CSC311 A2 Printed Outputs

David Pham: 1002597825

Nov 15 2020

Question 1(b)

```
1  Value of K: 3
2  Training error: 8.658268242282467
3  Test error:  11.905786549445054
4  Weight Vector:
5  [ 114.30512878 -187.717837     31.24228605    14.25033792
      -23.28707996
6   -96.93067091     8.90033976]
```

Question 1(c)

```
1  Value of K: 9
2  Training error: 3.1039124264553055
3  Test error:  86.30061384895747
4  Weight Vector:
5  [ 4.19153583e+06 -7.78801462e+06 -6.11451047e+04  4.26697404e+06
6   5.19610941e+04 -1.18585189e+06 -1.64583888e+04  1.33819261e+05
7   1.61411570e+03 -2.77362459e+03  3.75946160e+04 -6.23166543e+06
8  -6.45948298e+04  2.47048667e+06  3.29936794e+04 -4.57000349e+05
9  -6.21109454e+03  2.67547715e+04  2.20973773e+02]
```

Question 1(d)

```
1  Value of K: 12
2  Training error: 7.247597419485771e-06
3  Test error:  72435597930.03224
4  Weight Vector:
5  [-1.38284694e+12  2.60493179e+12  1.29942572e+11 -1.60364189e+12
6  -1.29007490e+11  5.87038142e+11  5.67983646e+10 -1.17544927e+11
7  -1.17058563e+10  1.07744839e+10  9.17817553e+08 -2.89140564e+08
8  -1.20184592e+07 -7.71182530e+10  2.17440962e+12  1.46010750e+11
9  -1.03931117e+12 -9.37895017e+10  2.85531139e+11  2.85425046e+10
10 -3.99346673e+10 -3.79439701e+09  2.16770833e+09  1.48129411e+08
11 -1.91330274e+07]
```

Question 1(e)

```
1  Value of K: 1
2  Training error: 113.08844099207023
3  Test error:  105.46724915507733
4  Weight Vector:
5  [-7.52258548  6.12353847  4.22461209]
6  Value of K: 2
7  Training error: 13.741160276011053
8  Test error:  12.09025690951816
```

```
 9  Weight Vector:
10  [  66.22002474 -107.19437051   15.21342666   -9.79486139
        -52.43545557]
11  Value of K: 3
12  Training error: 8.658268242282467
13  Test error:  11.905786549445054
14  Weight Vector:
15  [ 114.30512878 -187.717837     31.24228605   14.25033792
        -23.28707996
16   -96.93067091    8.90033976]
17  Value of K: 4
18  Training error: 8.402364801001895
19  Test error:  12.675482563636368
20  Weight Vector:
21  [ 63.1098582  -98.86074797  12.94675292 -11.14837942   4.74733244
22   -9.4400873  -39.7604281   -3.89018234  -6.33254632]
23  Value of K: 5
24  Training error: 7.205939703915732
25  Test error:  19.228964900243263
26  Weight Vector:
27  [-1649.81759498  2932.3775663    -143.03542857 -1074.15607524
28      66.00309889    69.26531742   101.54980267  2038.29102864
29   -128.43345046  -377.27149846    14.92211154]
30  Value of K: 6
31  Training error: 5.540393909529432
32  Test error:  19.213732204163016
33  Weight Vector:
34  [ 8.84241401e+03 -1.59576677e+04 -4.75069827e+02  6.74676257e+03
35   2.43652874e+02 -9.22995297e+02 -1.55918256e+01  3.27184444e+02
36  -1.16530829e+04 -4.21743386e+02  2.98895774e+03  8.60227096e+01
37  -1.55424162e+02]
38  Value of K: 7
39  Training error: 5.3445914064528495
40  Test error:  20.36824023354899
41  Weight Vector:
42  [-19177.23748883  35190.15726963   1289.69895496 -17259.21097925
43    -928.66328537   3525.74271418    186.20896195   -155.53025581
44    -816.77193877  27076.0986313    1272.66932317  -8873.60028822
45    -503.75959408    990.33879788     37.3031028 ]
46  Value of K: 8
47  Training error: 5.273631608902488
48  Test error:  20.589998349541563
49  Weight Vector:
50  [ 1.34651103e+05 -2.48252377e+05  7.39087487e+03  1.27284480e+05
51  -5.14377653e+03 -3.01011594e+04  1.02840186e+03  2.32016878e+03
52  -2.38324353e+01 -4.74406999e+03 -1.93940514e+05  7.21325281e+03
53   6.90580972e+04 -2.72735294e+03 -1.00308619e+04  2.43644400e+02
54   2.91851752e+02]
55  Value of K: 9
56  Training error: 3.1039124264553055
57  Test error:  86.30061384895747
58  Weight Vector:
59  [ 4.19153583e+06 -7.78801462e+06 -6.11451047e+04  4.26697404e+06
60   5.19610941e+04 -1.18585189e+06 -1.64583888e+04  1.33819261e+05
61   1.61411570e+03 -2.77362459e+03  3.75946160e+04 -6.23166543e+06
62  -6.45948298e+04  2.47048667e+06  3.29936794e+04 -4.57000349e+05
63  -6.21109454e+03  2.67547715e+04  2.20973773e+02]
```

```
64  Value of K: 10
65  Training error: 3.012639866133934
66  Test error:  14356.943850700873
67  Weight Vector:
68  [ 8.29520935e+07 -1.54910051e+08  6.71858927e+05  8.86497122e+07
69   -4.23254089e+05 -2.74216430e+07  4.26107268e+04  3.94118296e+06
70    1.50403556e+04 -1.74620617e+05 -1.01492390e+03 -4.38158360e+05
71   -1.25910937e+08  6.35435898e+05  5.35878730e+07 -1.91383007e+05
72   -1.16217106e+07 -1.22149006e+04  1.00919842e+06  5.99284643e+03
73   -1.54091429e+04]
74  Value of K: 11
75  Training error: 1.4400862786185333
76  Test error:  35912866.270372815
77  Weight Vector:
78  [ 1.11800155e+10 -2.09776991e+10 -3.60532183e+08  1.24961830e+10
79    3.53614039e+08 -4.24457048e+09 -1.49615169e+08  7.36810163e+08
80    2.74839893e+07 -5.05850206e+07 -1.51350434e+06  5.90002501e+05
81    2.14375120e+08 -1.73013161e+10 -4.03439640e+08  7.85046100e+09
82    2.53372553e+08 -1.94417508e+09 -7.20339954e+07  2.22774041e+08
83    7.86655208e+06 -7.69599563e+06 -1.47725144e+05]
84  Value of K: 12
85  Training error: 7.247597419485771e-06
86  Test error:  72435597930.03224
87  Weight Vector:
88  [-1.38284694e+12  2.60493179e+12  1.29942572e+11 -1.60364189e+12
89   -1.29007490e+11  5.87038142e+11  5.67983646e+10 -1.17544927e+11
90   -1.17058563e+10  1.07744839e+10  9.17817553e+08 -2.89140564e+08
91   -1.20184592e+07 -7.71182530e+10  2.17440962e+12  1.46010750e+11
92   -1.03931117e+12 -9.37895017e+10  2.85531139e+11  2.85425046e+10
93   -3.99346673e+10 -3.79439701e+09  2.16770833e+09  1.48129411e+08
94   -1.91330274e+07]
```

Question 2(b)

```
1  Question 2(b):
2  Value of Logistic Regression accuracy1: 0.7761111111111111
3  Value of Logistic Regression accuracy2: 0.7761111111111111
4  Difference of accuracy2 and accuracy1 for Logistic Regression: 0.0
```

Question 2(c)

```
1  Question 2(c):
2  Value of Discriminative Analysis accuracy1: 0.8288888888888889
3  Value of Discriminative Analysis accuracy2: 0.8288888888888889
4  Difference of accuracy2 and accuracy1 for Discriminative Analysis:
      0.0
```

Question 2(d)

```
1  Question 2(d):
2  Value of Gaussian Naive Bayes accuracy1: 0.79
3  Value of Gaussian Naive Bayes accuracy2: 0.79
4  Difference of accuracy2 and accuracy1 for Gaussian Naive Bayes: 0.0
```

Question 3(b)

```
1  Value of Neural Network accuracy for 1 hidden unit(s):
      0.6861111111111111
```

Question 3(c)

```
1 Value of Neural Network accuracy for 2 hidden unit(s):
      0.7861111111111111
```

Question 3(d)

```
1 Value of Neural Network accuracy for 9 hidden unit(s):
      0.8116666666666666
```

Question 3(e)

```
1 Value of Neural Network accuracy for 7 hidden unit(s):
      0.5555555555555556
2
3 Value of Neural Network accuracy for 7 hidden unit(s):
      0.5683333333333334
4
5 Value of Neural Network accuracy for 7 hidden unit(s):
      0.7233333333333334
6
7 Value of Neural Network accuracy for 7 hidden unit(s):
      0.7916666666666666
8
9 Value of Neural Network accuracy for 7 hidden unit(s):
      0.7916666666666666
10
11 Value of Neural Network accuracy for 7 hidden unit(s): 0.795
12
13 Value of Neural Network accuracy for 7 hidden unit(s):
      0.7938888888888889
14
15 Value of Neural Network accuracy for 7 hidden unit(s):
      0.8138888888888889
16
17 Value of Neural Network accuracy for 7 hidden unit(s):
      0.8116666666666666
```

Question 3(f)

```
1 Value of Neural Network accuracy for 5 hidden unit(s):
      0.8105555555555556
2
3 Value of Neural Network accuracy for 5 hidden unit(s): 0.81
4
5 Value of Neural Network accuracy for 5 hidden unit(s):
      0.8144444444444444
6
7 Value of Neural Network accuracy for 5 hidden unit(s):
      0.8122222222222222
8
9 Value of Neural Network accuracy for 5 hidden unit(s):
      0.8116666666666666
10
11 Value of Neural Network accuracy for 5 hidden unit(s):
      0.8116666666666666
12
13 Value of Neural Network accuracy for 5 hidden unit(s):
      0.8116666666666666
14
15 Value of Neural Network accuracy for 5 hidden unit(s):
      0.8116666666666666
```

```
16
17 Value of Neural Network accuracy for 5 hidden unit(s): 0.81
```

Question 3(g)

```
1 Value of Neural Network accuracy1 for 9 hidden unit(s):
      0.8322222222222222
2 Value of Neural Network accuracy2 for 9 hidden unit(s):
      0.8322222222222222
3 Difference of accuracy2 and accuracy1 for Neural Network for 9
      hidden unit(s): 0.0
```

Question 3(h)

```
1 I Don't Know
```