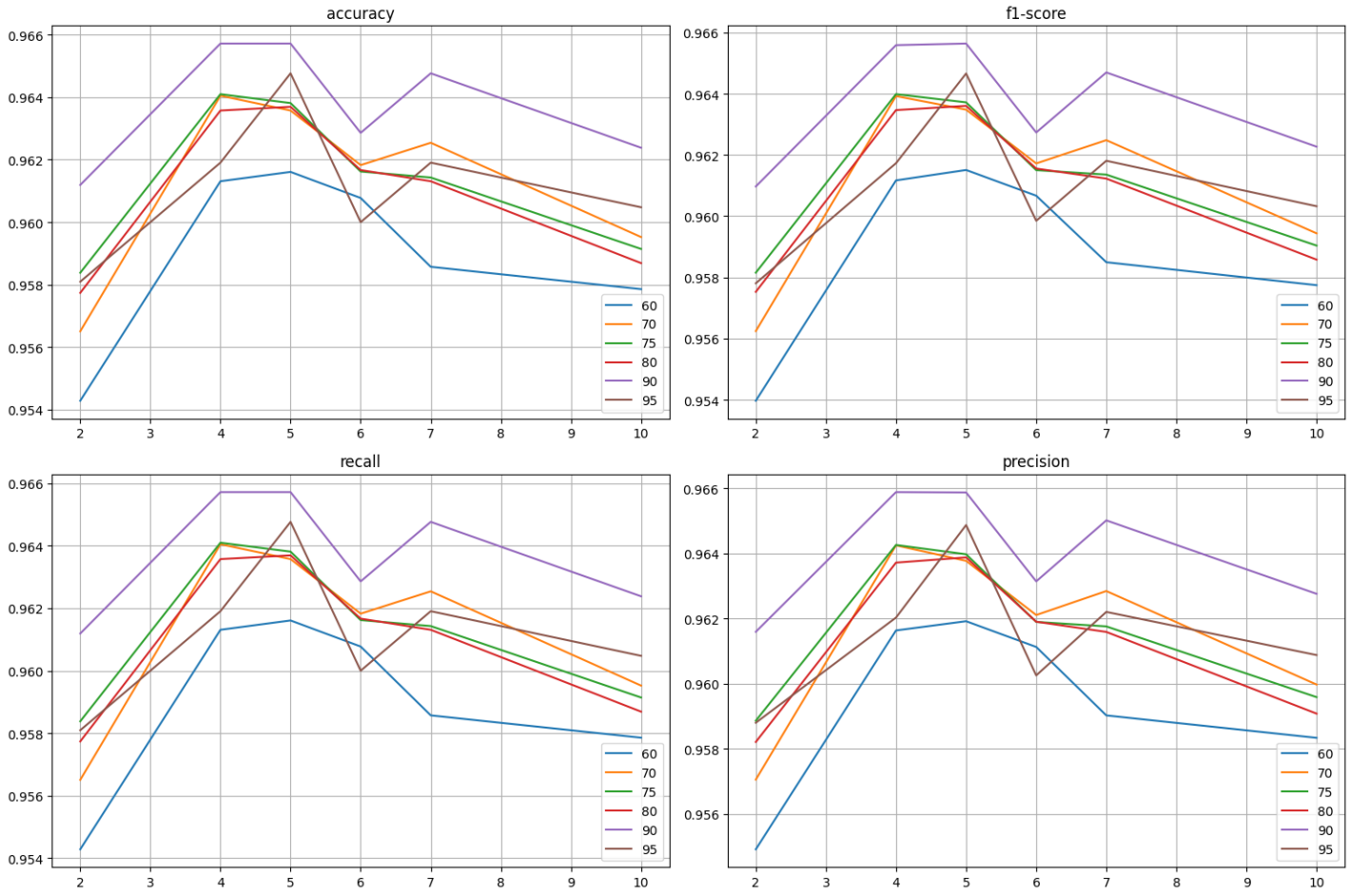
Final Graphs After comparing the values received



Inference:

We get better values when there is Test-Train split of 90-10 and at value of k = 4 and k=5, we have maximum accuracy, precision, recall and f1-score

Confusion Matrix and Performance reports

For test train split of 60-40 and K=2

Cofusion Matrix and Performance Report:

[[1612 0 2 0 0 1 2 0 0 0]
[0 1867 0 0 0 0 0 1 1 2]
[12 18 1652 7 2 1 1 15 2 3]
[5 7 18 1733 1 19 0 8 10 2]
[3 19 1 0 1594 0 5 3 0 17]
[7 3 3 54 3 1418 13 0 0 5]
[21 1 0 0 3 13 1574 0 0 0]
[1 29 8 5 5 0 0 1684 1 19]
[13 21 17 53 12 56 5 13 1388 10]
[8 8 2 17 66 10 1 66 8 1510]]

	precision	recall	f1-score	support
0	0.96	1.00	0.98	1617
1	0.95	1.00	0.97	1871
2	0.97	0.96	0.97	1713
3	0.93	0.96	0.94	1803
4	0.95	0.97	0.96	1642
5	0.93	0.94	0.94	1506
6	0.98	0.98	0.98	1612
7	0.94	0.96	0.95	1752
8	0.98	0.87	0.93	1588
9	0.96	0.89	0.93	1696
accuracy			0.95	16800
macro avg	0.96	0.95	0.95	16800
weighted avg	0.95	0.95	0.95	16800

Accuracy received = 0.9542857142857143

For test train split of 60-40 and K=4

Cofusion Matrix and Performance Report:

[[1609 0 2 0 0 1 3 1 0 1]
[0 1865 0 0 1 0 0 2 1 2]
[10 20 1641 7 2 1 3 24 2 3]
[3 9 8 1733 0 20 1 8 14 7]
[2 19 0 0 1590 0 4 1 0 26]
[5 6 1 41 1 1423 16 1 1 11]
[12 2 0 0 0 6 1591 0 1 0]
[1 33 2 3 4 0 0 1689 0 20]
[9 17 12 37 8 41 8 8 1434 14]
[9 6 1 18 35 7 1 38 6 1575]]

	precision	recall	f1-score	support
0	0.97	1.00	0.98	1617
1	0.94	1.00	0.97	1871
2	0.98	0.96	0.97	1713
3	0.94	0.96	0.95	1803
4	0.97	0.97	0.97	1642
5	0.95	0.94	0.95	1506
6	0.98	0.99	0.98	1612
7	0.95	0.96	0.96	1752

8	0.98	0.90	0.94	1588
9	0.95	0.93	0.94	1696
accuracy			0.96	16800
macro avg	0.96	0.96	0.96	16800
weighted avg	0.96	0.96	0.96	16800

Accuracy received = 0.9613095238095238

For test train split of 60-40 and K=5

Cofusion Matrix and Performance Report:

[[1605 0 2 0 0 2 7 1 0 0]
[0 1863 0 0 0 0 3 2 1 2]
[8 22 1631 8 3 0 4 28 6 3]
[2 8 10 1722 0 30 2 9 13 7]
[3 18 0 0 1579 0 4 1 0 37]
[5 4 1 29 3 1433 21 1 1 8]
[11 2 0 0 0 6 1591 0 2 0]
[1 30 3 4 0 0 0 1690 0 24]
[12 17 8 28 9 37 7 6 1446 18]
[8 10 2 17 23 6 1 28 6 1595]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1617
1	0.94	1.00	0.97	1871
2	0.98	0.95	0.97	1713
3	0.95	0.96	0.95	1803
4	0.98	0.96	0.97	1642
5	0.95	0.95	0.95	1506
6	0.97	0.99	0.98	1612
7	0.96	0.96	0.96	1752
8	0.98	0.91	0.94	1588
9	0.94	0.94	0.94	1696
accuracy			0.96	16800
macro avg	0.96	0.96	0.96	16800
weighted avg	0.96	0.96	0.96	16800

Accuracy received = 0.9616071428571429

For test train split of 60-40 and K=6

Cofusion Matrix and Performance Report:

[[1606 0 2 0 0 2 6 1 0 0]
[0 1864 0 0 1 0 2 1 1 2]
[8 27 1628 8 2 0 4 28 5 3]
[1 10 11 1727 1 21 2 8 12 10]
[3 24 0 0 1579 0 3 1 0 32]
[5 4 1 33 5 1429 18 1 2 8]
[11 2 0 0 0 5 1592 0 2 0]
[1 32 6 3 5 0 0 1686 0 19]
[11 17 9 30 11 27 8 8 1450 17]
[8 11 2 22 29 5 1 35 3 1580]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1617
1	0.94	1.00	0.97	1871
2	0.98	0.95	0.97	1713
3	0.95	0.96	0.95	1803
4	0.97	0.96	0.96	1642
5	0.96	0.95	0.95	1506
6	0.97	0.99	0.98	1612
7	0.95	0.96	0.96	1752
8	0.98	0.91	0.95	1588
9	0.95	0.93	0.94	1696
accuracy			0.96	16800
macro avg	0.96	0.96	0.96	16800
weighted avg	0.96	0.96	0.96	16800

Accuracy received = 0.9607738095238095

For test train split of 60-40 and K=7

Cofusion Matrix and Performance Report:

[[1600 1 2 0 0 3 10 1 0 0]
[0 1862 1 0 1 0 3 1 1 2]
[9 27 1618 9 2 1 5 34 5 3]
[2 11 9 1717 2 28 1 11 14 8]
[3 24 0 0 1563 0 4 1 0 47]
[4 5 2 25 3 1428 25 1 2 11]
[9 1 0 0 0 5 1594 0 3 0]
[1 34 3 1 1 0 0 1682 1 29]
[11 18 8 30 12 24 8 7 1450 20]
[9 13 1 20 25 5 1 29 3 1590]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1617
1	0.93	1.00	0.96	1871
2	0.98	0.94	0.96	1713
3	0.95	0.95	0.95	1803
4	0.97	0.95	0.96	1642
5	0.96	0.95	0.95	1506
6	0.97	0.99	0.98	1612
7	0.95	0.96	0.96	1752
8	0.98	0.91	0.95	1588
9	0.93	0.94	0.93	1696
accuracy			0.96	16800
macro avg	0.96	0.96	0.96	16800
weighted avg	0.96	0.96	0.96	16800

Accuracy received = 0.9585714285714285

For test train split of 60-40 and K=10

Cofusion Matrix and Performance Report:

[[1602 1 1 0 0 3 9 1 0 0]

[0 1863 1 0 1 0 2 1 1 2]

[9 30 1616 9 3 1 5 32 5 3]

[2 11 9 1719 2 27 1 11 13 8]

[3 25 0 0 1571 0 5 2 0 36]

[4 8 1 25 5 1433 18 0 1 11]

[10 2 0 0 1 4 1592 0 3 0]

[1 34 4 0 3 0 0 1685 1 24]

[12 22 9 30 10 28 9 9 1433 26]

[9 13 3 23 25 4 1 33 7 1578]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1617
1	0.93	1.00	0.96	1871
2	0.98	0.94	0.96	1713
3	0.95	0.95	0.95	1803
4	0.97	0.96	0.96	1642
5	0.96	0.95	0.95	1506
6	0.97	0.99	0.98	1612
7	0.95	0.96	0.96	1752
8	0.98	0.90	0.94	1588
9	0.93	0.93	0.93	1696
accuracy			0.96	16800
macro avg	0.96	0.96	0.96	16800
weighted avg	0.96	0.96	0.96	16800

Accuracy received = 0.9578571428571429

For test train split of 70-30 and K=2

Cofusion Matrix and Performance Report:

[[1230 0 2 0 0 1 2 0 0 1]

[0 1367 0 0 0 0 0 1 1 1]

[7 9 1211 5 1 0 1 14 2 2]

[1 4 12 1322 1 13 0 8 6 2]

[2 13 1 0 1181 0 4 3 0 11]

[5 0 1 43 4 1066 9 1 0 3]

[16 0 0 0 2 10 1188 0 0 0]

[0 22 8 0 4 1 0 1276 0 15]

[10 10 10 41 13 38 3 6 1058 8]

[7 5 1 14 42 5 0 52 8 1153]]

	precision	recall	f1-score	support
0	0.96	1.00	0.98	1236
1	0.96	1.00	0.98	1370
2	0.97	0.97	0.97	1252
3	0.93	0.97	0.95	1369
4	0.95	0.97	0.96	1215
5	0.94	0.94	0.94	1132
6	0.98	0.98	0.98	1216
7	0.94	0.96	0.95	1326
8	0.98	0.88	0.93	1197
9	0.96	0.90	0.93	1287
accuracy			0.96	12600
macro avg	0.96	0.96	0.96	12600
weighted avg	0.96	0.96	0.96	12600

9	0.95	0.93	0.94	1287

Accuracy received = 0.9565079365079365

accuracy			0.96	12600
macro avg	0.96	0.96	0.96	12600
weighted avg	0.96	0.96	0.96	12600

For test train split of 70-30 and K=4

Accuracy received = 0.964047619047619

Cofusion Matrix and Performance Report:

[[1228 0 2 0 0 1 3 0 0 2]
[0 1365 0 0 0 0 1 2 1 1]
[4 12 1206 3 1 0 2 19 3 2]
[1 6 6 1320 0 16 1 7 10 2]
[1 12 0 0 1179 0 3 1 0 19]
[4 3 0 28 1 1075 14 1 1 5]
[9 0 0 0 0 4 1202 0 1 0]
[1 20 3 0 2 0 0 1283 0 17]
[6 9 6 24 9 29 3 6 1094 11]
[7 3 2 17 24 5 0 31 3 1195]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1236
1	0.95	1.00	0.97	1370
2	0.98	0.96	0.97	1252
3	0.95	0.96	0.96	1369
4	0.97	0.97	0.97	1215
5	0.95	0.95	0.95	1132
6	0.98	0.99	0.98	1216
7	0.95	0.97	0.96	1326
8	0.98	0.91	0.95	1197

For test train split of 70-30 and K=5

Cofusion Matrix and Performance Report:

[[1225 0 2 0 0 1 6 1 0 1]
[0 1365 0 0 0 0 1 2 1 1]
[4 14 1197 7 2 1 2 20 3 2]
[1 5 7 1315 0 19 0 9 10 3]
[2 10 0 0 1172 0 3 1 0 27]
[3 3 0 26 3 1073 18 1 1 4]
[7 1 0 0 0 4 1204 0 0 0]
[1 19 3 0 1 0 0 1281 0 21]
[7 10 5 18 10 26 4 2 1101 14]
[7 8 1 15 16 4 0 21 7 1208]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1236
1	0.95	1.00	0.97	1370
2	0.99	0.96	0.97	1252
3	0.95	0.96	0.96	1369

4	0.97	0.96	0.97	1215
5	0.95	0.95	0.95	1132
6	0.97	0.99	0.98	1216
7	0.96	0.97	0.96	1326
8	0.98	0.92	0.95	1197
9	0.94	0.94	0.94	1287
accuracy			0.96	12600
macro avg	0.96	0.96	0.96	12600
weighted avg	0.96	0.96	0.96	12600

Accuracy received = 0.9635714285714285

For test train split of 70-30 and K=6

Cofusion Matrix and Performance Report:

[[1225 0 2 0 0 1 6 1 0 1]
[0 1365 0 0 0 0 1 2 1 1]
[4 15 1197 5 1 0 2 21 5 2]
[1 7 7 1315 1 16 1 8 9 4]
[1 13 0 0 1173 0 3 1 0 24]
[4 3 0 29 2 1070 17 1 1 5]
[11 1 0 0 0 3 1199 0 2 0]
[1 24 4 0 1 0 0 1278 0 18]
[9 12 4 19 9 25 7 4 1094 14]
[7 7 1 18 18 3 0 26 4 1203]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1236
1	0.94	1.00	0.97	1370
2	0.99	0.96	0.97	1252
3	0.95	0.96	0.95	1369
4	0.97	0.97	0.97	1215
5	0.96	0.95	0.95	1132
6	0.97	0.99	0.98	1216
7	0.95	0.96	0.96	1326
8	0.98	0.91	0.95	1197
9	0.95	0.93	0.94	1287
accuracy			0.96	12600
macro avg	0.96	0.96	0.96	12600
weighted avg	0.96	0.96	0.96	12600

Accuracy received = 0.9618253968253968

For test train split of 70-30 and K=7

Cofusion Matrix and Performance Report:

[[1222 0 2 0 0 2 8 1 0 1]
[0 1364 1 0 0 0 1 2 1 1]
[4 14 1192 5 1 0 3 27 4 2]
[2 7 6 1311 1 17 1 10 10 4]
[2 13 0 0 1167 0 3 1 0 29]
[3 3 0 18 1 1079 20 1 0 7]
[8 1 0 0 0 4 1201 0 2 0]

[1 23 3 0 1 0 0 1271 0 27]

[7 10 4 15 11 20 7 4 1106 13]

[7 7 1 18 14 3 0 18 4 1215]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1236
1	0.95	1.00	0.97	1370
2	0.99	0.95	0.97	1252
3	0.96	0.96	0.96	1369
4	0.98	0.96	0.97	1215
5	0.96	0.95	0.96	1132
6	0.97	0.99	0.98	1216
7	0.95	0.96	0.96	1326
8	0.98	0.92	0.95	1197
9	0.94	0.94	0.94	1287
accuracy			0.96	12600
macro avg	0.96	0.96	0.96	12600
weighted avg	0.96	0.96	0.96	12600

Accuracy received = 0.9625396825396826

For test train split of 70-30 and K=10

Cofusion Matrix and Performance Report:

[[1223 0 2 0 0 2 8 1 0 0]

[0 1366 0 0 0 0 1 1 1 1]

[4 15 1187 6 2 1 5 26 3 3]

[1 8 8 1312 1 15 1 13 6 4]

[2 15 0 0 1165 0 4 2 0 27]

[3 5 0 21 2 1078 16 0 0 7]

[11 2 0 0 1 3 1198 0 1 0]

[1 26 4 0 1 0 0 1270 0 24]

[9 13 5 23 11 20 6 3 1091 16]

[9 10 4 17 15 2 0 27 3 1200]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1236
1	0.94	1.00	0.97	1370
2	0.98	0.95	0.96	1252
3	0.95	0.96	0.95	1369
4	0.97	0.96	0.97	1215
5	0.96	0.95	0.96	1132
6	0.97	0.99	0.98	1216
7	0.95	0.96	0.95	1326
8	0.99	0.91	0.95	1197
9	0.94	0.93	0.93	1287
accuracy			0.96	12600
macro avg	0.96	0.96	0.96	12600
weighted avg	0.96	0.96	0.96	12600

Accuracy received = 0.9595238095238096

For test train split of 75-25 and K=2 Accuracy received = 0.9583809523809523

Cofusion Matrix and Performance Report:

[[1017 0 2 0 0 1 2 0 0 0]
[0 1128 0 0 0 0 0 0 1 1]
[7 9 1023 4 1 0 0 8 0 1]
[0 3 10 1089 1 12 0 6 5 2]
[2 12 1 0 982 0 3 3 0 11]
[3 0 1 35 4 878 9 1 0 3]
[13 2 0 0 2 5 986 0 0 0]
[0 17 5 0 3 1 0 1066 0 11]
[8 7 10 30 11 32 2 4 903 6]
[6 5 1 11 36 5 0 33 7 991]]

	precision	recall	f1-score	support
0	0.96	1.00	0.98	1022
1	0.95	1.00	0.98	1130
2	0.97	0.97	0.97	1053
3	0.93	0.97	0.95	1128
4	0.94	0.97	0.96	1014
5	0.94	0.94	0.94	934
6	0.98	0.98	0.98	1008
7	0.95	0.97	0.96	1103
8	0.99	0.89	0.94	1013
9	0.97	0.91	0.93	1095
accuracy			0.96	10500
macro avg	0.96	0.96	0.96	10500
weighted avg	0.96	0.96	0.96	10500

For test train split of 75-25 and K=4

Cofusion Matrix and Performance Report:

[[1015 0 2 0 0 1 2 0 0 2]
[0 1126 0 0 0 0 1 1 1 1]
[4 12 1019 3 1 0 0 10 2 2]
[0 5 6 1086 0 12 1 5 10 3]
[1 11 0 0 980 0 2 1 0 19]
[3 2 0 22 1 888 13 0 1 4]
[5 2 0 0 0 6 995 0 0 0]
[1 16 2 0 2 0 0 1067 0 15]
[5 7 6 15 7 27 2 5 931 8]
[6 3 2 13 21 5 0 26 3 1016]]

	precision	recall	f1-score	support
0	0.98	0.99	0.98	1022
1	0.95	1.00	0.97	1130
2	0.98	0.97	0.98	1053
3	0.95	0.96	0.96	1128
4	0.97	0.97	0.97	1014
5	0.95	0.95	0.95	934
6	0.98	0.99	0.98	1008
7	0.96	0.97	0.96	1103
8	0.98	0.92	0.95	1013
9	0.95	0.93	0.94	1095

accuracy			0.96	10500
macro avg	0.96	0.96	0.96	10500
weighted avg	0.96	0.96	0.96	10500

Accuracy received = 0.9640952380952381

For test train split of 75-25 and K=5

Cofusion Matrix and Performance Report:

[[1013 0 2 0 0 1 5 1 0 0]
[0 1126 0 0 0 0 1 1 1 1]
[4 12 1014 2 1 1 1 15 2 1]
[1 4 5 1082 0 15 0 7 10 4]
[1 9 0 0 974 0 3 1 0 26]
[3 3 0 21 3 884 14 0 3 3]
[4 1 0 0 0 5 998 0 0 0]
[1 15 2 0 1 0 0 1067 0 17]
[6 7 6 12 10 25 4 1 932 10]
[6 7 1 11 16 4 0 16 4 1030]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1022
1	0.95	1.00	0.97	1130
2	0.98	0.96	0.97	1053
3	0.96	0.96	0.96	1128
4	0.97	0.96	0.96	1014
5	0.95	0.95	0.95	934
6	0.97	0.99	0.98	1008
7	0.96	0.97	0.96	1103
8	0.98	0.92	0.95	1013
9	0.94	0.94	0.94	1095
accuracy			0.96	10500
macro avg	0.96	0.96	0.96	10500
weighted avg	0.96	0.96	0.96	10500

Accuracy received = 0.9638095238095238

For test train split of 75-25 and K=6

Cofusion Matrix and Performance Report:

[[1013 0 2 0 0 1 4 1 0 1]
[0 1127 0 0 0 0 0 1 1 1]
[4 13 1015 2 1 0 1 12 4 1]
[1 6 6 1083 0 14 1 6 8 3]
[1 12 0 0 974 0 2 1 0 24]
[3 3 0 25 2 881 14 1 1 4]
[8 2 0 0 0 2 995 0 1 0]
[1 19 2 0 1 0 0 1065 0 15]
[9 10 4 16 9 24 7 2 923 9]
[6 8 1 14 16 4 0 20 5 1021]]

precision recall f1-score support

0	0.97	0.99	0.98	1022
1	0.94	1.00	0.97	1130
2	0.99	0.96	0.97	1053
3	0.95	0.96	0.96	1128
4	0.97	0.96	0.97	1014
5	0.95	0.94	0.95	934
6	0.97	0.99	0.98	1008
7	0.96	0.97	0.96	1103
8	0.98	0.91	0.94	1013
9	0.95	0.93	0.94	1095
accuracy			0.96	10500
macro avg	0.96	0.96	0.96	10500
weighted avg	0.96	0.96	0.96	10500

Accuracy received = 0.9616190476190476

For test train split of 75-25 and K=7

Cofusion Matrix and Performance Report:

[[1011 0 2 0 0 1 6 1 0 1]
[0 1125 1 0 0 0 1 1 1 1]
[4 14 1007 2 1 0 2 18 4 1]
[1 6 5 1081 0 15 1 6 9 4]
[1 12 0 0 971 0 3 1 0 26]
[3 3 0 17 1 887 16 1 1 5]
[5 2 0 0 0 4 996 0 1 0]
[1 19 2 0 1 0 0 1058 0 22]
[7 9 4 13 10 19 7 3 930 11]
[7 7 1 14 14 3 0 18 2 1029]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1022
1	0.94	1.00	0.97	1130
2	0.99	0.96	0.97	1053
3	0.96	0.96	0.96	1128
4	0.97	0.96	0.97	1014
5	0.95	0.95	0.95	934
6	0.97	0.99	0.98	1008
7	0.96	0.96	0.96	1103
8	0.98	0.92	0.95	1013
9	0.94	0.94	0.94	1095
accuracy			0.96	10500
macro avg	0.96	0.96	0.96	10500
weighted avg	0.96	0.96	0.96	10500

Accuracy received = 0.9614285714285714

For test train split of 75-25 and K=10

Cofusion Matrix and Performance Report:

[[1011 0 2 0 0 1 7 1 0 0]
[0 1127 0 0 0 0 1 0 1 1]
[4 16 1003 4 2 0 2 17 4 1]

[1 7 6 1080 1 13 1 9 6 4]

[1 13 0 0 971 0 3 1 0 25]

[3 3 0 20 2 884 16 1 1 4]

[7 2 0 0 1 3 994 0 1 0]

[1 21 3 0 0 0 0 1061 0 17]

[8 10 4 17 11 22 6 2 918 15]

[7 8 1 14 13 2 0 26 2 1022]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	1022
1	0.93	1.00	0.96	1130
2	0.98	0.95	0.97	1053
3	0.95	0.96	0.95	1128
4	0.97	0.96	0.96	1014
5	0.96	0.95	0.95	934
6	0.97	0.99	0.98	1008
7	0.95	0.96	0.96	1103
8	0.98	0.91	0.94	1013
9	0.94	0.93	0.94	1095
accuracy			0.96	10500
macro avg	0.96	0.96	0.96	10500
weighted avg	0.96	0.96	0.96	10500

Accuracy received = 0.9591428571428572

For test train split of 80-20 and K=2

Cofusion Matrix and Performance Report:

[[817 0 1 0 0 1 2 0 0 0]

[0 897 0 0 0 0 0 0 1 1]

[7 8 830 3 1 0 0 8 0 1]

[0 3 8 879 1 10 0 6 5 1]

[2 11 1 0 763 0 1 3 0 10]

[2 0 0 27 3 719 7 1 0 3]

[11 3 0 0 2 3 789 0 0 0]

[0 13 3 0 3 0 0 852 0 9]

[5 6 7 25 6 23 2 4 707 4]

[5 5 1 10 30 5 0 24 7 792]]

	precision	recall	f1-score	support
0	0.96	1.00	0.98	821
1	0.95	1.00	0.97	899
2	0.98	0.97	0.97	858
3	0.93	0.96	0.95	913
4	0.94	0.96	0.95	791
5	0.94	0.94	0.94	762
6	0.99	0.98	0.98	808
7	0.95	0.97	0.96	880
8	0.98	0.90	0.94	789
9	0.96	0.90	0.93	879
accuracy			0.96	8400
macro avg	0.96	0.96	0.96	8400
weighted avg	0.96	0.96	0.96	8400

Accuracy received = 0.9577380952380953

accuracy			0.96	8400
macro avg	0.96	0.96	0.96	8400
weighted avg	0.96	0.96	0.96	8400

For test train split of 80-20 and K=4

Accuracy received = 0.9635714285714285

Cofusion Matrix and Performance Report:

[[815 0 1 0 0 1 2 0 0 2]
[0 896 0 0 0 0 0 1 1 1]
[4 9 830 1 1 0 0 9 2 2]
[0 4 4 879 0 11 1 5 8 1]
[0 10 0 0 759 0 2 1 0 19]
[3 1 0 16 1 724 11 1 1 4]
[4 1 0 0 1 4 798 0 0 0]
[0 12 2 0 2 0 0 854 0 10]
[3 5 4 9 5 24 1 4 729 5]
[6 3 0 13 20 6 0 18 3 810]]

	precision	recall	f1-score	support
0	0.98	0.99	0.98	821
1	0.95	1.00	0.97	899
2	0.99	0.97	0.98	858
3	0.96	0.96	0.96	913
4	0.96	0.96	0.96	791
5	0.94	0.95	0.95	762
6	0.98	0.99	0.98	808
7	0.96	0.97	0.96	880
8	0.98	0.92	0.95	789
9	0.95	0.92	0.93	879

For test train split of 80-20 and K=5

Cofusion Matrix and Performance Report:

[[815 0 1 0 0 1 3 1 0 0]
[0 896 0 0 0 0 0 1 1 1]
[4 9 827 1 1 1 0 13 0 2]
[1 3 3 874 0 16 0 7 7 2]
[1 8 0 0 758 0 2 1 0 21]
[2 2 0 16 3 722 13 0 2 2]
[4 1 0 0 1 3 799 0 0 0]
[0 11 2 0 1 0 0 853 0 13]
[5 5 4 10 7 20 2 2 727 7]
[6 6 1 11 13 3 0 12 3 824]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	821
1	0.95	1.00	0.97	899
2	0.99	0.96	0.98	858
3	0.96	0.96	0.96	913
4	0.97	0.96	0.96	791
5	0.94	0.95	0.95	762

6	0.98	0.99	0.98	808
7	0.96	0.97	0.96	880
8	0.98	0.92	0.95	789
9	0.94	0.94	0.94	879
accuracy			0.96	8400
macro avg	0.96	0.96	0.96	8400
weighted avg	0.96	0.96	0.96	8400

Accuracy received = 0.9636904761904762

For test train split of 80-20 and K=6

Cofusion Matrix and Performance Report:

[[815 0 1 0 0 1 2 1 0 1]
[0 896 0 0 0 0 0 1 1 1]
[4 12 825 1 1 0 0 10 3 2]
[1 5 4 874 0 14 1 6 6 2]
[1 9 0 0 759 0 1 1 0 20]
[2 2 0 20 2 718 12 1 2 3]
[7 1 0 0 0 1 798 0 1 0]
[0 15 2 0 1 0 0 852 0 10]
[6 7 3 13 7 18 4 2 723 6]
[6 6 1 10 16 4 0 14 4 818]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	821
1	0.94	1.00	0.97	899
2	0.99	0.96	0.97	858
3	0.95	0.96	0.95	913
4	0.97	0.96	0.96	791
5	0.95	0.94	0.95	762
6	0.98	0.99	0.98	808
7	0.96	0.97	0.96	880
8	0.98	0.92	0.95	789
9	0.95	0.93	0.94	879
accuracy			0.96	8400
macro avg	0.96	0.96	0.96	8400
weighted avg	0.96	0.96	0.96	8400

Accuracy received = 0.9616666666666667

For test train split of 80-20 and K=7

Cofusion Matrix and Performance Report:

[[814 0 1 0 0 1 3 1 0 1]
[0 895 1 0 0 0 0 1 1 1]
[4 12 820 2 1 0 1 13 3 2]
[1 5 3 873 0 15 1 6 7 2]
[0 9 0 0 758 0 3 1 0 20]
[2 2 0 14 1 721 14 1 2 5]
[5 1 0 0 1 2 798 0 1 0]
[0 15 2 0 1 0 0 847 0 15]
[6 7 2 11 7 14 6 2 727 7]

[7 6 1 11 14 2 0 14 2 822]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	821
1	0.94	1.00	0.97	899
2	0.99	0.96	0.97	858
3	0.96	0.96	0.96	913
4	0.97	0.96	0.96	791
5	0.95	0.95	0.95	762
6	0.97	0.99	0.98	808
7	0.96	0.96	0.96	880
8	0.98	0.92	0.95	789
9	0.94	0.94	0.94	879
accuracy			0.96	8400
macro avg	0.96	0.96	0.96	8400
weighted avg	0.96	0.96	0.96	8400

Accuracy received = 0.9613095238095238

For test train split of 80-20 and K=10

Cofusion Matrix and Performance Report:

[[814 0 1 0 0 1 4 1 0 0]
[0 896 0 0 0 0 0 1 1 1]
[4 11 818 3 2 0 1 15 3 1]
[1 6 4 872 1 12 1 8 6 2]
[0 10 0 0 756 0 3 1 0 21]
[2 2 0 16 2 719 15 1 1 4]
[6 1 0 0 1 2 797 0 1 0]
[0 16 2 0 0 0 0 849 0 13]
[5 9 2 13 7 15 7 2 718 11]
[7 7 1 12 14 3 0 19 2 814]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	821
1	0.94	1.00	0.96	899
2	0.99	0.95	0.97	858
3	0.95	0.96	0.95	913
4	0.97	0.96	0.96	791
5	0.96	0.94	0.95	762
6	0.96	0.99	0.97	808
7	0.95	0.96	0.96	880
8	0.98	0.91	0.94	789
9	0.94	0.93	0.93	879
accuracy			0.96	8400
macro avg	0.96	0.96	0.96	8400
weighted avg	0.96	0.96	0.96	8400

Accuracy received = 0.9586904761904762

For test train split of 90-10 and K=2

Cofusion Matrix and Performance Report:

[[389 0 0 0 0 0 0 0 0 0]
[0 456 0 0 0 0 0 0 0 1]
[4 2 429 0 1 0 1 4 0 0]
[0 3 3 421 0 3 0 2 2 0]
[0 5 0 0 397 0 0 0 0 5]
[1 0 0 11 2 359 5 1 0 1]
[6 0 0 0 0 2 420 0 0 0]
[0 5 2 0 3 0 0 406 0 5]
[3 2 1 13 3 11 2 1 370 3]
[1 3 0 6 14 4 0 12 4 390]]

	precision	recall	f1-score	support
0	0.96	1.00	0.98	389
1	0.96	1.00	0.98	457
2	0.99	0.97	0.98	441
3	0.93	0.97	0.95	434
4	0.95	0.98	0.96	407
5	0.95	0.94	0.95	380
6	0.98	0.98	0.98	428
7	0.95	0.96	0.96	421
8	0.98	0.90	0.94	409
9	0.96	0.90	0.93	434
accuracy			0.96	4200
macro avg	0.96	0.96	0.96	4200
weighted avg	0.96	0.96	0.96	4200

Accuracy received = 0.9611904761904762

For test train split of 90-10 and K=4

Cofusion Matrix and Performance Report:

[[388 0 0 0 0 0 0 0 0 1]
[0 456 0 0 0 0 0 0 0 1]
[3 2 430 0 0 0 0 6 0 0]
[0 3 3 419 0 3 0 2 4 0]
[0 4 0 0 395 0 1 0 0 7]
[2 0 0 5 1 361 7 1 0 3]
[2 0 0 0 0 3 423 0 0 0]
[0 5 1 0 2 0 0 408 0 5]
[3 2 1 5 3 12 1 3 376 3]
[1 2 0 8 8 6 0 8 1 400]]

	precision	recall	f1-score	support
0	0.97	1.00	0.98	389
1	0.96	1.00	0.98	457
2	0.99	0.98	0.98	441
3	0.96	0.97	0.96	434
4	0.97	0.97	0.97	407
5	0.94	0.95	0.94	380
6	0.98	0.99	0.98	428
7	0.95	0.97	0.96	421
8	0.99	0.92	0.95	409
9	0.95	0.92	0.94	434
accuracy			0.97	4200

macro avg	0.97	0.97	0.97	4200
weighted avg	0.97	0.97	0.97	4200

Accuracy received = 0.9657142857142857

For test train split of 90-10 and K=5

Cofusion Matrix and Performance Report:

[[388 0 0 0 0 0 0 1 0 0]
[0 456 0 0 0 0 0 0 0 1]
[3 2 425 0 2 0 0 8 1 0]
[1 3 2 418 0 4 0 3 2 1]
[0 3 0 0 392 0 0 0 0 12]
[1 0 0 5 1 360 9 1 1 2]
[2 0 0 0 0 2 424 0 0 0]
[0 4 1 0 1 0 0 408 0 7]
[3 1 0 5 4 11 0 1 380 4]
[1 3 0 8 6 3 0 6 2 405]]

	precision	recall	f1-score	support
0	0.97	1.00	0.98	389
1	0.97	1.00	0.98	457
2	0.99	0.96	0.98	441
3	0.96	0.96	0.96	434
4	0.97	0.96	0.96	407
5	0.95	0.95	0.95	380
6	0.98	0.99	0.98	428
7	0.95	0.97	0.96	421
8	0.98	0.93	0.96	409
9	0.94	0.93	0.94	434
accuracy			0.97	4200
macro avg	0.97	0.97	0.97	4200
weighted avg	0.97	0.97	0.97	4200

Accuracy received = 0.9657142857142857

For test train split of 90-10 and K=6

Cofusion Matrix and Performance Report:

[[388 0 0 0 0 0 0 1 0 0]
[0 456 0 0 0 0 0 0 0 1]
[3 2 426 0 1 1 0 8 0 0]
[1 3 2 419 0 3 0 3 2 1]
[1 3 0 0 395 0 0 0 0 8]
[1 0 0 11 1 353 9 2 1 2]
[3 0 0 0 0 2 423 0 0 0]
[0 7 1 0 2 0 0 405 0 6]
[3 1 0 8 5 10 3 1 375 3]
[1 3 0 7 8 3 0 7 1 404]]

	precision	recall	f1-score	support
0	0.97	1.00	0.98	389
1	0.96	1.00	0.98	457

2	0.99	0.97	0.98	441
3	0.94	0.97	0.95	434
4	0.96	0.97	0.96	407
5	0.95	0.93	0.94	380
6	0.97	0.99	0.98	428
7	0.95	0.96	0.96	421
8	0.99	0.92	0.95	409
9	0.95	0.93	0.94	434
accuracy			0.96	4200
macro avg	0.96	0.96	0.96	4200
weighted avg	0.96	0.96	0.96	4200

Accuracy received = 0.9628571428571429

For test train split of 90-10 and K=7

Cofusion Matrix and Performance Report:

[[387 0 0 0 0 0 1 1 0 0]
[0 456 0 0 0 0 0 0 0 1]
[3 2 425 0 1 0 0 9 1 0]
[1 3 2 418 0 3 0 3 2 2]
[0 2 0 0 392 0 1 0 0 12]
[1 1 0 4 1 361 9 0 1 2]
[2 0 0 0 0 2 424 0 0 0]
[0 7 1 0 1 0 0 404 0 8]
[3 2 0 5 4 7 3 1 378 6]
[1 3 0 6 6 2 0 7 2 407]]

	precision	recall	f1-score	support
0	0.97	0.99	0.98	389
1	0.96	1.00	0.98	457
2	0.99	0.96	0.98	441
3	0.97	0.96	0.96	434
4	0.97	0.96	0.97	407
5	0.96	0.95	0.96	380
6	0.97	0.99	0.98	428
7	0.95	0.96	0.96	421
8	0.98	0.92	0.95	409
9	0.93	0.94	0.93	434
accuracy			0.96	4200
macro avg	0.97	0.96	0.96	4200
weighted avg	0.97	0.96	0.96	4200

Accuracy received = 0.9647619047619047

For test train split of 90-10 and K=10

Cofusion Matrix and Performance Report:

[[386 0 0 0 0 0 2 1 0 0]
[0 456 0 0 0 0 0 0 0 1]
[3 4 425 0 1 0 0 8 0 0]
[1 4 2 415 0 5 0 4 2 1]
[0 3 0 0 394 0 1 0 0 9]

```
[ 1  1  0  6  1 358  10  1  0  2]
[ 2  0  0  0  0  1 424  0  1  0]
[ 0  8  1  0  0  0  0 407  0  5]
[ 3  2  0  7  3  10  4  1 372  7]
[ 1  3  0  8  6  3  0  7  1 405]]
```

	precision	recall	f1-score	support
0	0.97	0.99	0.98	389
1	0.95	1.00	0.97	457
2	0.99	0.96	0.98	441
3	0.95	0.96	0.95	434
4	0.97	0.97	0.97	407
5	0.95	0.94	0.95	380
6	0.96	0.99	0.98	428
7	0.95	0.97	0.96	421
8	0.99	0.91	0.95	409
9	0.94	0.93	0.94	434
accuracy			0.96	4200
macro avg	0.96	0.96	0.96	4200
weighted avg	0.96	0.96	0.96	4200

Accuracy received = 0.9623809523809523

For test train split of 95-5 and K=2

Cofusion Matrix and Performance Report:

```
[[210  0  0  0  0  0  0  0  0  0]
[ 0 215  0  0  0  0  0  0  0  0]
[ 1  1 205  0  1  0  0  3  0  0]
[ 0  0  3 207  0  2  0  2  1  0]
[ 0  1  0  0 187  0  0  0  0  2]
[ 0  0  0  5  2 189  4  1  0  0]
[ 4  0  0  0  0  0 208  0  0  0]
[ 0  5  2  0  2  0  0 212  0  1]
[ 1  1  1  7  2  5  2  0 204  0]
[ 0  2  0  5  7  2  0  7  3 175]]
```

	precision	recall	f1-score	support
0	0.97	1.00	0.99	210
1	0.96	1.00	0.98	215
2	0.97	0.97	0.97	211
3	0.92	0.96	0.94	215
4	0.93	0.98	0.96	190
5	0.95	0.94	0.95	201
6	0.97	0.98	0.98	212
7	0.94	0.95	0.95	222
8	0.98	0.91	0.95	223
9	0.98	0.87	0.92	201
accuracy			0.96	2100
macro avg	0.96	0.96	0.96	2100
weighted avg	0.96	0.96	0.96	2100

Accuracy received = 0.9580952380952381

weighted avg 0.96 0.96 0.96 2100

For test train split of 95-5 and K=4

Accuracy received = 0.9619047619047619

Cofusion Matrix and Performance Report:

[[209 0 0 0 0 0 0 0 0 1]
[0 215 0 0 0 0 0 0 0 0]
[2 1 205 0 0 0 0 3 0 0]
[0 1 2 206 0 2 0 2 2 0]
[0 1 0 0 185 0 0 0 0 4]
[1 0 0 2 1 189 5 1 0 2]
[1 0 0 0 0 0 211 0 0 0]
[0 5 1 0 2 0 0 211 0 3]
[1 0 1 4 2 6 1 1 207 0]
[0 2 0 4 6 3 0 3 1 182]]

	precision	recall	f1-score	support
0	0.98	1.00	0.99	210
1	0.96	1.00	0.98	215
2	0.98	0.97	0.98	211
3	0.95	0.96	0.96	215
4	0.94	0.97	0.96	190
5	0.94	0.94	0.94	201
6	0.97	1.00	0.98	212
7	0.95	0.95	0.95	222
8	0.99	0.93	0.96	223
9	0.95	0.91	0.93	201
accuracy			0.96	2100
macro avg	0.96	0.96	0.96	2100

For test train split of 95-5 and K=5

Cofusion Matrix and Performance Report:

[[209 0 0 0 0 0 0 1 0 0]
[0 215 0 0 0 0 0 0 0 0]
[2 1 203 0 1 0 0 3 1 0]
[1 1 1 206 0 2 0 2 1 1]
[0 0 0 0 185 0 0 0 0 5]
[0 0 0 2 1 190 6 1 0 1]
[1 0 0 0 0 0 211 0 0 0]
[0 4 1 0 1 0 0 212 0 4]
[1 0 0 3 3 7 0 0 208 1]
[0 2 0 5 3 1 0 1 2 187]]

	precision	recall	f1-score	support
0	0.98	1.00	0.99	210
1	0.96	1.00	0.98	215
2	0.99	0.96	0.98	211
3	0.95	0.96	0.96	215
4	0.95	0.97	0.96	190
5	0.95	0.95	0.95	201
6	0.97	1.00	0.98	212
7	0.96	0.95	0.96	222

8	0.98	0.93	0.96	223
9	0.94	0.93	0.94	201
accuracy			0.96	2100
macro avg	0.96	0.96	0.96	2100
weighted avg	0.96	0.96	0.96	2100

Accuracy received = 0.9647619047619047

For test train split of 95-5 and K=6

Cofusion Matrix and Performance Report:

[[209 0 0 0 0 0 0 1 0 0]
[0 215 0 0 0 0 0 0 0 0]
[2 2 203 0 0 1 0 3 0 0]
[1 1 1 205 0 2 0 3 1 1]
[0 0 0 0 187 0 0 0 0 3]
[0 0 0 5 1 185 6 2 1 1]
[1 0 0 0 0 0 211 0 0 0]
[0 6 1 0 2 0 0 209 0 4]
[1 0 0 4 4 7 0 0 206 1]
[0 2 0 4 4 2 0 2 1 186]]

	precision	recall	f1-score	support
0	0.98	1.00	0.99	210
1	0.95	1.00	0.98	215
2	0.99	0.96	0.98	211
3	0.94	0.95	0.95	215
4	0.94	0.98	0.96	190
5	0.94	0.92	0.93	201
6	0.97	1.00	0.98	212
7	0.95	0.94	0.95	222
8	0.99	0.92	0.95	223
9	0.95	0.93	0.94	201
accuracy			0.96	2100
macro avg	0.96	0.96	0.96	2100
weighted avg	0.96	0.96	0.96	2100

Accuracy received = 0.96

For test train split of 95-5 and K=7

Cofusion Matrix and Performance Report:

[[208 0 0 0 0 0 1 1 0 0]
[0 215 0 0 0 0 0 0 0 0]
[2 2 201 0 1 0 0 4 1 0]
[1 1 1 205 0 2 0 3 1 1]
[0 0 0 0 186 0 0 0 0 4]
[0 1 0 1 0 190 6 0 1 2]
[1 0 0 0 0 0 211 0 0 0]
[0 6 1 0 1 0 0 209 0 5]
[1 1 0 4 3 5 0 0 207 2]
[0 2 0 4 3 1 0 2 1 188]]

	precision	recall	f1-score	support
0	0.98	0.99	0.98	210
1	0.94	1.00	0.97	215
2	0.99	0.95	0.97	211
3	0.96	0.95	0.96	215
4	0.96	0.98	0.97	190
5	0.96	0.95	0.95	201
6	0.97	1.00	0.98	212
7	0.95	0.94	0.95	222
8	0.98	0.93	0.95	223
9	0.93	0.94	0.93	201
accuracy			0.96	2100
macro avg	0.96	0.96	0.96	2100
weighted avg	0.96	0.96	0.96	2100

Accuracy received = 0.9619047619047619

For test train split of 95-5 and K=10

Cofusion Matrix and Performance Report:

[[208 0 0 0 0 0 1 1 0 0]
[0 215 0 0 0 0 0 0 0 0]
[2 2 203 0 0 0 0 4 0 0]
[1 2 1 204 0 2 0 3 1 1]
[0 0 0 0 187 0 0 0 0 3]
[0 1 0 3 1 187 7 1 0 1]
[1 0 0 0 0 0 211 0 0 0]
[0 6 1 0 0 0 0 212 0 3]
[1 0 0 5 3 7 1 0 203 3]
[0 2 0 4 4 1 0 2 1 187]]

	precision	recall	f1-score	support
0	0.98	0.99	0.98	210
1	0.94	1.00	0.97	215
2	0.99	0.96	0.98	211
3	0.94	0.95	0.95	215
4	0.96	0.98	0.97	190
5	0.95	0.93	0.94	201
6	0.96	1.00	0.98	212
7	0.95	0.95	0.95	222
8	0.99	0.91	0.95	223
9	0.94	0.93	0.94	201
accuracy			0.96	2100
macro avg	0.96	0.96	0.96	2100
weighted avg	0.96	0.96	0.96	2100

Accuracy received = 0.9604761904761905