**********

**Assignment No: 5**

**Title Name:** Implement K-Nearest Neighbors algorithm

**Name**:Vasant Kumar

**Class** : BE **Div**: B **Batch**: C

**Roll No: 405B091**

**********

In [1]:
```
import numpy as np
import pandas as pd
import math
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.neighbors import KNeighborsClassifier
from sklearn import metrics
from sklearn.model_selection import cross_val_score
from sklearn.model_selection import KFold
%matplotlib inline


location = 'diabetes.csv'
f = pd.read_csv(location)
data = pd.DataFrame(f)
data.head()
```

Out[1]:

| | Pregnancies | Glucose | BloodPressure | SkinThickness | Insulin | BMI | Pedigree | Age | Outco |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 6 | 148 | 72 | 35 | 0 | 33.6 | 0.627 | 50 | 1 |
| **1** | 1 | 85 | 66 | 29 | 0 | 26.6 | 0.351 | 31 | 0 |
| **2** | 8 | 183 | 64 | 0 | 0 | 23.3 | 0.672 | 32 | 1 |
| **3** | 1 | 89 | 66 | 23 | 94 | 28.1 | 0.167 | 21 | 0 |
| **4** | 0 | 137 | 40 | 35 | 168 | 43.1 | 2.288 | 33 | 1 |

In [2]:
```
cols_clean  =  ['Glucose','BloodPressure','SkinThickness','Insulin','BMI','Pedigree']

# with this function , i dealt with missing values and NaN values
for i in cols_clean:
    data[i] = data[i].replace(0,np.NaN)
    cols_mean = int(data[i].mean(skipna=True))
    data[i] = data[i].replace(np.NaN, cols_mean)
data1 = data
data1.head().style.highlight_max(color="lightblue").highlight_min(color="red")
```

Out[2]:

| | Pregnancies | Glucose | BloodPressure | SkinThickness | Insulin | BMI | Pedigree | Age | O |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 6 | 148.000000 | 72.000000 | 35.000000 | 155.000000 | 33.600000 | 0.627000 | 50 | |
| **1** | 1 | 85.000000 | 66.000000 | 29.000000 | 155.000000 | 26.600000 | 0.351000 | 31 | |
| **2** | 8 | 183.000000 | 64.000000 | 29.000000 | 155.000000 | 23.300000 | 0.672000 | 32 | |
| **3** | 1 | 89.000000 | 66.000000 | 23.000000 | 94.000000 | 28.100000 | 0.167000 | 21 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **4** | 0 | 137.000000 | 40.000000 | 35.000000 | 168.000000 | 43.100000 | 2.288000 | 33 |

In [3]:
```
print(data1.describe())
```

```
       Pregnancies    Glucose BloodPressure SkinThickness   Insulin  \
count   768.000000 768.000000    768.000000    768.000000 768.00000
mean      3.845052 121.682292     72.386719     29.108073 155.28125
std       3.369578  30.435999     12.096642      8.791221  85.02155
min       0.000000  44.000000     24.000000      7.000000  14.00000
25%       1.000000  99.750000     64.000000     25.000000 121.50000
50%       3.000000 117.000000     72.000000     29.000000 155.00000
```

```
75%      6.000000 140.250000     80.000000     32.000000  155.00000
max     17.000000 199.000000    122.000000     99.000000  846.00000

              BMI    Pedigree         Age     Outcome
count  768.000000 768.000000 768.000000 768.000000
mean    32.450911   0.471876  33.240885   0.348958
std      6.875366   0.331329  11.760232   0.476951
min     18.200000   0.078000  21.000000   0.000000
25%     27.500000   0.243750  24.000000   0.000000
50%     32.000000   0.372500  29.000000   0.000000
75%     36.600000   0.626250  41.000000   1.000000
max     67.100000   2.420000  81.000000   1.000000
```

In [4]:

```
# for the purpose of simplicity and analysing the most relevent  data , we will se
# Glucose , Insulin and BMI
q_cols = ['Glucose','Insulin','BMI','Outcome']

# defining variables and features for the dataset for splitting
df = data1[q_cols]
print(df.head(2))
```

```
   Glucose  Insulin BMI  Outcome
0    148.0    155.0  33.6       1
1     85.0    155.0  26.6       0
```

In [5]:

```
# let's split the data into training and testing datasets
split = 0.75 # 75% train and 25% test dataset
total_len = len(df)
split_df = int(total_len*split)
train, test = df.iloc[:split_df,0:4],df.iloc[split_df:,0:4]
train_x = train[['Glucose','Insulin','BMI']]
train_y = train['Outcome']
test_x = test[['Glucose','Insulin','BMI']]
test_y = test['Outcome']
```

In [6]:

```
a = len(train_x)
b = len(test_x)
print(' Training data =',a,'\n','Testing data =',b,'\n','Total data length = ',a+b
```

```
Training data = 576
Testing data = 192
Total data length =  768
```

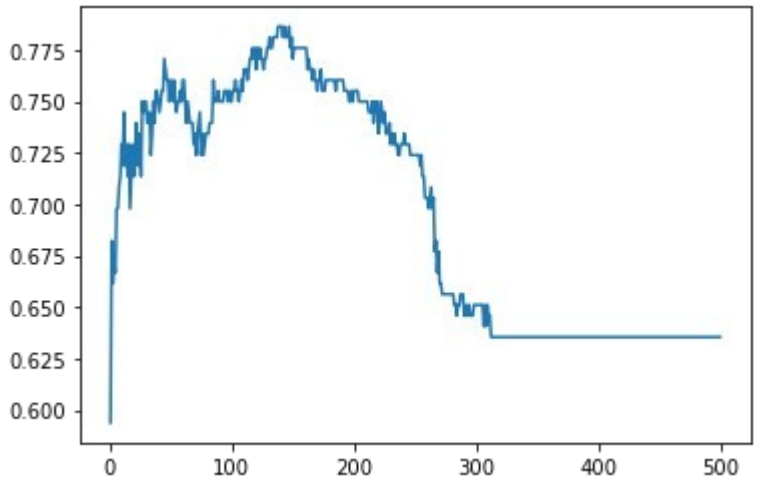
In [7]:

```
def knn(x_train, y_train, x_test, y_test,n):
    n_range = range(1, n)
    results = []
    for n in n_range:
        knn = KNeighborsClassifier(n_neighbors=n)
        knn.fit(x_train, y_train)
        #Predict the response for test dataset
        predict_y = knn.predict(x_test)
        accuracy = metrics.accuracy_score(y_test, predict_y)
        #matrix = confusion_matrix(y_test,predict_y)
        #seaborn_matrix = sns.heatmap(matrix, annot = True, cmap="Blues",cbar=True)
        results.append(accuracy)
    return results
```

In [8]:

```
n= 500
output = knn(train_x,train_y,test_x,test_y,n)
n_range = range(1, n)
plt.plot(n_range, output)
```

Out[8]: [<matplotlib.lines.Line2D at 0x1f812813580>]




In [ ]: