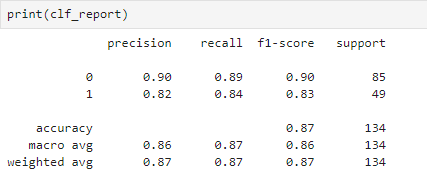
**CONFUSION MATRIX – EVALUATION METRICS CALCULATION FOR RANDOM FOREST**

**I.SAMPLE 1 - Random Forest - Social\_Network\_Ad**

**Confusion Matrix:**

****

**Classification Report**

****

1. **ACCURACY**

**Question:**

What is the Percentage of Correct Classification of Both PURCHASED and NOT PURCHASED (0 & 1) to the total input of the test set?

**Calculation:**

|  |  |
| --- | --- |
| **Accuracy** | = **(T0 + T1) / (T0 + F0 + T1 + F1)** |
|  | = (76 + 41) / (76 + 9 + 41 + 8) |
|  | **= 0.87** |

2. **RECALL**

**2.1. Recall – Not Purchased**

**Question:**

What is the Percentage of Correct Classification of NOT PURCHASED (0) to the total input of NOT PURCHASED in the test set?

**Calculation:**

|  |  |
| --- | --- |
| **Recall (Not Purchased)** | = **(T0) / (T0 + F0)** |
|  | = (76) / (76 + 9) |
|  | **= 0.89** |

**2.2. Recall – Purchased**

**Question:**

What is the Percentage of Correct Classification of PURCHASED (1) to the total input of PURCHASED in the test set?

**Calculation:**

|  |  |
| --- | --- |
| **Recall (Purchased)** | = **(T1) / (T1 + F1)** |
|  | = (41) / (41+8) |
|  | **=** 0**.**8367 **= 0.84** |

3. **PRECISION**

**3.1. Precision – Not Purchased**

**Question:**

What is the Percentage of Correct Classification of NOT PURCHASED (0) to the sum of Correctly Classified as NOT PURCHASED and wrongly classified as NOT PURCHASED in the test set?

**Calculation:**

|  |  |
| --- | --- |
| **Precision**  **( Not Purchased)** | = **(T0) / (T0 + F1)** |
|  | = (76) / (76 + 8) |
|  | **= 0.90** |

**3.2. Precision –Purchased**

**Question:**

What is the Percentage of Correct Classification of PURCHASED (0) to the sum of Correctly Classified as PURCHASED and wrongly classified as PURCHASED in the test set?

**Calculation:**

|  |  |
| --- | --- |
| **Precision (Purchased)** | = **(T1) / (T1 + F0)** |
|  | = (41) / (41 + 9) |
|  | **= 0.82** |

4. **F1 MEASURE**

**4.1. F1 Measure – Not Purchased**

**Question:**

What is the Overall Performance of NOT PURCHASED (0)?

**Calculation:**

|  |  |
| --- | --- |
| **F1 Measure**  **( Not Purchased)** | = **2 \* { (Recall(0) \* Precision(0)) / (Recall(0) \* Precision(0)) }** |
|  | = 2 \* { (0.89 \* 0.90) / (0.89 + 0.90) } |
|  | **=** 2 \* { 0.801 / 1.79} = 0.8949 |
|  | **= 0.90** |
|  |  |

**4.2. F1 Measure –Purchased**

**Question:**

What is the Overall Performance of PURCHASED (1)?

**Calculation:**

|  |  |
| --- | --- |
| **F1 Measure**  **(Purchased)** | = **2 \* { (Recall(1) \* Precision(1)) / (Recall(1) \* Precision(1)) }** |
|  | = 2 \* { (0.84 \* 0.82) / (0.84 + 0.82) } |
|  | **=** 2 \* { 0.6888 / 1.66} = 0.8298 |
|  | **= 0.83** |

5. **MACRO AVERAGE**

**5.1. Macro Average – Precision**

**Question:**

What is the Average Performance of Precision - Correctly and wrongly classified PURCHASED AND NOT PURCHASED (0 & 1)?

**Calculation:**

|  |  |
| --- | --- |
| **Macro Average (Precision)** | = (**Precision (0) + Precision (0)) / 2** |
|  | = (0.90 + 0.82) / 2 |
|  | = 1.72 / 2 |
|  | **= 0.86** |

**5.2. Macro Average – Recall**

**Question:**

What is the Average Performance of Recall - Correctly and wrongly classified PURCHASED AND NOT PURCHASED (0 & 1)?

**Calculation:**

|  |  |
| --- | --- |
| **Macro Average (Recall)** | = **(Recall (0) + Recall (0)) / 2** |
|  | = (0.89 + 0.84) / 2 |
|  | = 1.73 / 2 = 0.865 |
|  | **= 0.87** |

**5.3. Macro Average – F1 Measure**

**Question:**

What is the Average Performance of F1 Measure - Correctly and wrongly classified PURCHASED AND NOT PURCHASED (0 & 1)?

**Calculation:**

|  |  |
| --- | --- |
| **Macro Average (F1 Measure)** | = **(F1 Measure (0) + F1 Measure (0)) / 2** |
|  | = (0.8949+ 0.8298) / 2 |
|  | = 1.72 / 2 = 0.865 |
|  | **= 0.86** |

6. **WEIGHTED AVERAGE**

**6.1. Weighted Average – Precision**

**Question:**

**What is the Sum of Product of proportion rate (weight) of Precision of each class NOT PURCHASED and PURCHASED (0 & 1)?**

**Calculation:**

|  |  |
| --- | --- |
| **Macro Average (Precision)** | = { (**Precision (0)) \* ((Total Sum of Not Purchased(0) samples) / (Total Number of Samples in the test set)) }**  **+**  **{ (Precision (1)) \* ((Total Sum of Purchased(1) samples) / (Total Number of Samples in the test set)) }** |
|  | = {(0.90) \* (85/134) } + { (0.82) \* (49/134) } |
|  | = {(0.90) \* (0.634) } + { (0.82) \* (0.366) } |
|  | = { 0.57 + 0.30) |
|  | **= 0.87** |

**6.2. Weighted Average – Recall**

**Question:**

**What is the Sum of Product of proportion rate (weight) of Recall of each class NOT PURCHASED and PURCHASED (0 & 1)?**

**Calculation:**

|  |  |
| --- | --- |
| **Macro Average (Recall)** | = { (**Recall (0)) \* ((Total Sum of Not Purchased(0) samples) / (Total Number of Samples in the test set)) }**  **+**  **{ (Recall (1)) \* ((Total Sum of Purchased(1) samples) / (Total Number of Samples in the test set)) }** |
|  | = {(0.89) \* (85/134) } + { (0.84) \* (49/134) } |
|  | = {(0.89) \* (0.634) } + { (0.84) \* (0.366) } |
|  | = { 0.56 + 0.31) |
|  | **= 0.87** |

**6.3. Weighted Average – F1 Measure**

**Question:**

**What is the Sum of Product of proportion rate (weight) of F1 Measure of each class NOT PURCHASED and PURCHASED (0 & 1)?**

**Calculation:**

|  |  |
| --- | --- |
| **Macro Average (F1 Measure)** | = { (**F1 Measure (0)) \* ((Total Sum of Not Purchased(0) samples) / (Total Number of Samples in the test set)) }**  **+**  **{ (F1 Measure (1)) \* ((Total Sum of Purchased(1) samples) / (Total Number of Samples in the test set)) }** |
|  | = {(0.90) \* (85/134) } + { (0.83) \* (49/134) } |
|  | = {(0.90) \* (0.634) } + { (0.83) \* (0.366) } |
|  | = { 0.57 + 0.30) |
|  | **= 0.87** |