In [1]:

```
# KNN Classification
from pandas import read_csv
import numpy as np
from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
from sklearn.neighbors import KNeighborsClassifier
```

In [2]:

```
filename = 'C:/Users/Ashraf/Documents/Datafiles/pima-indians-diabetes.data.csv'
names = [
    'preg', 'plas', 'pres', 'skin', 'test', 'mass', 'pedi', 'age', 'class'
]
dataframe = read_csv(filename, names=names)
array = dataframe.values
X = array[:, 0:8]
Y = array[:, 8]
```

In [3]:

```
num_folds = 10
kfold = KFold(n_splits=10)
```

In [4]:

```
model = KNeighborsClassifier(n_neighbors=17)
results = cross_val_score(model, X, Y, cv=kfold)
```

In [5]:

```
print(results.mean())
```

```
0.7565276828434724
```

# Grid Search for Algorithm Tuning

In [6]:

```
# Grid Search for Algorithm Tuning
import numpy
from pandas import read_csv
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import GridSearchCV
```

In [7]:

```
filename = 'C:/Users/Ashraf/Documents/Datafiles/pima-indians-diabetes.data.csv'
names = [
    'preg', 'plas', 'pres', 'skin', 'test', 'mass', 'pedi', 'age', 'class'
]
dataframe = read_csv(filename, names=names)
array = dataframe.values
X = array[:, 0:8]
Y = array[:, 8]
```

In [8]:

```
n_neighbors = numpy.array(range(1,40))
param_grid = dict(n_neighbors=n_neighbors)
```

In [9]:

```
model = KNeighborsClassifier()
grid = GridSearchCV(estimator=model, param_grid=param_grid)
grid.fit(X, Y)
```

Out[9]:

```
GridSearchCV(estimator=KNeighborsClassifier(),
             param_grid={'n_neighbors': array([ 1,  2,  3,  4,  5,  6,  7,
8,  9, 10, 11, 12, 13, 14, 15, 16, 17,
       18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34,
       35, 36, 37, 38, 39])})
```

In [10]:

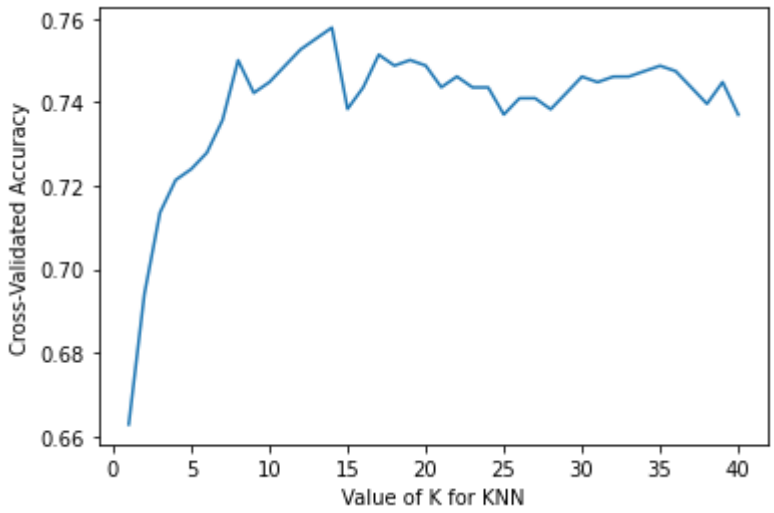
```
print(grid.best_score_)
print(grid.best_params_)
```

```
0.7578558696205755
{'n_neighbors': 14}
```

# Visualizing the CV results

In [11]:

```
import matplotlib.pyplot as plt
%matplotlib inline
# choose k between 1 to 41
k_range = range(1, 41)
k_scores = []
# use iteration to caclulator different k in models, then return the average accuracy based
for k in k_range:
    knn = KNeighborsClassifier(n_neighbors=k)
    scores = cross_val_score(knn, X, Y, cv=5)
    k_scores.append(scores.mean())
# plot to see clearly
plt.plot(k_range, k_scores)
plt.xlabel('Value of K for KNN')
plt.ylabel('Cross-Validated Accuracy')
plt.show()
```




In [ ]: