

## SEP 787 Project Console Output

This is the console output of the python program which contains:

- Computational Times for both training and testing
- Cross Validation for parameter selection
- Confusion matrixs

```
/usr/local/bin/python3.7 "/Users/yishengli/Desktop/SEP 787/787Project/787Project.py"
```

```
/////////////////////////////////////////////////////////////////  
/////////////////////////////////////////////////////////////////      KNN, k = 5      //  
/////////////////////////////////////////////////////////////////
```

```
-----KNN (k = 5) test #1-----
```

Confusion Matrix:

```
[[183  0]
```

```
 [ 0 117]]
```

total errors = 0

```
---KNN Computational Time for testing time used: 30.364 milliseconds ---
```

```
precision recall f1-score support
```

```
0    1.00    1.00    1.00    183
```

```
1    1.00    1.00    1.00    117
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

```
-----KNN (k = 5) test #2-----
```

Confusion Matrix:

```
[[179  0]
```

```
 [ 0 121]]
```

total errors = 0

```
---KNN Computational Time for testing time used: 35.790 milliseconds ---
```

```
precision recall f1-score support
```

```
0    1.00    1.00    1.00    179
```

```
1    1.00    1.00    1.00    121
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

```
-----KNN (k = 5) test #3-----
```

Confusion Matrix:

```
[[199  0]
```

```
 [ 0 101]]
```

total errors = 0

```
---KNN Computational Time for testing time used: 37.226 milliseconds ---
```

```
precision recall f1-score support
```

0	1.00	1.00	1.00	199
1	1.00	1.00	1.00	101

  

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 5) test #4-----

Confusion Matrix:

[[200 1]

[ 0 99]]

total errors = 1

---KNN Computational Time for testing time used: 37.638 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	201
1	0.99	1.00	0.99	99

accuracy			1.00	300
macro avg	0.99	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

----- KNN, k = 5, Average number of errors from cross validations = 0.25

//  
 // KNN, k = 6 //  
 //

-----KNN (k = 6) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 34.990 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	183
1	1.00	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 6) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.204 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	179
---	------	------	------	-----

1	1.00	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 6) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
[ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.301 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	199
---	------	------	------	-----

1	1.00	1.00	1.00	101
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 6) test #4-----

Confusion Matrix:

```
[[201  0]
```

```
[ 0  99]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.215 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	201
---	------	------	------	-----

1	1.00	1.00	1.00	99
---	------	------	------	----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

----- KNN, k = 6, Average number of errors from cross validations = 0.0

```
////////////////////////////////////  
//////////////////////////////////// KNN, k = 7 //////////////////////////////////  
////////////////////////////////////
```

-----KNN (k = 7) test #1-----

Confusion Matrix:

```
[[183  0]
```

```
[ 0 117]]
```

total errors = 0

---KNN Computational Time for testing time used: 35.106 milliseconds ---

precision recall f1-score support

```
0    1.00    1.00    1.00    183
```

```
1    1.00    1.00    1.00    117
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

-----KNN (k = 7) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 34.406 milliseconds ---

precision recall f1-score support

```
0    1.00    1.00    1.00    179
```

```
1    1.00    1.00    1.00    121
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

-----KNN (k = 7) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
[ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.230 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	199
1	1.00	1.00	1.00	101

  

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 7) test #4-----

Confusion Matrix:

[[201 0]

[ 0 99]]

total errors = 0

---KNN Computational Time for testing time used: 37.190 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	201
1	1.00	1.00	1.00	99

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

----- KNN, k = 7, Average number of errors from cross validations = 0.0

////////////////////////////////////  
 ////////////////////////////////////// KNN, k = 8 //////////////////////////////////////  
 //////////////////////////////////////

-----KNN (k = 8) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 36.693 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	183
1	1.00	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 8) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 32.700 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	179
---	------	------	------	-----

1	1.00	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 8) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
[ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.131 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	199
---	------	------	------	-----

1	1.00	1.00	1.00	101
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 8) test #4-----

Confusion Matrix:

```
[[201  0]
```

```
[ 0 99]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.664 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	201
---	------	------	------	-----

1	1.00	1.00	1.00	99
---	------	------	------	----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

----- KNN, k = 8, Average number of errors from cross validations = 0.0

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 9 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 9) test #1-----

Confusion Matrix:

```
[[183  0]
```

```
[ 0 117]]
```

total errors = 0

---KNN Computational Time for testing time used: 35.168 milliseconds ---

precision recall f1-score support

```
0    1.00    1.00    1.00    183
```

```
1    1.00    1.00    1.00    117
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

-----KNN (k = 9) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 32.478 milliseconds ---

precision recall f1-score support

```
0    1.00    1.00    1.00    179
```

```
1    1.00    1.00    1.00    121
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

-----KNN (k = 9) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
[ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.477 milliseconds ---

precision recall f1-score support



0	1.00	1.00	1.00	199
1	1.00	1.00	1.00	101

  

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 9) test #4-----

Confusion Matrix:

[[201 0]

[ 0 99]]

total errors = 0

---KNN Computational Time for testing time used: 34.143 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	201
1	1.00	1.00	1.00	99

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

----- KNN, k = 9, Average number of errors from cross validations = 0.0

//  
 // KNN, k = 10 //  
 //

-----KNN (k = 10) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 33.419 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	183
1	1.00	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 10) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
 [ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 37.050 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 179

1 1.00 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 10) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
 [ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 35.392 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 199

1 1.00 1.00 1.00 101

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 10) test #4-----

Confusion Matrix:

```
[[201  0]
```

```
 [ 0  99]]
```

total errors = 0

---KNN Computational Time for testing time used: 37.373 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 201

1 1.00 1.00 1.00 99

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

----- KNN, k = 10, Average number of errors from cross validations = 0.0

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 11 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 11) test #1-----

Confusion Matrix:

```
[[183  0]
```

```
 [ 0 117]]
```

total errors = 0

---KNN Computational Time for testing time used: 32.790 milliseconds ---

precision recall f1-score support

```
0    1.00    1.00    1.00    183
```

```
1    1.00    1.00    1.00    117
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

-----KNN (k = 11) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
 [ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 38.022 milliseconds ---

precision recall f1-score support

```
0    1.00    1.00    1.00    179
```

```
1    1.00    1.00    1.00    121
```

```
accuracy                1.00    300
```

```
macro avg    1.00    1.00    1.00    300
```

```
weighted avg    1.00    1.00    1.00    300
```

-----KNN (k = 11) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
 [ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 51.764 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	199
1	1.00	1.00	1.00	101

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 11) test #4-----

Confusion Matrix:

[[198 3]

[ 0 99]]

total errors = 3

---KNN Computational Time for testing time used: 34.955 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.99	0.99	201
1	0.97	1.00	0.99	99

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

----- KNN, k = 11, Average number of errors from cross validations = 0.75

//  
// KNN, k = 12 //  
//

-----KNN (k = 12) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 32.008 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	1.00	1.00	183
1	1.00	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 12) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.401 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 179

1 1.00 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 12) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
[ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 32.278 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 199

1 1.00 1.00 1.00 101

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 12) test #4-----

Confusion Matrix:

```
[[198  3]
```

```
[ 0 99]]
```

total errors = 3

---KNN Computational Time for testing time used: 35.786 milliseconds ---

precision recall f1-score support

0 1.00 0.99 0.99 201

1 0.97 1.00 0.99 99

accuracy 0.99 300

macro avg 0.99 0.99 0.99 300

weighted avg 0.99 0.99 0.99 300

----- KNN, k = 12, Average number of errors from cross validations = 0.75

////////////////////////////////////  
//////////////////////////////////// KNN, k = 13 //////////////////////////////////  
////////////////////////////////////

-----KNN (k = 13) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 29.824 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 183

1 1.00 1.00 1.00 117

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 13) test #2-----

Confusion Matrix:

[[179 0]

[ 0 121]]

total errors = 0

---KNN Computational Time for testing time used: 37.200 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 179

1 1.00 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 13) test #3-----

Confusion Matrix:

[[199 0]

[ 0 101]]

total errors = 0

---KNN Computational Time for testing time used: 36.673 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	199
1	1.00	1.00	1.00	101

  

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 13) test #4-----

Confusion Matrix:

[[198 3]

[ 0 99]]

total errors = 3

---KNN Computational Time for testing time used: 36.517 milliseconds ---

precision recall f1-score support

0	1.00	0.99	0.99	201
1	0.97	1.00	0.99	99

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

----- KNN, k = 13, Average number of errors from cross validations = 0.75

////////////////////////////////////  
 ////////////////////////////////////// KNN, k = 14 //////////////////////////////////////  
 //////////////////////////////////////

-----KNN (k = 14) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 35.708 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	183
1	1.00	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 14) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
 [ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 28.839 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 179

1 1.00 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 14) test #3-----

Confusion Matrix:

```
[[199  0]
```

```
 [ 0 101]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.063 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 199

1 1.00 1.00 1.00 101

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 14) test #4-----

Confusion Matrix:

```
[[198  3]
```

```
 [ 0 99]]
```

total errors = 3

---KNN Computational Time for testing time used: 36.529 milliseconds ---

precision recall f1-score support

0 1.00 0.99 0.99 201

1 0.97 1.00 0.99 99

accuracy 0.99 300

macro avg 0.99 0.99 0.99 300

weighted avg 0.99 0.99 0.99 300



----- KNN, k = 14, Average number of errors from cross validations = 0.75

////////////////////////////////////  
//////////////////////////////////// KNN, k = 15 //////////////////////////////////  
////////////////////////////////////

-----KNN (k = 15) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 36.165 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 183

1 1.00 1.00 1.00 117

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 15) test #2-----

Confusion Matrix:

[[179 0]

[ 0 121]]

total errors = 0

---KNN Computational Time for testing time used: 37.084 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 179

1 1.00 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 15) test #3-----

Confusion Matrix:

[[198 1]

[ 0 101]]

total errors = 1

---KNN Computational Time for testing time used: 37.357 milliseconds ---

precision recall f1-score support

0	1.00	0.99	1.00	199
1	0.99	1.00	1.00	101

  

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 15) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 37.516 milliseconds ---

precision recall f1-score support

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 15, Average number of errors from cross validations = 1.5

//////////////////////////////////////  
 ////////////////////////////////////// KNN, k = 16 //////////////////////////////////////  
 //////////////////////////////////////

-----KNN (k = 16) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 37.783 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	183
1	1.00	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 16) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 30.007 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 179

1 1.00 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 16) test #3-----

Confusion Matrix:

```
[[198  1]
```

```
[ 0 101]]
```

total errors = 1

---KNN Computational Time for testing time used: 36.710 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 199

1 0.99 1.00 1.00 101

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 16) test #4-----

Confusion Matrix:

```
[[196  5]
```

```
[ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 37.118 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 201

1 0.95 1.00 0.98 99

accuracy 0.98 300

macro avg 0.98 0.99 0.98 300

weighted avg 0.98 0.98 0.98 300

----- KNN, k = 16, Average number of errors from cross validations = 1.5

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 17 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 17) test #1-----

Confusion Matrix:

```
[[183  0]
```

```
[ 0 117]]
```

total errors = 0

---KNN Computational Time for testing time used: 37.362 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	183
---	------	------	------	-----

1	1.00	1.00	1.00	117
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 17) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 36.070 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	179
---	------	------	------	-----

1	1.00	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 17) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 36.811 milliseconds ---

precision recall f1-score support

0	1.00	0.98	0.99	199
1	0.97	1.00	0.99	101

  

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

-----KNN (k = 17) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 37.073 milliseconds ---

precision recall f1-score support

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 17, Average number of errors from cross validations = 2.0

////////////////////////////////////  
 ////////////////////////////////////// KNN, k = 18 //////////////////////////////////////  
 //////////////////////////////////////

-----KNN (k = 18) test #1-----

Confusion Matrix:

[[183 0]

[ 0 117]]

total errors = 0

---KNN Computational Time for testing time used: 36.419 milliseconds ---

precision recall f1-score support

0	1.00	1.00	1.00	183
1	1.00	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 18) test #2-----

Confusion Matrix:

```
[[179 0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 37.109 milliseconds ---

precision recall f1-score support

0 1.00 1.00 1.00 179

1 1.00 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 18) test #3-----

Confusion Matrix:

```
[[196 3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 34.322 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 199

1 0.97 1.00 0.99 101

accuracy 0.99 300

macro avg 0.99 0.99 0.99 300

weighted avg 0.99 0.99 0.99 300

-----KNN (k = 18) test #4-----

Confusion Matrix:

```
[[196 5]
```

```
[ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 34.718 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 201

1 0.95 1.00 0.98 99

accuracy 0.98 300

macro avg 0.98 0.99 0.98 300

weighted avg 0.98 0.98 0.98 300

----- KNN, k = 18, Average number of errors from cross validations = 2.0

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 19 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 19) test #1-----

Confusion Matrix:

```
[[182  1]
```

```
[ 0 117]]
```

total errors = 1

---KNN Computational Time for testing time used: 32.958 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	183
---	------	------	------	-----

1	0.99	1.00	1.00	117
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 19) test #2-----

Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 35.034 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	179
---	------	------	------	-----

1	1.00	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 19) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 38.922 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	199
1	0.97	1.00	0.99	101

  

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

-----KNN (k = 19) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 38.842 milliseconds ---

precision recall f1-score support

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 19, Average number of errors from cross validations = 2.25

//  
 // KNN, k = 20 //  
 //

-----KNN (k = 20) test #1-----

Confusion Matrix:

[[182 1]

[ 0 117]]

total errors = 1

---KNN Computational Time for testing time used: 37.313 milliseconds ---

precision recall f1-score support

0	1.00	0.99	1.00	183
1	0.99	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 20) test #2-----



Confusion Matrix:

```
[[179  0]
```

```
[ 0 121]]
```

total errors = 0

---KNN Computational Time for testing time used: 32.751 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	1.00	1.00	179
---	------	------	------	-----

1	1.00	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 20) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 37.230 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	199
---	------	------	------	-----

1	0.97	1.00	0.99	101
---	------	------	------	-----

accuracy			0.99	300
----------	--	--	------	-----

macro avg	0.99	0.99	0.99	300
-----------	------	------	------	-----

weighted avg	0.99	0.99	0.99	300
--------------	------	------	------	-----

-----KNN (k = 20) test #4-----

Confusion Matrix:

```
[[196  5]
```

```
[ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 39.217 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	201
---	------	------	------	-----

1	0.95	1.00	0.98	99
---	------	------	------	----

accuracy			0.98	300
----------	--	--	------	-----

macro avg	0.98	0.99	0.98	300
-----------	------	------	------	-----

weighted avg	0.98	0.98	0.98	300
--------------	------	------	------	-----

----- KNN, k = 20, Average number of errors from cross validations = 2.25

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 21 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 21) test #1-----

Confusion Matrix:

```
[[182  1]
```

```
[ 0 117]]
```

total errors = 1

---KNN Computational Time for testing time used: 30.977 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 183

1 0.99 1.00 1.00 117

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 21) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 37.802 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 179

1 0.99 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 21) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 36.683 milliseconds ---

precision recall f1-score support

0	1.00	0.98	0.99	199
1	0.97	1.00	0.99	101

  

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

-----KNN (k = 21) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 34.549 milliseconds ---

precision recall f1-score support

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 21, Average number of errors from cross validations = 2.5

////////////////////////////////////  
 ////////////////////////////////////// KNN, k = 22 //////////////////////////////////////  
 //////////////////////////////////////

-----KNN (k = 22) test #1-----

Confusion Matrix:

[[182 1]

[ 0 117]]

total errors = 1

---KNN Computational Time for testing time used: 36.505 milliseconds ---

precision recall f1-score support

0	1.00	0.99	1.00	183
1	0.99	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 22) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 38.186 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	179
---	------	------	------	-----

1	0.99	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 22) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 31.768 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	199
---	------	------	------	-----

1	0.97	1.00	0.99	101
---	------	------	------	-----

accuracy			0.99	300
----------	--	--	------	-----

macro avg	0.99	0.99	0.99	300
-----------	------	------	------	-----

weighted avg	0.99	0.99	0.99	300
--------------	------	------	------	-----

-----KNN (k = 22) test #4-----

Confusion Matrix:

```
[[196  5]
```

```
[ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 36.132 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	201
---	------	------	------	-----

1	0.95	1.00	0.98	99
---	------	------	------	----

accuracy			0.98	300
----------	--	--	------	-----

macro avg	0.98	0.99	0.98	300
-----------	------	------	------	-----

weighted avg	0.98	0.98	0.98	300
--------------	------	------	------	-----

----- KNN, k = 22, Average number of errors from cross validations = 2.5

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 23 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 23) test #1-----

Confusion Matrix:

```
[[182  1]
```

```
[ 0 117]]
```

total errors = 1

---KNN Computational Time for testing time used: 42.936 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	183
---	------	------	------	-----

1	0.99	1.00	1.00	117
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 23) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 35.496 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	179
---	------	------	------	-----

1	0.99	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 23) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 38.568 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	199
1	0.97	1.00	0.99	101

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

-----KNN (k = 23) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 37.672 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 23, Average number of errors from cross validations = 2.5

//  
// KNN, k = 24 //  
//

-----KNN (k = 24) test #1-----

Confusion Matrix:

[[182 1]

[ 0 117]]

total errors = 1

---KNN Computational Time for testing time used: 38.247 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.99	1.00	183
1	0.99	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 24) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 39.193 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 179

1 0.99 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 24) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 38.997 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 199

1 0.97 1.00 0.99 101

accuracy 0.99 300

macro avg 0.99 0.99 0.99 300

weighted avg 0.99 0.99 0.99 300

-----KNN (k = 24) test #4-----

Confusion Matrix:

```
[[196  5]
```

```
[ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 39.009 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 201

1 0.95 1.00 0.98 99

accuracy 0.98 300

macro avg 0.98 0.99 0.98 300

weighted avg 0.98 0.98 0.98 300

----- KNN, k = 24, Average number of errors from cross validations = 2.5

```
////////////////////////////////////
////////////////////////////////////      KNN, k = 25      //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 25) test #1-----

Confusion Matrix:

```
[[182  1]
```

```
 [ 0 117]]
```

total errors = 1

---KNN Computational Time for testing time used: 38.073 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 183

1 0.99 1.00 1.00 117

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 25) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
 [ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 36.885 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 179

1 0.99 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 25) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
 [ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 38.403 milliseconds ---

precision recall f1-score support



0	1.00	0.98	0.99	199
1	0.97	1.00	0.99	101

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

-----KNN (k = 25) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 39.896 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 25, Average number of errors from cross validations = 2.5

//  
// KNN, k = 26 //  
//

-----KNN (k = 26) test #1-----

Confusion Matrix:

[[182 1]

[ 0 117]]

total errors = 1

---KNN Computational Time for testing time used: 28.109 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.99	1.00	183
1	0.99	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 26) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 43.405 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 179

1 0.99 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 26) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 41.013 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 199

1 0.97 1.00 0.99 101

accuracy 0.99 300

macro avg 0.99 0.99 0.99 300

weighted avg 0.99 0.99 0.99 300

-----KNN (k = 26) test #4-----

Confusion Matrix:

```
[[196  5]
```

```
[ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 38.351 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 201

1 0.95 1.00 0.98 99

accuracy 0.98 300

macro avg 0.98 0.99 0.98 300

weighted avg 0.98 0.98 0.98 300

----- KNN, k = 26, Average number of errors from cross validations = 2.5

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 27 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 27) test #1-----

Confusion Matrix:

```
[[182  1]
```

```
[ 0 117]]
```

total errors = 1

---KNN Computational Time for testing time used: 38.285 milliseconds ---

precision recall f1-score support

0	1.00	0.99	1.00	183
---	------	------	------	-----

1	0.99	1.00	1.00	117
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 27) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 38.683 milliseconds ---

precision recall f1-score support

0	1.00	0.99	1.00	179
---	------	------	------	-----

1	0.99	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 27) test #3-----

Confusion Matrix:

```
[[192  7]
```

```
[ 0 101]]
```

total errors = 7

---KNN Computational Time for testing time used: 39.147 milliseconds ---

precision recall f1-score support

0	1.00	0.96	0.98	199
1	0.94	1.00	0.97	101

accuracy			0.98	300
macro avg	0.97	0.98	0.97	300
weighted avg	0.98	0.98	0.98	300

-----KNN (k = 27) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 38.624 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 27, Average number of errors from cross validations = 3.5

////////////////////////////////////  
//////////////////////////////////// KNN, k = 28 //////////////////////////////////////  
////////////////////////////////////

-----KNN (k = 28) test #1-----

Confusion Matrix:

[[182 1]

[ 0 117]]

total errors = 1

---KNN Computational Time for testing time used: 38.375 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.99	1.00	183
1	0.99	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 28) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 38.932 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	179
---	------	------	------	-----

1	0.99	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 28) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 38.401 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	199
---	------	------	------	-----

1	0.97	1.00	0.99	101
---	------	------	------	-----

accuracy			0.99	300
----------	--	--	------	-----

macro avg	0.99	0.99	0.99	300
-----------	------	------	------	-----

weighted avg	0.99	0.99	0.99	300
--------------	------	------	------	-----

-----KNN (k = 28) test #4-----

Confusion Matrix:

```
[[196  5]
```

```
[ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 39.742 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	201
---	------	------	------	-----

1	0.95	1.00	0.98	99
---	------	------	------	----

accuracy			0.98	300
----------	--	--	------	-----

macro avg	0.98	0.99	0.98	300
-----------	------	------	------	-----

weighted avg	0.98	0.98	0.98	300
--------------	------	------	------	-----

----- KNN, k = 28, Average number of errors from cross validations = 2.5

```
////////////////////////////////////
//////////////////////////////////// KNN, k = 29 //////////////////////////////////
////////////////////////////////////
```

-----KNN (k = 29) test #1-----

Confusion Matrix:

```
[[182  1]
```

```
[ 0 117]]
```

total errors = 1

---KNN Computational Time for testing time used: 29.344 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	183
---	------	------	------	-----

1	0.99	1.00	1.00	117
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 29) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
[ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 38.097 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	179
---	------	------	------	-----

1	0.99	1.00	1.00	121
---	------	------	------	-----

accuracy			1.00	300
----------	--	--	------	-----

macro avg	1.00	1.00	1.00	300
-----------	------	------	------	-----

weighted avg	1.00	1.00	1.00	300
--------------	------	------	------	-----

-----KNN (k = 29) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
[ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 38.357 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	199
1	0.97	1.00	0.99	101

accuracy			0.99	300
macro avg	0.99	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

-----KNN (k = 29) test #4-----

Confusion Matrix:

[[196 5]

[ 0 99]]

total errors = 5

---KNN Computational Time for testing time used: 38.537 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.98	0.99	201
1	0.95	1.00	0.98	99

accuracy			0.98	300
macro avg	0.98	0.99	0.98	300
weighted avg	0.98	0.98	0.98	300

----- KNN, k = 29, Average number of errors from cross validations = 2.5

//  
 // KNN, k = 30 //  
 //

-----KNN (k = 30) test #1-----

Confusion Matrix:

[[182 1]

[ 0 117]]

total errors = 1

---KNN Computational Time for testing time used: 43.730 milliseconds ---

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

0	1.00	0.99	1.00	183
1	0.99	1.00	1.00	117

accuracy			1.00	300
macro avg	1.00	1.00	1.00	300
weighted avg	1.00	1.00	1.00	300

-----KNN (k = 30) test #2-----

Confusion Matrix:

```
[[178  1]
```

```
 [ 0 121]]
```

total errors = 1

---KNN Computational Time for testing time used: 30.585 milliseconds ---

precision recall f1-score support

0 1.00 0.99 1.00 179

1 0.99 1.00 1.00 121

accuracy 1.00 300

macro avg 1.00 1.00 1.00 300

weighted avg 1.00 1.00 1.00 300

-----KNN (k = 30) test #3-----

Confusion Matrix:

```
[[196  3]
```

```
 [ 0 101]]
```

total errors = 3

---KNN Computational Time for testing time used: 38.622 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 199

1 0.97 1.00 0.99 101

accuracy 0.99 300

macro avg 0.99 0.99 0.99 300

weighted avg 0.99 0.99 0.99 300

-----KNN (k = 30) test #4-----

Confusion Matrix:

```
[[196  5]
```

```
 [ 0 99]]
```

total errors = 5

---KNN Computational Time for testing time used: 40.986 milliseconds ---

precision recall f1-score support

0 1.00 0.98 0.99 201

1 0.95 1.00 0.98 99

accuracy 0.98 300

macro avg 0.98 0.99 0.98 300

weighted avg 0.98 0.98 0.98 300



----- KNN, k = 30, Average number of errors from cross validations = 2.5  
k and it's avg number of errors: {5: 0.25, 6: 0.0, 7: 0.0, 8: 0.0, 9: 0.0, 10: 0.0, 11: 0.75, 12: 0.75,  
13: 0.75, 14: 0.75, 15: 1.5, 16: 1.5, 17: 2.0, 18: 2.0, 19: 2.25, 20: 2.25, 21: 2.5, 22: 2.5, 23: 2.5,  
24: 2.5, 25: 2.5, 26: 2.5, 27: 3.5, 28: 2.5, 29: 2.5, 30: 2.5}  
----- When k = 6, KNN has the smallest avg number of errors = 0.0 -----

////////////////////////////////////  
//////////////////////////////////// Native Bayes //////////////////////////////////////  
////////////////////////////////////

-----Native Bayes test #1-----

---Native Bayes Computational Time for training: 22.741 milliseconds ---

Confusion Matrix:

[[168 15]

[ 26 91]]

total errors = 41

---Native Bayes Computational Time for testing: 7.192 milliseconds ---

precision recall f1-score support

0 0.87 0.92 0.89 183

1 0.86 0.78 0.82 117

accuracy 0.86 300

macro avg 0.86 0.85 0.85 300

weighted avg 0.86 0.86 0.86 300

-----Native Bayes test #2-----

---Native Bayes Computational Time for training: 22.517 milliseconds ---

Confusion Matrix:

[[166 13]

[ 35 86]]

total errors = 48

---Native Bayes Computational Time for testing: 7.362 milliseconds ---

precision recall f1-score support

0 0.83 0.93 0.87 179

1 0.87 0.71 0.78 121

accuracy 0.84 300

macro avg 0.85 0.82 0.83 300

weighted avg 0.84 0.84 0.84 300

-----Native Bayes test #3-----

---Native Bayes Computational Time for training: 22.477 milliseconds ---

Confusion Matrix:

[[181 18]

[ 24 77]]

total errors = 42

---Native Bayes Computational Time for testing: 7.333 milliseconds ---

precision recall f1-score support

0 0.88 0.91 0.90 199

1 0.81 0.76 0.79 101

accuracy 0.86 300

macro avg 0.85 0.84 0.84 300

weighted avg 0.86 0.86 0.86 300

-----Native Bayes test #4-----

---Native Bayes Computational Time for training: 21.916 milliseconds ---

Confusion Matrix:

[[174 27]

[ 31 68]]

total errors = 58

---Native Bayes Computational Time for testing: 6.879 milliseconds ---

precision recall f1-score support

0 0.85 0.87 0.86 201

1 0.72 0.69 0.70 99

accuracy 0.81 300

macro avg 0.78 0.78 0.78 300

weighted avg 0.80 0.81 0.81 300

----- Native Bayes Average number of errors from cross validations = 47.25

////////////////////////////////////  
//////////////////////////////////// SVM //////////////////////////////////////  
////////////////////////////////////

-----SVM test #1-----

---SVM Computational Time for training: 29.942 milliseconds ---

Confusion Matrix:

[[182 1]

[ 3 114]]

total errors = 4

---SVM Computational Time for testing: 1.627 milliseconds ---

precision recall f1-score support

0	0.98	0.99	0.99	183
1	0.99	0.97	0.98	117

accuracy			0.99	300
macro avg	0.99	0.98	0.99	300
weighted avg	0.99	0.99	0.99	300

-----SVM test #2-----

---SVM Computational Time for training: 28.797 milliseconds ---

Confusion Matrix:

[[176 3]

[ 2 119]]

total errors = 5

---SVM Computational Time for testing: 1.848 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	0.99	0.98	0.99	179
1	0.98	0.98	0.98	121

accuracy			0.98	300
macro avg	0.98	0.98	0.98	300
weighted avg	0.98	0.98	0.98	300

-----SVM test #3-----

---SVM Computational Time for training: 26.658 milliseconds ---

Confusion Matrix:

[[195 4]

[ 0 101]]

total errors = 4

---SVM Computational Time for testing: 1.793 milliseconds ---

precision	recall	f1-score	support
-----------	--------	----------	---------

0	1.00	0.98	0.99	199
1	0.96	1.00	0.98	101

accuracy			0.99	300
macro avg	0.98	0.99	0.99	300
weighted avg	0.99	0.99	0.99	300

-----SVM test #4-----

---SVM Computational Time for training: 24.309 milliseconds ---

Confusion Matrix:

[[199 2]

[ 0 99]]

total errors = 2

---SVM Computational Time for testing: 1.683 milliseconds ---

precision recall f1-score support

0	1.00	0.99	0.99	201
---	------	------	------	-----

1	0.98	1.00	0.99	99
---	------	------	------	----

accuracy			0.99	300
----------	--	--	------	-----

macro avg	0.99	1.00	0.99	300
-----------	------	------	------	-----

weighted avg	0.99	0.99	0.99	300
--------------	------	------	------	-----

----- SVM Average number of errors from cross validations = 3.75

Process finished with exit code 0