KNN

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KNN Project:

In this project I have KNN algorithm to create a classification model that would predict target class. The data I used has variables which had no proper definitions, that is the reason I have used KNN as the classifier.

Importing python libraries that would be used for the problem.

```
In [1]: import pandas as pd
        import sklearn as sk
        import seaborn as sns
        import matplotlib.pyplot as plt
        import numpy as np
```

Creating a pandas dataframe from the csv dataset and creating dataframe for target variable out of it

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

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

Out[4]:

	XVPM	GWYH	TRAT	TLLZ	IGGA	HYKR	EDFS	GUUB	MGJM	JHZC	TARGET CLASS
0	1636.670614	817.988525	2565.995189	358.347163	550.417491	1618.870897	2147.641254	330.727893	1494.878631	845.136088	0
1	1013.402760	577.587332	2644.141273	280.428203	1161.873391	2084.107872	853.404981	447.157619	1193.032521	861.081809	1
2	1300.035501	820.518697	2025.854469	525.562292	922.206261	2552.355407	818.676686	845.491492	1968.367513	1647.186291	1
3	1059.347542	1066.866418	612.000041	480.827789	419.467495	685.666983	852.867810	341.664784	1154.391368	1450.935357	0
4	1018.340526	1313.679056	950.622661	724.742174	843.065903	1370.554164	905.469453	658.118202	539.459350	1899.850792	0

```
In [5]: df_y = df.pop('TARGET CLASS')
        df_y.head()

Out[5]: 0    0
        1    1
        2    1
        3    0
        4    0
        Name: TARGET CLASS, dtype: int64
```

Standardizing the independent variables for ease of use in KNN Algorithm

```
In [6]: from sklearn.preprocessing import StandardScaler

In [7]: Std = StandardScaler()

In [8]: Std.fit(df)

Out[8]: StandardScaler(copy=True, with_mean=True, with_std=True)

In [9]: std_trans = Std.transform(df)

In [10]: type(std_trans)

Out[10]: numpy.ndarray

In [11]: df_x = pd.DataFrame(std_trans,columns=df.columns)

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

Out[12]:

	XVPM	GWYH	TRAT	TLLZ	IGGA	HYKR	EDFS	GUUB	MGJM	JHZC
0	1.568522	-0.443435	1.619808	-0.958255	-1.128481	0.138336	0.980493	-0.932794	1.008313	-1.069627
1	-0.112376	-1.056574	1.741918	-1.504220	0.640009	1.081552	-1.182663	-0.461864	0.258321	-1.041546
2	0.660647	-0.436981	0.775793	0.213394	-0.053171	2.030872	-1.240707	1.149298	2.184784	0.342811
3	0.011533	0.191324	-1.433473	-0.100053	-1.507223	-1.753632	-1.183561	-0.888557	0.162310	-0.002793
4	-0.099059	0.820815	-0.904346	1.609015	-0.282065	-0.365099	-1.095644	0.391419	-1.365603	0.787762

Splitting Training and testing data

```
In [13]: from sklearn.model_selection import train_test_split

In [14]: train_x,test_x,train_y,test_y = train_test_split(df_x,df_y,test_size = 0.3,random_sta

In [19]: test_y.head()
```

```
Out[19]: 545    1
         298    1
         109    0
         837    1
         194    0
         Name: TARGET CLASS, dtype: int64
```

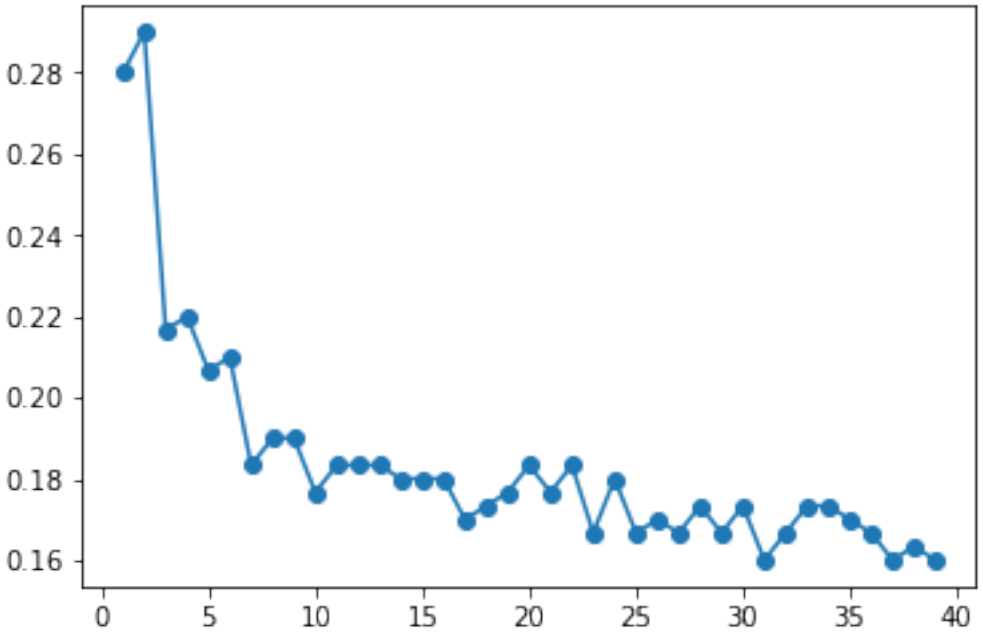
Using Error Rate logic to find the right K value to use in algorithm

```
In [15]: from sklearn.neighbors import KNeighborsClassifier

In [16]: KNN = KNeighborsClassifier

In [21]: error_rate = []
         for i in range(1,40):
             KNN = KNeighborsClassifier(n_neighbors=i)
             KNN.fit(train_x,train_y)
             pred_i = KNN.predict(test_x)
             error_rate.append(np.mean(pred_i!=test_y))

In [22]: error_rate

Out[22]: [0.28,
          0.29,
          0.21666666666666667,
          0.22,
          0.20666666666666667,
          0.21,
          0.18333333333333332,
          0.19,
          0.19,
          0.17666666666666667,
          0.18333333333333332,
          0.18333333333333332,
          0.18333333333333332,
          0.18,
          0.18,
          0.18,
          0.17,
          0.17333333333333334,
          0.17666666666666667,
          0.18333333333333332,
          0.17666666666666667,
          0.18333333333333332,
          0.16666666666666666,
          0.18,
          0.16666666666666666,
          0.17,
          0.16666666666666666,
```

```
 0.17333333333333334,
 0.16666666666666666,
 0.17333333333333334,
 0.16,
 0.16666666666666666,
 0.17333333333333334,
 0.17333333333333334,
 0.17,
 0.16666666666666666,
 0.16,
 0.16333333333333333,
 0.16]
```

```
In [24]: plt.plot(range(1,40),error_rate,marker = 'o',linestyle='-')
```

```
Out[24]: [<matplotlib.lines.Line2D at 0x27ae0618cf8>]
```



From the above plot, it is observed that K value 23 would be an appropriate

```
In [26]: KNN = KNeighborsClassifier(n_neighbors=23)
         KNN.fit(train_x,train_y)
         pred_y = KNN.predict(test_x)
```

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

```
In [29]: print('for K = 23:')
         print('\n')
```

```
        print(confusion_matrix(test_y,pred_y))
        print('\n')
        print(classification_report(test_y,pred_y))

for K = 23:


[[124  28]
 [ 22 126]]


              precision    recall  f1-score   support

           0       0.85      0.82      0.83       152
           1       0.82      0.85      0.83       148

   micro avg       0.83      0.83      0.83       300
   macro avg       0.83      0.83      0.83       300
weighted avg       0.83      0.83      0.83       300
```

Finally, a classification model is developed that uses KNN algorithm which is accurate upto 83%

In [ ]: