Roll no:COBA020

In [1]:

```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import datetime as dt
```

In [2]:

```
df = pd.read_csv("uber.csv")
df.head()
```

Out[2]:

	Unnamed: 0	key	fare_amount	pickup_datetime	pickup_longitude	pickup_la
0	24238194	2015-05-07 19:52:06.0000003	7.5	2015-05-07 19:52:06 UTC	-73.999817	40.7
1	27835199	2009-07-17 20:04:56.0000002	7.7	2009-07-17 20:04:56 UTC	-73.994355	40.7
2	44984355	2009-08-24 21:45:00.00000061	12.9	2009-08-24 21:45:00 UTC	-74.005043	40.74
3	25894730	2009-06-26 08:22:21.0000001	5.3	2009-06-26 08:22:21 UTC	-73.976124	40.7
4	17610152	2014-08-28 17:47:00.000000188	16.0	2014-08-28 17:47:00 UTC	-73.925023	40.74

In [3]:

```
df.drop(columns=['Unnamed: 0','key'],inplace=True)
```

In [4]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200000 entries, 0 to 199999
Data columns (total 7 columns):
 #   Column             Non-Null Count   Dtype
```

```
---  ------             --------------   -----  0
 fare_amount        200000 non-null  float64
  1    pickup_datetime    200000 non-null  object
  2    pickup_longitude   200000 non-null  float64
  3    pickup_latitude    200000 non-null  float64
  4    dropoff_longitude  199999 non-null  float64
  5    dropoff_latitude   199999 non-null  float64
  6    passenger_count    200000 non-null  int64  dtypes: float64(5), int64(1),
 object(1) memory usage: 10.7+ MB
```

Dropping null rows

In [5]:

```
df.dropna(how='any',inplace=True)
```

In [6]:

```
df.isnull().sum()
```

Out[6]:

```
fare_amount          0
pickup_datetime      0
pickup_longitude     0
pickup_latitude      0
dropoff_longitude    0
dropoff_latitude     0
passenger_count      0
dtype: int64
```

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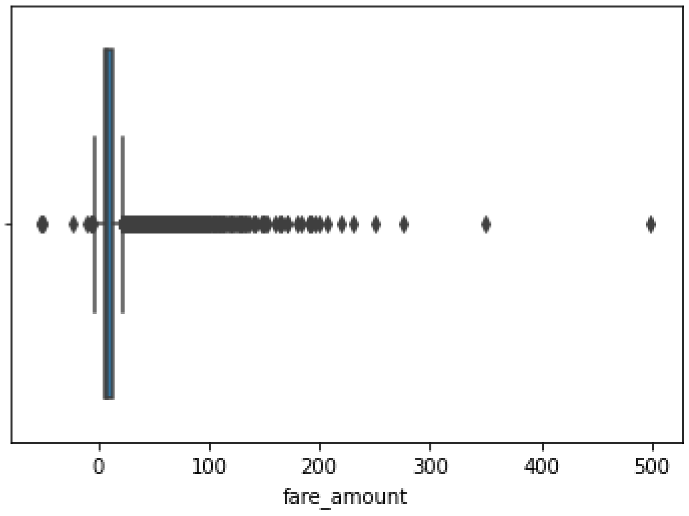
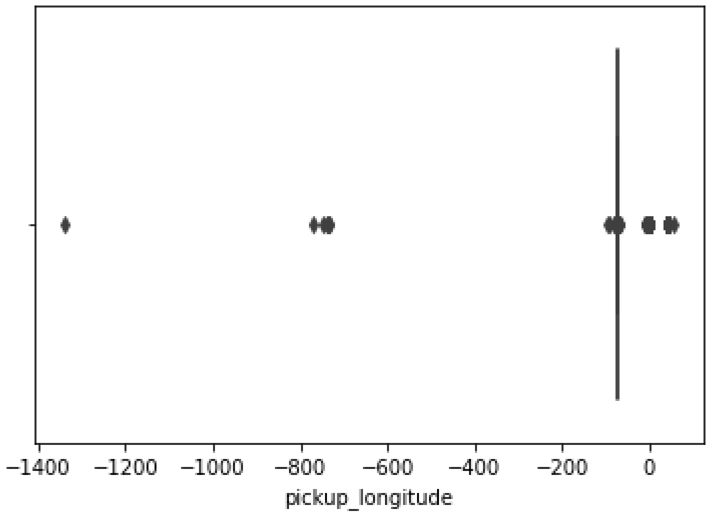
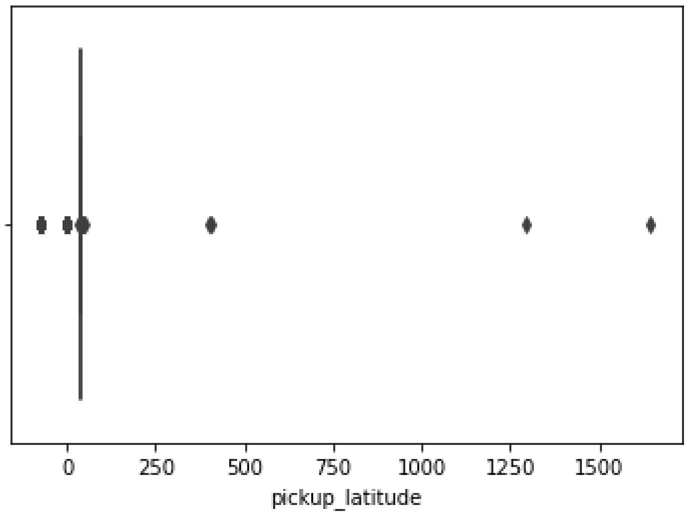
Boxplots

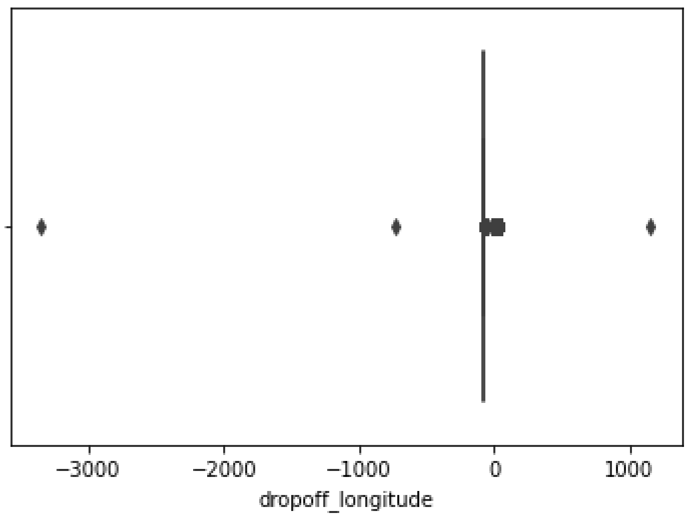
In [7]:

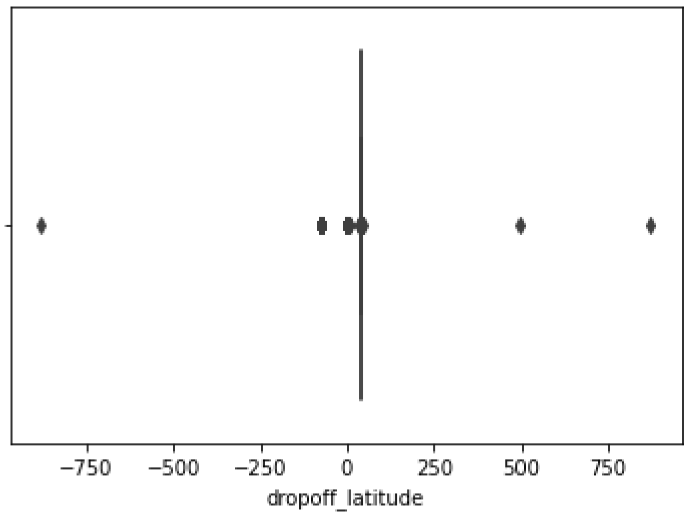
```
for col in df.select_dtypes(exclude=['object']):
    plt.figure()
    sns.boxplot(data=df,x=col)
```

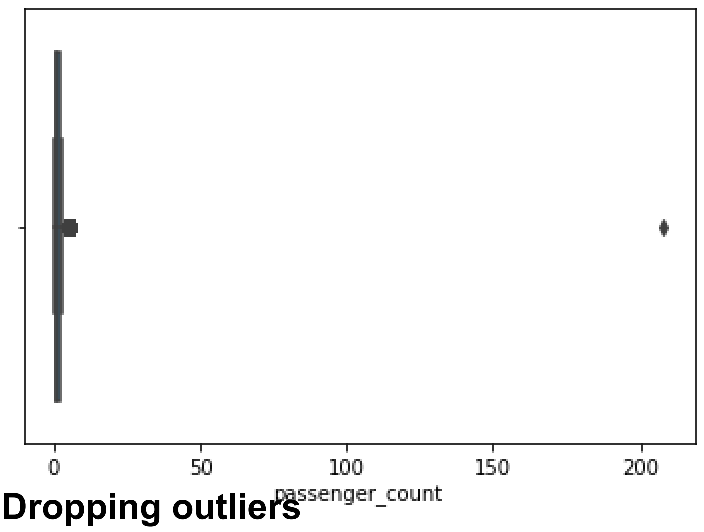












Dropping outliers

-90 < latitude < 90 -
180 < longitude < 180
fare > 0
0 < passenger_count < 50 In [8]:

```
df = df[
    (df.pickup_latitude > -90) & (df.pickup_latitude < 90) &
    (df.dropoff_latitude > -90) & (df.dropoff_latitude < 90) &
    (df.pickup_longitude > -180) & (df.pickup_longitude < 180) &
    (df.dropoff_longitude > -180) & (df.dropoff_longitude < 180) &
    (df.fare_amount > 0) & (df.passenger_count > 0)  & (df.passenger_count < 50)
]
```

Calculating Distance

In [9]:

```
from math import cos, asin, sqrt, pi
import numpy as np

def distance(lat_1,lon_1,lat_2,lon_2):
#     lat1 = row.pickup_latitude
#     lon1 = row.pickup_longitude
#     lat2 = row.dropoff_latitude
#     lon2 = row.dropoff_longitude
    lon_1, lon_2, lat_1, lat_2 = map(np.radians, [lon_1, lon_2, lat_1, lat_2])  #Degrees


    diff_lon = lon_2 - lon_1
    diff_lat = lat_2 - lat_1


    km = 2 * 6371 * np.arcsin(np.sqrt(np.sin(diff_lat/2.0)**2 +  np.cos(lat_1) * np.cos(

    return km
```

In [10]:

```
temp = distance(df['pickup_latitude'],df['pickup_longitude'],df['dropoff_latitude'],df['
temp.head()
```

Out[10]:

```
0    1.683323
1    2.457590
2    5.036377
3    1.661683 4    4.475450 dtype: float64
```

In [11]:

```
df_new = df.copy()
df_new['Distance'] = temp
df = df_new
df.head()
```

Out[11]:

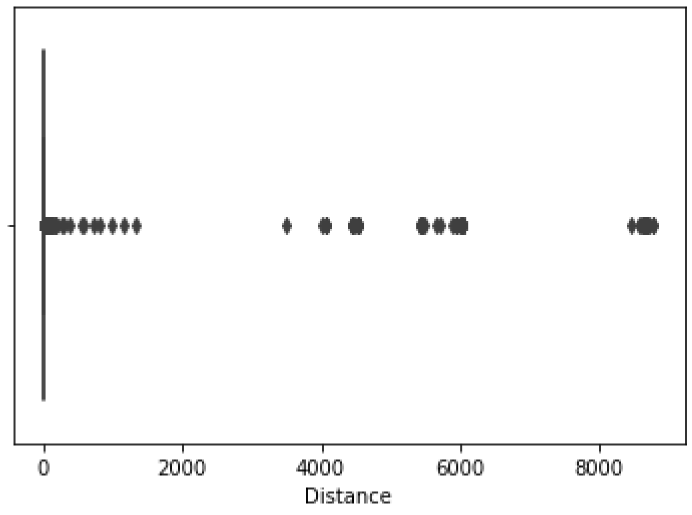
	fare_amount	pickup_datetime	pickup_longitude	pickup_latitude	dropoff_longitude	dropo
0	7.5	2015-05-07 19:52:06 UTC	-73.999817	40.738354	-73.999512	
1	7.7	2009-07-17 20:04:56 UTC	-73.994355	40.728225	-73.994710	
2	12.9	2009-08-24 21:45:00 UTC	-74.005043	40.740770	-73.962565	
3	5.3	2009-06-26 08:22:21 UTC	-73.976124	40.790844	-73.965316	
4	16.0	2014-08-28 17:47:00 UTC	-73.925023	40.744085	-73.973082	

In [12]:

```
sns.boxplot(data=df,x='Distance')
```

Out[12]:
```
<AxesSubplot:

xlabel='Distance'>
```



In [13]:

```
df = df[(df['Distance'] < 200) & (df['Distance'] > 0)]
```

Date and Time features extract

In [14]:

```
df['pickup_datetime'] = pd.to_datetime(df['pickup_datetime'])
```

```
<ipython-input-14-834f97bbe4ec>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)
  df['pickup_datetime'] = pd.to_datetime(df['pickup_datetime'])
```

In
 [15]:

```
df['week_day'] = df['pickup_datetime'].dt.day_name()
df['Year'] = df['pickup_datetime'].dt.year
df['Month'] = df['pickup_datetime'].dt.month
df['Hour'] = df['pickup_datetime'].dt.hour
```

```
<ipython-input-15-b91c1da9c026>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)  df['week_day'] =
df['pickup_datetime'].dt.day_name()
<ipython-input-15-b91c1da9c026>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)  df['Year'] = df['pickup_datetime'].dt.year
<ipython-input-15-b91c1da9c026>:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)  df['Month'] = df['pickup_datetime'].dt.month
<ipython-input-15-b91c1da9c026>:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)  df['Hour'] = df['pickup_datetime'].dt.hour
```

In [16]:

```
df.drop(columns=['pickup_datetime','pickup_latitude','pickup_longitude','dropoff_latitud
```

```
<ipython-input-16-a7c1789815f4>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)
  df.drop(columns=['pickup_datetime','pickup_latitude','pickup_longitud
e','dropoff_latitude','dropoff_longitude'],inplace=True)
```

In
[17]:

```
df.head()
```

Out[17]:

	fare_amount	passenger_count	Distance	week_day	Year	Month	Hour
0	7.5	1	1.683323	Thursday	2015	5	19
1	7.7	1	2.457590	Friday	2009	7	20
2	12.9	1	5.036377	Monday	2009	8	21
3	5.3	3	1.661683	Friday	2009	6	8
4	16.0	5	4.475450	Thursday	2014	8	17

In
 [18]:

```
temp = df.copy()

def convert_week_day(day):
    if day in ['Monday','Tuesday','Wednesday','Thursday']:
        return 0 # Weekday
    return 1 # Weekend

def convert_hour(hour):
    if 5 <= hour <= 12:
        return 1
    elif 12 < hour <= 17:
        return 2
    elif 17 < hour < 24:
        return 3
    return 0

df['week_day'] = temp['week_day'].apply(convert_week_day)
df['Hour'] = temp['Hour'].apply(convert_hour)
df.head()
```

```
<ipython-input-18-655f90749f34>:17: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)  df['week_day'] =
temp['week_day'].apply(convert_week_day)
<ipython-input-18-655f90749f34>:18: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-do
cs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (http
s://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returni
ng-a-view-versus-a-copy)  df['Hour'] = temp['Hour'].apply(convert_hour)
```

Out[18]:

	fare_amount	passenger_count	Distance	week_day	Year	Month	Hour
0	7.5	1	1.683323	0	2015	5	3
1	7.7	1	2.457590	1	2009	7	3
2	12.9	1	5.036377	0	2009	8	3
3	5.3	3	1.661683	1	2009	6	1

4	16.0	5	4.475450	0	2014	8	2

Correlation Matrix

In [19]:

```
df.corr()
```

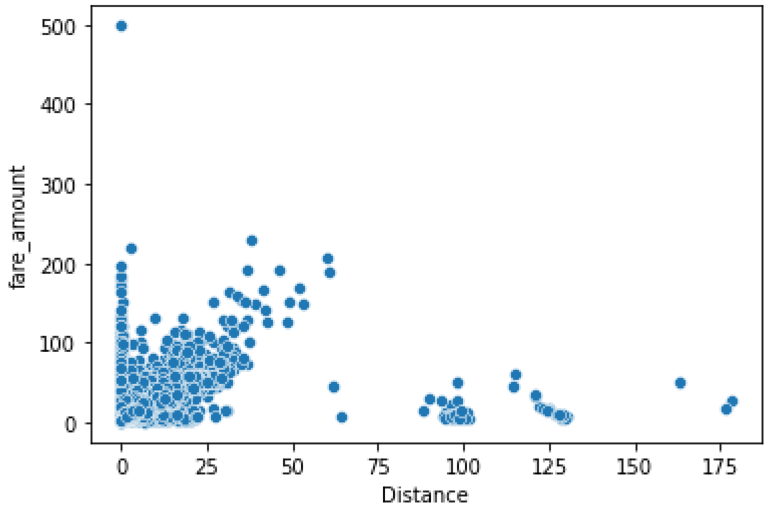
Out[19]:

	fare_amount	passenger_count	Distance	week_day	Year	Month
fare_amount	1.000000	0.011884	0.778667	0.002305	0.120430	0.024120
passenger_count	0.011884	1.000000	0.005112	0.035882	0.005339	0.008818
Distance	0.778667	0.005112	1.000000	0.014518	0.018617	0.007373
week_day	0.002305	0.035882	0.014518	1.000000	0.006910	-0.007328
Year	0.120430	0.005339	0.018617	0.006910	1.000000	-0.115182
Month	0.024120	0.008818	0.007373	-0.007328	-0.115182	1.000000
Hour	-0.021078	0.013572	-0.022691	-0.078129	0.001131	-0.005410

In [20]:

```
sns.scatterplot(y=df['fare_amount'],x=df['Distance'])
```

Out[20]:
```
<AxesSubplot: xlabel='Distance',
ylabel='fare_amount'>
```



In [21]:

```
from sklearn.preprocessing import StandardScaler
x = df[['Distance']].values
y = df['fare_amount'].values.reshape(-1,1)
```

In
Independent Variable: Distance
Dependent Variable: fare_amount
 [31]:

```
from sklearn.model_selection import train_test_split x_train, x_test,

y_train,y_test = train_test_split(x,y,random_state=10) In [32]:
```

```
std_x = StandardScaler()
x_train = std_x.fit_transform(x_train)
```

In [33]:

```
x_test = std_x.transform(x_test)
```

In [34]:

```
std_y = StandardScaler()
y_train = std_y.fit_transform(y_train)
```

In [35]:

```
y_test = std_y.transform(y_test)
```

In [36]:

```
from sklearn.metrics import mean_squared_error,r2_score, mean_absolute_error
def fit_predict(model):     model.fit(x_train,y_train.ravel())     y_pred =
model.predict(x_test)     r_squared = r2_score(y_test,y_pred)
    RMSE = mean_squared_error(y_test, y_pred,squared=False)
    MAE = mean_absolute_error(y_test,y_pred)
print('R-squared:        ',        r_squared)
print('RMSE: ', RMSE)     print("MAE:  ",MAE)
In [37]:
```

```
from sklearn.linear_model import LinearRegression
```

In [38]:

```
fit_predict(LinearRegression())
```

```
R-squared:  0.604116792084117
RMSE:      0.6290054895695945
MAE:   0.27552329590959823 In
[39]:
```

```
from sklearn.ensemble import RandomForestRegressor
fit_predict(RandomForestRegressor())
```

```
R-squared:  0.652350257870196
RMSE:  0.589443049630681
MAE:   0.2921068537600526
```

In [ ]:

```

```