Lecture 9-K Nearest Neighbour-Part 2

K Nearest Neighbors with Python

Import Libraries

In [10]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
%matplotlib inline
```

Get the Data

In [11]:
```
df = pd.read_csv('Downloads/KNN_Project_Data')
```

In [12]:
```
df.head()
```

Out[12]:

	XVPM	GWYH	TRAT	TLLZ	IGGA	HYKR	EDFS	
0	1636.670614	817.988525	2565.995189	358.347163	550.417491	1618.870897	2147.641254	330
1	1013.402760	577.587332	2644.141273	280.428203	1161.873391	2084.107872	853.404981	447
2	1300.035501	820.518697	2025.854469	525.562292	922.206261	2552.355407	818.676686	845
3	1059.347542	1066.866418	612.000041	480.827789	419.467495	685.666983	852.867810	341
4	1018.340526	1313.679056	950.622661	724.742174	843.065903	1370.554164	905.469453	658

Standardize the Variables

In [4]:
```
from sklearn.preprocessing import StandardScaler
```

In [5]:
```
scaler = StandardScaler()
```

In [13]:
```
scaler.fit(df.drop('TARGET CLASS',axis=1))
```

Out[13]:
```
StandardScaler()
```

In [16]:
```
scaled_features = scaler.transform(df.drop('TARGET CLASS',axis=1))
```

In [20]:
```
df_feat = pd.DataFrame(scaled_features,columns=df.columns[:-1])
df_feat.head()
```

Out[20]:

	XVPM	GWYH	TRAT	TLLZ	IGGA	HYKR	EDFS	GUUB	MGJM
0	1.568522	-0.443435	1.619808	-0.958255	-1.128481	0.138336	0.980493	-0.932794	1.008313
1	-0.112376	-1.056574	1.741918	-1.504220	0.640009	1.081552	-1.182663	-0.461864	0.258321
2	0.660647	-0.436981	0.775793	0.213394	-0.053171	2.030872	-1.240707	1.149298	2.184784
3	0.011533	0.191324	-1.433473	-0.100053	-1.507223	-1.753632	-1.183561	-0.888557	0.162310
4	-0.099059	0.820815	-0.904346	1.609015	-0.282065	-0.365099	-1.095644	0.391419	-1.365603

Train Test Split

In [21]:
```
from sklearn.model_selection import train_test_split
```

In [22]:
```
X_train, X_test, y_train, y_test = train_test_split(scaled_features,df['TARG
                                                    test_size=0.30)
```

Using KNN

Remember that we are trying to come up with a model to predict whether someone will TARGET CLASS or not. We'll start with k=1.

In [23]:
```
from sklearn.neighbors import KNeighborsClassifier
```

In [24]:
```
knn = KNeighborsClassifier(n_neighbors=1)
```

In [25]:
```
knn.fit(X_train,y_train)
```

Out[25]:
```
KNeighborsClassifier(n_neighbors=1)
```

In [26]:
```
pred = knn.predict(X_test)
```

Predictions and Evaluations

Let's evaluate our KNN model!

In [27]:
```
from sklearn.metrics import classification_report,confusion_matrix
```

In [28]:
```
print(confusion_matrix(y_test,pred))
```

```
[[109  45]
 [ 33 113]]
```

In [29]:
```
print(classification_report(y_test,pred))
```

```
              precision    recall  f1-score   support

           0       0.77      0.71      0.74       154
           1       0.72      0.77      0.74       146

    accuracy                           0.74       300
   macro avg       0.74      0.74      0.74       300
weighted avg       0.74      0.74      0.74       300
```

Choosing a K Value

Let's go ahead and use the elbow method to pick a good K Value:

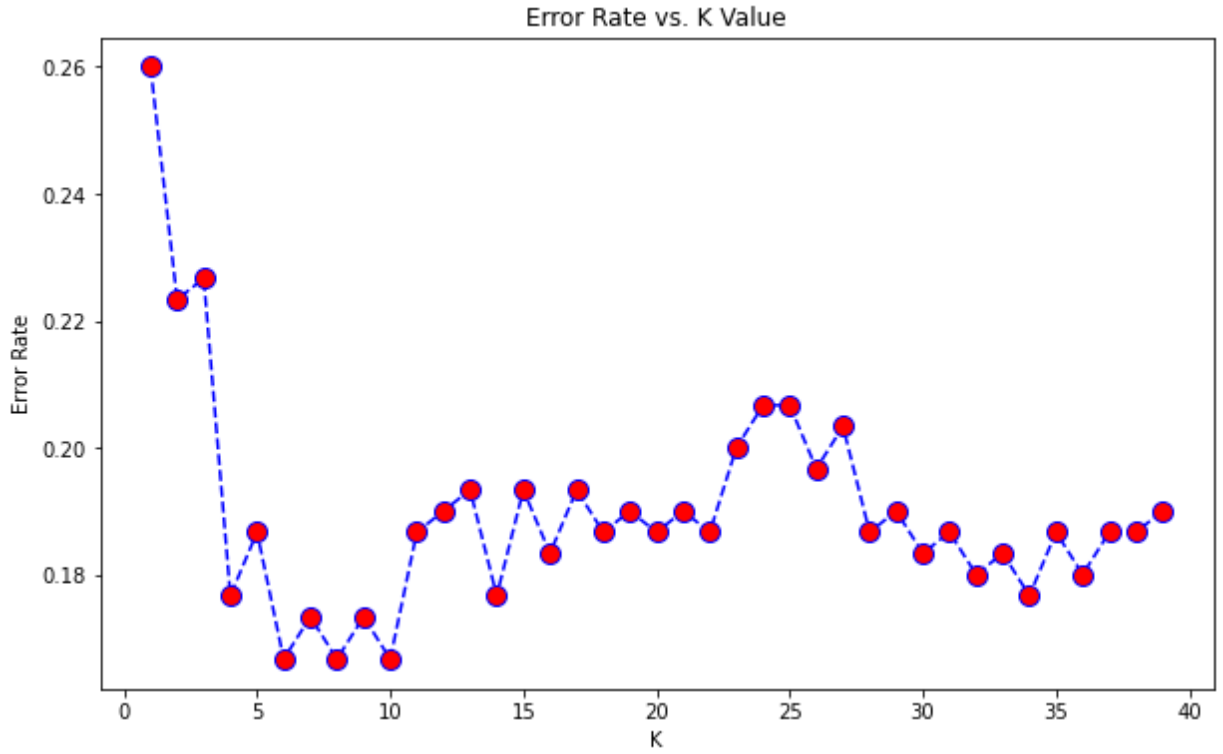
In [30]:
```
error_rate = []

# Will take some time
for i in range(1,40):

    knn = KNeighborsClassifier(n_neighbors=i)
    knn.fit(X_train,y_train)
    pred_i = knn.predict(X_test)
    error_rate.append(np.mean(pred_i != y_test))
```

In [31]:
```
plt.figure(figsize=(10,6))
plt.plot(range(1,40),error_rate,color='blue', linestyle='dashed', marker='o'
         markerfacecolor='red', markersize=10)
plt.title('Error Rate vs. K Value')
plt.xlabel('K')
plt.ylabel('Error Rate')
```

Out[31]: Text(0, 0.5, 'Error Rate')



In [32]:
```
# FIRST A QUICK COMPARISON TO OUR ORIGINAL K=1
knn = KNeighborsClassifier(n_neighbors=1)

knn.fit(X_train,y_train)
pred = knn.predict(X_test)

print('WITH K=1')
print('\n')
print(confusion_matrix(y_test,pred))
print('\n')
print(classification_report(y_test,pred))
```

```
WITH K=1


[[109  45]
 [ 33 113]]


              precision    recall  f1-score   support

           0       0.77      0.71      0.74       154
           1       0.72      0.77      0.74       146

    accuracy                           0.74       300
   macro avg       0.74      0.74      0.74       300
weighted avg       0.74      0.74      0.74       300
```

In [35]:
```
# NOW WITH K=3
knn = KNeighborsClassifier(n_neighbors=23)

knn.fit(X_train,y_train)
pred = knn.predict(X_test)

print('WITH K=30')
print('\n')
print(confusion_matrix(y_test,pred))
print('\n')
print(classification_report(y_test,pred))
```

```
WITH K=30


[[114  40]
 [ 20 126]]


              precision    recall  f1-score   support

           0       0.85      0.74      0.79       154
           1       0.76      0.86      0.81       146

    accuracy                           0.80       300
   macro avg       0.80      0.80      0.80       300
weighted avg       0.81      0.80      0.80       300
```

In [ ]:
```
1
```