KNN example_2

July 5, 2022

[ ]:
```
import pandas as pd
import pickle
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

1 loading train/test data

[ ]:
```
with open('basketball_train.pkl', 'rb') as train_data:
    train = pickle.load(train_data)

with open('basketball_test.pkl', 'rb') as test_data:
    test = pickle.load(test_data)
```

2 calculating "k" by cross validation

[ ]:
```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import cross_val_score

# find best k, range from 3 to half of the number of data
max_k_range = train.shape[0] //2
k_list = []
for i in range(3, max_k_range, 1):
    k_list.append(i)

cross_validation_scores = []
x_train = train[['3P', 'BLK', 'TRB']]
y_train = train[['Pos']]
```

[ ]:
```
# 10-fold cv
for k in k_list:
    knn = KNeighborsClassifier(n_neighbors = k)
    scores = cross_val_score(knn, x_train, y_train.values.ravel(), cv = 10,␣
 ↪scoring = 'accuracy')
    cross_validation_scores.append(scores.mean())
```

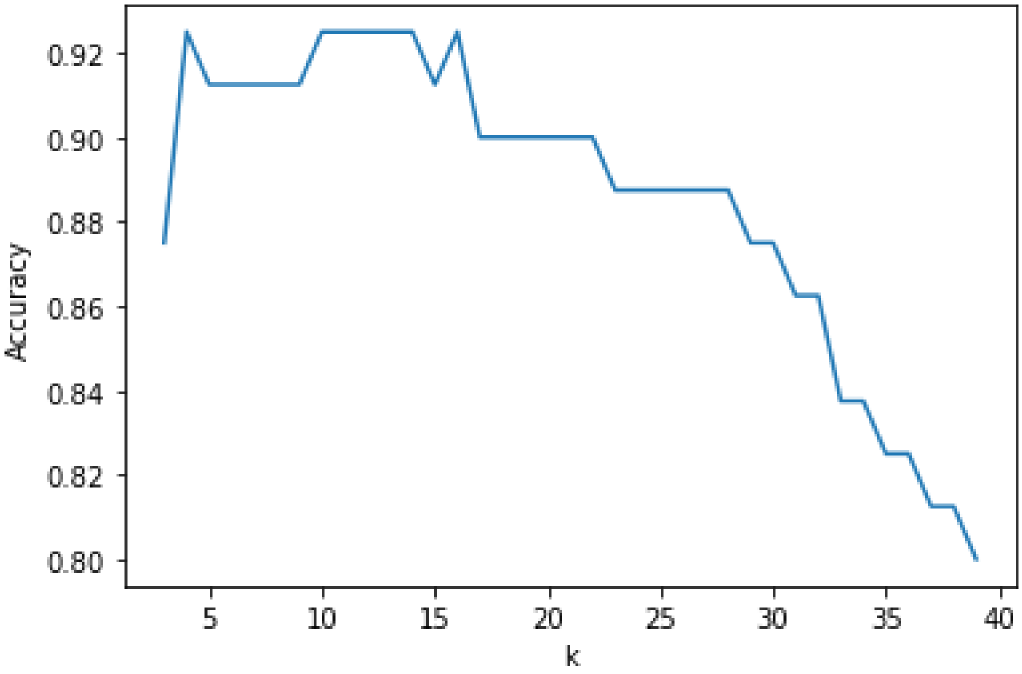
```
cross_validation_scores
```

```
[ ]: [0.875,
      0.925,
      0.9125,
      0.9125,
      0.9125,
      0.9125,
      0.9125,
      0.925,
      0.925,
      0.925,
      0.925,
      0.925,
      0.9125,
      0.925,
      0.9,
      0.9,
      0.9,
      0.9,
      0.9,
      0.9,
      0.8875,
      0.8875,
      0.8875,
      0.8875,
      0.8875,
      0.8875,
      0.875,
      0.875,
      0.8625,
      0.8625,
      0.8375,
      0.8375,
      0.825,
      0.825,
      0.8125,
      0.8125,
      0.8]
```

```
[ ]: print("train.shape[0] size: ", train.shape[0])
     print("train.shape[0] size divided by 2: ", train.shape[0] //2)
     print("max_k_range: ", max_k_range)
     print("Number of k's: ", len(k_list))
     print("Length of scores: ", len(scores))
     print("Data Type of scores: ", type(scores))
     print("Length of scores * k's: ", scores.size * len(k_list))
print("Length of cross_validation_scores (number of mean cv scores):",␣
 ↪len(cross_validation_scores))
```

```
train.shape[0] size:  80
train.shape[0] size divided by 2:  40
max_k_range:  40
Number of k's:  37
Length of scores:  10
Data Type of scores:  <class 'numpy.ndarray'>
Length of scores * k's:  370
Length of cross_validation_scores (number of mean cv scores): 37
```

[ ]:
```
# visualize accuracy according to k
plt.plot(k_list, cross_validation_scores)
plt.xlabel('k')
plt.ylabel('Accuracy')
plt.show()
```



[ ]:
```
# find best k
cvs = cross_validation_scores
k = k_list[cvs.index(max(cross_validation_scores))]
print("The best number of k: " + str(k))
```

```
The best number of k: 4
```

3 using two features only (3P, BLK)

[ ]:

```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score

knn = KNeighborsClassifier(n_neighbors = k)

x_train = train[['3P', 'BLK']]
y_train = train[['Pos']]

# setup knn using train data
knn.fit(x_train, y_train.values.ravel())

# select data feature to be used for prediction
x_test = test[['3P', 'BLK']]

# select target value
y_test = test[['Pos']]

# test
pred = knn.predict(x_test)
```

[ ]:

```
# check ground truth with knn prediction
comparison = pd.DataFrame(
    {'prediction' : pred, 'ground_truth' : y_test.values.ravel()})
comparison
```

[ ]:

```
   prediction ground_truth
0           C            C
1           C            C
2           C            C
3           C            C
4          SG           SG
5           C            C
6           C            C
7           C            C
8          SG           SG
9          SG            C
10         SG           SG
11         SG           SG
12         SG           SG
13          C            C
14          C            C
15          C            C
16         SG           SG
17         SG           SG
18          C            C
```

```
19          SG             SG
```

[ ]:

```python
# check accuracy
print("accuracy is " + str (accuracy_score(y_test.values.ravel(), pred)))
```

```
accuracy is 0.95
```