**Task 2.1**

Output:

Number of nearest neighbours: 1

Number of test samples: 3974

User time taken in seconds: 24.49

Accuracy: 0.9643

Number of wrongly classified test samples: 142

Number of nearest neighbours: 3

Number of test samples: 3974

User time taken in seconds: 27.28

Accuracy: 0.9663

Number of wrongly classified test samples: 134

Number of nearest neighbours: 5

Number of test samples: 3974

User time taken in seconds: 25.94

Accuracy: 0.9645

Number of wrongly classified test samples: 141

Number of nearest neighbours: 10

Number of test samples: 3974

User time taken in seconds: 28.27

Accuracy: 0.9575

Number of wrongly classified test samples: 169

Number of nearest neighbours: 20

Number of test samples: 3974

User time taken in seconds: 24.45

Accuracy: 0.9512

Number of wrongly classified test samples: 194

Task 2.2

Decision regions for KNN

Task 2.4

|  |  |
| --- | --- |
| **Class** | **Covariance** |
| 1 | -0.2106 |
| 2 | 0.1539 |
| 3 | 0.0449 |
| 4 | -0.4299 |
| 5 | 0.5887 |
| 6 | -0.2715 |
| 7 | 0.3224 |
| 8 | 0.5605 |
| 9 | 0.1378 |
| 10 | 0.4548 |
| All | 0 |

Task 2.5

Output:

Number of test samples: 3974

User time taken in seconds: 65.08

Accuracy: 0.9421

Number of wrongly classified test samples: 230

Task 2.7

|  |  |
| --- | --- |
| **Ratio** | **Accuracy** |
| 90% | 0.9429 |
| 80% | 0.9431 |
| 70% | 0.9424 |
| 60% | 0.9429 |
| 50% | 0.9436 |
| 40% | 0.9444 |
| 30% | 0.9434 |

Task 2.8

Output:

>> task2\_8(Xtrn, Ytrn, Xtst, Ytst, 0.01, 2);

Number of test samples: 3974

User time taken in seconds: 28.92

Accuracy: 0.8571

Number of wrongly classified test samples: 568

>> task2\_8(Xtrn, Ytrn, Xtst, Ytst, 0.01, 5);

Number of test samples: 3974

User time taken in seconds: 72.90

Accuracy: 0.8953

Number of wrongly classified test samples: 416

>> task2\_8(Xtrn, Ytrn, Xtst, Ytst, 0.01, 10);

Number of test samples: 3974

User time taken in seconds: 140.21

Accuracy: 0.9157

Number of wrongly classified test samples: 335