Chapter 5: Demo KNN Regression

In [0]:
```
# from google.colab import drive
# drive.mount("/content/gdrive", force_remount=True)
```

In [0]:
```
# %cd '/content/gdrive/My Drive/LDS6_MachineLearning/practice/Chapter5_KNN/'
```

In [0]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
```

In [0]:
```
# import some data to play with
iris = pd.read_excel("Iris.xls")
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 5 columns):
sepallength    150 non-null float64
sepalwidth     150 non-null float64
petallength    150 non-null float64
petalwidth     150 non-null float64
iris           150 non-null object
dtypes: float64(4), object(1)
memory usage: 5.9+ KB
```

In [0]:
```
iris.head()
```

Out[3]:

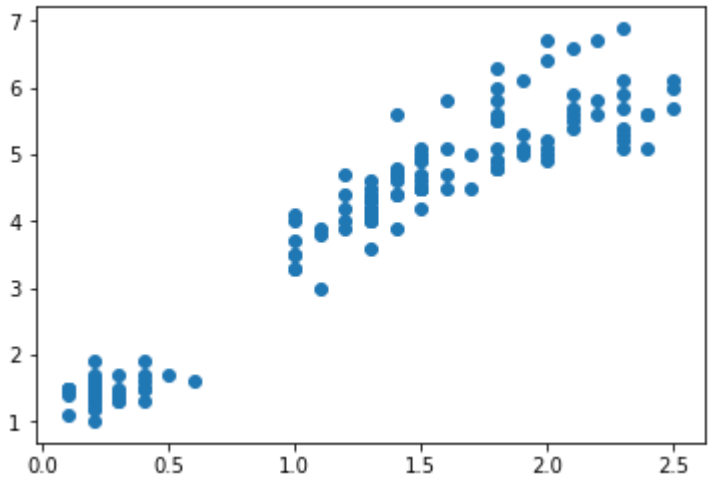
	sepallength	sepalwidth	petallength	petalwidth	iris
0	5.1	3.5	1.4	0.2	Iris-setosa
1	4.9	3.0	1.4	0.2	Iris-setosa
2	4.7	3.2	1.3	0.2	Iris-setosa
3	4.6	3.1	1.5	0.2	Iris-setosa
4	5.0	3.6	1.4	0.2	Iris-setosa

In [0]:
```
# Cho pentalwidth dự đoán pentallength
petalwidth = iris[['petalwidth']] # x hay input
pentallength = iris['petallength'] # y hay output
```

In [0]:
```
pentallength[:5]
```

Out[5]:
```
0    1.4
1    1.4
2    1.3
3    1.5
4    1.4
Name: petallength, dtype: float64
```

In [0]:
```
plt.scatter(petalwidth, pentallength)
plt.show()
```



In [0]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(petalwidth,
                                                    pentallength,
                                                    test_size=0.20,
                                                    random_state = 42)
```

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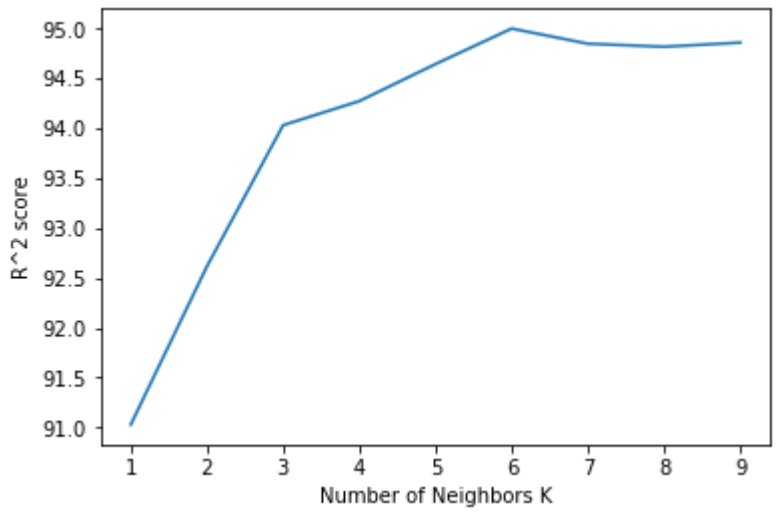
In [0]:
```
from sklearn.neighbors import KNeighborsRegressor
```

In [0]:
```
# neu nhu co mot so k co score = nhau => tim mse cua cac k bang nhau =>
# mse << => chon k
list_k = []
list_r_score = []
for K_value in range(2,int(y_train.shape[0]**0.5)):
    list_k.append(K_value)
    neigh = KNeighborsRegressor(n_neighbors = K_value)
    neigh.fit(X_train, y_train)
    score = neigh.score(X_test,y_test)*100
    list_r_score.append(score)
    print("The R^2 score is ", score, " for K-Value:",K_value)
vi_tri = list_r_score.index(max(list_r_score))
k = list_k[vi_tri]
print("\nThe optimal number of neighbors is:", k, "with R^2 score is:",
      list_r_score[vi_tri])
```

```
The R^2 score is  91.02944417134236  for K-Value: 1
The R^2 score is  92.61607309341787  for K-Value: 2
The R^2 score is  94.03093022335983  for K-Value: 3
The R^2 score is  94.27262556574509  for K-Value: 4
The R^2 score is  94.6437034902446  for K-Value: 5
The R^2 score is  94.99968922866555  for K-Value: 6
The R^2 score is  94.84781487391967  for K-Value: 7
The R^2 score is  94.8173935890699  for K-Value: 8
The R^2 score is  94.85852370431896  for K-Value: 9

The optimal number of neighbors is: 6 with R^2 score is: 94.99968922866555
```

In [0]:
```
plt.plot(list_k, list_r_score)
plt.xlabel('Number of Neighbors K')
plt.ylabel('R^2 score')
plt.show()
```



In [0]:
```
# seleck k => model
knn = KNeighborsRegressor(n_neighbors=6)
knn.fit(X_train, y_train)
```

Out[11]:
```
KNeighborsRegressor(algorithm='auto', leaf_size=30, metric='minkowski',
          metric_params=None, n_jobs=None, n_neighbors=6, p=2,
          weights='uniform')
```

In [0]:
```
y_pred = knn.predict(X_test)
y_pred
```

Out[12]:
```
array([3.9       , 1.36666667, 5.71666667, 4.63333333, 4.6       ,
       1.6       , 4.16666667, 5.71666667, 4.63333333, 3.9       ,
       5.53333333, 1.4       , 1.38333333, 1.4       , 1.36666667,
       4.85      , 5.85      , 3.91666667, 4.16666667, 5.85      ,
       1.38333333, 5.36666667, 1.6       , 5.66666667, 5.53333333,
       5.71666667, 5.36666667, 5.71666667, 1.36666667, 1.38333333])
```

In [0]:
```
print("The Training R^2 score is: ", knn.score(X_train,y_train))
print("The Testing R^2 score is: ", knn.score(X_test,y_test))
```

```
The Training R^2 score is:  0.9581011061128362
The Testing R^2 score is:  0.9499968922866555
```

In [0]:
```
from sklearn import metrics
print('Mean Squared Error:', metrics.mean_squared_error(y_test, y_pred))
```

```
Mean Squared Error: 0.16387962962962974
```

In [0]:
```
df = pd.DataFrame({'Actual': pd.DataFrame(y_test.values)[0].values,
                   'Prediction': pd.DataFrame(y_pred)[0].values})
df.head()
```

Out[15]:

	Actual	Prediction
0	4.7	3.900000
1	1.7	1.366667
2	6.9	5.716667
3	4.5	4.633333
4	4.8	4.600000

In [0]:
```
x_now = [[0.25]]
y_now = knn.predict(x_now)
y_now
```

Out[16]:
```
array([1.38333333])
```