KNN WITH PYTHON NOTES

In [1]:
```
import pandas as pd
import numpy as np
```

In [2]:
```
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [3]:
```
df = pd.read_csv('Classified Data', index_col=0)

#It is all classified data so you do not know what any of those numbers represent
# Also the letters and what they represent. You just have to use these features
#  in order to predict a target class 1 or 0
```

In [4]:
```
df.head()
```

Out[4]:

	WTT	PTI	EQW	SBI	LQE	QWG	FDJ	PJF	HQE	NXJ	TARGET CLASS
0	0.913917	1.162073	0.567946	0.755464	0.780862	0.352608	0.759697	0.643798	0.879422	1.231409	1
1	0.635632	1.003722	0.535342	0.825645	0.924109	0.648450	0.675334	1.013546	0.621552	1.492702	0
2	0.721360	1.201493	0.921990	0.855595	1.526629	0.720781	1.626351	1.154483	0.957877	1.285597	0
3	1.234204	1.386726	0.653046	0.825624	1.142504	0.875128	1.409708	1.380003	1.522692	1.153093	1
4	1.279491	0.949750	0.627280	0.668976	1.232537	0.703727	1.115596	0.646691	1.463812	1.419167	1

In [5]:
```
#First, standardize everything to the same scale
from sklearn.preprocessing import StandardScaler
```

Data standardization is the process of creating standards and transforming data taken from different sources into a consistent format that adheres to the standards

In [6]:
```
scaler = StandardScaler()
```

In [7]:
```
#We want to fit it to our data while avoiding the target class

scaler.fit(df.drop('TARGET CLASS',axis=1))
```

Out[7]:
```
StandardScaler()
```

In [8]:
```
scaled_features = scaler.transform(df.drop('TARGET CLASS',axis=1))
```

In [10]:
```
scaled_features #scaled version of the df
```

Out[10]:
```
array([[-0.12354188,  0.18590747, -0.91343069, ..., -1.48236813,
        -0.9497194 , -0.64331425],
       [-1.08483602, -0.43034845, -1.02531333, ..., -0.20224031,
        -1.82805088,  0.63675862],
       [-0.78870217,  0.33931821,  0.30151137, ...,  0.28570652,
        -0.68249379, -0.37784986],
       ...,
       [ 0.64177714, -0.51308341, -0.17920486, ..., -2.36249443,
        -0.81426092,  0.11159651],
       [ 0.46707241, -0.98278576, -1.46519359, ..., -0.03677699,
         0.40602453, -0.85567   ],
       [-0.38765353, -0.59589427, -1.4313981 , ..., -0.56778932,
         0.3369971 ,  0.01034996]])
```

In [12]:
```
df_feat = pd.DataFrame(scaled_features,columns=df.columns[:-1])
```

In [13]:
```
df_feat.head()
```

Out[13]:

	WTT	PTI	EQW	SBI	LQE	QWG	FDJ	PJF	HQE	NXJ
0	-0.123542	0.185907	-0.913431	0.319629	-1.033637	-2.308375	-0.798951	-1.482368	-0.949719	-0.643314
1	-1.084836	-0.430348	-1.025313	0.625388	-0.444847	-1.152706	-1.129797	-0.202240	-1.828051	0.636759
2	-0.788702	0.339318	0.301511	0.755873	2.031693	-0.870156	2.599818	0.285707	-0.682494	-0.377850
3	0.982841	1.060193	-0.621399	0.625299	0.452820	-0.267220	1.750208	1.066491	1.241325	-1.026987
4	1.139275	-0.640392	-0.709819	-0.057175	0.822886	-0.936773	0.596782	-1.472352	1.040772	0.276510

In [29]:
```
from sklearn.model_selection import train_test_split
```

In [30]:
```
X = df_feat
y = df['TARGET CLASS']
```

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=101)
```

In [31]:
```
from sklearn.neighbors import KNeighborsClassifier
```

In [32]:
```
knn = KNeighborsClassifier(n_neighbors=1)
```

In [33]:
```
knn.fit(X_train,y_train)
```

Out[33]:
```
KNeighborsClassifier(n_neighbors=1)
```

In [34]:
```
pred = knn.predict(X_test)
```

```
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  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
```

In [27]:
```
from sklearn.metrics import classification_report,confusion_matrix
print(classification_report(y_test,pred))
print(confusion_matrix(y_test,pred))
```

```
              precision    recall  f1-score   support

           0       0.91      0.95      0.93       159
           1       0.94      0.89      0.92       141

    accuracy                           0.92       300
   macro avg       0.92      0.92      0.92       300
weighted avg       0.92      0.92      0.92       300

[[151   8]
 [ 15 126]]
```

In [36]:
```
#Use Elbow method to get and choose a correct K value

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))
```

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`axis` over which the statistic is taken will be eliminated, and the value None will no longer be accepted. Set
`keepdims` to True or False to avoid this warning.
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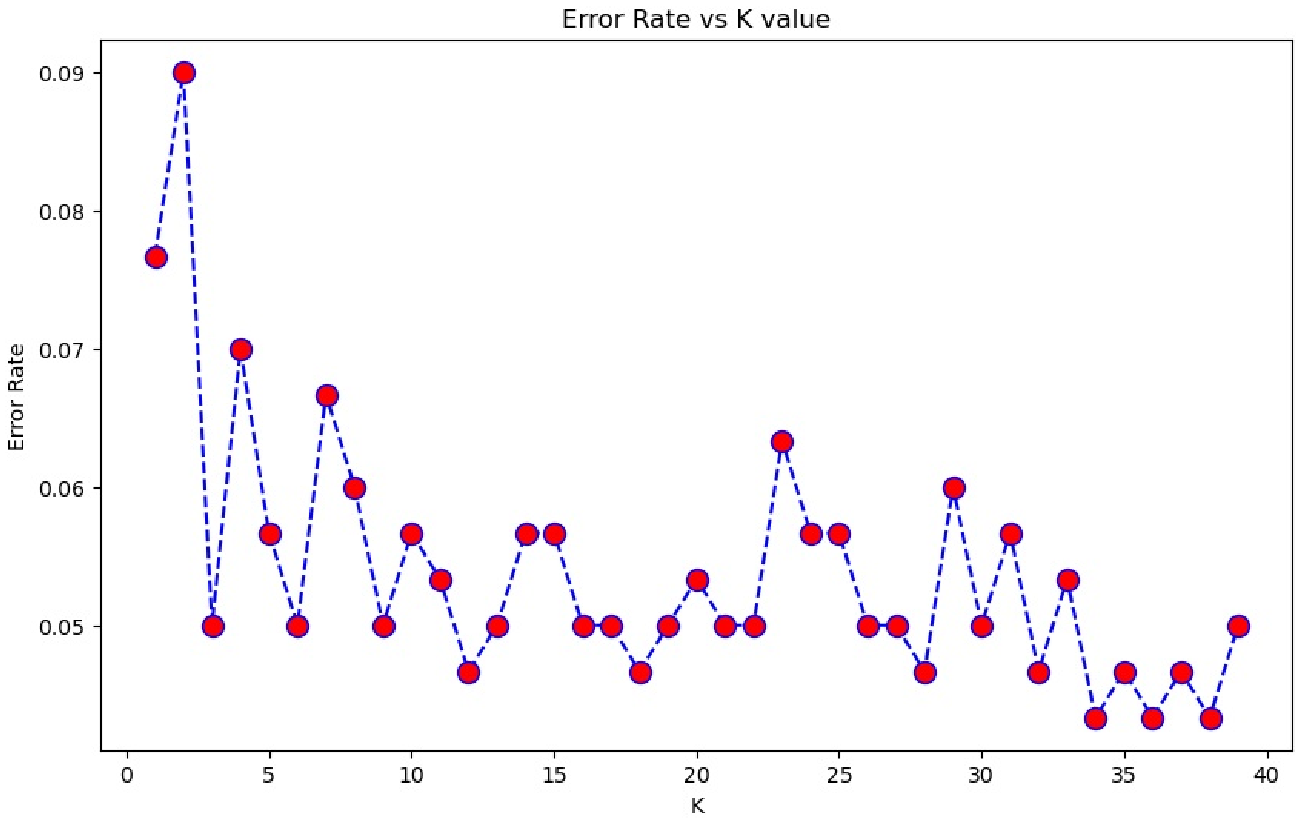
`keepdims` to True or False to avoid this warning.
  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
```

In [38]:

```
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[38]:

```
Text(0, 0.5, 'Error Rate')
```



In [40]:

```
knn = KNeighborsClassifier(n_neighbors=17)
knn.fit(X_train,y_train)
pred = knn.predict(X_test)

print(confusion_matrix(y_test,pred))
print('\n')
print(classification_report(y_test,pred))
```

```
[[153   6]
 [  9 132]]


              precision    recall  f1-score   support

           0       0.94      0.96      0.95       159
           1       0.96      0.94      0.95       141

    accuracy                           0.95       300
   macro avg       0.95      0.95      0.95       300
weighted avg       0.95      0.95      0.95       300
```

```
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  mode, _ = stats.mode(_y[neigh_ind, k], axis=1)
```

In [ ]: