

# Random Forest

## Random Forest Classification

1. What is the overall performance of the model in Random forest  
**Accuracy : 0.90**
2. What is the correct(actual) classification of not purchased?  
**Recall : 0.92**
3. What is the correct classification of truly not purchased?  
**Precision : 0.93**
4. What is the overall performance of not purchased?  
**F1-Measure : 0.92**
5. What is the correct(actual) classification of purchased?  
**Recall : 0.88**
6. What is the correct classification of truly purchased?  
**Precision : 0.86**
7. What is the overall performance of purchased?  
**F1-Measure : 0.87**
8. What is the weighted average for Precision? – 0.90
9. What is the weighted average for Recall? – 0.90
10. What is the weighted average for F1-Measure? – 0.90

# Decision Tree

## Decision Tree Classification

1. What is the overall performance of the model in Decision Tree  
**Accuracy : 0.87**
2. What is the correct(actual) classification of not purchased?  
**Recall : 0.89**
3. What is the correct classification of truly not purchased?  
**Precision : 0.90**
4. What is the overall performance of not purchased?  
**F1-Measure : 0.90**
5. What is the correct(actual) classification of purchased?  
**Recall : 0.84**
6. What is the correct classification of truly purchased?  
**Precision : 0.82**
7. What is the overall performance of purchased?  
**F1-Measure : 0.83**
8. What is the weighted average for Precision? – 0.87
9. What is the weighted average for Recall? – 0.87
10. What is the weighted average for F1-Measure? – 0.87

# Support Vector Machine

## Support Vector Machine Classification

1. What is the overall performance of the model in Decision Tree  
**Accuracy : 0.78**
2. What is the correct(actual) classification of not purchased?  
**Recall : 0.96**
3. What is the correct classification of truly not purchased?  
**Precision : 0.76**
4. What is the overall performance of not purchased?  
**F1-Measure : 0.85**
5. What is the correct(actual) classification of purchased?  
**Recall : 0.47**
6. What is the correct classification of truly purchased?  
**Precision : 0.88**
7. What is the overall performance of purchased?  
**F1-Measure : 0.61**
8. What is the weighted average for Precision? – **0.81**
9. What is the weighted average for Recall? – **0.78**
10. What is the weighted average for F1-Measure? – **0.76**

# Logistic Regression

## Logistic Regression Classification

1. What is the overall performance of the model in Logistic Regression

<b>Accuracy</b>	$\frac{T(\text{Purchased})+T(\text{NotPurchased})}{T(\text{Purchased})+T(\text{NotPurchased})+F(\text{Purchased})+F(\text{NotPurchased})}$
	$A = 79+40/79+6+9+40$ $= 119/134$ $= 0.8880$

**Accuracy : 0.89**

2. What is the correct(actual) classification of not purchased?

<b>Recall</b>	$\frac{T(\text{Purchased})}{T(\text{Purchased})+F(\text{Purchased})}$
	$R = 79/79+6$ $= 79/85$ $= 0.9294$

**Recall : 0.93**

3. What is the correct classification of truly not purchased?

Precision	$T(\text{Purchased})/T(\text{Purchased})+F(\text{NotPurchased})$
	$P = 79/79+9$ $= 79/88$ $= 0.8977$

**Precision : 0.90**

4. What is the overall performance of not purchased?

F1-Measure	$2*Recall*Precision/Recall+Precision$
	$F1 = 2*0.9294*0.8977/0.9294+0.8977$ $= 1.6686/1.8271$ $= 0.9132$

**F1-Measure : 0.91**

5. What is the correct(actual) classification of purchased?

Recall	$T(\text{NotPurchased})/T(\text{NotPurchased})+F(\text{NotPurchased})$
	$R = 40/40+9$ $= 40/49$ $= 0.8163$

**Recall : 0.81**

6. What is the correct classification of truly purchased?

Precision	$T(\text{NotPurchased})/T(\text{NotPurchased})+F(\text{Purchased})$
	$R = 40/40+6$ $= 40/46$ $= 0.8695$

**Precision : 0.87**

7. What is the overall performance of purchased?

F1-Measure	$2*Recall*Precision/Recall+Precision$
	$F1 = 2*0.8163*0.8695/0.8163+0.8695$ $= 1.4195/1.6858$ $= 0.8420$

**F1-Measure : 0.84**

8. What is the weighted average for Precision? – **0.89**
9. What is the weighted average for Recall? – **0.89**
10. What is the weighted average for F1-Measure? – **0.89**

# K Nearest Neighbour Classification

## KNN Classification

1. What is the overall performance of the model in KNN classification

Accuracy	$\frac{T(\text{Purchased})+T(\text{NotPurchased})}{T(\text{Purchased})+T(\text{NotPurchased})+F(\text{Purchased})+F(\text{NotPurchased})}$
	$A = 70+33/70+15+16+33$ $= 103/134$ $= 0.7686$

Accuracy : 0.77

2. What is the correct(actual) classification of not purchased?

Recall	$\frac{T(\text{Purchased})}{T(\text{Purchased})+F(\text{Purchased})}$
	$R = 70/70+15$ $= 70/85$ $= 0.8235$

Recall : 0.82

3. What is the correct classification of truly not purchased?

Precision	$\frac{T(\text{Purchased})}{T(\text{Purchased})+F(\text{NotPurchased})}$
	$P = 70/70+16$ $= 70/86$ $= 0.8139$

Precision : 0.81

4. What is the overall performance of not purchased?

F1-Measure	$\frac{2*Recall*Precision}{Recall+Precision}$
	$F1 = 2*0.8235*0.8139/0.8235+0.8139$ $= 1.3404/1.6374$ $= 0.8186$

F1-Measure : 0.82

5. What is the correct(actual) classification of purchased?

Recall	$\frac{T(\text{NotPurchased})}{T(\text{NotPurchased})+F(\text{NotPurchased})}$
	$R = 33/33+16$ $= 33/49$ $= 0.6734$

Recall : 0.67

6. What is the correct classification of truly purchased?

Precision	$T(\text{NotPurchased})/T(\text{NotPurchased})+F(\text{Purchased})$
	$P = 33/33+15$ $= 33/48$ $= 0.6875$

**Precision : 0.69**

7. What is the overall performance of purchased?

F1-Measure	$2*Recall*Precision/Recall+Precision$
	$F1 = 2*0.6734*0.6875/0.6734+0.6875$ $= 0.9259/1.3609$ $= 0.6803$

**F1-Measure : 0.68**

8. What is the weighted average for Precision? – 0.77

9. What is the weighted average for Recall? – 0.77

10. What is the weighted average for F1-Measure? – 0.77

## Multinomial Navies' Bayes Classification

### MultiNomialNB Classification

1. What is the overall performance of the model in NB classification

Accuracy	$T(\text{Purchased})+T(\text{NotPurchased})/T(\text{Purchased})+T(\text{NotPurchased})+F(\text{Purchased})+F(\text{NotPurchased})$
	$A = 85+0/85+49+0+0$ $= 85/134$ $= 0.6343$

**Accuracy : 0.63**

2. What is the correct(actual) classification of not purchased?

Recall	$T(\text{Purchased})/T(\text{Purchased})+F(\text{Purchased})$
	$R = 85/85+0$ $= 85/85$ $= 1.0000$

**Recall : 1.00**

3. What is the correct classification of truly not purchased?

Precision	$T(\text{Purchased})/T(\text{Purchased})+F(\text{NotPurchased})$
	$P = 85/49+85$ $= 85/134$ $= 0.6343$

**Precision : 0.63**

4. What is the overall performance of not purchased?

F1-Measure	$2 * \text{Recall} * \text{Precision} / (\text{Recall} + \text{Precision})$
	$F1 = 2 * 0.6343 * 1 / (0.6343 + 1.00)$ $= 1.2686 / 1.6343$ $= 0.7762$

**F1-Measure : 0.78**

5. What is the correct(actual) classification of purchased?

Recall	$T(\text{NotPurchased}) / (T(\text{NotPurchased}) + F(\text{NotPurchased}))$
	$R = 0 / (0 + 0)$ $= 0 / 0$ $= 0.00$

**Recall : 0.00**

6. What is the correct classification of truly purchased?

Precision	$T(\text{NotPurchased}) / (T(\text{NotPurchased}) + F(\text{Purchased}))$
	$P = 0 / (0 + 0)$ $= 0 / 0$ $= 0.00$

**Precision : 0.00**

7. What is the overall performance of purchased?

F1-Measure	$2 * \text{Recall} * \text{Precision} / (\text{Recall} + \text{Precision})$
	$F1 = 2 * 0.00 * 0.00 / (0.00 + 0.00)$ $= 0.00 / 0.00$ $= 0.00$

**F1-Measure : 0.00**

8. What is the weighted average for Precision? – 0.40  
 9. What is the weighted average for Recall? – 0.63  
 10. What is the weighted average for F1-Measure? – 0.49

## Categorical Navies' Bayes Classification

### MultiNomialNB Classification

1. What is the overall performance of the model in classification

Accuracy	$T(\text{Purchased}) + T(\text{NotPurchased}) / (T(\text{Purchased}) + T(\text{NotPurchased}) + F(\text{Purchased}) + F(\text{NotPurchased}))$
	$A = 82 + 31 / (82 + 3 + 18 + 31)$ $= 113 / 134$ $= 0.8432$

**Accuracy : 0.84**

2. What is the correct(actual) classification of not purchased?

Recall	$T(\text{Purchased})/T(\text{Purchased})+F(\text{Purchased})$
	$R = 82/82+3$ $= 82/85$ $= 0.9647$

Recall : 0.96

3. What is the correct classification of truly not purchased?

Precision	$T(\text{Purchased})/T(\text{Purchased})+F(\text{NotPurchased})$
	$P = 82/82+18$ $= 82/100$ $= 0.82$

Precision : 0.82

4. What is the overall performance of not purchased?

F1-Measure	$2*Recall*Precision/Recall+Precision$
	$F1 = 2*0.9647*0.82/0.9647+0.82$ $= 1.5821/1.7847$ $= 0.8864$

F1-Measure : 0.89

5. What is the correct(actual) classification of purchased?

Recall	$T(\text{NotPurchased})/T(\text{NotPurchased})+F(\text{NotPurchased})$
	$R = 31/31+18$ $= 31/49$ $= 0.6326$

Recall : 0.63

6. What is the correct classification of truly purchased?

Precision	$T(\text{NotPurchased})/T(\text{NotPurchased})+F(\text{Purchased})$
	$P = 31/31+3$ $= 31/34$ $= 0.9117$

Precision : 0.91

7. What is the overall performance of purchased?

F1-Measure	$2*Recall*Precision/Recall+Precision$
	$F1 = 2*0.6326*0.9117/0.6326+0.9117$ $= 1.1534/1.5443$ $= 0.7469$

F1-Measure : 0.75

8. What is the weighted average for Precision? – 0.85
9. What is the weighted average for Recall? – 0.84
10. What is the weighted average for F1-Measure? – 0.84

## Complement Navies' Bayes Classification

### ComplimentNB Classification

1. What is the overall performance of the model in NB classification

Accuracy	$\frac{T(\text{Purchased})+T(\text{NotPurchased})}{T(\text{Purchased})+T(\text{NotPurchased})+F(\text{Purchased})+F(\text{NotPurchased})}$
	$A = 40+29/40+45+20+29$ $= 69/134$ $= 0.5149$

**Accuracy : 0.51**

2. What is the correct(actual) classification of not purchased?

Recall	$\frac{T(\text{Purchased})}{T(\text{Purchased})+F(\text{Purchased})}$
	$R = 40/40+45$ $= 40/85$ $= 0.4705$

**Recall : 0.47**

3. What is the correct classification of truly not purchased?

Precision	$\frac{T(\text{Purchased})}{T(\text{Purchased})+F(\text{NotPurchased})}$
	$P = 40/40+20$ $= 40/60$ $= 0.6666$

**Precision : 0.67**

4. What is the overall performance of not purchased?

F1-Measure	$\frac{2*Recall*Precision}{Recall+Precision}$
	$F1 = 2*0.4705*0.6666/0.4705+0.6666$ $= 0.6272/1.1371$ $= 0.5516$

**F1-Measure : 0.55**

5. What is the correct(actual) classification of purchased?

Recall	$\frac{T(\text{NotPurchased})}{T(\text{NotPurchased})+F(\text{NotPurchased})}$
	$R = 29/29+20$ $= 29/49$ $= 0.5918$



**Recall : 0.59**

6. What is the correct classification of truly purchased?

Precision	$T(\text{NotPurchased})/T(\text{NotPurchased})+F(\text{Purchased})$
	$P = 29/29+45$ $= 29/74$ $= 0.3918$

**Precision : 0.39**

7. What is the overall performance of purchased?

F1-Measure	$2*Recall*Precision/Recall+Precision$
	$F1 = 2*0.5918*0.3918/0.5918+0.3918$ $= 0.4637/0.9836$ $= 0.4714$

**F1-Measure : 0.47**

8. What is the weighted average for Precision? – **0.57**
9. What is the weighted average for Recall? – **0.51**
10. What is the weighted average for F1-Measure? – **0.52**

**Below models has Good Performance**

**Random Forest – 0.90**

Logistic Regression - 0.89

Categorical Navie Bayes - 0.84