = 0.917 = \mathbf{0.92}$$

## Macro Avg:

Precision :

$$P(\text{purchased}) + P(\text{not purchased}) / 2$$

$$= 0.94 + 0.88 / 2 = \mathbf{0.91}$$

Recall:

$$= 0.93 + 0.90 / 2 = \mathbf{0.91}$$

F1 Score:

$$= 0.93 + 0.89 / 2 = \mathbf{0.91}$$

## Weighted Avg:

Precision :

$$= (P1 \times \text{Support for purchased}) + (P2 \times \text{Support for not purchased}) / \text{Total Support}$$

$$= 0.94 \times 84 + 0.88 \times 50 / 134 = 0.92$$

Recall:

$$= (R(p) \times \text{Support for purchased}) + (R(np) \times \text{Support for not purchased}) / \text{Total Support}$$

$$= 133(0.9286 \times 84) + (0.8979 \times 49) \approx 0.9150 = 0.92$$

F1 Score:

$$= (F1(p) \times \text{Support for purchased}) + (F1(NP) \times \text{Support for not purchased}) / \text{Total Support}$$

$$= 133(0.9341 \times 84) + (0.8889 \times 49) \approx 0.9158 = 0.92$$