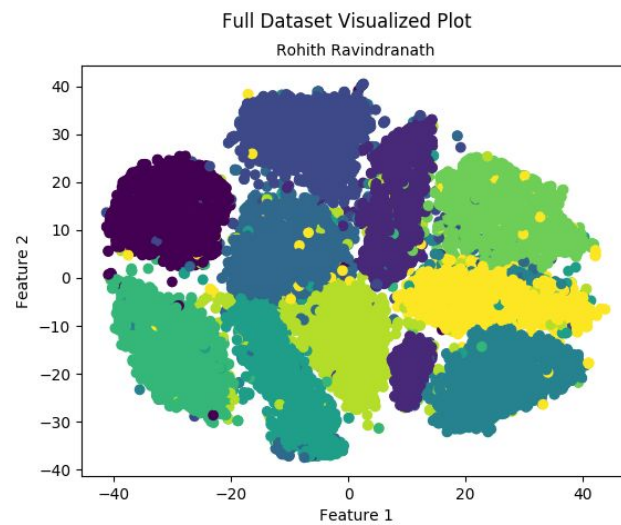


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Project 1

Full Dataset (Training Data 80%, Testing Data 20%)

Plot of Visualized Images



Confusion Matrix for k = [1,15,15,31]

-----FULL DATASET-----

Welcome to KNN Algo

Classifying Data for Full Dataset (k = 1)...

Data Classified for Full Dataset (k = 1)...

Evaluating Model for Full Dataset (k = 1)...

Confusion Matrix for Full Dataset (k = 1):

```
[[398.  0.  1.  0.  0.  1.  2.  0.  0.  0.]
 [ 0. 454.  3.  1.  2.  0.  3.  2.  5.  0.]
 [ 0.  4. 377.  3.  1.  2.  0.  9.  2.  0.]
 [ 0.  1.  6. 397.  0. 13.  0.  2. 11.  4.]
 [ 0.  3.  2.  0. 390.  0.  1.  2.  1.  7.]
 [ 0.  0.  0. 11.  0. 327.  8.  3.  4.  2.]
 [ 5.  0.  1.  1.  1.  4. 350.  0.  2.  0.]
 [ 0.  3.  3.  0.  0.  1.  0. 409.  1.  7.]
 [ 2.  2.  0.  5.  0.  5.  0.  1. 338.  4.]
 [ 3.  0.  0.  2.  9.  4.  0.  9.  5. 358.]]
```

Average F1 Score: for Full Dataset (k = 1):0.948761211712973

Classifying Data for Full Dataset (k = 5)...

Data Classified for Full Dataset (k = 5)...

Evaluating Model for Full Dataset (k = 5)...

Confusion Matrix for Full Dataset (k = 5):

```
[[383.  0.  1.  0.  0.  0.  4.  0.  0.  2.]
 [ 0. 416.  3.  2.  1.  0.  3.  3.  4.  2.]
 [ 4.  8. 361.  3.  1.  3.  1. 18.  3.  1.]
 [ 0.  1. 11. 381.  0. 31.  0. 17. 24.  4.]
 [ 0. 11.  3.  1. 368.  1.  4.  3.  6. 16.]
 [ 0.  0.  0. 14.  1. 293. 16.  3.  4.  4.]
 [ 7.  0.  0.  1.  1.  5. 329.  0.  2.  0.]
 [ 0. 13.  5.  0.  3.  1.  0. 373.  3. 19.]
 [ 8. 12.  9. 12.  5. 18.  6.  6. 317. 17.]
 [ 6.  6.  0.  6. 23.  5.  1. 14.  6. 317.]]
```

Average F1 Score: for Full Dataset (k = 5):0.8839421969006288

Classifying Data for Full Dataset (k = 15)...

Data Classified for Full Dataset (k = 15)...

Evaluating Model for Full Dataset (k = 15)...

Confusion Matrix for Full Dataset (k = 15):

```
[[333.  1.  2.  0.  0.  1.  4.  0.  3.  3.]
 [  0. 305.  2.  6.  4.  1.  2.  2.  6.  4.]
 [ 17.  24. 329.  5.  4.  3.  3. 41. 10.  5.]
 [  1.  3.  26. 308.  1. 69.  0. 38. 50. 15.]
 [  0. 33.  3.  0. 320.  1. 15.  2.  4. 58.]
 [  0.  1.  0. 30.  6. 222. 29.  7. 10.  7.]
 [ 14.  1.  0.  1.  3.  9. 294.  0.  1.  0.]
 [  0. 39. 14.  0. 11.  1.  0. 302.  2. 32.]
 [ 21. 39. 15. 40. 11. 43. 14. 14. 271. 39.]
 [ 22. 21.  2. 30. 43.  7.  3. 31. 12. 219.]]
```

Average F1 Score: for Full Dataset (k = 15):0.7285424379783335

Classifying Data for Full Dataset (k = 31)...

Data Classified for Full Dataset (k = 31)...

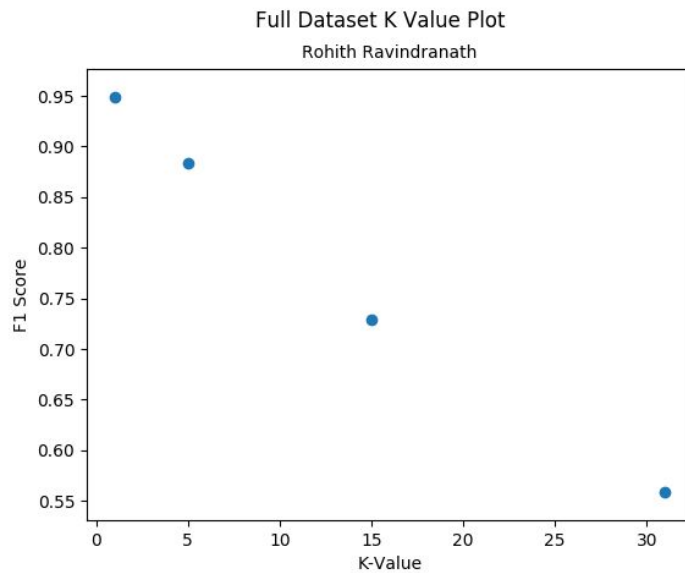
Evaluating Model for Full Dataset (k = 31)...

Confusion Matrix for Full Dataset (k = 31):

```
[[277.  4.  3.  0.  1.  1.  4.  0.  4.  4.]
 [  0. 178.  7.  8.  7.  0.  1.  6. 10.  4.]
 [ 31.  55. 299. 10.  9.  7.  4. 66. 16.  6.]
 [  3. 10.  41. 249.  3. 90.  0. 58. 70. 27.]
 [  0. 55.  3.  1. 249.  3. 19.  5.  2. 81.]
 [  0.  1.  0. 25. 11. 147. 40. 15. 11. 18.]
 [ 28.  1.  0.  1.  5.  9. 251.  0.  2.  0.]
 [  0. 63. 17.  0. 14.  0.  0. 208.  5. 50.]
 [ 38. 69. 18. 64. 37. 86. 37. 30. 230. 70.]
 [ 31. 31.  5. 62. 67. 14.  8. 49. 19. 122.]]
```

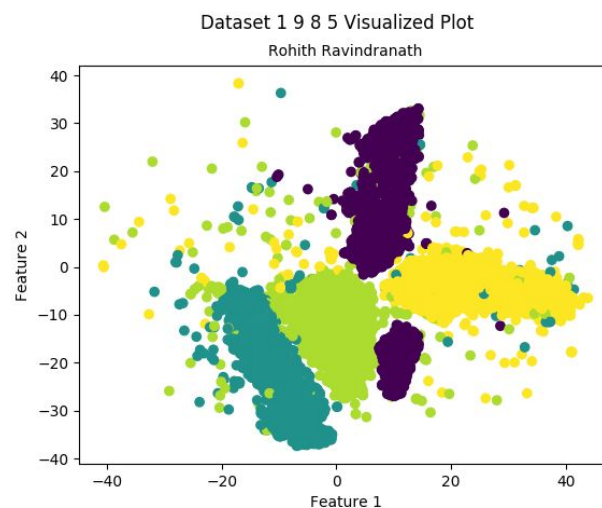
Average F1 Score: for Full Dataset (k = 31):0.5590582694381914

Plot of Average F1 Scores for k-values



Dataset (1,9,8,5) (Training Data 80%, Testing Data 20%)

Plot of Visualized Images



Confusion Matrix for k = [1, 15, 15, 31]

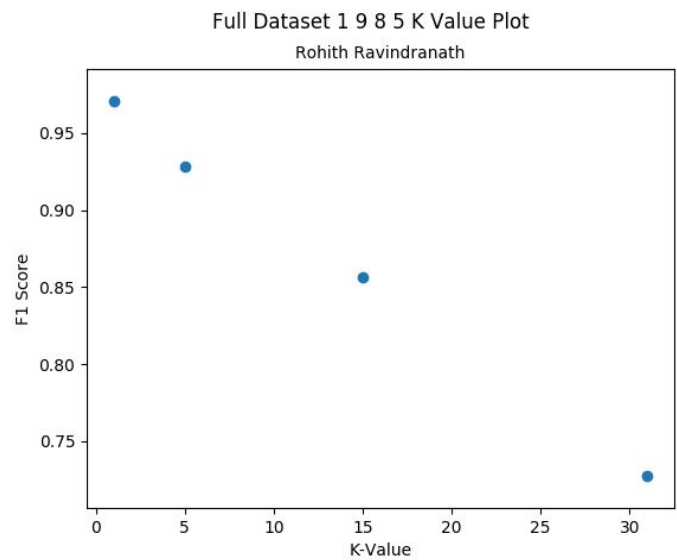
```
-----DATASET 1 9 8 5-----
Welcome to KNN Algo
Classifying Data for Dataset 1 9 8 5 (k = 1)...
Data Classified for Dataset 1 9 8 5 (k = 1)...
Evaluating Model for Dataset 1 9 8 5 (k = 1)...
Confusion Matrix for Dataset 1 9 8 5 (k = 1):
[[437.  0.  6.  0.]
 [ 0. 337.  9.  4.]
 [ 4.  3. 391.  5.]
 [ 2.  5.  8. 388.]]
Average F1 Score: for Dataset 1 9 8 5 (k = 1):0.9708501243301095

Classifying Data for Dataset 1 9 8 5 (k = 5)...
Data Classified for Dataset 1 9 8 5 (k = 5)...
Evaluating Model for Dataset 1 9 8 5 (k = 5)...
Confusion Matrix for Dataset 1 9 8 5 (k = 5):
[[417.  0. 12.  4.]
 [ 1. 321.  9.  7.]
 [19. 19. 379. 19.]
 [ 6.  5. 14. 367.]]
Average F1 Score: for Dataset 1 9 8 5 (k = 5):0.9285204315160775

Classifying Data for Dataset 1 9 8 5 (k = 15)...
Data Classified for Dataset 1 9 8 5 (k = 15)...
Evaluating Model for Dataset 1 9 8 5 (k = 15)...
Confusion Matrix for Dataset 1 9 8 5 (k = 15):
[[378.  0. 11.  8.]
 [ 1. 300. 13. 21.]
 [50. 39. 373. 53.]
 [14.  6. 17. 315.]]
Average F1 Score: for Dataset 1 9 8 5 (k = 15):0.8566221075112539

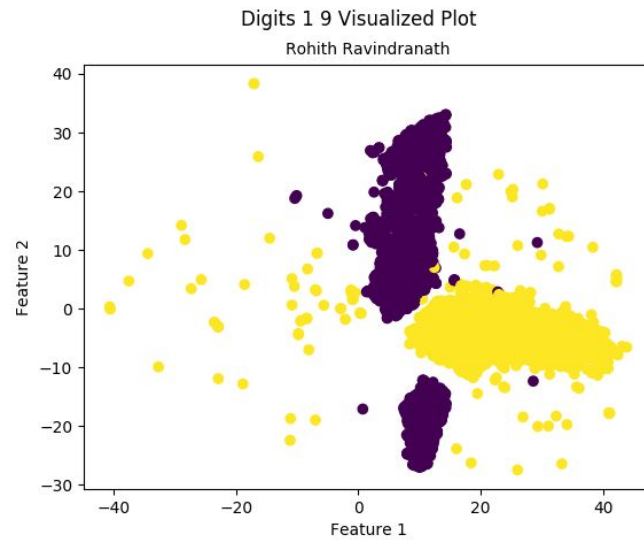
Classifying Data for Dataset 1 9 8 5 (k = 31)...
Data Classified for Dataset 1 9 8 5 (k = 31)...
Evaluating Model for Dataset 1 9 8 5 (k = 31)...
Confusion Matrix for Dataset 1 9 8 5 (k = 31):
[[309.  0. 15. 11.]
 [ 3. 249. 24. 35.]
 [92. 84. 350. 104.]
 [39. 12. 25. 247.]]
Average F1 Score: for Dataset 1 9 8 5 (k = 31):0.7275250024683564
```

Plot of Average F1 Scores for k-values



Dataset (1,9) (Training Data 80%, Testing Data 20%)

Plot of Visualized Images



Confusion Matrix for k = [1, 15, 15, 31]

```
-----DATASET 1 9-----
Welcome to KNN Algo
Classifying Data for Dataset 1 9 (k = 1)...
Data Classified for Dataset 1 9 (k = 1).
Evaluating Model for Dataset 1 9 (k = 1)...
Confusion Matrix for Dataset 1 9 (k = 1):
[[472.   3.]
 [   3. 381.]]
Average F1 Score: for Dataset 1 9 (k = 1):0.992935855263158

Classifying Data for Dataset 1 9 (k = 5)...
Data Classified for Dataset 1 9 (k = 5).
Evaluating Model for Dataset 1 9 (k = 5)...
Confusion Matrix for Dataset 1 9 (k = 5):
[[467.   5.]
 [   8. 379.]]
Average F1 Score: for Dataset 1 9 (k = 5):0.9847056100430467

Classifying Data for Dataset 1 9 (k = 15)...
Data Classified for Dataset 1 9 (k = 15).
Evaluating Model for Dataset 1 9 (k = 15)...
Confusion Matrix for Dataset 1 9 (k = 15):
[[455.  10.]
 [  20. 374.]]
Average F1 Score: for Dataset 1 9 (k = 15):0.9647623475359624

Classifying Data for Dataset 1 9 (k = 31)...
Data Classified for Dataset 1 9 (k = 31).
Evaluating Model for Dataset 1 9 (k = 31)...
Confusion Matrix for Dataset 1 9 (k = 31):
[[425.  11.]
 [  50. 373.]]
Average F1 Score: for Dataset 1 9 (k = 31):0.9287260074784711
```

Plot of Average F1 Scores for k-values

