0316219 林語新
使用系統 macos 10.12.3
使用語言 python 3
library panda sklearn time csv numpy

```
Last login: Fri Apr 14 00:52:25 on ttys002
lewis0816deMacBook-Pro:~ lewis0816$ cd /Users/lewis0816/Desktop/NCTU/machine\ learning/HW2
lewis0816deMacBook-Pro:HW2 lewis0816$ python 0316219_HW2.py
[[  7.     0.27   0.36 ...,   3.     0.45   8.8 ]
 [  6.3    0.3    0.34 ...,   3.3    0.49   9.5 ]
 [  8.1    0.28   0.4  ...,   3.26   0.44  10.1 ]
 ...,
 [  6.5    0.24   0.19 ...,   2.99   0.46   9.4 ]
 [  5.5    0.29   0.3  ...,   3.34   0.38  12.8 ]
 [  6.     0.21   0.38 ...,   3.26   0.32  11.8 ]]
[ 6.  6.  6. ...,  6.  7.  6.]

KD_tree euclidean

[[  2   1   2   1   0   0   0]
 [  0  10   8   2   1   0   0]
 [  4  18 197  69  11   0   0]
 [  0  28 166 226  17   2   0]
 [  0   6  48  83  42   3   0]
 [  0   1   6  10   8   7   0]
 [  0   0   0   1   0   0   0]]
('Classification Accuracy = ', 0.49387755102040815)
('Train elapsed time =', 0.008831024169921875)
('Test elapsed time =', 0.008595943450927734)
[[  0   1   2   0   0   0   0]
 [  2   9  18   7   3   0   0]
 [  2  21 200  75   9   1   0]
 [  0  18 161 206  31   5   0]
 [  2   5  44  73  57   0   0]
 [  0   1   7   9   5   5   0]
 [  0   0   0   0   1   0   0]]
('Classification Accuracy = ', 0.48673469387755103)
('Train elapsed time =', 0.004601955413818359)
('Test elapsed time =', 0.010146141052246094)
[[  1   0   1   1   0   0   0]
 [  4   6  15   7   6   0   0]
 [  2  24 187  63   5   0   0]
 [  1  12 144 249  22   1   0]
 [  0   6  32  89  58   0   0]
 [  1   2   9  16   9   5   0]
 [  0   0   1   1   0   0   0]]
('Classification Accuracy = ', 0.51632653061224487)
('Train elapsed time =', 0.005448102951049805)
('Test elapsed time =', 0.008121013641357422)
[[  0   2   0   1   0   0   0]
 [  2   6  18  11   1   0   0]
 [  0  14 173  74  11   2   0]
 [  4  21 166 233  34   1   0]
 [  0   2  33  79  54   1   0]
 [  0   0   8  17   6   4   0]
 [  0   0   0   1   0   0   0]]
('Classification Accuracy = ', 0.48008171603677224)
('Train elapsed time =', 0.0052449703216552734)
('Test elapsed time =', 0.010240793228149414)
[[  0   2   2   1   0   0]
 [  0   8   6  12   1   0]

 [  1  19 213  52  10   0]
 [  4  11 174 228  33   0]
 [  0   5  44  70  43   1]
 [  0   0   8  20   7   4]]
('Classification Accuracy = ', 0.50663942798774264)
('Train elapsed time =', 0.0040111541748046875)
('Test elapsed time =', 0.007870912551879883)

KD_tree manhattan

[[  0   2   1   0   0   0   0]
 [  2  11   5   6   2   0   0]
 [  0  26 204  60  15   0   0]
 [  2  11 158 229  24   3   0]
 [  0   1  39  78  65   3   0]
 [  0   0   4  11  11   6   0]
 [  0   0   0   1   0   0   0]]
('Classification Accuracy = ', 0.52551020408163263)
('Train elapsed time =', 0.0049979686737060055)
('Test elapsed time =', 0.01894998550415039)
[[  1   1   1   2   0   0]
 [  0   6  15   6   2   0]
 [  1  13 189  53  14   0]
 [  2  18 166 213  41   3]
 [  1   4  52  82  51   2]
 [  0   2   8  17  12   2]]
('Classification Accuracy = ', 0.47142857142857142)
('Train elapsed time =', 0.0040810108184814453)
('Test elapsed time =', 0.009190797805786133)
[[  0   1   1   0   0   0   0]
 [  0  12  18   7   2   0   0]
 [  3  21 204  67   6   2   0]
 [  0  25 150 225  31   0   0]
 [  1   3  35  75  54   3   0]
 [  0   0   8  12   6   6   0]
 [  0   0   1   1   0   0   0]]
('Classification Accuracy = ', 0.51122448979591839)
('Train elapsed time =', 0.005362987518310547)
('Test elapsed time =', 0.010563135147094727)
[[  1   1   1   1   0   0]
 [  3   6  13  10   4   0]
 [  2  15 206  69   2   4]
 [  1  10 180 229  28   1]
 [  0   6  34  79  41   5]
 [  0   1   6   8   6   6]]
('Classification Accuracy = ', 0.49948927477017363)
('Train elapsed time =', 0.0039498805999755586)
('Test elapsed time =', 0.011577129364013672)
[[  0   2   2   2   0   0   0]
 [  2   9   8  13   0   1   0]
 [  2  19 198  55   7   0   0]
 [  1  22 154 250  21   0   0]
 [  0   6  40  66  53   1   0]
 [  1   0   7  20  12   3   0]
 [  0   0   0   1   1   0   0]]
('Classification Accuracy = ', 0.52400408580183866)
```

```
('Train elapsed time =', 0.004283905029296875)
('Test elapsed time =', 0.009423017501831055)

brute euclidean

[[  1   3   2   2   0   0   0]
 [  2   9  10  10   4   0   0]
 [  3  19 205  63   9   1   0]
 [  2  23 157 217  33   1   0]
 [  1   2  38  77  46   0   0]
 [  0   1   9  14   9   6   0]
 [  0   0   0   1   0   0   0]]
('Classification Accuracy = ', 0.49387755102040815)
('Train elapsed time =', 0.000946044921875)
('Test elapsed time =', 0.09290218353271484)
[[  0   1   2   1   0   0   0]
 [  0  10  11   7   1   0   0]
 [  3  21 191  68   5   1   0]
 [  1  12 161 240  25   4   0]
 [  0   7  34  84  54   1   0]
 [  0   0  10  15   4   5   0]
 [  0   0   0   0   1   0   0]]
('Classification Accuracy = ', 0.51020408163265307)
('Train elapsed time =', 0.0008718967437744141)
('Test elapsed time =', 0.0639188289642334)
[[  0   1   0   0   0   0   0]
 [  1   6  12  13   1   0   0]
 [  3  14 203  62  14   0   0]
 [  2  15 144 246  24   2   0]
 [  1   5  33  84  55   0   0]
 [  0   0   3  20   7   7   0]
 [  0   0   0   2   0   0   0]]
('Classification Accuracy = ', 0.52755102040816326)
('Train elapsed time =', 0.0010240077972411)
('Test elapsed time =', 0.0649712085723877)
[[  1   2   1   0   1   0   0]
 [  1   4  22   2   1   1   0]
 [  0  16 195  66  12   0   0]
 [  1  22 153 230  32   4   0]
 [  0   7  35  81  47   4   0]
 [  0   1   6  17   7   6   0]
 [  0   0   1   0   0   0   0]]
('Classification Accuracy = ', 0.49336057201225741)
('Train elapsed time =', 0.0007989406585693359)
('Test elapsed time =', 0.06593108177185059)
[[  1   0   1   0   0   0]
 [  4   6  16   7   2   0]
 [  0  13 206  61   2   1]
 [  2  20 169 234  20   2]
 [  3   5  48  75  51   2]
 [  0   0   5  15   6   2]]
('Classification Accuracy = ', 0.51072522982635338)
('Train elapsed time =', 0.0009260177612304688)
('Test elapsed time =', 0.0661020278930664)

brute manhattan


[[  0   1   3   0   0   0   0]
 [  0   9  17   4   1   0   0]
 [  0  25 228  66  15   0   0]
 [  0  18 143 217  25   3   0]
 [  0   6  37  70  48   1   0]
 [  0   0   4  19  10   6   0]
 [  0   0   2   2   0   0   0]]
('Classification Accuracy = ', 0.51836734693877551)
('Train elapsed time =', 0.0009510517120361328)
('Test elapsed time =', 0.0714571475982666)
[[  0   2   3   0   0   0   0]
 [  1   9  11   6   1   1   0]
 [  0  16 197  73   6   2   0]
 [  1  15 149 252  18   1   0]
 [  2   6  28  88  49   4   0]
 [  0   0   7  16  11   4   0]
 [  0   0   0   1   0   0   0]]
('Classification Accuracy = ', 0.52142857142857146)
('Train elapsed time =', 0.0008449554443359375)
('Test elapsed time =', 0.07184696197509766)
[[  0   0   0   2   0   0]
 [  4   8  20   6   4   0]
 [  1  16 180  55  11   0]
 [  1  19 158 246  22   1]
 [  0   4  43  88  53   0]
 [  0   0   8  20   8   2]]
('Classification Accuracy = ', 0.49897959183673468)
('Train elapsed time =', 0.0008330345153808594)
('Test elapsed time =', 0.07303786277770996)
[[  1   1   3   0   1   0]
 [  1  10  12   3   1   0]
 [  6  21 187  65   8   1]
 [  4  22 156 230  31   1]
 [  0   4  36  82  63   0]
 [  1   2   6  12   5   3]]
('Classification Accuracy = ', 0.50459652706843716)
('Train elapsed time =', 0.0011620521545410156)
('Test elapsed time =', 0.07436203956604004)
[[  0   0   2   1   0   0]
 [  0  12   8  12   1   1]
 [  2  21 184  63   8   0]
 [  1  12 182 240  26   4]
 [  0   5  39  74  48   2]
 [  0   1   5  10   6   9]]
('Classification Accuracy = ', 0.50357507660878442)
('Train elapsed time =', 0.0009398460388183594)
('Test elapsed time =', 0.07966399192810059)

brute cosine

[[  0   0   1   1   0   0   0]
 [  3  10   7   7   2   0   0]
 [  2  11 192  74   7   1   0]
 [  0  18 153 253  29   6   0]
 [  2   5  33  88  45   2   0]
```

```
brute cosine

[[  0   0   1   1   0   0   0]
 [  3  10   7   7   2   0   0]
 [  2  11 192  74   7   1   0]
 [  0  18 153 253  29   6   0]
 [  2   5  33  88  45   2   0]
 [  0   0   7  11   4   5   0]
 [  0   0   0   1   0   0   0]]
('Classification Accuracy = ', 0.51530612244897955)
('Train elapsed time =', 0.0008950233459472656)
('Test elapsed time =', 0.056327104568481445)
[[  0   1   2   1   0   1]
 [  1   9  13   9   3   0]
 [  1  20 188  56   6   1]
 [  2  14 175 255  19   2]
 [  0   6  31  83  47   0]
 [  2   0   5  17   5   5]]
('Classification Accuracy = ', 0.51428571428571423)
('Train elapsed time =', 0.0011489391326904297)
('Test elapsed time =', 0.06058096885681152)
[[  0   2   3   1   0   0   0]
 [  1  12  13   9   0   0   0]
 [  2  20 195  88   9   0   0]
 [  0  13 139 225  26   4   0]
 [  0   5  28  78  65   1   0]
 [  0   0   5  27   3   5   0]
 [  0   0   0   1   0   0   0]]
('Classification Accuracy = ', 0.51224489795918371)
('Train elapsed time =', 0.00080108642578125)
('Test elapsed time =', 0.057749032974243164)
[[  0   1   3   0   1   1   0]
 [  1   8  14   4   2   0   0]
 [  0  14 192  66  10   0   0]
 [  1  16 163 244  29   1   0]
 [  0   5  37  87  41   1   0]
 [  0   0   4  19   9   3   0]
 [  0   0   2   0   0   0   0]]
('Classification Accuracy = ', 0.49846782431052095)
('Train elapsed time =', 0.0009338855743408203)
('Test elapsed time =', 0.058417797088623047)
[[  0   1   0   0   0   0   0]
 [  1  12  10  12   0   0   0]
 [  0  12 199  79  11   1   0]
 [  0  11 137 239  23   1   0]
 [  0   0  51  79  59   1   0]
 [  0   1   7  16   6   9   0]
 [  0   0   1   0   0   0   0]]
('Classification Accuracy = ', 0.52911133810010214)
('Train elapsed time =', 0.0009500980377197266)
('Test elapsed time =', 0.058003902435302734)
lewis0816deMacBook-Pro:HW2 lewis0816$
```

```
print("\nKD_tree euclidean\n")
clf = KNeighborsClassifier(n_neighbors=2,algorithm='kd_tree',metric='euclidean')
kf = KFold(n_splits=5, shuffle=True)
```

KNN &Kfold

```
for train, test in kf.split(data, target):
    train_time = timer()
    r=clf.fit(data[train], target[train])
    train_time = timer()-train_time
    test_time = timer()
    pred = clf.predict(data[test])
    test_time = timer()-test_time
    cnf_matrix = confusion_matrix(target[test], pred)
    print(cnf_matrix)
    score= r.score(data[test], target[test])
    print("Classification Accuracy = ", score)
    print("Train elapsed time =", train_time)
    print("Test elapsed time =", test_time)
```

Time&Matrix