Importing Libraries

In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
from haversine import haversine
import seaborn as sns
```

Reading dataset

In [2]:

```
data=pd.read_csv("C:/Users/AYRUS/Desktop/nyc_taxi_trip_duration.csv")
```

In [3]:

```
data.head()
```

Out[3]:

	id	vendor_id	pickup_datetime	dropoff_datetime	passenger_count	pickup_longitude	pi
0	id1080784	2	2016-02-29 16:40:21	2016-02-29 16:47:01	1	-73.953918	
1	id0889885	1	2016-03-11 23:35:37	2016-03-11 23:53:57	2	-73.988312	
2	id0857912	2	2016-02-21 17:59:33	2016-02-21 18:26:48	2	-73.997314	
3	id3744273	2	2016-01-05 09:44:31	2016-01-05 10:03:32	6	-73.961670	
4	id0232939	1	2016-02-17 06:42:23	2016-02-17 06:56:31	1	-74.017120	

In [4]:

```
data.isna().sum()
```

Out[4]:

```
id                    0
vendor_id             0
pickup_datetime       0
dropoff_datetime      0
passenger_count       0
pickup_longitude      0
pickup_latitude       0
dropoff_longitude     0
dropoff_latitude      0
store_and_fwd_flag    0
trip_duration         0
dtype: int64
```

In [5]:
```
data.dtypes
```

Out[5]:
```
id                     object
vendor_id               int64
pickup_datetime        object
dropoff_datetime       object
passenger_count         int64
pickup_longitude      float64
pickup_latitude       float64
dropoff_longitude     float64
dropoff_latitude      float64
store_and_fwd_flag     object
trip_duration           int64
dtype: object
```

Performing EDA

In [6]:
```
data['vendor_id']=data['vendor_id'].astype('category')
data['store_and_fwd_flag']=data['store_and_fwd_flag'].astype('category')
```

In [7]:
```
data['pickup_datetime']=pd.to_datetime(data['pickup_datetime'],format='%Y-%m-%d %
data['dropoff_datetime']=pd.to_datetime(data['dropoff_datetime'],format='%Y-%m-%
```

In [8]:
```
data['pickup_hour']=data['pickup_datetime'].dt.hour
```

In [9]:
```
data['pick_time_of_the_day']=data.pickup_hour.apply(lambda y:(y%24+4)//4).replace
```

In [10]:
```
data['day_of_the_week']=data.pickup_datetime.apply(lambda x:x.day_name())
```

In [11]:
```
data['trip_duration_in_hours']=data.trip_duration.apply(lambda x: x/3600)
```

In [12]:
```
data['pickup_day_of_week']=data['pickup_datetime'].dt.dayofweek
```

In [13]:
```
condition=[data['pick_time_of_the_day']=='Late Night',
           data['pick_time_of_the_day']=='Early Morning',
           data['pick_time_of_the_day']=='Morning',
           data['pick_time_of_the_day']=='Afternoon',
           data['pick_time_of_the_day']=='Evening',
           data['pick_time_of_the_day']=='Night']

choice=[0,1,2,3,4,5]

data['pick_time_of_the_day_in_numbers']=np.select(condition,choice)
```

In [14]:

```
def calc_distance(df):
    pickup = (df['pickup_latitude'], df['pickup_longitude'])
    drop = (df['dropoff_latitude'], df['dropoff_longitude'])
    return haversine(pickup, drop)
```

In [15]:

```
data['total_distance'] = data.apply(lambda x: calc_distance(x), axis = 1)
```

In [16]:

```
data['speed'] = (data.total_distance/(data.trip_duration/3600))
```

In [17]:

```
data['trip_duration'].sort_values(ascending=False)
```

Out[17]:

```
21813     1939736
259437      86391
119185      86387
177225      86378
496391      86377
           ...   
672240          1
102646          1
533760          1
512833          1
622664          1
Name: trip_duration, Length: 729322, dtype: int64
```

In [18]:

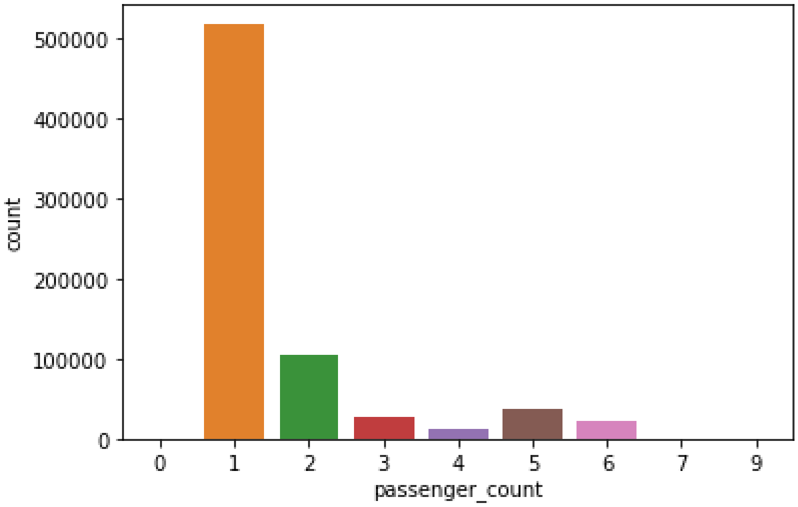
```
data.drop(data[data['trip_duration']==1939736].index,inplace=True)
```

In [19]:

```
sns.countplot(x='passenger_count',data=data)
```

Out[19]:

```
<AxesSubplot:xlabel='passenger_count', ylabel='count'>
```



In [20]:
```
data.passenger_count.value_counts()
```

Out[20]:
```
1    517414
2    105097
5     38926
3     29692
6     24107
4     14050
0        33
7         1
9         1
Name: passenger_count, dtype: int64
```

In [21]:
```
data=data[data['passenger_count']!=0]
data=data[data['passenger_count']<=6]
```

In [22]:
```
data.passenger_count.value_counts()
```

Out[22]:
```
1    517414
2    105097
5     38926
3     29692
6     24107
4     14050
Name: passenger_count, dtype: int64
```

In [23]:
```
data.head()
```

Out[23]:

	id	vendor_id	pickup_datetime	dropoff_datetime	passenger_count	pickup_longitude	pi
0	id1080784	2	2016-02-29 16:40:21	2016-02-29 16:47:01	1	-73.953918	
1	id0889885	1	2016-03-11 23:35:37	2016-03-11 23:53:57	2	-73.988312	
2	id0857912	2	2016-02-21 17:59:33	2016-02-21 18:26:48	2	-73.997314	
3	id3744273	2	2016-01-05 09:44:31	2016-01-05 10:03:32	6	-73.961670	
4	id0232939	1	2016-02-17 06:42:23	2016-02-17 06:56:31	1	-74.017120	

In [24]:
```
data=pd.get_dummies(data,columns=['store_and_fwd_flag','passenger_count','day_of_
```

In [25]:
```
data.head()
```

Out[25]:

	id	pickup_datetime	dropoff_datetime	pickup_longitude	pickup_latitude	dropoff_longitud
0	id1080784	2016-02-29 16:40:21	2016-02-29 16:47:01	-73.953918	40.778873	-73.96387
1	id0889885	2016-03-11 23:35:37	2016-03-11 23:53:57	-73.988312	40.731743	-73.99475
2	id0857912	2016-02-21 17:59:33	2016-02-21 18:26:48	-73.997314	40.721458	-73.94802
3	id3744273	2016-01-05 09:44:31	2016-01-05 10:03:32	-73.961670	40.759720	-73.95677
4	id0232939	2016-02-17 06:42:23	2016-02-17 06:56:31	-74.017120	40.708469	-73.98818

5 rows × 37 columns

Divide data into Train & Module

In [26]:
```
from sklearn.utils import shuffle

# Shuffling the Dataset
data = shuffle(data, random_state = 42)

#creating 4 divisions
div = int(data.shape[0]/4)

# 3 parts to train set and 1 part to module set
train_data= data.loc[:3*div+1,:]
module_data = data.loc[3*div+1:]
```

In [27]:
```
train_data.shape
```

Out[27]:
```
(522516, 37)
```

In [28]:
```
module_data.shape
```

Out[28]:
```
(206771, 37)
```

In [29]:

```
# Loading module data in new_data
new_data=module_data.drop(['id','pickup_datetime','dropoff_datetime'],axis=1)

new_data.head()
```

Out[29]:

	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	trip_duration	pickup_
546964	-73.957359	40.785664	-73.963364	40.775875	468	
207141	-73.863258	40.769756	-73.980888	40.764374	3388	
637544	-73.966644	40.757729	-73.970009	40.750610	288	
721586	-73.966293	40.767910	-73.986977	40.726765	765	
639710	-74.005028	40.722752	-73.978699	40.740940	484	

5 rows × 34 columns

Segragating variables Independent and Dependent

In [30]:

```
# seprating independent and dependent variables
x=new_data.drop(['trip_duration_in_hours'],axis=1)
y=new_data['trip_duration_in_hours']

x.shape , y.shape
```

Out[30]:

```
((206771, 33), (206771,))
```

scaling the data(using minmax scaler)

In [31]:

```
# Importing Minmax scaler
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()
x_scaled = scaler.fit_transform(x)
```

In [32]:

```
x = pd.DataFrame(x_scaled)
```

In [33]:

```
# Importing Train test split

from sklearn.model_selection import train_test_split
train_x,test_x,train_y,test_y = train_test_split(x,y, random_state = 42,test_size
```

In [34]:

```
train_x.shape
```

Out[34]:

```
(202635, 33)
```

In [35]:
```
test_x.shape
```

Out[35]:
```
(4136, 33)
```

Importing KNN regressor and Mean Absolute Error

In [36]:
```
from sklearn.neighbors import KNeighborsRegressor as KNN
from sklearn.metrics import mean_absolute_error as mae
```

In [37]:
```
# Creating instance of KNN
reg = KNN(n_neighbors = 1)

# Fitting the model
reg.fit(train_x, train_y)

# Predicting over the Train Set and calculating MAE
test_predict = reg.predict(test_x)
k = mae(test_predict, test_y)
print('Test MAE    ', k )
```

```
Test MAE     0.038721053621319 58
```

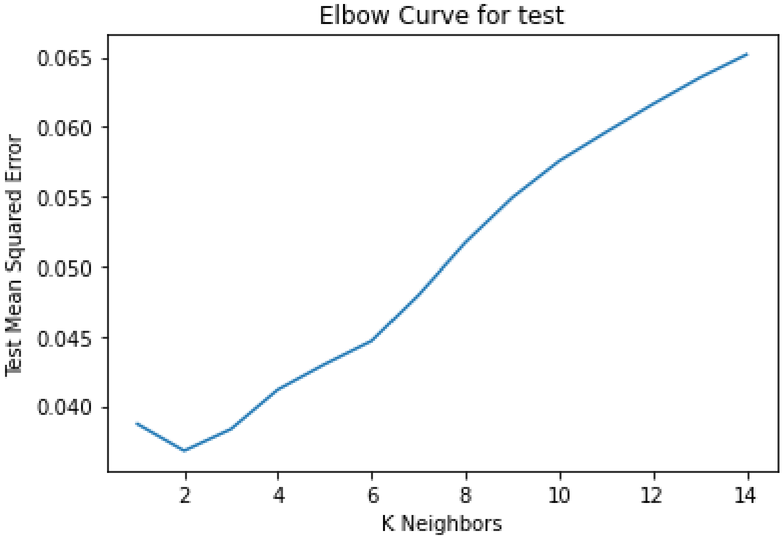
In [38]:
```
# making Elbow classifier
def Elbow(K):
  #initiating empty list
    test_mae= []

  #training model for evey value of K
    for i in K:
        #Instance of KNN
        reg = KNN(n_neighbors = i)
        reg.fit(train_x, train_y)
        #Appending mae value to empty list claculated using the predictions
        tmp = reg.predict(test_x)
        tmp = mae(tmp,test_y)
        test_mae.append(tmp)

    return test_mae
```

In [39]:
```
# K value
k = range(1,15)
```

In [40]:
```
# calling above function
test = Elbow(k)
```

In [41]:
```
# plotting the curves
plt.plot(k, test)
plt.xlabel('K Neighbors')
plt.ylabel('Test Mean Squared Error')
plt.title('Elbow Curve for test')
```

Out[41]:
```
Text(0.5, 1.0, 'Elbow Curve for test')
```



In [42]:
```
# Creating instance of KNN
reg = KNN(n_neighbors = 2)

# Fitting the model
reg.fit(train_x, train_y)

# Predicting over the Train Set and calculating mae
test_predict = reg.predict(test_x)
k1= mae(test_predict, test_y)
print('Test MAE    ', k1 )
```

```
Test MAE     0.036796287341500096
```

Loading train data

In [43]:

```
new_df=train_data.drop(['id','pickup_datetime','dropoff_datetime'],axis=1)

new_df.head()
```

Out[43]:

	pickup_longitude	pickup_latitude	dropoff_longitude	dropoff_latitude	trip_duration	pickup_
327115	-73.991814	40.744064	-73.907669	40.683575	3368	
642546	-73.991463	40.745068	-73.973129	40.756336	517	
500012	-73.984879	40.742359	-73.990654	40.724621	427	
217796	-73.943489	40.787701	-73.882362	40.829941	1074	
319765	-73.981354	40.747139	-74.003647	40.741589	445	

5 rows × 34 columns

Segragating Depenent & Independent Variable

In [44]:

```
a=new_df.drop(['trip_duration_in_hours'],axis=1)
b=new_df['trip_duration_in_hours']

a.shape , b.shape
```

Out[44]:

```
((522516, 33), (522516,))
```

In [45]:

```
# importing minmax scaler
from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()
a_scaled = scaler.fit_transform(a)
```

In [46]:

```
a = pd.DataFrame(a_scaled)
```

Loading train test split function

In [47]:

```
from sklearn.model_selection import train_test_split
train_x,test_x,train_y,test_y = train_test_split(a,b, random_state = 42,test_size
train_x.shape ,  test_x.shape
```

Out[47]:

```
((512065, 33), (10451, 33))
```

In [48]:

```
# Creating instance of KNN
reg = KNN(n_neighbors = 2)

# Fitting the model
reg.fit(train_x, train_y)

# Predicting over the Train Set and calculating MAE
test_predict = reg.predict(test_x)
k2 = mae(test_predict, test_y)
print('Test MAE    ', k2 )
```

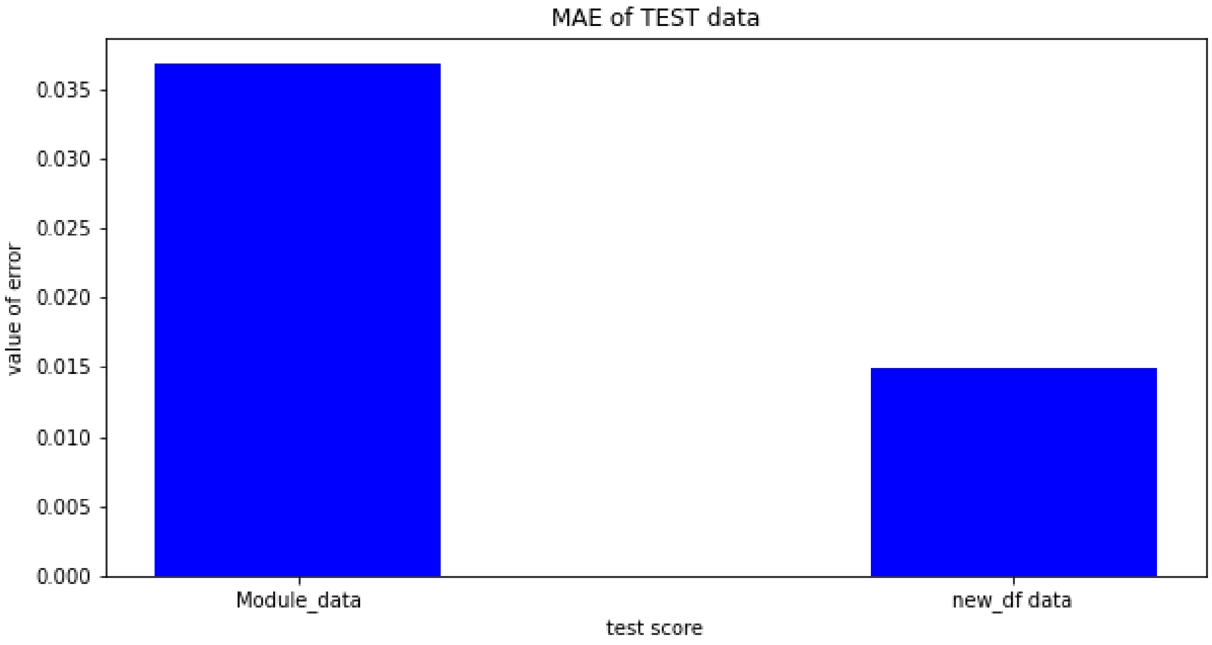
```
Test MAE     0.014908182630051349
```

In [49]:

```
# creating data for bar plot
create_data={'Module_data':k1,
            'new_df data':k2}

display=list(create_data.keys())
value=list(create_data.values())

fig = plt.figure(figsize = (10, 5))

# creating the bar plot
plt.bar(display, value, color ='blue',
        width = 0.4)

plt.xlabel("test score")
plt.ylabel("value of error")
plt.title("MAE of TEST data")
plt.show
```

Out[49]:

```
<function matplotlib.pyplot.show(close=None, block=None)>
```



In [ ]:

In [ ]: