**Part I: Confusion Matrix and ROC curve**

**1.1** Set T=0.6, generate a CM.

Confusion Matrix:

|  |  |  |
| --- | --- | --- |
|  | Positive | Negative |
| Y | 4 | 2 |
| N | 4 | 2 |

Y: Cat; N: No

**1.2** To calculate the ROC curve



**Part II Classification**

**2.1** Nearest neighbor method:

Followed the guideline develop a function, func\_KNN, which can accept different K values and return a confusion matrix, accuracy, recalls, and precisions.

K = 7: Accuracy = 98% K = 13: Accuracy = 94% K = 21: Accuracy = 94%

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 16 | 0 | 0 |
| 2 | 0 | 14 | 0 |
| 3 | 0 | 1 | 19 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 21 | 0 | 0 |
| 2 | 0 | 12 | 2 |
| 3 | 0 | 1 | 14 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 18 | 0 | 0 |
| 2 | 0 | 19 | 0 |
| 3 | 0 | 3 | 10 |

**2.2** Support vector machine

Regular SVM Model SVM Model with RBF kernel

Accuracy : 100% Accuracy : 100%

Recall : 1: 100%; -1: 100% Recall : 1: 100%; -1: 100%

Precision : 1: 100%; -1: 100% Precision : 1: 100%; -1: 100%

|  |  |  |
| --- | --- | --- |
|  | 1 | -1 |
| 1 | 14 | 0 |
| -1 | 0 | 36 |

|  |  |  |
| --- | --- | --- |
|  | 1 | -1 |
| 1 | 14 | 0 |
| -1 | 0 | 36 |

**2.3** Naïve Bayes classifier

Accuracy : 96%

Recall : 1: 100%; 2: 90.00%; 3: 94.12%

Precision : 1: 100%; 2: 94.74%; 3: 88.89%

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| 1 | 13 | 0 | 0 |
| 2 | 0 | 18 | 2 |
| 3 | 0 | 1 | 16 |

**2.4** Adaboost

Accuracy : 98%

Recall : 1: 94.44%; -1: 100%

Precision : 1: 100%; -1: 96.97%

|  |  |  |
| --- | --- | --- |
|  | 1 | -1 |
| 1 | 17 | 1 |
| -1 | 0 | 32 |