PROJECT DEVELOPMENT PHASE

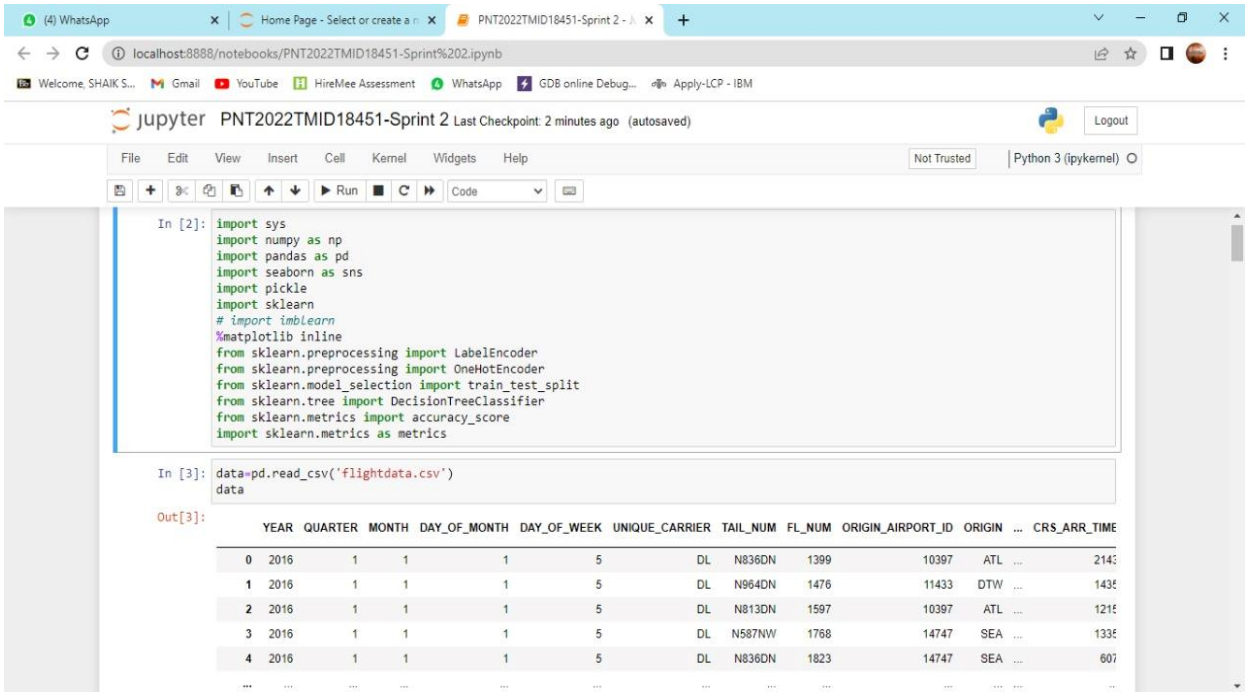
SPRINT 2 – CODE AND TESTCASE

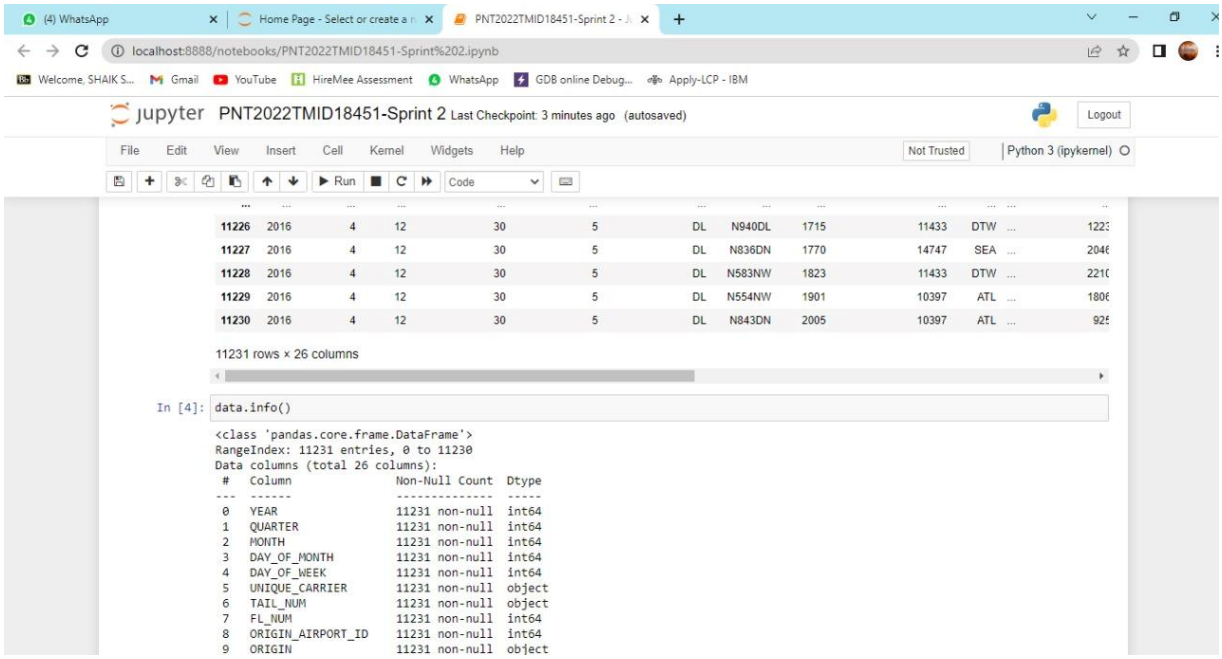
Date	10 November 2022
Team ID	PNT2022TMID18451
Project	Flight delay prediction using Machine learning
Marks	8 Marks

We have performed the uploading the Dataset and performed the Data Pre-processing and also we have split the dataset into train data and Test dataset in this Sprint development phase.

Jupyter notebook :

Screenshots :

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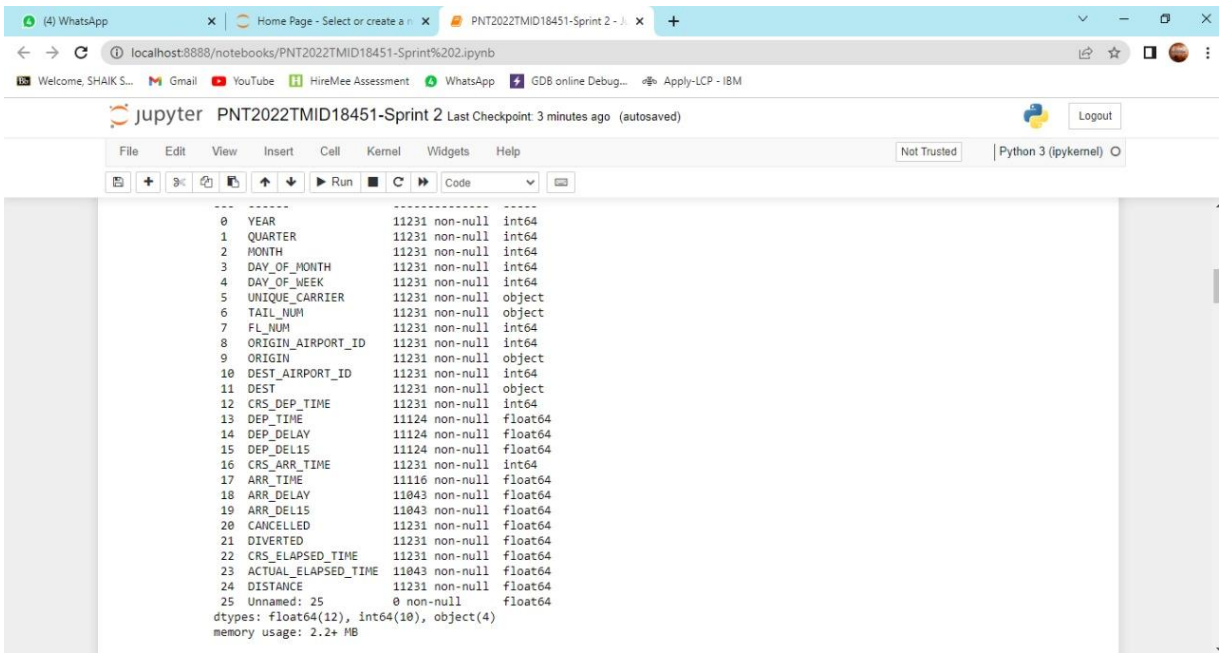
Python 3 (ipykernel)
Run
Code
11226 2016 4 12 30 5 DL N940DL 1715 11433 DTW ... 1223
11227 2016 4 12 30 5 DL N836DN 1770 14747 SEA ... 2046
11228 2016 4 12 30 5 DL N583NW 1823 11433 DTW ... 2210
11229 2016 4 12 30 5 DL N554NW 1901 10397 ATL ... 1806
11230 2016 4 12 30 5 DL N843DN 2005 10397 ATL ... 925
11231 rows × 26 columns
In [4]: data.info()
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11231 entries, 0 to 11230
Data columns (total 26 columns):
Column Non-Null Count Dtype
--- ------ -------------- -----
0 YEAR 11231 non-null int64
1 QUARTER 11231 non-null int64
2 MONTH 11231 non-null int64
3 DAY_OF_MONTH 11231 non-null int64
4 DAY_OF_WEEK 11231 non-null int64
5 UNIQUE_CARRIER 11231 non-null object
6 TAIL_NUM 11231 non-null object
7 FL_NUM 11231 non-null int64
8 ORIGIN_AIRPORT_ID 11231 non-null int64
9 ORIGIN 11231 non-null object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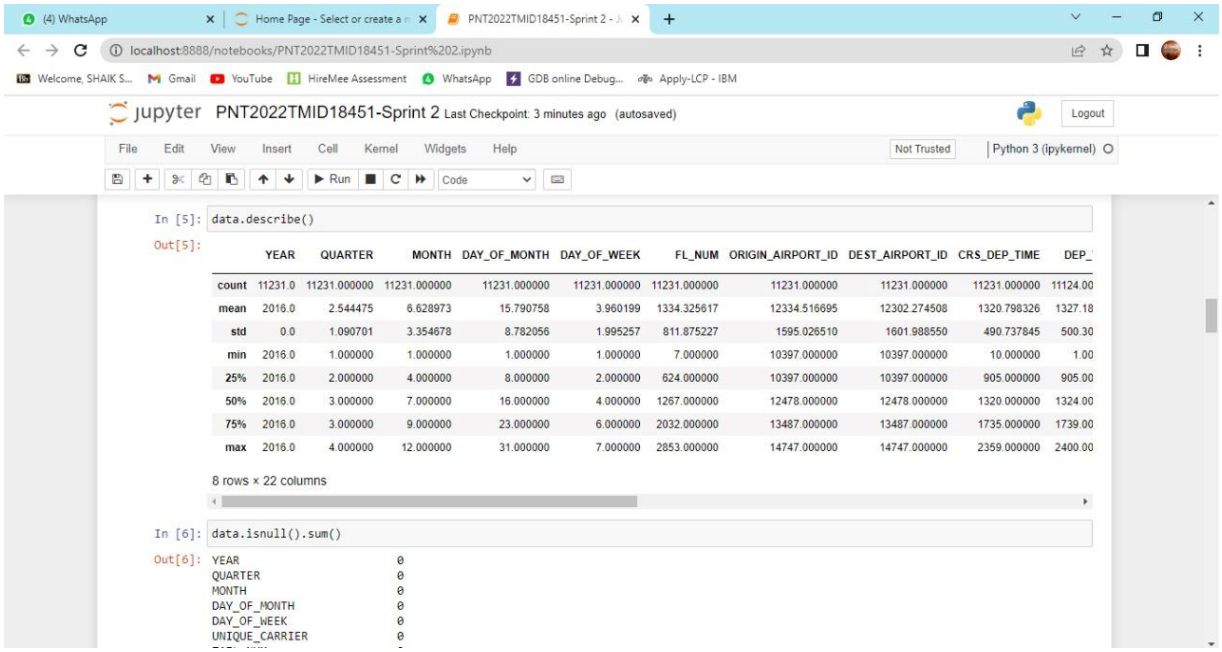
Code
0 YEAR 11231 non-null int64
1 QUARTER 11231 non-null int64
2 MONTH 11231 non-null int64
3 DAY_OF_MONTH 11231 non-null int64
4 DAY_OF_WEEK 11231 non-null int64
5 UNIQUE_CARRIER 11231 non-null object
6 TAIL_NUM 11231 non-null object
7 FL_NUM 11231 non-null int64
8 ORIGIN_AIRPORT_ID 11231 non-null int64
9 ORIGIN 11231 non-null object
10 DEST_AIRPORT_ID 11231 non-null int64
11 DEST 11231 non-null object
12 CRS_DEP_TIME 11231 non-null int64
13 DEP_TIME 11124 non-null float64
14 DEP_DELAY 11124 non-null float64
15 DEP_DEL15 11124 non-null float64
16 CRS_ARR_TIME 11231 non-null int64
17 ARR_TIME 11116 non-null float64
18 ARR_DELAY 11043 non-null float64
19 ARR_DEL15 11043 non-null float64
20 CANCELLED 11231 non-null float64
21 DIVERTED 11231 non-null float64
22 CRS_ELAPSED_TIME 11231 non-null float64
23 ACTUAL_ELAPSED_TIME 11043 non-null float64
24 DISTANCE 11231 non-null float64
25 Unnamed: 25 0 non-null float64
dtypes: float64(12), int64(10), object(4)
memory usage: 2.2+ MB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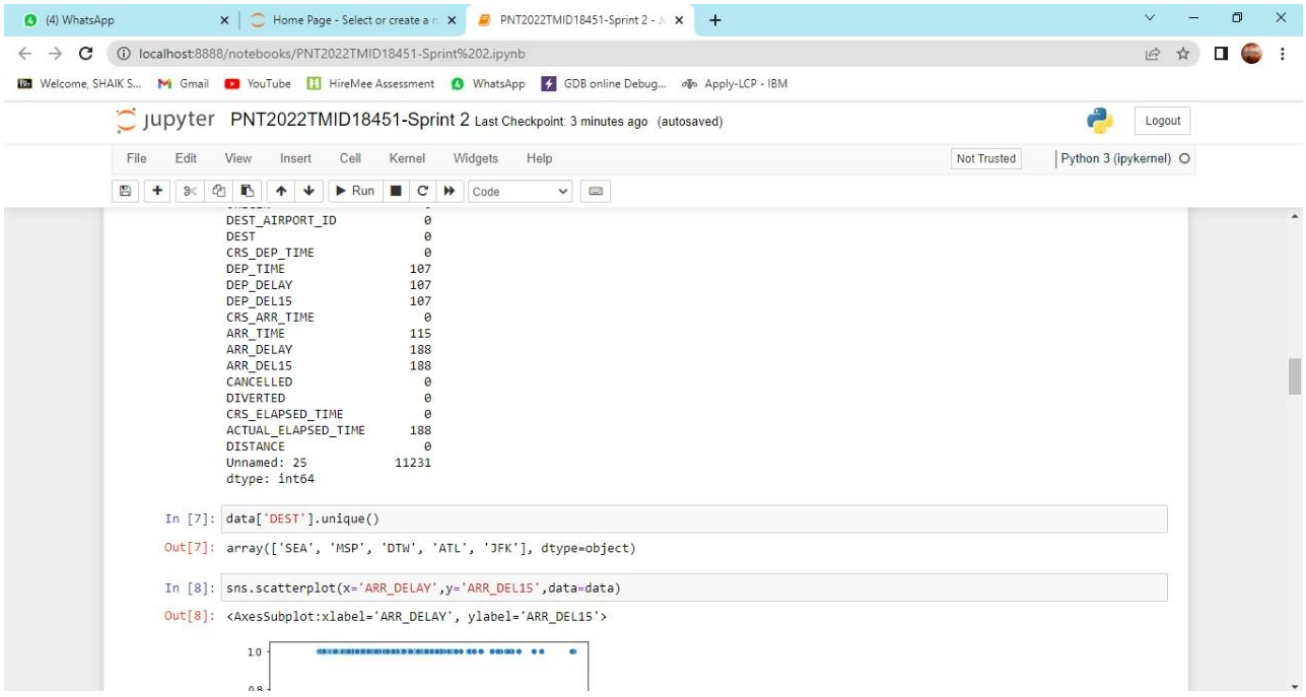
Code
In [5]: data.describe()
Out[5]:
YEAR QUARTER MONTH DAY_OF_MONTH DAY_OF_WEEK FL_NUM ORIGIN_AIRPORT_ID DEST_AIRPORT_ID CRS_DEP_TIME DEP_
count 11231.0 11231.000000 11231.000000 11231.000000 11231.000000 11231.000000 11231.000000 11231.000000 11231.000000 11124.00
mean 2016.0 2.544475 6.628973 15.790758 3.960199 1334.325617 12334.516695 12302.274508 1320.798326 1327.18
std 0.0 1.090701 3.354678 8.782056 1.995257 811.875227 1595.026510 1601.988550 490.737845 500.30
min 2016.0 1.000000 1.000000 1.000000 1.000000 7.000000 10397.000000 10397.000000 10.000000 1.00
25% 2016.0 2.000000 4.000000 8.000000 2.000000 624.000000 10397.000000 10397.000000 905.000000 905.00
50% 2016.0 3.000000 7.000000 16.000000 4.000000 1267.000000 12478.000000 12478.000000 1320.000000 1324.00
75% 2016.0 3.000000 9.000000 23.000000 6.000000 2032.000000 13487.000000 13487.000000 1735.000000 1739.00
max 2016.0 4.000000 12.000000 31.000000 7.000000 2853.000000 14747.000000 14747.000000 2359.000000 2400.00
8 rows × 22 columns
In [6]: data.isnull().sum()
Out[6]:
YEAR 0
QUARTER 0
MONTH 0
DAY_OF_MONTH 0
DAY_OF_WEEK 0
UNIQUE_CARRIER 0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Run
Code
DEST_AIRPORT_ID 0
DEST 0
CRS_DEP_TIME 0
DEP_TIME 107
DEP_DELAY 107
DEP_DEL15 107
CRS_ARR_TIME 0
ARR_TIME 115
ARR_DELAY 188
ARR_DEL15 188
CANCELLED 0
DIVERTED 0
CRS_ELAPSED_TIME 0
ACTUAL_ELAPSED_TIME 188
DISTANCE 0
Unnamed: 25 11231
dtype: int64
In [7]: data['DEST'].unique()
Out[7]: array(['SEA', 'MSP', 'DTW', 'ATL', 'JFK'], dtype=object)
In [8]: sns.scatterplot(x='ARR_DELAY',y='ARR_DEL15',data=data)
Out[8]: <AxesSubplot:xlabel='ARR_DELAY', ylabel='ARR_DEL15'>
1.0

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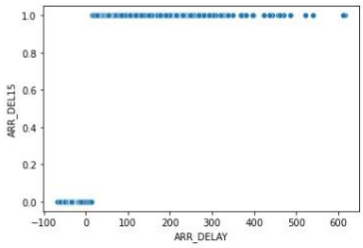
Run Code

Out[8]: <AxesSubplot:xlabel='ARR_DELAY', ylabel='ARR_DEL15'>



In [9]:
```
sns.heatmap(data.corr())
```

Out[9]: <AxesSubplot:>

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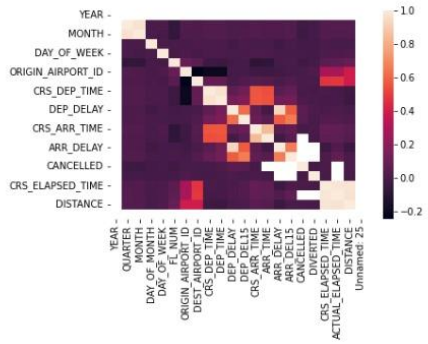
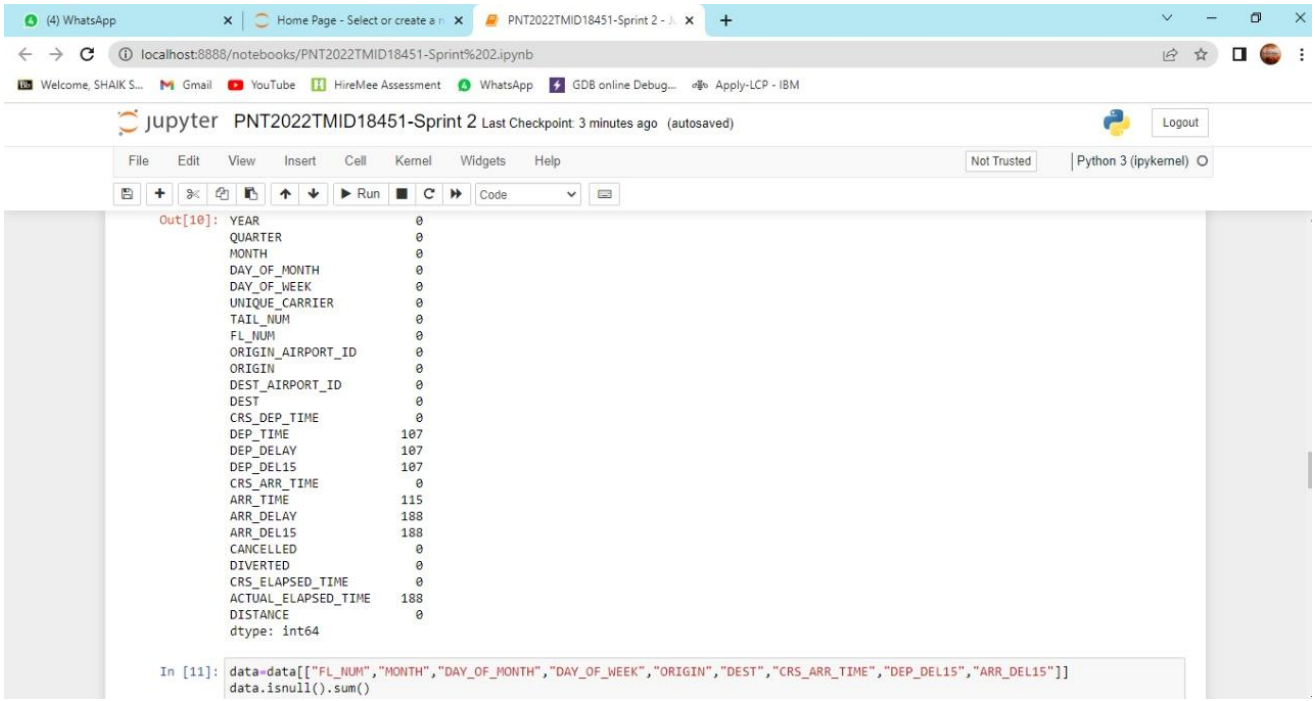
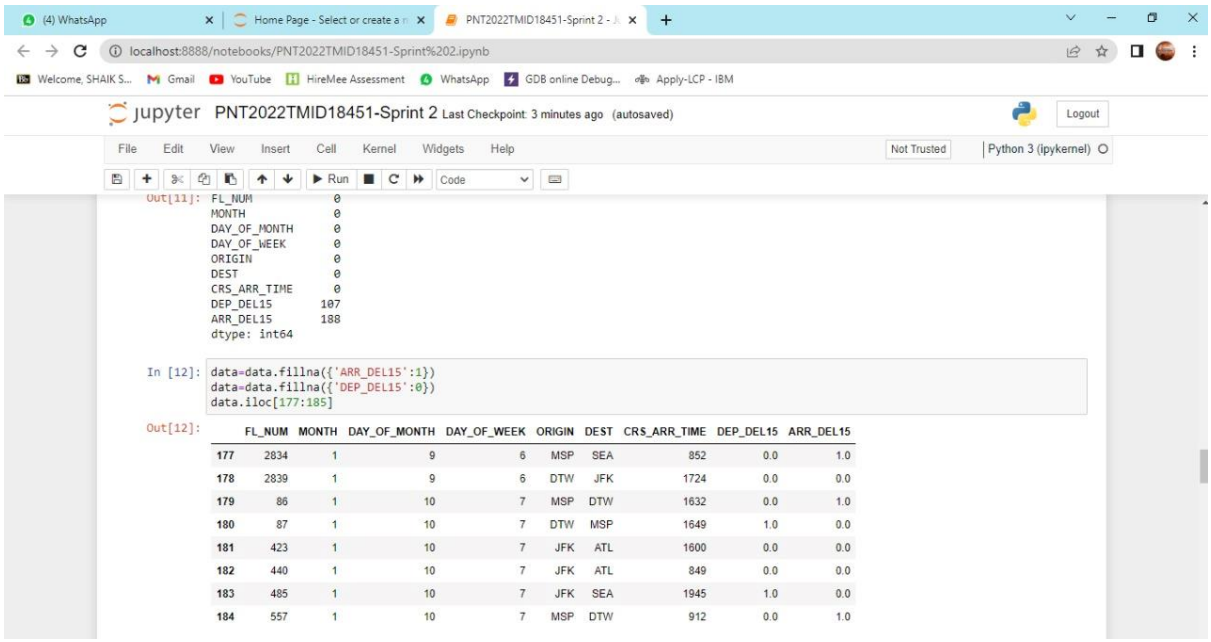
In [9]:
```
sns.heatmap(data.corr())
```

Out[9]: <AxesSubplot:>

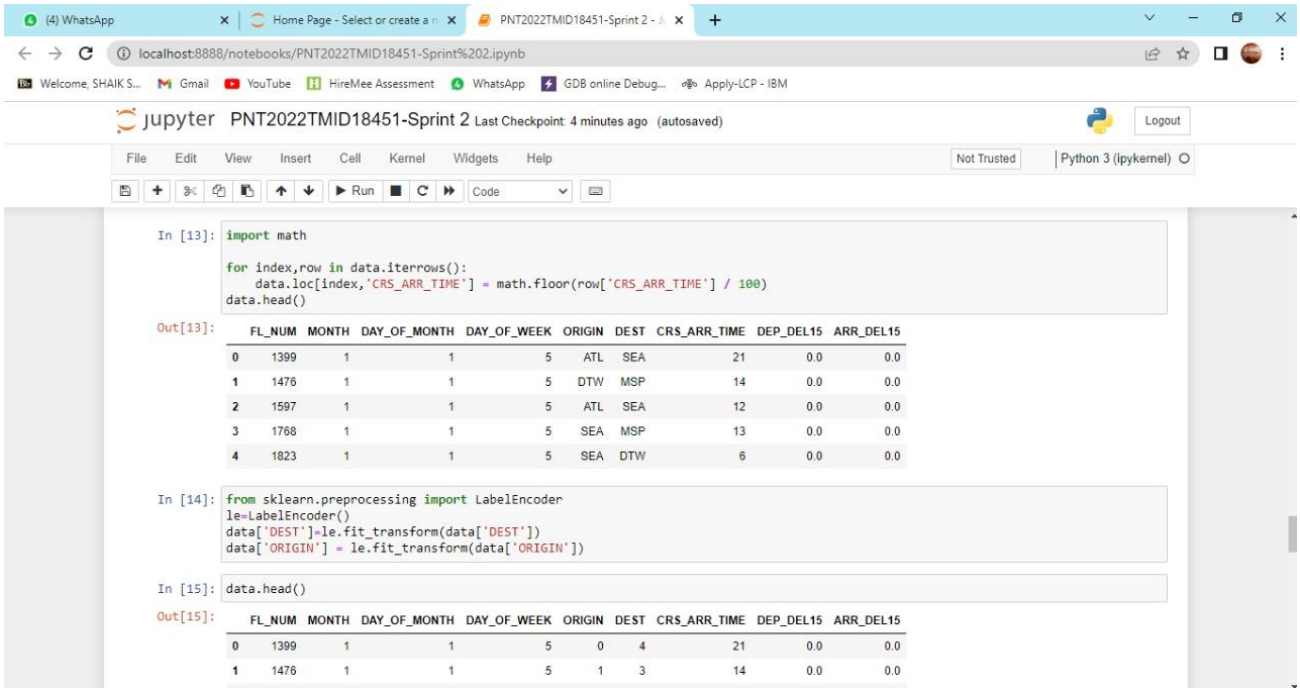


In [10]:
```
data=data.drop('Unnamed: 25',axis=1)
data.isnull().sum()
```





	FL_NUM	MONTH	DAY_OF_MONTH	DAY_OF_WEEK	ORIGIN	DEST	CRS_ARR_TIME	DEP_DEL15	ARR_DEL15
177	2834	1	9	6	MSP	SEA	852	0.0	1.0
178	2839	1	9	6	DTW	JFK	1724	0.0	0.0
179	86	1	10	7	MSP	DTW	1632	0.0	1.0
180	87	1	10	7	DTW	MSP	1649	1.0	0.0
181	423	1	10	7	JFK	ATL	1600	0.0	0.0
182	440	1	10	7	JFK	ATL	849	0.0	0.0
183	485	1	10	7	JFK	SEA	1945	1.0	0.0
184	557	1	10	7	MSP	DTW	912	0.0	1.0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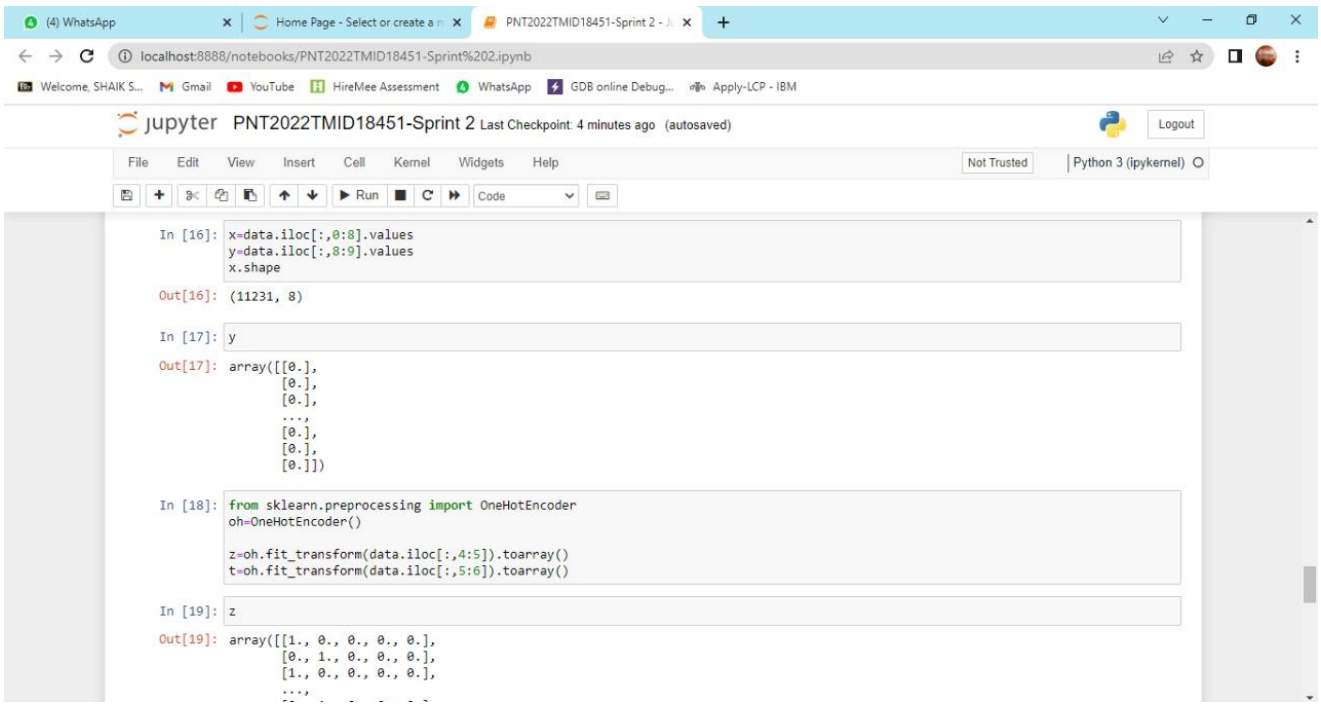
Code
In [13]:
import math
for index,row in data.iterrows():
data.loc[index,'CRS_ARR_TIME'] = math.floor(row['CRS_ARR_TIME'] / 100)
data.head()
Out[13]:
FL_NUM MONTH DAY_OF_MONTH DAY_OF_WEEK ORIGIN DEST CRS_ARR_TIME DEP_DEL15 ARR_DEL15
0 1399 1 1 5 ATL SEA 21 0.0 0.0
1 1476 1 1 5 DTW MSP 14 0.0 0.0
2 1597 1 1 5 ATL SEA 12 0.0 0.0
3 1768 1 1 5 SEA MSP 13 0.0 0.0
4 1823 1 1 5 SEA DTW 6 0.0 0.0
In [14]:
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
data['DEST']=le.fit_transform(data['DEST'])
data['ORIGIN'] = le.fit_transform(data['ORIGIN'])
In [15]:
data.head()
Out[15]:
FL_NUM MONTH DAY_OF_MONTH DAY_OF_WEEK ORIGIN DEST CRS_ARR_TIME DEP_DEL15 ARR_DEL15
0 1399 1 1 5 0 4 21 0.0 0.0
1 1476 1 1 5 1 3 14 0.0 0.0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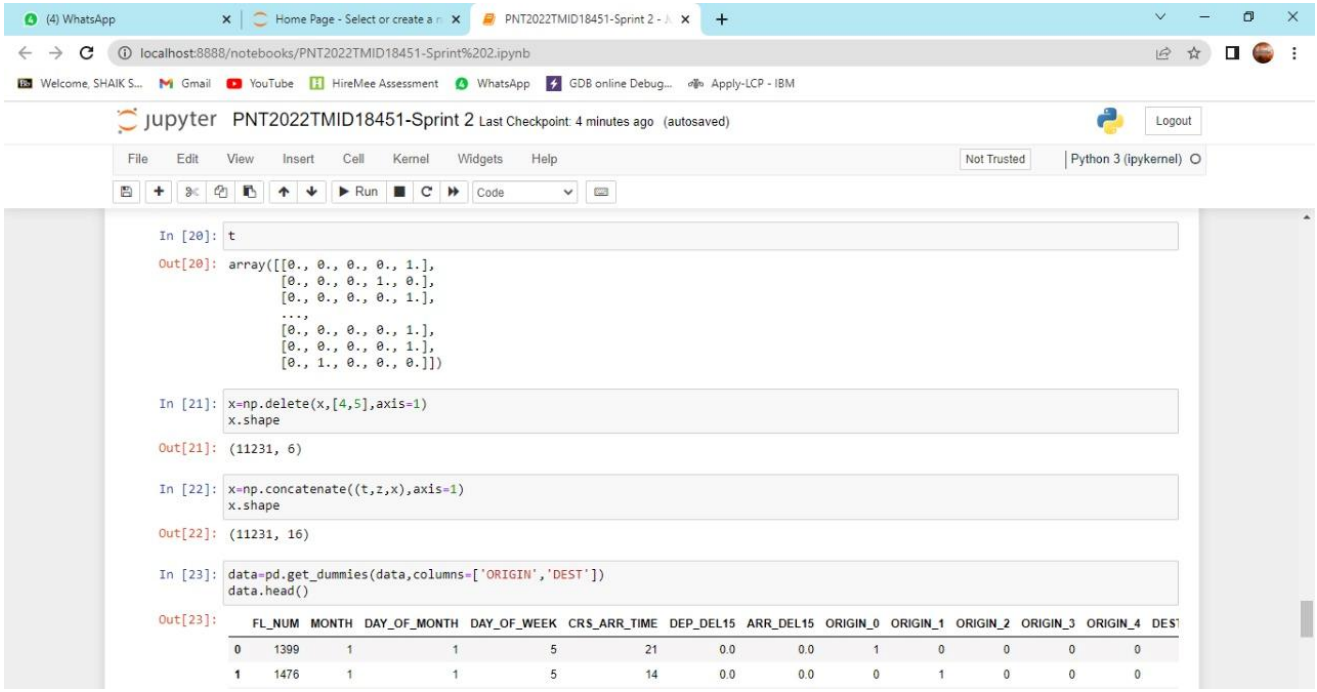
Code
In [16]:
x=data.iloc[:,0:8].values
y=data.iloc[:,8:9].values
x.shape
Out[16]:
(11231, 8)
In [17]:
y
Out[17]:
array([[0.],
[0.],
[0.],
...,
[0.],
[0.],
[0.]])
In [18]:
from sklearn.preprocessing import OneHotEncoder
oh=OneHotEncoder()
z=oh.fit_transform(data.iloc[:,4:5]).toarray()
t=oh.fit_transform(data.iloc[:,5:6]).toarray()
In [19]:
z
Out[19]:
array([[1., 0., 0., 0., 0.],
[0., 1., 0., 0., 0.],
[1., 0., 0., 0., 0.],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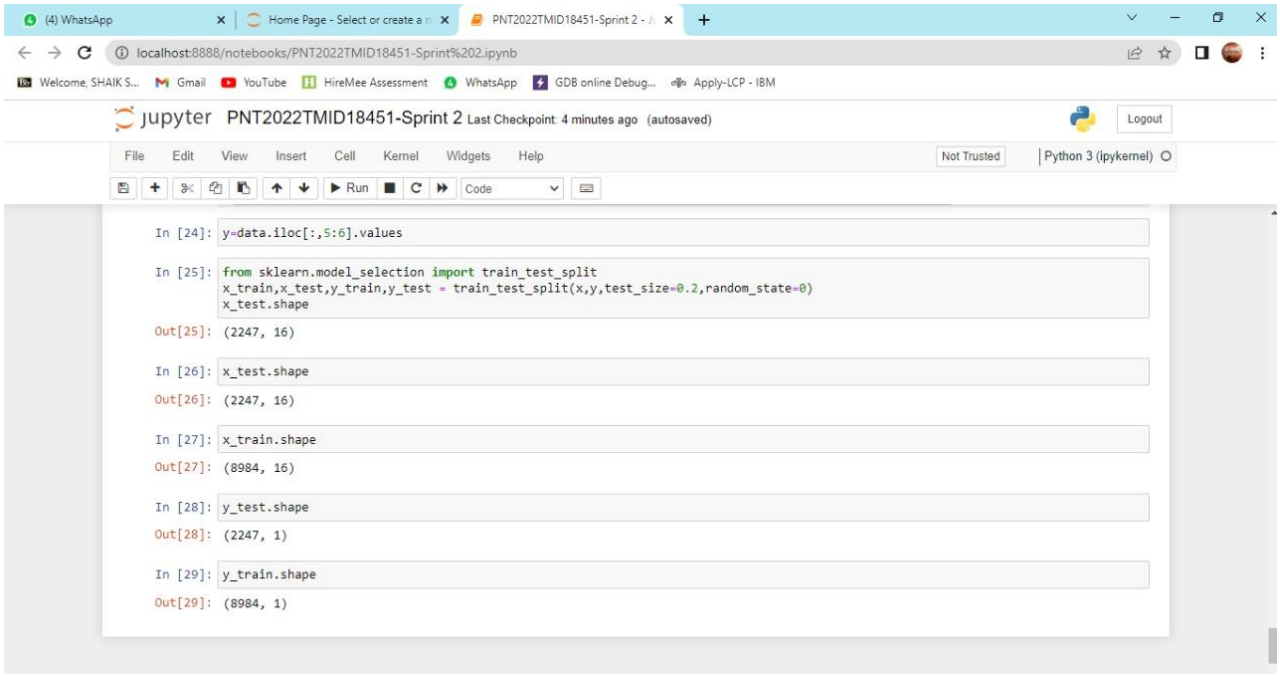
Code
In [20]: t
Out[20]: array([[0., 0., 0., 0., 1.],
[0., 0., 0., 1., 0.],
[0., 0., 0., 0., 1.],
...,
[0., 0., 0., 0., 1.],
[0., 0., 0., 0., 1.],
[0., 1., 0., 0., 0.]])
In [21]: x=np.delete(x,[4,5],axis=1)
x.shape
Out[21]: (11231, 6)
In [22]: x=np.concatenate((t,z,x),axis=1)
x.shape
Out[22]: (11231, 16)
In [23]: data=pd.get_dummies(data,columns=['ORIGIN','DEST'])
data.head()
Out[23]:
FL_NUM MONTH DAY_OF_MONTH DAY_OF_WEEK CRS_ARR_TIME DEP_DEL15 ARR_DEL15 ORIGIN_0 ORIGIN_1 ORIGIN_2 ORIGIN_3 ORIGIN_4 DES
0 1399 1 1 5 21 0.0 0.0 1 0 0 0 0
1 1476 1 1 5 14 0.0 0.0 0 1 0 0 0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Run
Code
In [24]: y=data.iloc[:,5:6].values
In [25]: from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.2,random_state=0)
x_test.shape
Out[25]: (2247, 16)
In [26]: x_test.shape
Out[26]: (2247, 16)
In [27]: x_train.shape
Out[27]: (8984, 16)
In [28]: y_test.shape
Out[28]: (2247, 1)
In [29]: y_train.shape
Out[29]: (8984, 1)