

CLASSIFICATION ASSIGNMENT

1. Accuracy (or) Overall Performance:

Here, it is a collection of both purchased and not purchased class to the total input of test set.

$$\text{Accuracy} = \frac{\text{true}(\text{purchased}) + \text{true}(\text{not purchased})}{[\text{true}(\text{purchased}) + \text{true}(\text{not purchased}) + \text{false}(\text{purchased}) + \text{false}(\text{not purchased})]}$$

Confusion Matrix:

$$\begin{pmatrix} 74 & 14 \\ 11 & 35 \end{pmatrix}$$

Total Count in test set= 134

Total Not purchased in test set= 88

Total purchased in test set= 46

Using KNN((K- Nearest Neighbor) algorithm,

$$\text{Accuracy} = \frac{35+74}{35+74+11+14} = 0.813$$

2. Recall:

Here, it shows the % of correct classification of a class to the total input of the class in test set.

Not purchased,

$$\text{Recall} = \frac{\text{true}(\text{not purchased})}{[\text{true}(\text{not purchased}) + \text{false}(\text{not purchased})]}$$

$$\text{Recall} = \frac{74}{74+14} = 0.84$$

Purchased,

$$\text{Recall} = \frac{\text{true}(\text{purchased})}{[\text{true}(\text{purchased}) + \text{false}(\text{purchased})]}$$

$$\text{Recall} = \frac{35}{35+11} = 0.76$$

3. Precision:

Here, it shows the % of correct classification of class to the correct classification and incorrect classification of a class.

Not purchased,

$$\text{Precision} = \frac{\text{true(not purchased)}}{[\text{true(not purchased)} + \text{false (purchased)}]}$$

$$\text{Precision} = \frac{74}{74+11} = 0.87$$

Purchased,

$$\text{Precision} = \frac{\text{true(purchased)}}{[\text{true(purchased)} + \text{false (not purchased)}]}$$

$$\text{Precision} = \frac{35}{35+14} = 0.71$$

4. F1- measure:

When Recall value is high and precision is low or vice versa, we can evaluate model using F1 score.

Not purchased,

$$\text{F1- measure} = \frac{2(\text{Recall} * \text{Precision})}{[\text{Recall} + \text{Precision}]}$$

$$\text{F1- measure} = \frac{2 * 0.84 * 0.87}{0.84 + 0.87} = 0.86$$

Purchased,

$$\text{F1- measure} = \frac{2(\text{Recall} * \text{Precision})}{[\text{Recall} + \text{Precision}]}$$

$$\text{F1- measure} = \frac{2 * 0.76 * 0.71}{0.76 + 0.71} = 0.74$$

5. Macro Average:

For Precision,

$$\frac{[\text{Precision (not purchased)} + \text{Precision (purchased)}]}{2} = \frac{[0.87 + 0.71]}{2} = 0.79$$

For Recall,

$$\frac{[\text{Recall (not purchased)} + \text{Recall (purchased)}]}{2} = \frac{[0.84 + 0.76]}{2} = 0.80$$

For F1 Measure,

$$\frac{[\text{F1 measure (not purchased)} + \text{F1 measure (purchased)}]}{2} = \frac{[0.86 + 0.74]}{2} = 0.80$$

6. Weighted Average:

It is the sum of product of proportion of each class.

For Precision,

$$= [Precision(not\ purchased) * proportion(not\ purchased) + Precision(purchased) * proportion(purchased)]$$

$$= 0.87 * (88/134) + 0.71 * (46/134) = 0.82$$

For Recall,

$$= [Recall(not\ purchased) * proportion(not\ purchased) + Recall(purchased) * proportion(purchased)]$$

$$= 0.84 * (88/134) + 0.76 * (46/134) = 0.81$$

For F1-measure,

$$= [F1 - measure(not\ purchased) * proportion(not\ purchased) + F1 - measure(purchased) * proportion(purchased)]$$

$$= 0.86 * (88/134) + 0.74 * (46/134) = 0.81$$

