1.RANDOM FOREST CLASSIFICATION

Confusion matrix:-

[78 7]

[6 43]

T(Purchased) =43; F(Purchased)=6; T(Not Purchased)=78; F(Not Purchased)=7; Total count of Purchased **TC(P)=**49; Total count of Not Purchased **TC(NP)=**85; Total Count of the Purchased & Non Purchased **TC(P+NP)=**134

QUESTIONS:-

1.What is the percentage of correct classification of both(purchased and not purchased) to the total input of the test set?

Accuracy=TP+TN / TP+TN+FP+FN

          = (78+43) / (78+43+7+6)

Accuracy=0.90

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

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

          = 43 / 43+6

Recall=0.87

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

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

          = 78 / 78+7

Recall=0.92

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

= 43 / 43+7

Precision=0.86

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

= 78 / 78+6

Precision=0.92

6. What is the overall performance of Purchased?

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

= (2*0.87*0.86) / (0.87+0.86)

F1 Measure Purchased=0.86

7. What is the overall performance of Not Purchased?

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

= (2 *[0.92*0.92] / [0.92+0.92])

F1 Measure [NP] = 0.91

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

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

= [0.86+0.92] / 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

= [0.87+0.92] / 2

Macro Average Recall = 0.89

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

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

= [0.86+0.91] / 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])}

= {0.86*(49/134)} + {0.92*(85/134)}

Weighted Average (Precision) = 0.90

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])}

= {0.87*(49/134)} + {0.92*(85/134)}

Weighted Average (Recall) = 0.90

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])}

= {0.86*(49/134)} + {0.91*(85/134)}

Weighted Average (F1 Measure) = 0.94

2.DECISION TREE CLASSIFICATION

Confusion Matrix:-

[76 9]

[8 41]

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))

=41+76 / 41+76+8+9

Accuracy=0.87

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)

= 41/49

Recall Purchased= 0.84

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)

= 76/85

Recall Not Purchased= 0.89

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)]

= 41/[41+9]

Precision Purchased= 0.82

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)]

= 76/[76+8]   Precision Not Purchased=0.90

6. What is the overall performance of Purchased?

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

= (2 *[0.84*0.82]/[0.84+0.82])

F1 Measure Purchased=0.83

7. What is the overall performance of Not Purchased?

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

= (2 *[0.89*0.90]/[0.89+0.90])

F1 Measure Not Purchased=0.90

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

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

= [0.82+0.90] / 2

Macro Average Precision= 0.86

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

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

= [0.84+0.89] / 2

Macro Average Recall= 0.87

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

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

= [0.83+0.90] / 2

Macro Average F1 Measure= 0.86

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])}

= {0.82*(49/134)} + {0.90*(85/134)}

Weighted Average (Precision) = 0.87

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])}

= {0.84*(49/134)} + {0.89*(85/134)}

==Weighted Average (Recall) = 0.87==

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])}

$$= \{0.83*(41/134)\} + \{0.90*(85/1)\}$$

==Weighted Average (F1 Measure) = 0.87==

3.SVM CLASSIFICATION

Confusion Matrix:-

[82   3]

[26   23]

True Not Purchased, **T(NP)=** 82

False Not Purchased, **F(NP)** = 3

False Purchased, **F(P)** = 26

True Purchased, **T(P)** = 23

Total Count of Not Purchased, **TC[NP]** = 85

Total Count of Purchased, **TC[P]** =49

Total Count of the Purchased & Non Purchased, **TC[P+NP]=** 134

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))

=(23+82) / (23+82+26+3)

==Accuracy= 0.78==

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)

= 23/49   ==Recall Purchased =0.47==

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)

= 82/85

Recall [NP] = 0.96

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)]

= 23/[23+3]

Precision [P] = 0.88

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)]

= 82/[82+26]

Precision Not Purchased=0.76

6. What is the overall performance of Purchased?

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

= (2 *[0.47*0.88]/[0.47+0.88])

F1 Measure [P] = 0.61

7. What is the overall performance of Not Purchased?

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

= (2 *[0.96*0.76]/[0.96+0.76])

F1 Measure Not Purchased = 0.85

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

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

= [0.88+0.76] / 2

Macro Average Precision = 0.82

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

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

= [0.47+0.96] / 2

<mark>Macro Average Recall = 0.72</mark>

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

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

= [0.61+0.85] / 2

<mark>Macro Average F1 Measure=0.73</mark>

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])}

= {0.88*(49/134)} + {0.76*(85/134)}

<mark>Weighted Average (Precision) = 0.81</mark>

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])}

= {0.47*(49/134)} + {0.96*(85/134)}

<mark>Weighted Average (Recall) = 0.87</mark>

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])}

= {0.61*(49/134)} + {0.85*(85/134)}

<mark>Weighted Average (F1 Measure) = 0.76</mark>

Final Result:-

The Random Forest Classification Algorithm giving the <mark>best result</mark>