In [2]:

```
import pandas as pd
import numpy as np
import pylab as pl
from sklearn import datasets
import matplotlib.pyplot as plt
import sklearn.metrics as sm
from sklearn.cluster import KMeans
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score
%matplotlib inline

#https://github.com/VenkateshUV/Comprehending-K-Means-and-KNN-Algorithms/blob/master/Knn%20
```

In [3]:

```
family = pd.read_csv("Family2.csv")
```

In [4]:

```
family
```

Out[4]:

	n_residents	n_small_kids	n_growup_kids	n_elderly	n_disable	family	first_security	second_securi
0	1	0	0	0	1	one_eld_dis	surveillance	lack_ene
1	3	1	0	0	0	wkid	surveillance	lack_ene
2	2	1	0	0	0	mkid	lack_energ	water_le
3	4	1	1	0	0	wkid	lack_energ	alar
4	1	0	0	0	0	one_house	surveillance	lack_ene
5	5	0	2	1	0	wkid_ed	alarm	lack_ene
6	2	0	0	2	0	eld_dis	surveillance	acce
7	1	0	0	0	0	one_house	surveillance	Na
8	2	1	0	0	0	mkid	alarm	surveillan
9	2	0	0	0	0	cohab	surveillance	water_le

In [5]:

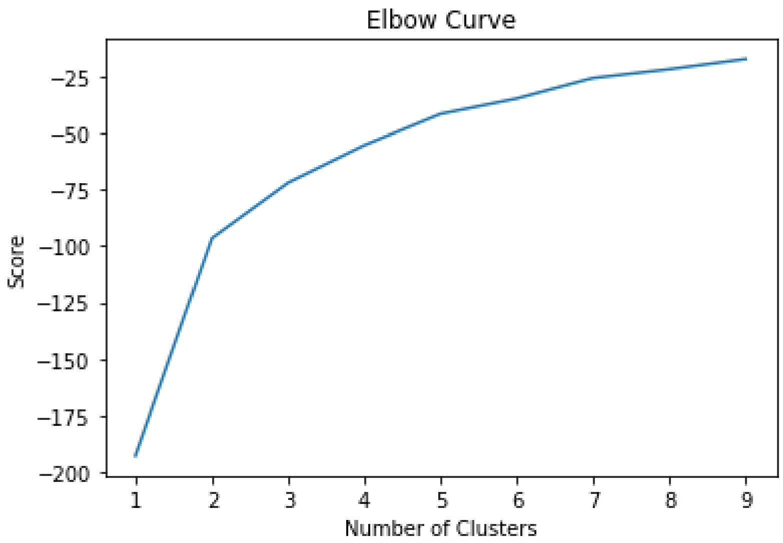
```
family_features = ['n_residents', 'n_small_kids', 'n_growup_kids', 'n_elderly',
       'n_disable']
X = family[family_features]
X
```

Out[5]:

	n_residents	n_small_kids	n_growup_kids	n_elderly	n_disable
0	1	0	0	0	1
1	3	1	0	0	0
2	2	1	0	0	0
3	4	1	1	0	0
4	1	0	0	0	0
5	5	0	2	1	0
6	2	0	0	2	0
7	1	0	0	0	0
8	2	1	0	0	0
9	2	0	0	0	0

In [6]:

```
Nc = range(1, 10)
kmeans = [KMeans(n_clusters=i) for i in Nc]
kmeans
score = [kmeans[i].fit(X).score(X) for i in range(len(kmeans))]
score
pl.plot(Nc,score)
pl.xlabel('Number of Clusters')
pl.ylabel('Score')
pl.title('Elbow Curve')
pl.show()
```



In [7]:

```
family_features = ['n_residents', 'n_small_kids', 'n_growup_kids', 'n_elderly',
       'n_disable']
X = family[family_features]
X.head()
```

Out[7]:

	n_residents	n_small_kids	n_growup_kids	n_elderly	n_disable
0	1	0	0	0	1
1	3	1	0	0	0
2	2	1	0	0	0
3	4	1	1	0	0
4	1	0	0	0	0

In [8]:

```
from sklearn.preprocessing import LabelEncoder
```

In [9]:

```
name_le = LabelEncoder()
y = name_le.fit_transform(family['family'].values)
y1 = name_le.inverse_transform(y)
```

In [10]:

```
d = {'LabelEncoder' : y,
   'Family Type' : y1}
pd.DataFrame(d)
```

Out[10]:

	LabelEncoder	Family Type
0	3	one_eld_dis
1	5	wkid
2	2	mkid
3	5	wkid
4	4	one_house
5	6	wkid_ed
6	1	eld_dis
7	4	one_house
8	2	mkid
9	0	cohab

In [11]:

```
y
```

Out[11]:

```
array([3, 5, 2, 5, 4, 6, 1, 4, 2, 0, 1, 1, 6, 2, 0, 0, 4, 1, 1, 3, 5, 2,
       5, 4, 6, 1, 4, 2, 0, 1, 1, 6, 2, 0, 0, 3, 1, 1, 1, 0, 4, 2, 0, 4,
       4, 6, 1, 4, 6, 1])
```

In [12]:

```
family.head(10)
```

Out[12]:

	n_residents	n_small_kids	n_growup_kids	n_elderly	n_disable	family	first_security	s
0	1	0	0	0	1	one_eld_dis	surveillance	
1	3	1	0	0	0	wkid	surveillance	
2	2	1	0	0	0	mkid	lack_energ	
3	4	1	1	0	0	wkid	lack_energ	
4	1	0	0	0	0	one_house	surveillance	
5	5	0	2	1	0	wkid_ed	alarm	
6	2	0	0	2	0	eld_dis	surveillance	
7	1	0	0	0	0	one_house	surveillance	
8	2	1	0	0	0	mkid	alarm	
9	2	0	0	0	0	cohab	surveillance	

In [59]:

```
X.insert(5,'type',y)
```

In [62]:

```
X.head()
```

Out[62]:

	n_residents	n_small_kids	n_growup_kids	n_elderly	n_disable	type
0	1	0	0	0	1	3
1	3	1	0	0	0	5
2	2	1	0	0	0	2
3	4	1	1	0	0	5
4	1	0	0	0	0	4

In [73]:

```
df_family = pd.DataFrame(X, columns = family_features + ['type'])
```

In [74]:

```
df_family.replace({'type': {0: 'Cohabit', 1:'Idoso-Defic',2:'Monoparental-kid',3:'Idoso-Soz
```

Out[74]:

	n_residents	n_small_kids	n_growup_kids	n_elderly	n_disable	type
0	1	0	0	0	1	Idoso-Sozinho
1	3	1	0	0	0	Pais-kid
2	2	1	0	0	0	Monoparental-kid
3	4	1	1	0	0	Pais-kid
4	1	0	0	0	0	Sozinho
5	5	0	2	1	0	Idoso-Defic-kid
6	2	0	0	2	0	Idoso-Defic
7	1	0	0	0	0	Sozinho
8	2	1	0	0	0	Monoparental-kid
9	2	0	0	0	0	Cohabit

In [75]:

```
X = df_family.iloc[:, :-1].values
y = df_family.iloc[:, 5].values
```

In [76]:

```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.20)
```

In [77]:

```
from sklearn.preprocessing import StandardScaler
scaler = StandardScaler()
scaler.fit(X_train)

X_train = scaler.transform(X_train)
X_test = scaler.transform(X_test)
```

In [78]:

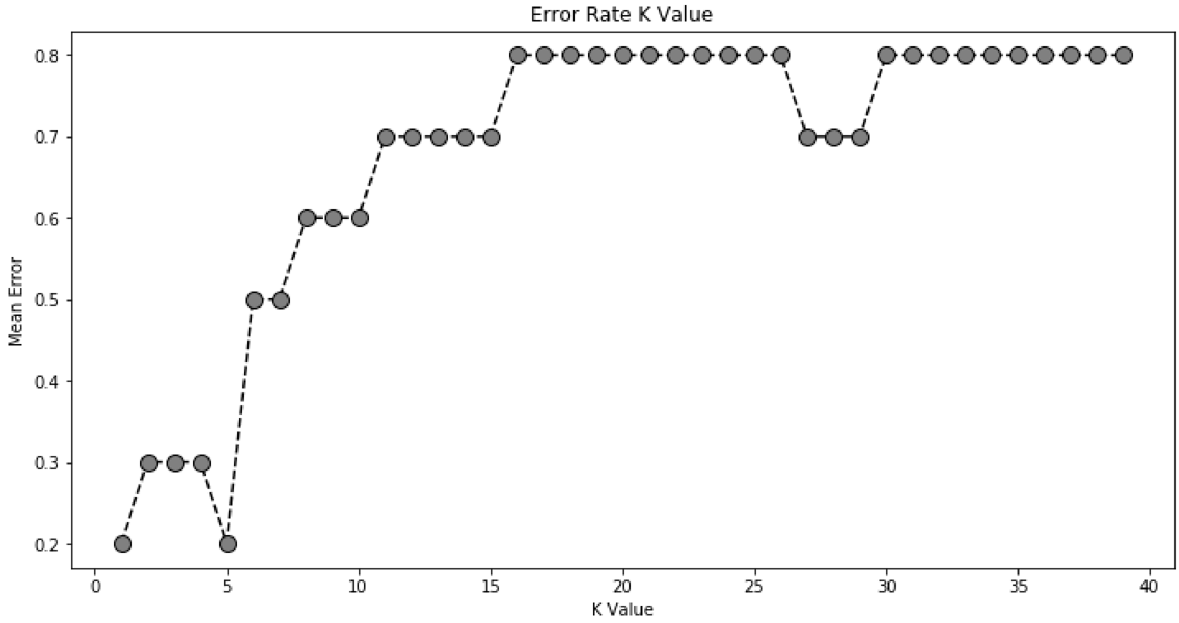
```
error = []

# Calculating error for K values between 1 and 40
for i in range(1, 40):
    knn = KNeighborsClassifier(n_neighbors=i)
    knn.fit(X_train, y_train)
    pred_i = knn.predict(X_test)
    error.append(np.mean(pred_i != y_test))
```

In [79]:

```
plt.figure(figsize=(12, 6))
plt.plot(range(1, 40), error, color='black', linestyle='dashed', marker='o',
         markerfacecolor='grey', markersize=10)
plt.title('Error Rate K Value')
plt.xlabel('K Value')
plt.ylabel('Mean Error')
```

Out[79]:

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



In [80]:

```
from sklearn.neighbors import KNeighborsClassifier
classifier = KNeighborsClassifier(n_neighbors=5)
classifier.fit(X_train, y_train)
```

Out[80]:

```
KNeighborsClassifier(algorithm='auto', leaf_size=30, metric='minkowski',
                     metric_params=None, n_jobs=None, n_neighbors=5, p=2,
                     weights='uniform')
```

In [81]:

```
y_pred = classifier.predict(X_test)
```

In [82]:

```
from sklearn.metrics import classification_report, confusion_matrix
print(confusion_matrix(y_test, y_pred))
print(classification_report(y_test, y_pred))
```

```
[[2 0 0 0 0 0]
 [0 2 0 0 0 0]
 [0 0 2 0 0 0]
 [0 0 0 1 0 0]
 [0 0 1 0 0 0]
 [0 1 0 0 0 1]]
              precision    recall  f1-score   support

           0       1.00      1.00      1.00         2
           1       0.67      1.00      0.80         2
           2       0.67      1.00      0.80         2
           4       1.00      1.00      1.00         1
           5       0.00      0.00      0.00         1
           6       1.00      0.50      0.67         2

    accuracy                           0.80        10
   macro avg       0.72      0.75      0.71        10
weighted avg       0.77      0.80      0.75        10


C:\Users\gabid\anaconda3\lib\site-packages\sklearn\metrics\_classification.p
y:1272: UndefinedMetricWarning: Precision and F-score are ill-defined and be
ing set to 0.0 in labels with no predicted samples. Use `zero_division` para
meter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

In [ ]: