1. Random Forest Classification

Confusion Matrix Result:

[72 7]

[6 35]

True Not Purchased**, T(NP)**= 72

False Not Purchased, **F(NP)** = 7

False Purchased, **F(P)** = 6

True Purchased, **T(P)** = 35

Total Count of Not Purchased, **TC[NP]** = 79

Total Count of Purchased, **TC[P]** =41

Total Count of the Purchased & Non Purchased, **TC[P+NP]**= 120

Questions:

1. What is the percentage of correct classification of both (Purchased & Not Purchased) to the total input of the test set?

Accuracy=(T(P)+T(NP)) / (T(P)+T(NP)+F(P)+F(NP))

Accuracy=(35+72) / (35+72+6+7)

Accuracy= 0.89

2. What is the percentage of correct classification of Purchased to the total input of Purchased in the test set?

Recall Purchased = T(P) / (Total count of Purchased)

Recall Purchased = 35/41

Recall [P] = 0. 85

3. What is the percentage of correct classification of Not Purchased to the total input of Not Purchased in the test set?

Recall Not Purchased = T(NP) / (Total count of Not Purchased)

Recall Not Purchased = 72/79

Recall [NP] = 0.91

4. What is the percentage of correct classification of Purchased to sum of **correctly** classified as Purchased and **wrongly** classified as Purchased in the test set?

Precision Purchased = T(P) / [T(P)+F(NP)]

Precision Purchased = 35/[35+7]

Precision [P] = 0.83

5. What is the percentage of correct classification of Not Purchased to sum of **correctly** classified as Not Purchased and **wrongly** classified as Not Purchased in the test set?

Precision Not Purchased = T(NP) / [T(NP)+F(P)]

Precision Not Purchased = 72/[72+6]

Precision [NP] = 0.92

6. What is the overall performance of Purchased?

F1 Measure Purchased = (2*[Recall [P] * Precision [P]] / [Recall [P] + Precision [P]])

F1 Measure Purchased = (2 *[0.85*0.83]/[0.85+0.83])

F1 Measure [P] = 0.84

7. What is the overall performance of Not Purchased?

F1 Measure Not Purchased = (2*[Recall [NP] * Precision [NP]] / [Recall [NP] + Precision [NP]])

F1 Measure Not Purchased = (2 *[0.91*0.92]/[0.91+0.92])

F1 Measure [NP] = 0.92

8. What is the average performance of Precision (correctly and wrongly classified)?

Macro Average Precision = [Precision [P] + Precision [NP]] / 2

Macro Average Precision = [0.83+0.92] / 2

Macro Average Precision = 0.88

9. What is the average performance of Recall (correctly and wrongly classified)?

Macro Average Recall = [Recall [P] + Recall [NP]] / 2

Macro Average Recall = [0.85+0.91] / 2

Macro Average Recall = 0.88

10. What is the average performance of F1 Measure (correctly and wrongly classified)?

Macro Average F1 Measure = [F1 Measure [P] + F1 Measure [NP]] / 2

Macro Average F1 Measure = [0.84+0.92] / 2

Macro Average F1 Measure = 0.88

11. What is the Sum of Product of Proportion rate (weight) of each class (Precision) ?

Weighted Average (Precision) = {Precision [P]*(TC[P] / TC[P+NP])} + {Precision [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (Precision) = {0.83*(41/120)} + {0.92*(79/120)}

Weighted Average (Precision) = 0.2835 + 0.6056

Weighted Average (Precision) = 0.89

12. What is the Sum of Product of Proportion rate (weight) of each class (Recall) ?

Weighted Average (Recall) = { Recall [P]*(TC[P] / TC[P+NP])} + { Recall [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (Recall) = {0.85*(41/120)} + {0.91*(79/120)}

Weighted Average (Recall) = 0.2904 + 0.5990

Weighted Average (Recall) = 0.89

13. What is the Sum of Product of Proportion rate (weight) of each class (F1 Measure) ?

Weighted Average (F1 Measure) = { F1 Measure [P]*(TC[P] / TC[P+NP])} + { F1 Measure [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (F1 Measure) = {0.84*(41/120)} + {0.92*(79/120)}

Weighted Average (F1 Measure) = 0.2870 + 0.6056

Weighted Average (F1 Measure) = 0.89

1. Decision Tree Classification

Confusion Matrix Result:

[71 8]

[3 38]

True Not Purchased**, T(NP)**= 71

False Not Purchased, **F(NP)** = 8

False Purchased, **F(P)** = 3

True Purchased, **T(P)** = 38

Total Count of Not Purchased, **TC[NP]** = 79

Total Count of Purchased, **TC[P]** =41

Total Count of the Purchased & Non Purchased, **TC[P+NP]**= 120

Questions:

1. What is the percentage of correct classification of both (Purchased & Not Purchased) to the total input of the test set?

Accuracy=(T(P)+T(NP)) / (T(P)+T(NP)+F(P)+F(NP))

Accuracy=(38+71) / (38+71+3+8)

Accuracy= 0.91

2. What is the percentage of correct classification of Purchased to the total input of Purchased in the test set?

Recall Purchased = T(P) / (Total count of Purchased)

Recall Purchased = 38/41

Recall [P] = 0. 93

3. What is the percentage of correct classification of Not Purchased to the total input of Not Purchased in the test set?

Recall Not Purchased = T(NP) / (Total count of Not Purchased)

Recall Not Purchased = 71/79

Recall [NP] = 0.90

4. What is the percentage of correct classification of Purchased to sum of **correctly** classified as Purchased and **wrongly** classified as Purchased in the test set?

Precision Purchased = T(P) / [T(P)+F(NP)]

Precision Purchased = 38/[38+8]

Precision [P] = 0.83

5. What is the percentage of correct classification of Not Purchased to sum of **correctly** classified as Not Purchased and **wrongly** classified as Not Purchased in the test set?

Precision Not Purchased = T(NP) / [T(NP)+F(P)]

Precision Not Purchased = 71/[71+3]

Precision [NP] = 0.96

6. What is the overall performance of Purchased?

F1 Measure Purchased = (2*[Recall [P] * Precision [P]] / [Recall [P] + Precision [P]])

F1 Measure Purchased = (2 *[0.93*0.83]/[0.93+0.83])

F1 Measure [P] = 0.87

7. What is the overall performance of Not Purchased?

F1 Measure Not Purchased = (2*[Recall [NP] * Precision [NP]] / [Recall [NP] + Precision [NP]])

F1 Measure Not Purchased = (2 *[0.90*0.96]/[0.90+0.96])

F1 Measure [NP] = 0.93

8. What is the average performance of Precision (correctly and wrongly classified)?

Macro Average Precision = [Precision [P] + Precision [NP]] / 2

Macro Average Precision = [0.83+0.96] / 2

Macro Average Precision = 0.89

9. What is the average performance of Recall (correctly and wrongly classified)?

Macro Average Recall = [Recall [P] + Recall [NP]] / 2

Macro Average Recall = [0.93+0.90] / 2

Macro Average Recall = 0.91

10. What is the average performance of F1 Measure (correctly and wrongly classified)?

Macro Average F1 Measure = [F1 Measure [P] + F1 Measure [NP]] / 2

Macro Average F1 Measure = [0.87+0.93] / 2

Macro Average F1 Measure = 0.90

11. What is the Sum of Product of Proportion rate (weight) of each class (Precision) ?

Weighted Average (Precision) = {Precision [P]*(TC[P] / TC[P+NP])} + {Precision [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (Precision) = {0.83*(41/120)} + {0.96*(79/120)}

Weighted Average (Precision) = 0.2835 + 0.6320

Weighted Average (Precision) = 0.91

12. What is the Sum of Product of Proportion rate (weight) of each class (Recall) ?

Weighted Average (Recall) = { Recall [P]*(TC[P] / TC[P+NP])} + { Recall [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (Recall) = {0.93*(41/120)} + {0.90*(79/120)}

Weighted Average (Recall) = 0.3177 + 0.5925

Weighted Average (Recall) = 0.91

13. What is the Sum of Product of Proportion rate (weight) of each class (F1 Measure) ?

Weighted Average (F1 Measure) = { F1 Measure [P]*(TC[P] / TC[P+NP])} + { F1 Measure [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (F1 Measure) = {0.87*(41/120)} + {0.93*(79/120)}

Weighted Average (F1 Measure) = 0.2972 + 0.6122

Weighted Average (F1 Measure) = 0.91

1. SVM Classification

Confusion Matrix Result:

[77 2]

[23 18]

True Not Purchased**, T(NP)**= 77

False Not Purchased, **F(NP)** = 2

False Purchased, **F(P)** = 23

True Purchased, **T(P)** = 18

Total Count of Not Purchased, **TC[NP]** = 79

Total Count of Purchased, **TC[P]** =41

Total Count of the Purchased & Non Purchased, **TC[P+NP]**= 120

Questions:

1. What is the percentage of correct classification of both (Purchased & Not Purchased) to the total input of the test set?

Accuracy=(T(P)+T(NP)) / (T(P)+T(NP)+F(P)+F(NP))

Accuracy=(18+77) / (18+77+23+2)

Accuracy= 0.79

2. What is the percentage of correct classification of Purchased to the total input of Purchased in the test set?

Recall Purchased = T(P) / (Total count of Purchased)

Recall Purchased = 18/41

Recall [P] = 0. 44

3. What is the percentage of correct classification of Not Purchased to the total input of Not Purchased in the test set?

Recall Not Purchased = T(NP) / (Total count of Not Purchased)

Recall Not Purchased = 77/79

Recall [NP] = 0.97

4. What is the percentage of correct classification of Purchased to sum of **correctly** classified as Purchased and **wrongly** classified as Purchased in the test set?

Precision Purchased = T(P) / [T(P)+F(NP)]

Precision Purchased = 18/[18+2]

Precision [P] = 0.90

5. What is the percentage of correct classification of Not Purchased to sum of **correctly** classified as Not Purchased and **wrongly** classified as Not Purchased in the test set?

Precision Not Purchased = T(NP) / [T(NP)+F(P)]

Precision Not Purchased = 77/[77+23]

Precision [NP] = 0.77

6. What is the overall performance of Purchased?

F1 Measure Purchased = (2*[Recall [P] * Precision [P]] / [Recall [P] + Precision [P]])

F1 Measure Purchased = (2 *[0.44*0.90]/[0.44+0.90])

F1 Measure [P] = 0.59

7. What is the overall performance of Not Purchased?

F1 Measure Not Purchased = (2*[Recall [NP] * Precision [NP]] / [Recall [NP] + Precision [NP]])

F1 Measure Not Purchased = (2 *[0.97*0.77]/[0.97+0.77])

F1 Measure [NP] = 0.86

8. What is the average performance of Precision (correctly and wrongly classified)?

Macro Average Precision = [Precision [P] + Precision [NP]] / 2

Macro Average Precision = [0.90+0.77] / 2

Macro Average Precision = 0.83

9. What is the average performance of Recall (correctly and wrongly classified)?

Macro Average Recall = [Recall [P] + Recall [NP]] / 2

Macro Average Recall = [0.44+0.97] / 2

Macro Average Recall = 0.71

10. What is the average performance of F1 Measure (correctly and wrongly classified)?

Macro Average F1 Measure = [F1 Measure [P] + F1 Measure [NP]] / 2

Macro Average F1 Measure = [0.59+0.86] / 2

Macro Average F1 Measure = 0.73

11. What is the Sum of Product of Proportion rate (weight) of each class (Precision) ?

Weighted Average (Precision) = {Precision [P]*(TC[P] / TC[P+NP])} + {Precision [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (Precision) = {0.90*(41/120)} + {0.77*(79/120)}

Weighted Average (Precision) = 0.3075 + 0.5069

Weighted Average (Precision) = 0.81

12. What is the Sum of Product of Proportion rate (weight) of each class (Recall) ?

Weighted Average (Recall) = { Recall [P]*(TC[P] / TC[P+NP])} + { Recall [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (Recall) = {0.44*(41/120)} + {0.97*(79/120)}

Weighted Average (Recall) = 0.1503 + 0.6385

Weighted Average (Recall) = 0.79

13. What is the Sum of Product of Proportion rate (weight) of each class (F1 Measure) ?

Weighted Average (F1 Measure) = { F1 Measure [P]*(TC[P] / TC[P+NP])} + { F1 Measure [NP]*(TC[NP] / TC[P+NP])}

Weighted Average (F1 Measure) = {0.59*(41/120)} + {0.86*(79/120)}

Weighted Average (F1 Measure) = 0.2015 + 0.5661

Weighted Average (F1 Measure) = 0.77

Final Result:

The **Decision Tree Classification Algorithm** giving the ***best result***.