Project2-Customer_service_request_Analysis

October 26, 2022

1 Customer Service Request Analysis

1.1 DESCRIPTION

You've been asked to perform data analysis of service request (311) calls from New York City. You've also been asked to utilize data wrangling techniques to understand the pattern in the data and visualize the major types of complaints.

1.1.1 Perform the following steps:

1. Understand the dataset:

   Identify the shape of the dataset

   Identify variables with null values

2. Perform basic data exploratory analysis:

   Utilize missing value treatment

   Analyze the date column and remove the entries if it has an incorrect timeline

   Draw a frequency plot for city-wise complaints

   Draw scatter and hexbin plots for complaint concentration across Brooklyn

3. Find major types of complaints:

   Plot a bar graph of count vs. complaint types

   Find the top 10 types of complaints

   Display the types of complaints in each city in a separate dataset

4. Visualize the major types of complaints in each city

5. Check if the average response time across various types of complaints

6. Identify significant variables by performing a statistical analysis using p-values and chi-square values (Optional)

```
[1]: # Importing the required libraries
     import pandas as pd
     import numpy as np
```

```python
import matplotlib.pyplot as plt
```

1.1.2 Read the Dataset

```python
[2]: data= pd.read_csv("311_Service_Requests_from_2010_to_Present.csv", low_memory=
    ↪False,parse_dates=['Created Date', 'Closed Date', 'Resolution Action Updated
    ↪Date'],index_col='Unique Key')
    data.head()
    ## date columns are parsed to change the object type as dates to further
    ↪perform response time dates calculation
```

```
[2]:                   Created Date          Closed Date Agency  \
    Unique Key
    32310363    2015-12-31 23:59:45 2016-01-01 00:55:15    NYPD
    32309934    2015-12-31 23:59:44 2016-01-01 01:26:57    NYPD
    32309159    2015-12-31 23:59:29 2016-01-01 04:51:03    NYPD
    32305098    2015-12-31 23:57:46 2016-01-01 07:43:13    NYPD
    32306529    2015-12-31 23:56:58 2016-01-01 03:24:42    NYPD


                                  Agency Name          Complaint Type  \
    Unique Key
    32310363    New York City Police Department  Noise - Street/Sidewalk
    32309934    New York City Police Department          Blocked Driveway
    32309159    New York City Police Department          Blocked Driveway
    32305098    New York City Police Department            Illegal Parking
    32306529    New York City Police Department            Illegal Parking


                                Descriptor    Location Type  Incident Zip  \
    Unique Key
    32310363              Loud Music/Party  Street/Sidewalk        10034.0
    32309934                     No Access  Street/Sidewalk        11105.0
    32309159                     No Access  Street/Sidewalk        10458.0
    32305098    Commercial Overnight Parking  Street/Sidewalk      10461.0
    32306529              Blocked Sidewalk  Street/Sidewalk        11373.0


                    Incident Address        Street Name  … Bridge Highway Name  \
    Unique Key                                           …
    32310363      71 VERMILYEA AVENUE  VERMILYEA AVENUE  …                  NaN
    32309934          27-07 23 AVENUE          23 AVENUE  …                  NaN
    32309159    2897 VALENTINE AVENUE  VALENTINE AVENUE  …                  NaN
    32305098      2940 BAISLEY AVENUE    BAISLEY AVENUE  …                  NaN
    32306529          87-14 57 ROAD            57 ROAD  …                  NaN


                Bridge Highway Direction Road Ramp Bridge Highway Segment  \
    Unique Key
    32310363                         NaN       NaN                      NaN
```

```
32309934                          NaN       NaN                    NaN
32309159                          NaN       NaN                    NaN
32305098                          NaN       NaN                    NaN
32306529                          NaN       NaN                    NaN

            Garage Lot Name Ferry Direction Ferry Terminal Name   Latitude  \
Unique Key
32310363                NaN             NaN                 NaN  40.865682
32309934                NaN             NaN                 NaN  40.775945
32309159                NaN             NaN                 NaN  40.870325
32305098                NaN             NaN                 NaN  40.835994
32306529                NaN             NaN                 NaN  40.733060

            Longitude                                        Location
Unique Key
32310363  -73.923501   (40.86568153633767, -73.92350095571744)
32309934  -73.915094  (40.775945312321085, -73.91509393898605)
32309159  -73.888525  (40.870324522111424, -73.88852464418646)
32305098  -73.828379   (40.83599404683083, -73.82837939584206)
32306529  -73.874170  (40.733059618956815, -73.87416975810375)

[5 rows x 52 columns]
```

1.1.3 1. Understand the Dataset

Identify the shape of the data set

```
[3]: #Shape of the data set
     data.shape
```

```
[3]: (364558, 52)
```

Identify the variables with null values

```
[4]: #Variables with null values
     data.isna().sum()
```

```
[4]: Created Date                  0
     Closed Date               2381
     Agency                       0
     Agency Name                  0
     Complaint Type               0
     Descriptor                6501
     Location Type              133
     Incident Zip              2998
     Incident Address         51699
     Street Name              51699
```

```
Cross Street 1                    57188
Cross Street 2                    57805
Intersection Street 1            313438
Intersection Street 2            314046
Address Type                       3252
City                               2997
Landmark                         364183
Facility Type                      2389
Status                                0
Due Date                              3
Resolution Description                0
Resolution Action Updated Date     2402
Community Board                       0
Borough                               0
X Coordinate (State Plane)         4030
Y Coordinate (State Plane)         4030
Park Facility Name                    0
Park Borough                          0
School Name                           0
School Number                         0
School Region                         1
School Code                           1
School Phone Number                   0
School Address                        0
School City                           0
School State                          0
School Zip                            1
School Not Found                      0
School or Citywide Complaint     364558
Vehicle Type                     364558
Taxi Company Borough             364558
Taxi Pick Up Location            364558
Bridge Highway Name              364261
Bridge Highway Direction         364261
Road Ramp                        364296
Bridge Highway Segment           364296
Garage Lot Name                  364558
Ferry Direction                  364557
Ferry Terminal Name              364556
Latitude                           4030
Longitude                          4030
Location                           4030
dtype: int64
```

1.1.4   2. Perform Basic data exploratory analysis

Missing value Treatment

```
[5]:  # Drop the columns which has null values
      data1= data.drop(["School or Citywide Complaint","Vehicle Type","Taxi Company
      →Borough","Taxi Pick Up Location","Bridge Highway Name","Bridge Highway
      →Direction","Road Ramp","Bridge Highway Segment","Garage Lot Name","Ferry
      →Direction","Ferry Terminal Name"],axis=1)
      data1.head()
```

```
[5]:                    Created Date         Closed Date Agency  \
      Unique Key
      32310363   2015-12-31 23:59:45 2016-01-01 00:55:15   NYPD
      32309934   2015-12-31 23:59:44 2016-01-01 01:26:57   NYPD
      32309159   2015-12-31 23:59:29 2016-01-01 04:51:03   NYPD
      32305098   2015-12-31 23:57:46 2016-01-01 07:43:13   NYPD
      32306529   2015-12-31 23:56:58 2016-01-01 03:24:42   NYPD


                                     Agency Name           Complaint Type  \
      Unique Key
      32310363   New York City Police Department  Noise - Street/Sidewalk
      32309934   New York City Police Department          Blocked Driveway
      32309159   New York City Police Department          Blocked Driveway
      32305098   New York City Police Department           Illegal Parking
      32306529   New York City Police Department           Illegal Parking


                             Descriptor    Location Type  Incident Zip  \
      Unique Key
      32310363           Loud Music/Party  Street/Sidewalk       10034.0
      32309934                  No Access  Street/Sidewalk       11105.0
      32309159                  No Access  Street/Sidewalk       10458.0
      32305098  Commercial Overnight Parking  Street/Sidewalk    10461.0
      32306529           Blocked Sidewalk  Street/Sidewalk       11373.0


                  Incident Address        Street Name  …  School Code  \
      Unique Key                                       …
      32310363     71 VERMILYEA AVENUE  VERMILYEA AVENUE  …  Unspecified
      32309934          27-07 23 AVENUE          23 AVENUE  …  Unspecified
      32309159    2897 VALENTINE AVENUE  VALENTINE AVENUE  …  Unspecified
      32305098     2940 BAISLEY AVENUE    BAISLEY AVENUE  …  Unspecified
      32306529          87-14 57 ROAD            57 ROAD  …  Unspecified


                  School Phone Number School Address  School City School State  \
      Unique Key
      32310363            Unspecified    Unspecified  Unspecified  Unspecified
      32309934            Unspecified    Unspecified  Unspecified  Unspecified
      32309159            Unspecified    Unspecified  Unspecified  Unspecified
      32305098            Unspecified    Unspecified  Unspecified  Unspecified
      32306529            Unspecified    Unspecified  Unspecified  Unspecified
```

```
            School Zip School Not Found   Latitude  Longitude  \
Unique Key
32310363     Unspecified              N  40.865682 -73.923501
32309934     Unspecified              N  40.775945 -73.915094
32309159     Unspecified              N  40.870325 -73.888525
32305098     Unspecified              N  40.835994 -73.828379
32306529     Unspecified              N  40.733060 -73.874170


                                          Location
Unique Key
32310363      (40.86568153633767, -73.92350095571744)
32309934      (40.775945312321085, -73.91509393898605)
32309159      (40.870324522111424, -73.88852464418646)
32305098      (40.83599404683083, -73.82837939584206)
32306529      (40.733059618956815, -73.87416975810375)


[5 rows x 41 columns]
```

Analyze the date column and remove the entries if it has an incorrect timeline

```python
# drop the null rows in closed date and Resolution Action updated date
data1=data1.dropna(subset=['Closed Date','Resolution Action Updated
 Date'],axis=0)
data1=data1[data1['Closed Date']>=data1['Created Date']]
data1.info()
#data1.loc[data1['Closed Date']<data1['Created Date']] ## to check any
 complaint closed date less than created date
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 362138 entries, 32310363 to 29611816
Data columns (total 41 columns):
 #   Column                     Non-Null Count   Dtype
---  ------                     --------------   -----
 0   Created Date               362138 non-null  datetime64[ns]
 1   Closed Date                362138 non-null  datetime64[ns]
 2   Agency                     362138 non-null  object
 3   Agency Name                362138 non-null  object
 4   Complaint Type             362138 non-null  object
 5   Descriptor                 355644 non-null  object
 6   Location Type              362045 non-null  object
 7   Incident Zip               361463 non-null  float64
 8   Incident Address           310459 non-null  object
 9   Street Name                310459 non-null  object
 10  Cross Street 1             306814 non-null  object
 11  Cross Street 2             306681 non-null  object
 12  Intersection Street 1      50621 non-null   object
```

```
13   Intersection Street 2            50497 non-null   object
14   Address Type                    361209 non-null  object
15   City                            361464 non-null  object
16   Landmark                        375 non-null     object
17   Facility Type                   362121 non-null  object
18   Status                          362138 non-null  object
19   Due Date                        362138 non-null  object
20   Resolution Description          362138 non-null  object
21   Resolution Action Updated Date  362138 non-null  datetime64[ns]
22   Community Board                 362138 non-null  object
23   Borough                         362138 non-null  object
24   X Coordinate (State Plane)      360431 non-null  float64
25   Y Coordinate (State Plane)      360431 non-null  float64
26   Park Facility Name              362138 non-null  object
27   Park Borough                    362138 non-null  object
28   School Name                     362138 non-null  object
29   School Number                   362138 non-null  object
30   School Region                   362137 non-null  object
31   School Code                     362137 non-null  object
32   School Phone Number             362138 non-null  object
33   School Address                  362138 non-null  object
34   School City                     362138 non-null  object
35   School State                    362138 non-null  object
36   School Zip                      362137 non-null  object
37   School Not Found                362138 non-null  object
38   Latitude                        360431 non-null  float64
39   Longitude                       360431 non-null  float64
40   Location                        360431 non-null  object
dtypes: datetime64[ns](3), float64(5), object(33)
memory usage: 116.0+ MB
```

Draw a frequency plot for city-wise complaints

```python
# City-wise complaints
citywise_complaint=pd.DataFrame({'Count':data1[["City"]].value_counts()})
citywise_complaint
```

[7]:

```
                    Count
City
BROOKLYN            118841
NEW YORK            77281
BRONX               49163
STATEN ISLAND       15332
JAMAICA             8921
ASTORIA             7991
FLUSHING            7486
RIDGEWOOD           6391
```

```
CORONA                  5382
WOODSIDE                4356
EAST ELMHURST           3557
OZONE PARK              3446
ELMHURST                3437
SOUTH RICHMOND HILL     3431
MASPETH                 3117
WOODHAVEN               3101
LONG ISLAND CITY        3026
SOUTH OZONE PARK        2668
FRESH MEADOWS           2451
RICHMOND HILL           2333
MIDDLE VILLAGE          2291
QUEENS VILLAGE          2251
FOREST HILLS            2122
JACKSON HEIGHTS         2105
REGO PARK               1807
BAYSIDE                 1550
COLLEGE POINT           1544
FAR ROCKAWAY            1397
WHITESTONE              1369
HOLLIS                  1231
HOWARD BEACH            1144
SPRINGFIELD GARDENS     1093
ROSEDALE                1091
SAINT ALBANS            1047
KEW GARDENS             1008
SUNNYSIDE                944
Astoria                  905
ROCKAWAY PARK            831
OAKLAND GARDENS          717
LITTLE NECK              712
CAMBRIA HEIGHTS          617
BELLEROSE                487
GLEN OAKS                361
ARVERNE                  259
FLORAL PARK              196
Long Island City         170
Woodside                 166
NEW HYDE PARK            129
CENTRAL PARK             110
QUEENS                    37
BREEZY POINT              31
East Elmhurst             30
Howard Beach               1
```

```
[8]: citywise_complaint.plot(kind="bar",figsize=(15,5),title="City wise complaints")
     plt.xlabel('City')
     plt.ylabel('Complaint count');
```
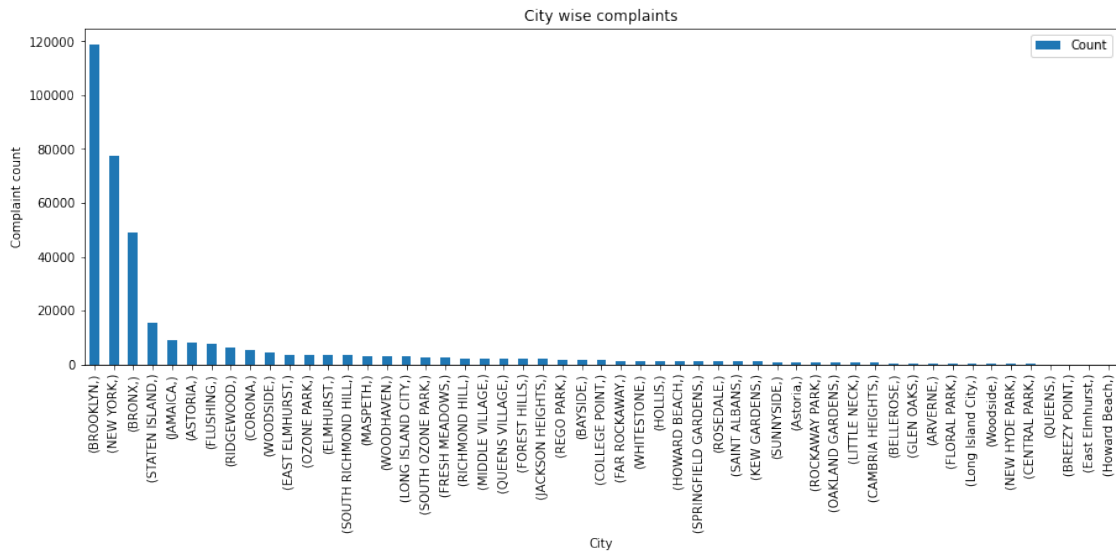

Draw scatter and hexbin plots for complaint concentration across Brooklyn

```
[9]: #Filtering the data for Brooklyn city
     data_Brooklyn=data1[data1["City"]=="BROOKLYN"]
     data_Brooklyn.shape
```

```
[9]: (118841, 41)
```

```
[10]: #Complaint types in Brooklyn city
      Brooklyn_Complaints=data_Brooklyn[["Complaint Type"]].value_counts()
      Brooklyn_Complaints
```

```
[10]: Complaint Type
      Blocked Driveway        36444
      Illegal Parking         33528
      Noise - Street/Sidewalk 13982
      Noise - Commercial      13855
      Derelict Vehicle         6257
      Noise - Vehicle          5965
      Animal Abuse             3191
      Noise - Park             1574
      Traffic                  1258
      Homeless Encampment       947
      Vending                   574
```

```
Noise - House of Worship      389
Drinking                      291
Urinating in Public           155
Bike/Roller/Skate Chronic     124
Disorderly Youth               79
Illegal Fireworks              61
Graffiti                       60
Posting Advertisement          58
Panhandling                    49
dtype: int64
```

[11]:
```python
## Scatter plot for Complaints concentration across Brooklyn
data_Brooklyn.plot(kind='scatter', x='Longitude', y='Latitude',
 →figsize=(15,8),title = 'Scatter Plot - Complaints concentration across
 →Brooklyn').axis('equal');
```
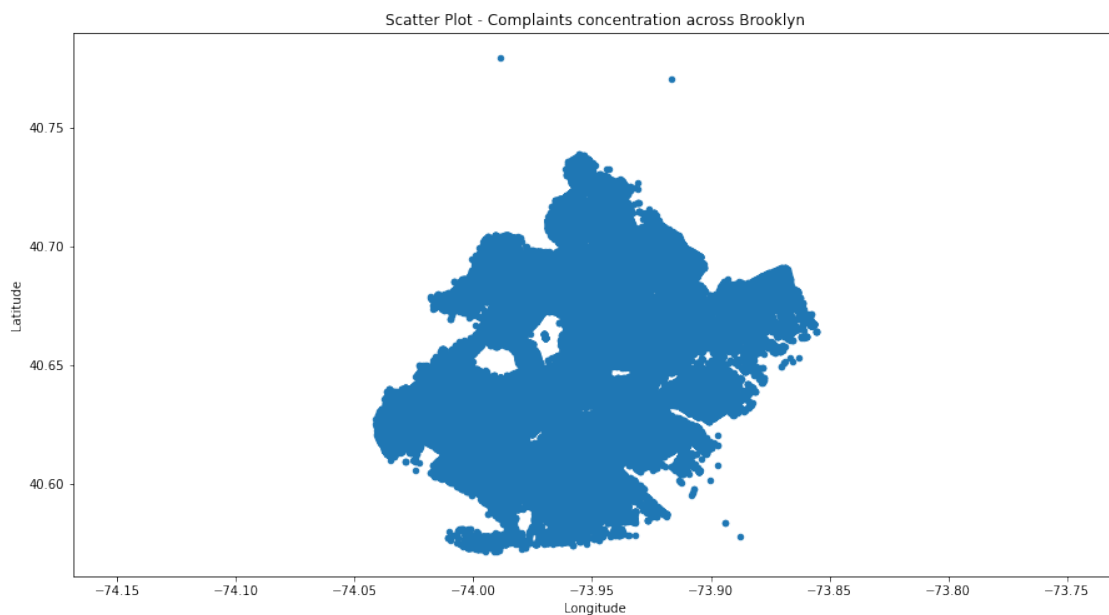

[12]:
```python
## Hexbin plot for Complaints concentration across Brooklyn
data_Brooklyn.plot(kind='hexbin', x='Longitude', y='Latitude',
 →gridsize=50,colormap='jet',mincnt=1,title ='Hexbin plot-Complaints
 →concentration across Brooklyn', figsize=(15,8)).axis('equal');
```

Hexbin plot-Complaints concentration across Brooklyn
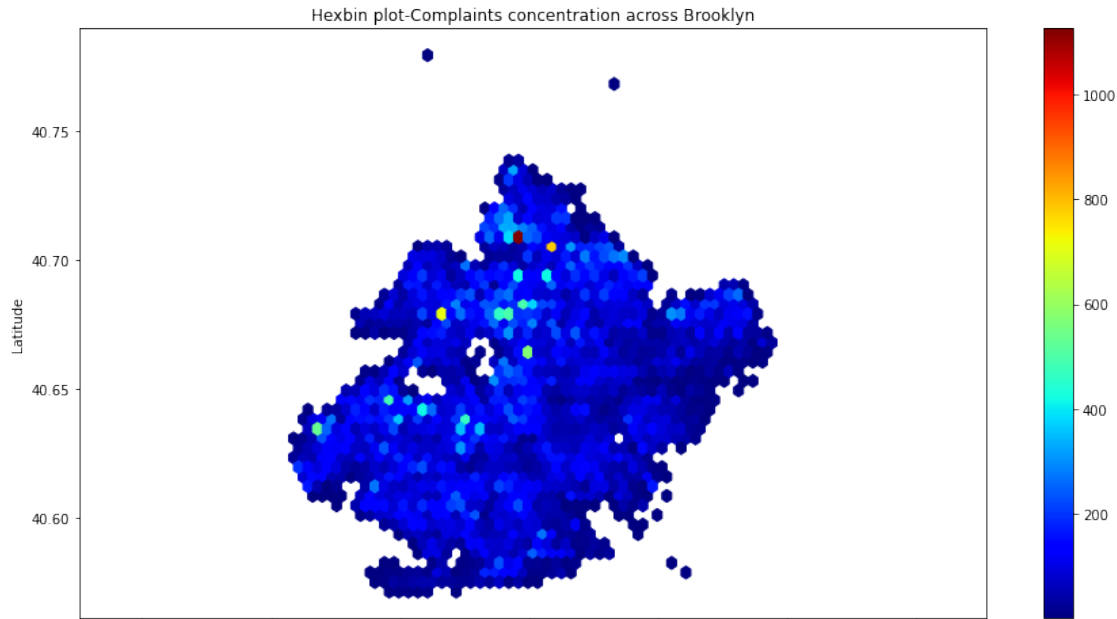
1.1.5 3. Find major types of complaints:

Plot a bar graph of count vs. complaint types

```python
# complaint types counts
complaint_types=pd.DataFrame({'count':data1[["Complaint Type"]].value_counts()})
complaint_types
```

[13]:

Complaint Type	count
Blocked Driveway	100618
Illegal Parking	91705
Noise - Street/Sidewalk	51131
Noise - Commercial	43749
Derelict Vehicle	21516
Noise - Vehicle	19300
Animal Abuse	10530
Traffic	5193
Homeless Encampment	4877
Vending	4183
Noise - Park	4088
Drinking	1404
Noise - House of Worship	1068
Posting Advertisement	678
Urinating in Public	641
Bike/Roller/Skate Chronic	475

```
Panhandling            325
Disorderly Youth       315
Illegal Fireworks      172
Graffiti               157
Agency Issues            8
Squeegee                 4
Animal in a Park         1
```

[14]:
```python
complaint_types.plot(kind="bar",figsize=(15,5),title="Count Vs. Complaint␣
 ↪Types")
plt.xlabel('Complaint types')
plt.ylabel('Compalint Counts');
```
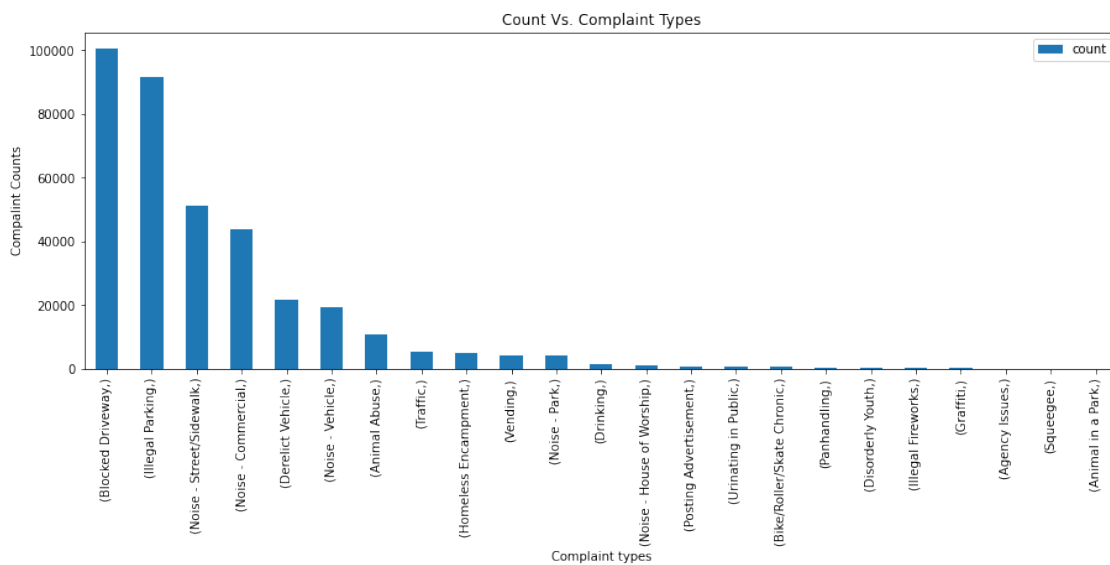

Find the top 10 types of complaints

[15]:
```python
complaint_types.head(10)
```

[15]:
```
                         count
Complaint Type
Blocked Driveway        100618
Illegal Parking          91705
Noise - Street/Sidewalk  51131
Noise - Commercial       43749
Derelict Vehicle         21516
Noise - Vehicle          19300
Animal Abuse             10530
Traffic                   5193
Homeless Encampment       4877
```

```
Vending                              4183
```

Display the types of complaints in each city in a separate dataset

```
[16]: #The types of complaints in each city in a separate dataset
      Citywise_complainttype_count=pd.DataFrame({'Count':data1.groupby(["Complaint␣
      ↪Type","City"]).size()})
      Citywise_complainttype_count.unstack()
```

[16]:

Complaint Type	Count ARVERNE	ASTORIA	Astoria	BAYSIDE	BELLEROSE
Animal Abuse	46.0	170.0	NaN	53.0	15.0
Animal in a Park	NaN	NaN	NaN	NaN	NaN
Bike/Roller/Skate Chronic	NaN	16.0	NaN	NaN	1.0
Blocked Driveway	50.0	3436.0	159.0	514.0	138.0
Derelict Vehicle	32.0	426.0	14.0	231.0	120.0
Disorderly Youth	2.0	5.0	NaN	2.0	2.0
Drinking	1.0	43.0	NaN	1.0	1.0
Graffiti	1.0	4.0	NaN	3.0	NaN
Homeless Encampment	4.0	32.0	NaN	2.0	1.0
Illegal Fireworks	NaN	4.0	NaN	NaN	1.0
Illegal Parking	62.0	1340.0	277.0	638.0	132.0
Noise - Commercial	2.0	1653.0	310.0	47.0	38.0
Noise - House of Worship	14.0	21.0	NaN	3.0	1.0
Noise - Park	2.0	64.0	NaN	4.0	1.0
Noise - Street/Sidewalk	29.0	409.0	145.0	17.0	13.0
Noise - Vehicle	10.0	236.0	NaN	24.0	11.0
Panhandling	1.0	2.0	NaN	NaN	1.0
Posting Advertisement	NaN	3.0	NaN	NaN	1.0
Squeegee	NaN	NaN	NaN	NaN	NaN
Traffic	1.0	60.0	NaN	9.0	9.0
Urinating in Public	1.0	10.0	NaN	NaN	1.0
Vending	1.0	57.0	NaN	2.0	NaN

Complaint Type	BREEZY POINT	BRONX	BROOKLYN	CAMBRIA HEIGHTS
Animal Abuse	2.0	1971.0	3191.0	15.0
Animal in a Park	NaN	NaN	NaN	NaN
Bike/Roller/Skate Chronic	NaN	22.0	124.0	NaN
Blocked Driveway	3.0	17061.0	36444.0	177.0
Derelict Vehicle	3.0	2402.0	6257.0	148.0
Disorderly Youth	NaN	66.0	79.0	NaN
Drinking	1.0	206.0	291.0	NaN
Graffiti	NaN	15.0	60.0	NaN
Homeless Encampment	NaN	275.0	947.0	6.0

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Complaint Type				
Illegal Fireworks	NaN	24.0	61.0	1.0
Illegal Parking	16.0	9889.0	33528.0	113.0
Noise - Commercial	4.0	2944.0	13855.0	19.0
Noise - House of Worship	NaN	90.0	389.0	2.0
Noise - Park	NaN	548.0	1574.0	NaN
Noise - Street/Sidewalk	1.0	9144.0	13982.0	29.0
Noise - Vehicle	1.0	3555.0	5965.0	100.0
Panhandling	NaN	20.0	49.0	NaN
Posting Advertisement	NaN	17.0	58.0	NaN
Squeegee	NaN	NaN	NaN	NaN
Traffic	NaN	427.0	1258.0	7.0
Urinating in Public	NaN	54.0	155.0	NaN
Vending	NaN	433.0	574.0	NaN

    …   \

City	CENTRAL PARK	…	SAINT ALBANS	SOUTH OZONE PARK
Complaint Type		…		
Animal Abuse	NaN	…	43.0	74.0
Animal in a Park	NaN	…	NaN	NaN
Bike/Roller/Skate Chronic	NaN	…	NaN	1.0
Blocked Driveway	NaN	…	318.0	1202.0
Derelict Vehicle	NaN	…	248.0	425.0
Disorderly Youth	NaN	…	1.0	2.0
Drinking	NaN	…	3.0	14.0
Graffiti	NaN	…	NaN	2.0
Homeless Encampment	NaN	…	11.0	5.0
Illegal Fireworks	NaN	…	NaN	1.0
Illegal Parking	5.0	…	237.0	602.0
Noise - Commercial	NaN	…	36.0	82.0
Noise - House of Worship	NaN	…	1.0	5.0
Noise - Park	NaN	…	1.0	4.0
Noise - Street/Sidewalk	105.0	…	81.0	108.0
Noise - Vehicle	NaN	…	50.0	97.0
Panhandling	NaN	…	NaN	NaN
Posting Advertisement	NaN	…	NaN	1.0
Squeegee	NaN	…	NaN	NaN
Traffic	NaN	…	14.0	36.0
Urinating in Public	NaN	…	1.0	2.0
Vending	NaN	…	2.0	5.0

\

City	SOUTH RICHMOND HILL	SPRINGFIELD GARDENS
Complaint Type		
Animal Abuse	40.0	42.0
Animal in a Park	NaN	NaN
Bike/Roller/Skate Chronic	1.0	NaN
Blocked Driveway	1946.0	330.0

Complaint Type		
Derelict Vehicle	356.0	266.0
Disorderly Youth	2.0	NaN
Drinking	25.0	6.0
Graffiti	NaN	NaN
Homeless Encampment	12.0	7.0
Illegal Fireworks	2.0	1.0
Illegal Parking	596.0	291.0
Noise - Commercial	223.0	38.0
Noise - House of Worship	3.0	1.0
Noise - Park	2.0	1.0
Noise - Street/Sidewalk	93.0	42.0
Noise - Vehicle	93.0	48.0
Panhandling	NaN	2.0
Posting Advertisement	NaN	2.0
Squeegee	NaN	NaN
Traffic	12.0	12.0
Urinating in Public	1.0	3.0
Vending	24.0	1.0

\

City	STATEN ISLAND	SUNNYSIDE	WHITESTONE	WOODHAVEN
Complaint Type				
Animal Abuse	786.0	40.0	43.0	57.0
Animal in a Park	NaN	NaN	NaN	NaN
Bike/Roller/Skate Chronic	10.0	2.0	4.0	2.0
Blocked Driveway	2845.0	278.0	279.0	1363.0
Derelict Vehicle	2183.0	17.0	279.0	369.0
Disorderly Youth	25.0	2.0	1.0	NaN
Drinking	188.0	12.0	3.0	4.0
Graffiti	6.0	1.0	1.0	NaN
Homeless Encampment	77.0	12.0	NaN	10.0
Illegal Fireworks	11.0	NaN	1.0	NaN
Illegal Parking	6223.0	167.0	631.0	895.0
Noise - Commercial	783.0	238.0	21.0	209.0
Noise - House of Worship	18.0	NaN	NaN	3.0
Noise - Park	67.0	16.0	7.0	3.0
Noise - Street/Sidewalk	885.0	69.0	35.0	89.0
Noise - Vehicle	424.0	53.0	31.0	81.0
Panhandling	13.0	NaN	NaN	1.0
Posting Advertisement	516.0	3.0	NaN	NaN
Squeegee	NaN	NaN	NaN	NaN
Traffic	228.0	17.0	32.0	7.0
Urinating in Public	19.0	2.0	NaN	2.0
Vending	25.0	15.0	1.0	6.0

City	WOODSIDE Woodside

```
Complaint Type
Animal Abuse                    111.0      NaN
Animal in a Park                  NaN      NaN
Bike/Roller/Skate Chronic         5.0      NaN
Blocked Driveway               2037.0     27.0
Derelict Vehicle                298.0      8.0
Disorderly Youth                  1.0      NaN
Drinking                         15.0      NaN
Graffiti                          4.0      NaN
Homeless Encampment              38.0      NaN
Illegal Fireworks                 1.0      NaN
Illegal Parking                1083.0    124.0
Noise - Commercial              256.0      2.0
Noise - House of Worship          4.0      NaN
Noise - Park                     38.0      NaN
Noise - Street/Sidewalk         261.0      5.0
Noise - Vehicle                 136.0      NaN
Panhandling                       NaN      NaN
Posting Advertisement             NaN      NaN
Squeegee                          NaN      NaN
Traffic                          45.0      NaN
Urinating in Public               8.0      NaN
Vending                          15.0      NaN

[22 rows x 53 columns]
```

1.1.6 4.Visualize the major types of complaints in each city

```python
[17]: Citywise_complainttype_count.sort_values('Count',ascending=False).unstack().
      ↪head(10)
      ##Assumed top 10 complaints as majortypes
```

```
[17]:                          Count                                          \
      City            ARVERNE ASTORIA Astoria BAYSIDE BELLEROSE
      Complaint Type
      Blocked Driveway   50.0  3436.0   159.0   514.0     138.0
      Illegal Parking    62.0  1340.0   277.0   638.0     132.0
      Noise - Street/Sidewalk  29.0   409.0   145.0    17.0      13.0
      Noise - Commercial   2.0  1653.0   310.0    47.0      38.0
      Noise - Vehicle     10.0   236.0     NaN    24.0      11.0
      Derelict Vehicle    32.0   426.0    14.0   231.0     120.0
      Animal Abuse        46.0   170.0     NaN    53.0      15.0
      Homeless Encampment  4.0    32.0     NaN     2.0       1.0
      Vending              1.0    57.0     NaN     2.0       NaN
      Traffic              1.0    60.0     NaN     9.0       9.0
```

```
                              \
City                    BREEZY POINT    BRONX BROOKLYN CAMBRIA HEIGHTS
Complaint Type
Blocked Driveway                 3.0  17061.0  36444.0           177.0
Illegal Parking                 16.0   9889.0  33528.0           113.0
Noise - Street/Sidewalk          1.0   9144.0  13982.0            29.0
Noise - Commercial               4.0   2944.0  13855.0            19.0
Noise - Vehicle                  1.0   3555.0   5965.0           100.0
Derelict Vehicle                 3.0   2402.0   6257.0           148.0
Animal Abuse                     2.0   1971.0   3191.0            15.0
Homeless Encampment              NaN    275.0    947.0             6.0
Vending                          NaN    433.0    574.0             NaN
Traffic                          NaN    427.0   1258.0             7.0


                                   …                          \
City                    CENTRAL PARK  … SAINT ALBANS SOUTH OZONE PARK
Complaint Type                        …
Blocked Driveway                 NaN  …        318.0           1202.0
Illegal Parking                  5.0  …        237.0            602.0
Noise - Street/Sidewalk        105.0  …         81.0            108.0
Noise - Commercial               NaN  …         36.0             82.0
Noise - Vehicle                  NaN  …         50.0             97.0
Derelict Vehicle                 NaN  …        248.0            425.0
Animal Abuse                     NaN  …         43.0             74.0
Homeless Encampment              NaN  …         11.0              5.0
Vending                          NaN  …          2.0              5.0
Traffic                          NaN  …         14.0             36.0


                                                                 \
City                    SOUTH RICHMOND HILL SPRINGFIELD GARDENS STATEN ISLAND
Complaint Type
Blocked Driveway                     1946.0                 330.0        2845.0
Illegal Parking                       596.0                 291.0        6223.0
Noise - Street/Sidewalk                93.0                  42.0         885.0
Noise - Commercial                    223.0                  38.0         783.0
Noise - Vehicle                        93.0                  48.0         424.0
Derelict Vehicle                      356.0                 266.0        2183.0
Animal Abuse                           40.0                  42.0         786.0
Homeless Encampment                    12.0                   7.0          77.0
Vending                                24.0                   1.0          25.0
Traffic                                12.0                  12.0         228.0


City                    SUNNYSIDE WHITESTONE WOODHAVEN WOODSIDE Woodside
Complaint Type
Blocked Driveway            278.0     279.0    1363.0   2037.0     27.0
Illegal Parking             167.0     631.0     895.0   1083.0    124.0
```

```
Noise - Street/Sidewalk       69.0      35.0      89.0     261.0      5.0
Noise - Commercial           238.0      21.0     209.0     256.0      2.0
Noise - Vehicle               53.0      31.0      81.0     136.0      NaN
Derelict Vehicle              17.0     279.0     369.0     298.0      8.0
Animal Abuse                  40.0      43.0      57.0     111.0      NaN
Homeless Encampment           12.0       NaN      10.0      38.0      NaN
Vending                       15.0       1.0       6.0      15.0      NaN
Traffic                       17.0      32.0       7.0      45.0      NaN

[10 rows x 53 columns]
```

1.1.7 5. Check the average response time across various types of complaints

```python
[18]: data1["response_time"]=data1['Closed Date'] - data1['Created Date']
      #data1["response_time"]=data1["response_time"]/np.timedelta64(1,'D')
      data1["response_time"]=data1["response_time"]/np.timedelta64(1,'h') # converted␣
       ↪response time in hours
      group=data1.groupby("Complaint Type")
      #complaint_types_group["response_time"].describe()
      Average_response_time=pd.DataFrame({"Avg response time in hours ":
       ↪group["response_time"].mean()})
      Average_response_time
```

```
[18]:                         Avg response time in hours
      Complaint Type
      Agency Issues                         5.080312
      Animal Abuse                          5.009043
      Animal in a Park                    336.842778
      Bike/Roller/Skate Chronic             3.645469
      Blocked Driveway                      4.509039
      Derelict Vehicle                      7.044693
      Disorderly Youth                      3.434375
      Drinking                              3.839250
      Graffiti                              6.465651
      Homeless Encampment                   4.293482
      Illegal Fireworks                     2.809301
      Illegal Parking                       4.347207
      Noise - Commercial                    3.079373
      Noise - House of Worship              3.164191
      Noise - Park                          3.394417
      Noise - Street/Sidewalk               3.397737
      Noise - Vehicle                       3.489398
      Panhandling                           4.403764
      Posting Advertisement                 2.024214
      Squeegee                              4.044514
```

```
Traffic                              3.420344
Urinating in Public                  3.599804
Vending                              3.990887
```