CustomerServiceRequestsAnalysis

March 24, 2023

```python
[1]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
     from matplotlib.pyplot import figure


     %matplotlib inline
```

```python
[2]: # 1. Understand the dataset:
     # 1.1 Import the dataset
     df = pd.read_csv("311_Service_Requests_from_2010_to_Present.csv")

     # Cleaning up certain columns
     df['City'] = df['City'].str.upper()
```

```
/usr/local/lib/python3.7/site-packages/IPython/core/interactiveshell.py:3063:
DtypeWarning: Columns (48,49) have mixed types.Specify dtype option on import or
set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

```python
[3]: # 1.2 Visualize the dataset
     # Viewing few Entries in the dataset
     df.head()
     df.tail()
```

```
[3]:         Unique Key          Created Date          Closed Date Agency  \
    364553    29609918  01/01/2015 12:04:44 AM  01/01/2015 10:22:31 AM   NYPD
    364554    29608392  01/01/2015 12:04:28 AM  01/01/2015 02:25:02 AM   NYPD
    364555    29607589  01/01/2015 12:01:30 AM  01/01/2015 12:20:33 AM   NYPD
    364556    29610889  01/01/2015 12:01:29 AM  01/01/2015 02:42:22 AM   NYPD
    364557    29611816  01/01/2015 12:00:50 AM  01/01/2015 02:47:50 AM   NYPD


                              Agency Name          Complaint Type  \
    364553  New York City Police Department         Illegal Parking
    364554  New York City Police Department          Noise - Vehicle
    364555  New York City Police Department  Noise - Street/Sidewalk
    364556  New York City Police Department          Blocked Driveway
    364557  New York City Police Department          Blocked Driveway
```

```
             Descriptor    Location Type   Incident Zip      Incident Address  \
364553    Blocked Hydrant  Street/Sidewalk       11421.0           84-25 85 ROAD
364554    Car/Truck Horn   Street/Sidewalk       10468.0   2555 SEDGWICK AVENUE
364555   Loud Music/Party  Street/Sidewalk       10031.0     508 WEST 139 STREET
364556         No Access   Street/Sidewalk       10466.0     931 EAST 226 STREET
364557         No Access   Street/Sidewalk       11420.0      123-19 135 STREET


          … Bridge Highway Name Bridge Highway Direction Road Ramp  \
364553    …               NaN                        NaN       NaN
364554    …               NaN                        NaN       NaN
364555    …               NaN                        NaN       NaN
364556    …               NaN                        NaN       NaN
364557    …               NaN                        NaN       NaN


          Bridge Highway Segment Garage Lot Name Ferry Direction  \
364553                       NaN            NaN             NaN
364554                       NaN            NaN             NaN
364555                       NaN            NaN             NaN
364556                       NaN            NaN             NaN
364557                       NaN            NaN             NaN


          Ferry Terminal Name   Latitude  Longitude  \
364553                    NaN  40.695145 -73.860949
364554                    NaN  40.867830 -73.907178
364555                    NaN  40.821647 -73.950873
364556                    NaN  40.886361 -73.853290
364557                    NaN  40.674212 -73.803585


                                          Location
364553   (40.69514470265117, -73.86094888534394)
364554   (40.86782963689454, -73.90717786644662)
364555  (40.821646626438095, -73.95087342885292)
364556   (40.88636077906953, -73.85329048666742)
364557  (40.674211762243935, -73.80358548685278)


[5 rows x 53 columns]
```

[4]:
```python
# 1.3 Print the columns of the DataFrame
df.dtypes
```

[4]:
```
Unique Key                        int64
Created Date                     object
Closed Date                      object
Agency                           object
Agency Name                      object
Complaint Type                   object
```

```
Descriptor                          object
Location Type                       object
Incident Zip                        float64
Incident Address                    object
Street Name                         object
Cross Street 1                      object
Cross Street 2                      object
Intersection Street 1               object
Intersection Street 2               object
Address Type                        object
City                                object
Landmark                            object
Facility Type                       object
Status                              object
Due Date                            object
Resolution Description              object
Resolution Action Updated Date      object
Community Board                     object
Borough                             object
X Coordinate (State Plane)          float64
Y Coordinate (State Plane)          float64
Park Facility Name                  object
Park Borough                        object
School Name                         object
School Number                       object
School Region                       object
School Code                         object
School Phone Number                 object
School Address                      object
School City                         object
School State                        object
School Zip                          object
School Not Found                    object
School or Citywide Complaint        float64
Vehicle Type                        float64
Taxi Company Borough                float64
Taxi Pick Up Location               float64
Bridge Highway Name                 object
Bridge Highway Direction            object
Road Ramp                           object
Bridge Highway Segment              object
Garage Lot Name                     float64
Ferry Direction                     object
Ferry Terminal Name                 object
Latitude                            float64
Longitude                           float64
Location                            object
```

```
dtype: object
```

[5]:
```
# 1.4 Identify the shape of the dataset
df.shape
```

[5]: (364558, 53)
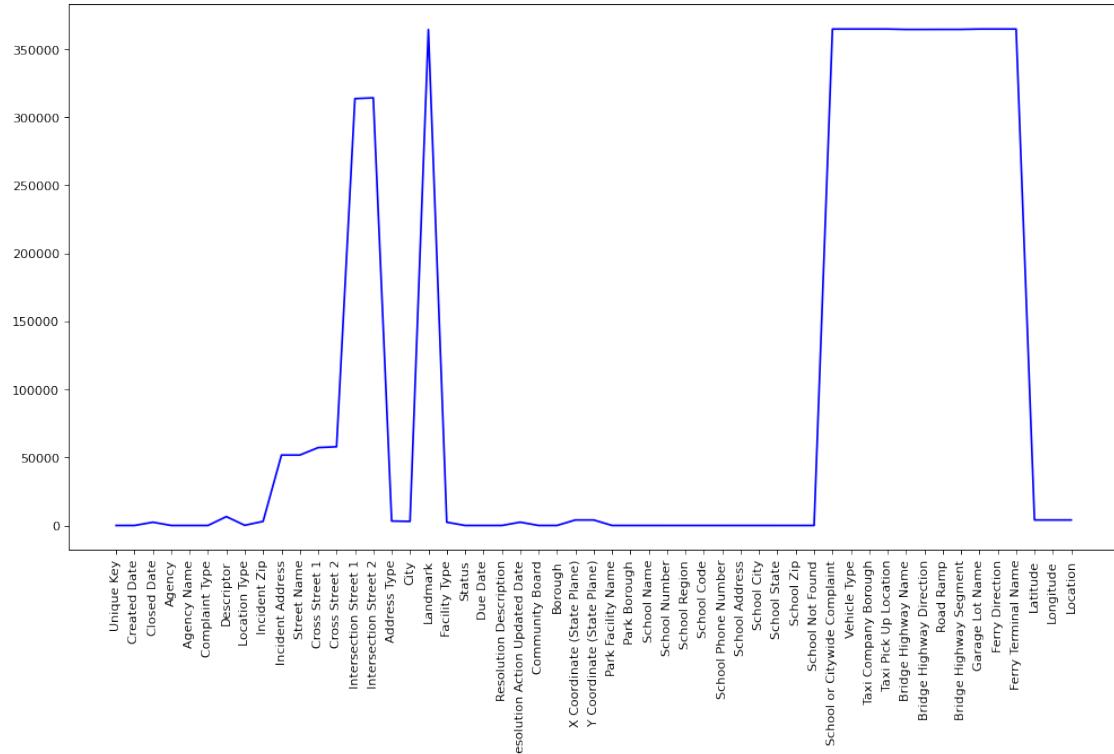
[6]:
```
# 1.5 Identify the variables with null values
df.isna().any()
```

[6]:
```
Unique Key                          False
Created Date                        False
Closed Date                          True
Agency                              False
Agency Name                         False
Complaint Type                      False
Descriptor                           True
Location Type                        True
Incident Zip                         True
Incident Address                     True
Street Name                          True
Cross Street 1                       True
Cross Street 2                       True
Intersection Street 1                True
Intersection Street 2                True
Address Type                         True
City                                 True
Landmark                             True
Facility Type                        True
Status                              False
Due Date                             True
Resolution Description              False
Resolution Action Updated Date       True
Community Board                     False
Borough                             False
X Coordinate (State Plane)           True
Y Coordinate (State Plane)           True
Park Facility Name                  False
Park Borough                        False
School Name                         False
School Number                       False
School Region                        True
School Code                          True
School Phone Number                 False
School Address                      False
School City                         False
School State                        False
```

```
School Zip                              True
School Not Found                       False
School or Citywide Complaint            True
Vehicle Type                            True
Taxi Company Borough                    True
Taxi Pick Up Location                   True
Bridge Highway Name                     True
Bridge Highway Direction                True
Road Ramp                               True
Bridge Highway Segment                  True
Garage Lot Name                         True
Ferry Direction                         True
Ferry Terminal Name                     True
Latitude                                True
Longitude                               True
Location                                True
dtype: bool
```

[7]:
```python
# 2. Perform basic data exploratory analysis:
# 2.1 Draw a frequency plot to show the number of null values in
# each column of the DataFrame

null_values = df.isna().sum()
column_values = df.columns.values
figure(figsize=(15, 8), dpi=80)
plt.plot(column_values, null_values, color='blue')
plt.xticks(rotation=90)
plt.savefig('Capture1.jpg')
```

```
[8]:  # 2.2 Missing value treatment
      # 2.2.1 Remove the records whose Closed Date values are
      # null

      df = df.dropna(subset=['Closed Date'])
      df.shape
```

[8]: (362177, 53)

```
[9]:  # 2.3 Analyze the date column, and remove entries that have an
      # incorrect timeline

      # Remove entries ith null values in remaining major dates
      df = df.dropna(subset=['Created Date'])
      df = df.dropna(subset=['Resolution Action Updated Date'])

      # Convert major date columns to Pandas datetime
      df["Created Date"] = pd.to_datetime(df["Created Date"])
      df["Closed Date"] = pd.to_datetime(df["Closed Date"])
      df["Resolution Action Updated Date"] = pd.to_datetime(df["Resolution Action␣
       ↪Updated Date"])
      df.shape
```

```
# (362177, 54)

# Ensure there are no entires where the proper timeline is not followed where␣
↪Closed Date is
# greater than equal to Resolution Action Updated Date and Resolution Action␣
↪Updated Date
# is greater than equal to Created Date

df = df[(df['Closed Date'] >= df["Resolution Action Updated Date"]) &␣
↪(df["Resolution Action Updated Date"] >= df["Created Date"])]

df.shape
# (340141, 54)
```

[9]: (340141, 53)

[10]:
```
# 2.3.1 Calculate the time elapsed in closed and creation date
df['Time Elapsed'] = df["Closed Date"] - df["Created Date"]

df.head()
```

[10]:
```
   Unique Key        Created Date         Closed Date Agency  \
0    32310363 2015-12-31 23:59:45 2016-01-01 00:55:15   NYPD
1    32309934 2015-12-31 23:59:44 2016-01-01 01:26:57   NYPD
2    32309159 2015-12-31 23:59:29 2016-01-01 04:51:03   NYPD
3    32305098 2015-12-31 23:57:46 2016-01-01 07:43:13   NYPD
4    32306529 2015-12-31 23:56:58 2016-01-01 03:24:42   NYPD


                       Agency Name        Complaint Type  \
0  New York City Police Department  Noise - Street/Sidewalk
1  New York City Police Department          Blocked Driveway
2  New York City Police Department          Blocked Driveway
3  New York City Police Department           Illegal Parking
4  New York City Police Department           Illegal Parking


                    Descriptor    Location Type  Incident Zip  \
0          Loud Music/Party  Street/Sidewalk       10034.0
1                No Access  Street/Sidewalk       11105.0
2                No Access  Street/Sidewalk       10458.0
3  Commercial Overnight Parking  Street/Sidewalk   10461.0
4          Blocked Sidewalk  Street/Sidewalk       11373.0


        Incident Address  … Bridge Highway Direction Road Ramp  \
0    71 VERMILYEA AVENUE  …                    NaN       NaN
1        27-07 23 AVENUE  …                    NaN       NaN
2  2897 VALENTINE AVENUE  …                    NaN       NaN
3    2940 BAISLEY AVENUE  …                    NaN       NaN
```

7

```
4              87-14 57 ROAD  …                        NaN      NaN

   Bridge Highway Segment Garage Lot Name Ferry Direction Ferry Terminal Name  \
0                    NaN             NaN            NaN                   NaN
1                    NaN             NaN            NaN                   NaN
2                    NaN             NaN            NaN                   NaN
3                    NaN             NaN            NaN                   NaN
4                    NaN             NaN            NaN                   NaN

    Latitude  Longitude                               Location  \
0  40.865682 -73.923501   (40.86568153633767, -73.92350095571744)
1  40.775945 -73.915094   (40.775945312321085, -73.91509393898605)
2  40.870325 -73.888525   (40.870324522111424, -73.88852464418646)
3  40.835994 -73.828379    (40.83599404683083, -73.82837939584206)
4  40.733060 -73.874170   (40.733059618956815, -73.87416975810375)

     Time Elapsed
0 0 days 00:55:30
1 0 days 01:27:13
2 0 days 04:51:34
3 0 days 07:45:27
4 0 days 03:27:44

[5 rows x 54 columns]
```

```python
# 2.3.2 Convert the calculated date to seconds to get a better
# representation

df['Time Elapsed'] = df['Time Elapsed'].dt.total_seconds()

df.head()
```

```
[11]:    Unique Key      Created Date         Closed Date Agency  \
     0    32310363 2015-12-31 23:59:45 2016-01-01 00:55:15   NYPD
     1    32309934 2015-12-31 23:59:44 2016-01-01 01:26:57   NYPD
     2    32309159 2015-12-31 23:59:29 2016-01-01 04:51:03   NYPD
     3    32305098 2015-12-31 23:57:46 2016-01-01 07:43:13   NYPD
     4    32306529 2015-12-31 23:56:58 2016-01-01 03:24:42   NYPD

                       Agency Name          Complaint Type  \
     0  New York City Police Department  Noise - Street/Sidewalk
     1  New York City Police Department         Blocked Driveway
     2  New York City Police Department         Blocked Driveway
     3  New York City Police Department          Illegal Parking
     4  New York City Police Department          Illegal Parking

                    Descriptor   Location Type   Incident Zip  \
```

```
0              Loud Music/Party   Street/Sidewalk          10034.0
1                    No Access    Street/Sidewalk          11105.0
2                    No Access    Street/Sidewalk          10458.0
3   Commercial Overnight Parking  Street/Sidewalk          10461.0
4              Blocked Sidewalk   Street/Sidewalk          11373.0

          Incident Address  … Bridge Highway Direction Road Ramp  \
0    71 VERMILYEA AVENUE    …                     NaN        NaN
1        27-07 23 AVENUE    …                     NaN        NaN
2   2897 VALENTINE AVENUE   …                     NaN        NaN
3    2940 BAISLEY AVENUE    …                     NaN        NaN
4           87-14 57 ROAD   …                     NaN        NaN

  Bridge Highway Segment Garage Lot Name Ferry Direction Ferry Terminal Name  \
0                    NaN             NaN             NaN                  NaN
1                    NaN             NaN             NaN                  NaN
2                    NaN             NaN             NaN                  NaN
3                    NaN             NaN             NaN                  NaN
4                    NaN             NaN             NaN                  NaN

     Latitude   Longitude                                     Location Time Elapsed
0   40.865682 -73.923501   (40.86568153633767, -73.92350095571744)        3330.0
1   40.775945 -73.915094   (40.775945312321085, -73.91509393898605)       5233.0
2   40.870325 -73.888525   (40.870324522111424, -73.88852464418646)      17494.0
3   40.835994 -73.828379    (40.83599404683083, -73.82837939584206)      27927.0
4   40.733060 -73.874170   (40.733059618956815, -73.87416975810375)      12464.0

[5 rows x 54 columns]
```

```
[12]: # 2.3.3 View the descriptive statistics for the newly created
      # column
      df['Time Elapsed'].describe()
```

```
[12]: count    3.401410e+05
      mean     1.507811e+04
      std      2.107662e+04
      min      6.100000e+01
      25%      4.525000e+03
      50%      9.603000e+03
      75%      1.884600e+04
      max      2.134342e+06
      Name: Time Elapsed, dtype: float64
```

```
[13]: # 2.3.4 Check the number of null values in the Complaint_Type
      # and City columns
      null_complaint_types = df['Complaint Type'].isna().sum()
      null_city = df['City'].isna().sum()
```
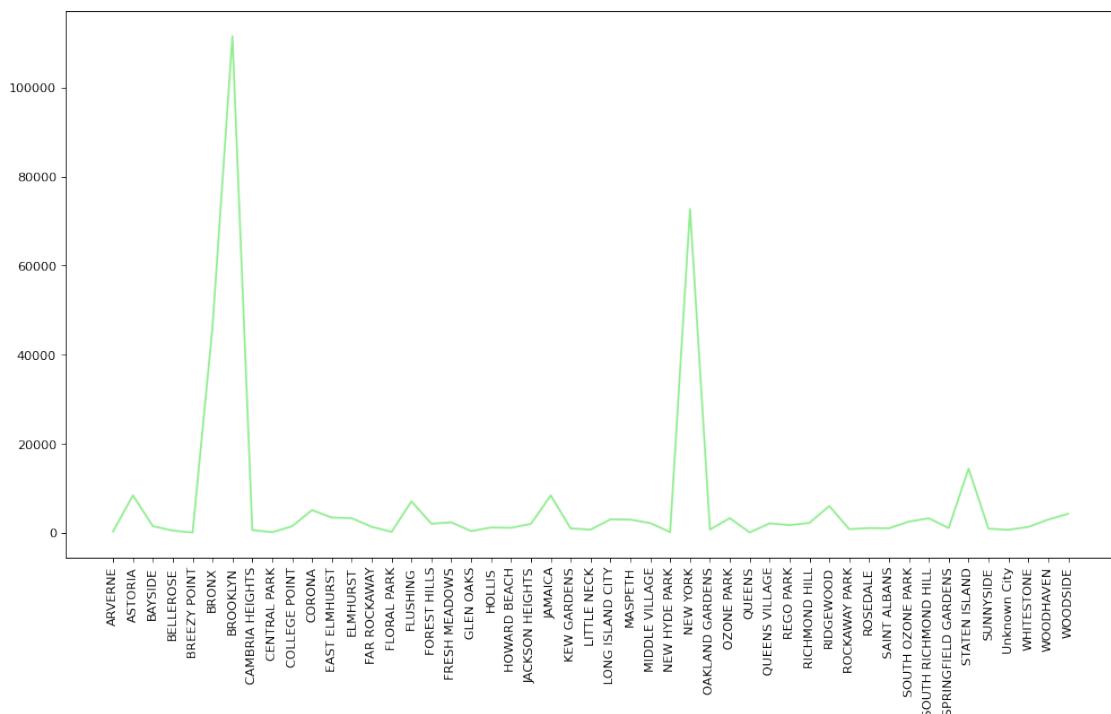
```
print(null_complaint_types)
print(null_city)
```

```
0
641
```
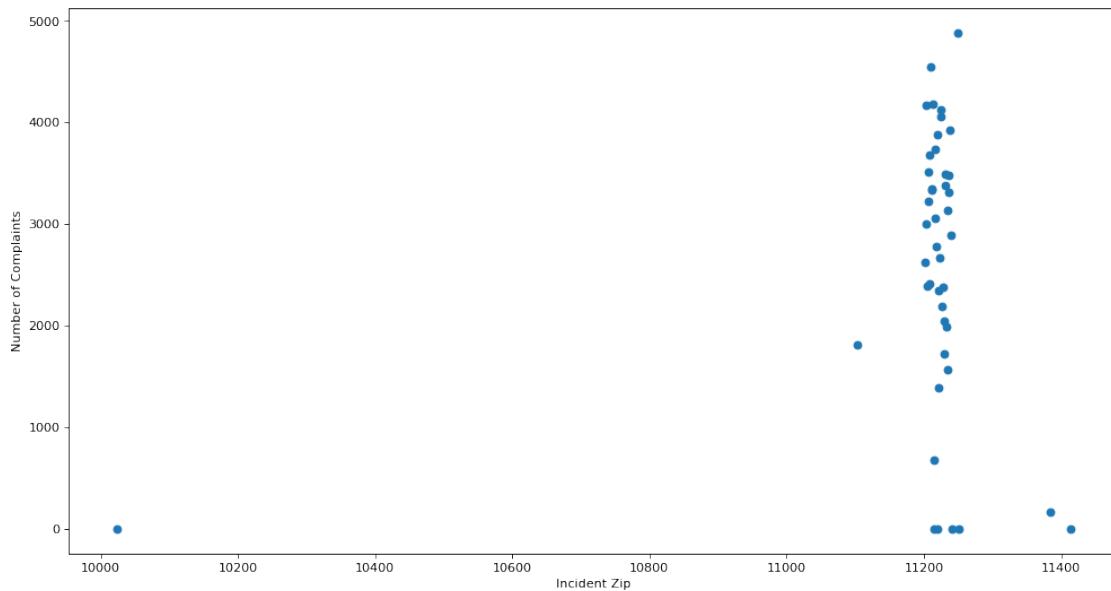
[14]:
```
# 2.3.5 Impute the NA value with Unknown City
# df["City"].isna().any()
# True
df["City"].fillna("Unknown City", inplace=True)
df["City"].isna().any()
```

[14]: False
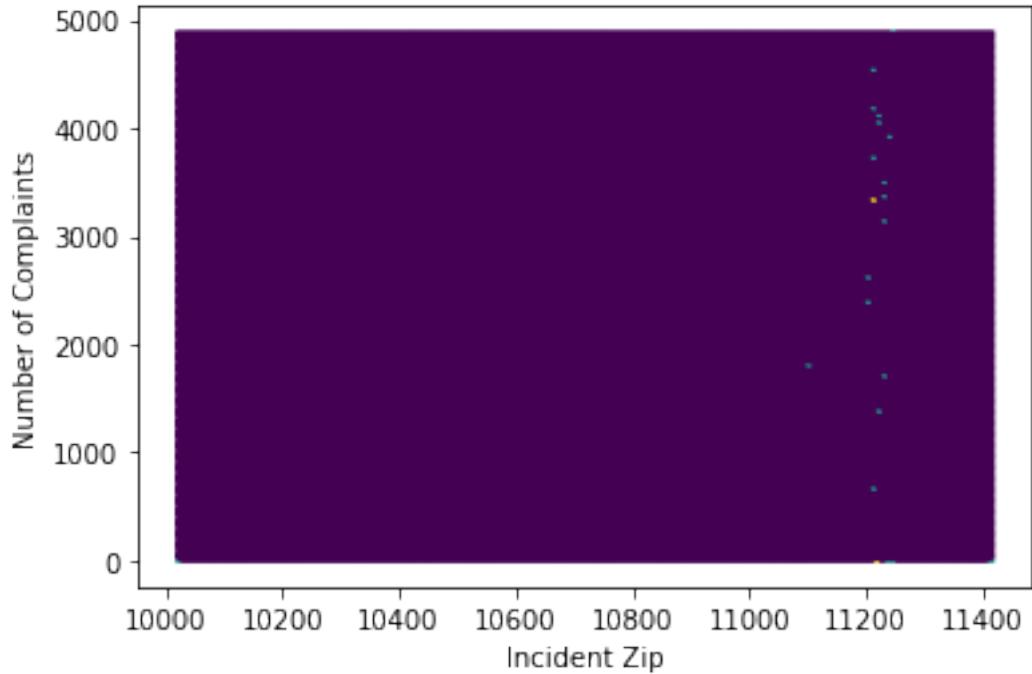
[15]:
```
# 2.3.6 Draw a frequency plot for the complaints in each city
city_complaints = df.groupby(["City"]).size()
figure(figsize=(15, 8), dpi=80)
plt.plot(city_complaints, color='lightgreen')
plt.xticks(rotation=90)
# plt.savefig('Capture10.jpg')
plt.show()
```

```
[20]: # 2.3.7 Create a scatter and hexbin plot of the concentration of
      # complaints across Brooklyn
      citywise_complaints = df.groupby('City')
      citywise_complaints.first()
      brooklyn_complaints = citywise_complaints.get_group('BROOKLYN')
      x_axis = brooklyn_complaints["Incident Zip"].unique()
      y_axis = brooklyn_complaints.groupby("Incident Zip").size()
      figure(figsize=(15, 8), dpi=80)
      plt.scatter(x_axis, y_axis)
      plt.xlabel("Incident Zip")
      plt.ylabel("Number of Complaints")
      # plt.savefig('Capture11.jpg')
      plt.show()
```



```
[22]: plt.hexbin(x_axis, y_axis, gridsize=(150,150),mincnt=0 )
      plt.xlabel("Incident Zip")
      plt.ylabel("Number of Complaints")
      # plt.savefig('Capture12.jpg')
      plt.show()
```

11
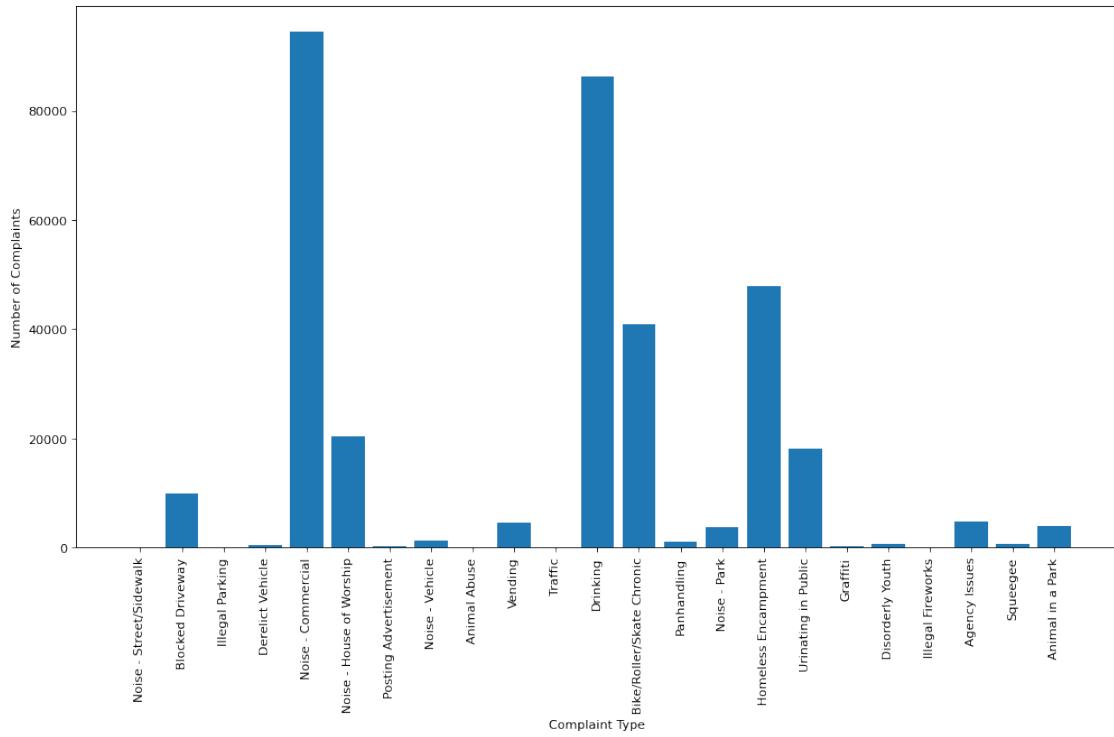
```
[24]:  # 3. Find major types of complaints:
       types_of_complaints = df['Complaint Type'].unique()
       types_of_complaints
```

```
[24]:  array(['Noise - Street/Sidewalk', 'Blocked Driveway', 'Illegal Parking',
              'Derelict Vehicle', 'Noise - Commercial',
              'Noise - House of Worship', 'Posting Advertisement',
              'Noise - Vehicle', 'Animal Abuse', 'Vending', 'Traffic',
              'Drinking', 'Bike/Roller/Skate Chronic', 'Panhandling',
              'Noise - Park', 'Homeless Encampment', 'Urinating in Public',
              'Graffiti', 'Disorderly Youth', 'Illegal Fireworks',
              'Agency Issues', 'Squeegee', 'Animal in a Park'], dtype=object)
```

```
[25]:  # 3.1 Plot a bar graph to show the types of complaints
       number_of_complaints = df.groupby('Complaint Type').size()
       figure(figsize=(15, 8), dpi=80)
       plt.bar(types_of_complaints,number_of_complaints)
       plt.xticks(rotation=90)
       plt.xlabel('Complaint Type')
       plt.ylabel('Number of Complaints')
       # plt.savefig('Capture13.jpg')
       plt.show()
```
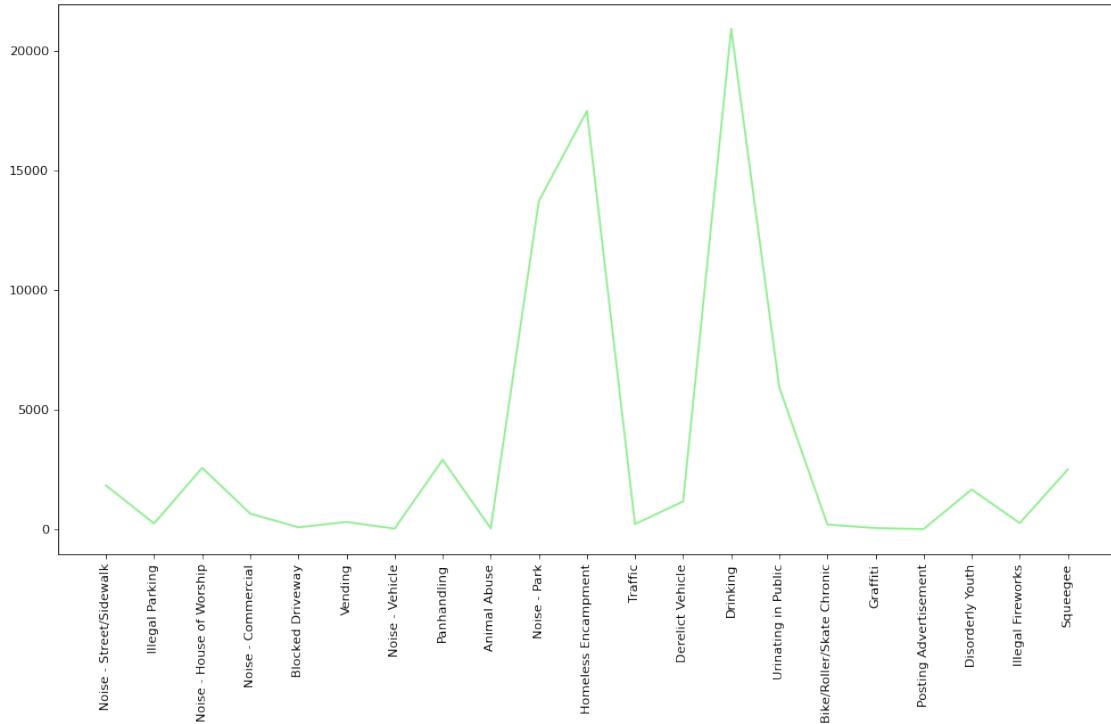
```
[26]:   # 3.2 Check the frequency of various types of complaints for New
        # York City
        citywise_complaints = df.groupby('City')
        citywise_complaints.first()
        brooklyn_complaints = citywise_complaints.get_group('NEW YORK')

        x_axis = brooklyn_complaints["Complaint Type"].unique()
        y_axis = brooklyn_complaints.groupby("Complaint Type").size()
        figure(figsize=(15, 8), dpi=80)

        plt.plot(x_axis,y_axis, color='lightgreen')
        plt.xticks(rotation=90)
        # plt.show()
        plt.savefig('Capture14.jpg')
```

```python
[24]: # 3.3 Find the top 10 complaint types
      types_of_complaints = df['Complaint Type'].unique()
      complaint_types_count = df.groupby('Complaint Type').size()
      complaints_df = pd.DataFrame(list(zip(types_of_complaints,␣
       ↪complaint_types_count)),
                    columns =['Complaint Type', 'Number of Complaints'])

      complaints_df.set_index('Complaint Type')

      complaints_df = complaints_df.sort_values(by=['Number of Complaints'],␣
       ↪ascending=False)

      complaints_df.head(10)
```

```
[24]:            Complaint Type  Number of Complaints
      4            Noise - Commercial              94430
      11                     Drinking              86183
      15            Homeless Encampment            47995
      12   Bike/Roller/Skate Chronic              40932
      5       Noise - House of Worship            20342
      16            Urinating in Public            18134
      1                Blocked Driveway             9873
      20                   Agency Issues            4880
```

```
         9                   Vending                   4620
        22            Animal in a Park                  3962
```

```
[25]:  # 3.4 Display the various types of complaints in each city
       groups = df.groupby('City')
       city_names = df['City'].unique()

       for city in city_names:
           city_group = df.loc[df['City'] == city]
           print(city)
           newGroup = city_group.groupby('Complaint Type')
           print(newGroup.size())
           print('\n')
```

```
NEW YORK
Complaint Type
Animal Abuse                 1830
Bike/Roller/Skate Chronic     239
Blocked Driveway             2565
Derelict Vehicle              652
Disorderly Youth               78
Drinking                      302
Graffiti                       23
Homeless Encampment          2903
Illegal Fireworks              36
Illegal Parking             13715
Noise - Commercial          17487
Noise - House of Worship      212
Noise - Park                 1160
Noise - Street/Sidewalk     20924
Noise - Vehicle              5937
Panhandling                   196
Posting Advertisement          47
Squeegee                        4
Traffic                      1661
Urinating in Public           255
Vending                      2497
dtype: int64


ASTORIA
Complaint Type
Animal Abuse                  161
Bike/Roller/Skate Chronic      14
Blocked Driveway             3375
Derelict Vehicle              405
Disorderly Youth                5
```

```
Drinking                      41
Graffiti                       3
Homeless Encampment           28
Illegal Fireworks              4
Illegal Parking             1533
Noise - Commercial          1854
Noise - House of Worship      18
Noise - Park                  63
Noise - Street/Sidewalk      526
Noise - Vehicle              214
Panhandling                    2
Posting Advertisement          3
Traffic                       56
Urinating in Public           10
Vending                       56
dtype: int64


BRONX
Complaint Type
Animal Abuse                1833
Bike/Roller/Skate Chronic     22
Blocked Driveway           16046
Derelict Vehicle            2284
Disorderly Youth              61
Drinking                     193
Graffiti                      13
Homeless Encampment          261
Illegal Fireworks             22
Illegal Parking             9274
Noise - Commercial          2787
Noise - House of Worship      87
Noise - Park                 519
Noise - Street/Sidewalk     8577
Noise - Vehicle             3353
Panhandling                   19
Posting Advertisement         15
Traffic                      400
Urinating in Public           47
Vending                      409
dtype: int64


ELMHURST
Complaint Type
Animal Abuse                  56
Bike/Roller/Skate Chronic      2
Blocked Driveway            1876
```

```
Derelict Vehicle              86
Disorderly Youth               2
Drinking                      12
Graffiti                       1
Homeless Encampment           32
Illegal Fireworks              1
Illegal Parking              718
Noise - Commercial            83
Noise - House of Worship       6
Noise - Park                  32
Noise - Street/Sidewalk      216
Noise - Vehicle               65
Panhandling                    3
Posting Advertisement          1
Traffic                       17
Urinating in Public           10
Vending                       23
dtype: int64


BROOKLYN
Complaint Type
Animal Abuse                3014
Bike/Roller/Skate Chronic    116
Blocked Driveway           34170
Derelict Vehicle            5880
Disorderly Youth              78
Drinking                     265
Graffiti                      57
Homeless Encampment          910
Illegal Fireworks             56
Illegal Parking            31505
Noise - Commercial         12928
Noise - House of Worship     367
Noise - Park                1496
Noise - Street/Sidewalk    13098
Noise - Vehicle             5585
Panhandling                   47
Posting Advertisement         53
Traffic                     1188
Urinating in Public          147
Vending                      542
dtype: int64


KEW GARDENS
Complaint Type
Animal Abuse                  26
```

```
Blocked Driveway          401
Derelict Vehicle           16
Drinking                    1
Homeless Encampment         5
Illegal Parking           260
Noise - Commercial        190
Noise - House of Worship    1
Noise - Street/Sidewalk    13
Noise - Vehicle            21
Posting Advertisement       1
Traffic                    10
Urinating in Public         3
Vending                     1
dtype: int64


JACKSON HEIGHTS
Complaint Type
Animal Abuse               46
Bike/Roller/Skate Chronic   2
Blocked Driveway          664
Derelict Vehicle           40
Drinking                   10
Graffiti                    1
Homeless Encampment        10
Illegal Fireworks           1
Illegal Parking           224
Noise - Commercial        569
Noise - House of Worship    2
Noise - Park                7
Noise - Street/Sidewalk   221
Noise - Vehicle            70
Posting Advertisement       1
Traffic                    12
Urinating in Public         3
Vending                    80
dtype: int64


MIDDLE VILLAGE
Complaint Type
Animal Abuse               33
Bike/Roller/Skate Chronic   1
Blocked Driveway          623
Derelict Vehicle          347
Drinking                    2
Homeless Encampment         5
Illegal Parking          1029
```

```
Noise - Commercial          13
Noise - Park                 4
Noise - Street/Sidewalk     32
Noise - Vehicle             42
Traffic                     14
dtype: int64


REGO PARK
Complaint Type
Animal Abuse                30
Blocked Driveway           728
Derelict Vehicle            88
Drinking                     3
Graffiti                     1
Homeless Encampment          6
Illegal Parking            598
Noise - Commercial          71
Noise - House of Worship     1
Noise - Park                20
Noise - Street/Sidewalk     60
Noise - Vehicle             57
Traffic                     15
Urinating in Public          1
Vending                      3
dtype: int64


SAINT ALBANS
Complaint Type
Animal Abuse                39
Blocked Driveway           297
Derelict Vehicle           238
Disorderly Youth             1
Drinking                     3
Homeless Encampment          8
Illegal Parking            223
Noise - Commercial          31
Noise - House of Worship     1
Noise - Park                 1
Noise - Street/Sidewalk     77
Noise - Vehicle             46
Traffic                     12
Urinating in Public          1
Vending                      2
dtype: int64
```

```
JAMAICA
Complaint Type
Animal Abuse                  296
Bike/Roller/Skate Chronic       3
Blocked Driveway             3390
Derelict Vehicle             1064
Disorderly Youth                9
Drinking                       40
Graffiti                        3
Homeless Encampment            86
Illegal Fireworks               3
Illegal Parking              1587
Noise - Commercial            510
Noise - House of Worship       15
Noise - Park                   36
Noise - Street/Sidewalk       337
Noise - Vehicle               315
Panhandling                     3
Posting Advertisement           8
Traffic                       594
Urinating in Public            35
Vending                        23
dtype: int64


SOUTH RICHMOND HILL
Complaint Type
Animal Abuse                   39
Bike/Roller/Skate Chronic       1
Blocked Driveway             1816
Derelict Vehicle              349
Disorderly Youth                1
Drinking                       21
Homeless Encampment            11
Illegal Fireworks               1
Illegal Parking               559
Noise - Commercial            212
Noise - House of Worship        3
Noise - Park                    2
Noise - Street/Sidewalk        88
Noise - Vehicle                86
Traffic                        12
Urinating in Public             1
Vending                        24
dtype: int64


Unknown City
```

```
Complaint Type
Agency Issues                8
Animal Abuse                 1
Bike/Roller/Skate Chronic    2
Blocked Driveway            83
Derelict Vehicle            61
Drinking                     3
Homeless Encampment          1
Illegal Parking            297
Noise - Commercial          74
Noise - Park                 5
Noise - Street/Sidewalk     94
Noise - Vehicle              9
Panhandling                  1
Traffic                      1
Vending                      1
dtype: int64


RIDGEWOOD
Complaint Type
Animal Abuse               142
Bike/Roller/Skate Chronic    3
Blocked Driveway          2027
Derelict Vehicle           485
Disorderly Youth             3
Drinking                     9
Graffiti                     2
Homeless Encampment         22
Illegal Fireworks            1
Illegal Parking           2084
Noise - Commercial         463
Noise - House of Worship     2
Noise - Park                25
Noise - Street/Sidewalk    417
Noise - Vehicle            230
Posting Advertisement        1
Traffic                     45
Urinating in Public          8
Vending                      9
dtype: int64


HOWARD BEACH
Complaint Type
Animal Abuse                46
Bike/Roller/Skate Chronic    1
Blocked Driveway           202
```

```
Derelict Vehicle            164
Disorderly Youth              1
Drinking                      4
Homeless Encampment           3
Illegal Fireworks             4
Illegal Parking             360
Noise - Commercial          246
Noise - House of Worship      1
Noise - Park                  2
Noise - Street/Sidewalk      22
Noise - Vehicle               9
Panhandling                   2
Traffic                       9
Vending                       3
dtype: int64


FOREST HILLS
Complaint Type
Animal Abuse                 70
Bike/Roller/Skate Chronic     6
Blocked Driveway            822
Derelict Vehicle             64
Disorderly Youth              1
Drinking                      1
Graffiti                      3
Homeless Encampment          18
Illegal Fireworks             1
Illegal Parking             593
Noise - Commercial          154
Noise - House of Worship      1
Noise - Park                 18
Noise - Street/Sidewalk      97
Noise - Vehicle              65
Panhandling                   5
Posting Advertisement         4
Traffic                      60
Urinating in Public           2
Vending                      10
dtype: int64


STATEN ISLAND
Complaint Type
Animal Abuse                742
Bike/Roller/Skate Chronic     9
Blocked Driveway           2656
Derelict Vehicle           2059
```

```
Disorderly Youth                22
Drinking                       181
Graffiti                         6
Homeless Encampment             68
Illegal Fireworks               10
Illegal Parking               5843
Noise - Commercial             715
Noise - House of Worship        17
Noise - Park                    66
Noise - Street/Sidewalk        832
Noise - Vehicle                402
Panhandling                     11
Posting Advertisement          488
Traffic                        215
Urinating in Public             18
Vending                         23
dtype: int64


OZONE PARK
Complaint Type
Animal Abuse                    66
Bike/Roller/Skate Chronic        1
Blocked Driveway              1591
Derelict Vehicle               465
Disorderly Youth                 4
Drinking                        17
Homeless Encampment              8
Illegal Fireworks                1
Illegal Parking                726
Noise - Commercial             115
Noise - House of Worship         4
Noise - Park                    18
Noise - Street/Sidewalk        131
Noise - Vehicle                 76
Panhandling                      7
Posting Advertisement            3
Traffic                         19
Urinating in Public              4
Vending                          1
dtype: int64


RICHMOND HILL
Complaint Type
Animal Abuse                    52
Blocked Driveway              1022
Derelict Vehicle               200
```

```
Drinking                      10
Graffiti                       1
Homeless Encampment           25
Illegal Fireworks              4
Illegal Parking              467
Noise - Commercial           229
Noise - Park                   3
Noise - Street/Sidewalk       87
Noise - Vehicle               61
Posting Advertisement          2
Traffic                        8
Urinating in Public            5
Vending                       14
dtype: int64


WOODHAVEN
Complaint Type
Animal Abuse                  55
Bike/Roller/Skate Chronic      2
Blocked Driveway            1278
Derelict Vehicle             369
Drinking                       3
Homeless Encampment           10
Illegal Parking              839
Noise - Commercial           196
Noise - House of Worship       3
Noise - Park                   3
Noise - Street/Sidewalk       83
Noise - Vehicle               75
Panhandling                    1
Traffic                        7
Urinating in Public            2
Vending                        6
dtype: int64


FLUSHING
Complaint Type
Animal Abuse                 179
Bike/Roller/Skate Chronic      3
Blocked Driveway            3409
Derelict Vehicle             508
Disorderly Youth               2
Drinking                      42
Graffiti                       6
Homeless Encampment           25
Illegal Fireworks              2
```

```
Illegal Parking              2115
Noise - Commercial            210
Noise - House of Worship        4
Noise - Park                   57
Noise - Street/Sidewalk       226
Noise - Vehicle               143
Panhandling                     2
Traffic                        52
Urinating in Public             9
Vending                        36
dtype: int64


CORONA
Complaint Type
Animal Abuse                   99
Blocked Driveway             3367
Derelict Vehicle               67
Disorderly Youth                5
Drinking                       33
Graffiti                        4
Homeless Encampment            25
Illegal Parking               749
Noise - Commercial            267
Noise - House of Worship        3
Noise - Park                   21
Noise - Street/Sidewalk       229
Noise - Vehicle               109
Panhandling                     1
Posting Advertisement           1
Traffic                        14
Urinating in Public             7
Vending                        60
dtype: int64


QUEENS VILLAGE
Complaint Type
Animal Abuse                   83
Blocked Driveway              719
Derelict Vehicle              445
Drinking                        5
Graffiti                        1
Homeless Encampment            18
Illegal Fireworks               5
Illegal Parking               623
Noise - Commercial             46
Noise - House of Worship        2
```

```
Noise - Park                    2
Noise - Street/Sidewalk        62
Noise - Vehicle                50
Panhandling                     1
Posting Advertisement           1
Traffic                        25
Urinating in Public             5
Vending                         2
dtype: int64


MASPETH
Complaint Type
Animal Abuse                   50
Bike/Roller/Skate Chronic       1
Blocked Driveway              946
Derelict Vehicle              497
Disorderly Youth                2
Drinking                        8
Graffiti                        1
Homeless Encampment            11
Illegal Fireworks               1
Illegal Parking              1149
Noise - Commercial             53
Noise - House of Worship        1
Noise - Park                    3
Noise - Street/Sidewalk       110
Noise - Vehicle                23
Traffic                        64
Urinating in Public             2
Vending                         7
dtype: int64


EAST ELMHURST
Complaint Type
Animal Abuse                   80
Bike/Roller/Skate Chronic       1
Blocked Driveway             1808
Derelict Vehicle              133
Disorderly Youth                1
Drinking                        9
Graffiti                        3
Homeless Encampment             2
Illegal Parking              1070
Noise - Commercial             36
Noise - House of Worship       24
Noise - Park                    5
```

```
Noise - Street/Sidewalk        102
Noise - Vehicle                 81
Posting Advertisement            1
Traffic                         23
Urinating in Public              6
Vending                          9
dtype: int64


SOUTH OZONE PARK
Complaint Type
Animal Abuse                    67
Bike/Roller/Skate Chronic        1
Blocked Driveway              1129
Derelict Vehicle               391
Drinking                        13
Graffiti                         2
Homeless Encampment              5
Illegal Fireworks                1
Illegal Parking                559
Noise - Commercial              77
Noise - House of Worship         5
Noise - Park                     4
Noise - Street/Sidewalk         99
Noise - Vehicle                 92
Posting Advertisement            1
Traffic                         32
Urinating in Public              2
Vending                          5
dtype: int64


WOODSIDE
Complaint Type
Animal Abuse                   106
Bike/Roller/Skate Chronic        4
Blocked Driveway              1923
Derelict Vehicle               289
Disorderly Youth                 1
Drinking                        15
Graffiti                         4
Homeless Encampment             36
Illegal Fireworks                1
Illegal Parking               1126
Noise - Commercial             242
Noise - House of Worship         4
Noise - Park                    34
Noise - Street/Sidewalk        252
```

```
Noise - Vehicle                128
Traffic                         45
Urinating in Public              7
Vending                         14
dtype: int64


FRESH MEADOWS
Complaint Type
Animal Abuse                    58
Blocked Driveway               656
Derelict Vehicle               326
Drinking                         2
Homeless Encampment              5
Illegal Parking               1093
Noise - Commercial              19
Noise - Park                     6
Noise - Street/Sidewalk         44
Noise - Vehicle                 92
Panhandling                      1
Traffic                         12
Urinating in Public              1
Vending                          1
dtype: int64


LONG ISLAND CITY
Complaint Type
Animal Abuse                    34
Bike/Roller/Skate Chronic        3
Blocked Driveway              1025
Derelict Vehicle               209
Disorderly Youth                 2
Drinking                         8
Graffiti                         3
Homeless Encampment              7
Illegal Parking                990
Noise - Commercial             272
Noise - Park                    50
Noise - Street/Sidewalk        148
Noise - Vehicle                116
Panhandling                      2
Posting Advertisement            1
Traffic                         77
Urinating in Public              3
Vending                         31
dtype: int64
```

```
ROCKAWAY PARK
Complaint Type
Animal Abuse              32
Blocked Driveway          77
Derelict Vehicle          17
Disorderly Youth           3
Drinking                  22
Homeless Encampment        4
Illegal Parking          312
Noise - Commercial        67
Noise - Park               1
Noise - Street/Sidewalk  206
Noise - Vehicle           27
Traffic                    6
Urinating in Public        1
Vending                    2
dtype: int64


SPRINGFIELD GARDENS
Complaint Type
Animal Abuse              39
Blocked Driveway         312
Derelict Vehicle         252
Drinking                   6
Homeless Encampment        7
Illegal Fireworks          1
Illegal Parking          274
Noise - Commercial        35
Noise - House of Worship   1
Noise - Park               1
Noise - Street/Sidewalk   39
Noise - Vehicle           44
Panhandling                2
Posting Advertisement      2
Traffic                   10
Urinating in Public        3
Vending                    1
dtype: int64


COLLEGE POINT
Complaint Type
Animal Abuse              33
Blocked Driveway         562
Derelict Vehicle         202
Disorderly Youth           1
```

```
Drinking                       1
Graffiti                       2
Homeless Encampment            2
Illegal Parking              418
Noise - Commercial            37
Noise - House of Worship       2
Noise - Park                   2
Noise - Street/Sidewalk       30
Noise - Vehicle              126
Traffic                       16
Vending                        1
dtype: int64


BAYSIDE
Complaint Type
Animal Abuse                  51
Blocked Driveway             482
Derelict Vehicle             227
Disorderly Youth               2
Drinking                       1
Graffiti                       3
Homeless Encampment            2
Illegal Parking              603
Noise - Commercial            43
Noise - House of Worship       3
Noise - Park                   4
Noise - Street/Sidewalk       16
Noise - Vehicle               22
Traffic                        9
Vending                        2
dtype: int64


HOLLIS
Complaint Type
Animal Abuse                  37
Blocked Driveway             411
Derelict Vehicle             151
Disorderly Youth               1
Drinking                       2
Homeless Encampment            9
Illegal Parking              168
Noise - Commercial            49
Noise - House of Worship     205
Noise - Park                  16
Noise - Street/Sidewalk       38
Noise - Vehicle               52
```

```
Traffic                        11
Urinating in Public             2
dtype: int64


GLEN OAKS
Complaint Type
Animal Abuse                    4
Blocked Driveway               45
Derelict Vehicle               56
Illegal Parking                91
Noise - Commercial             78
Noise - Park                   36
Noise - Street/Sidewalk         6
Noise - Vehicle                 4
Traffic                         3
Urinating in Public             2
Vending                        19
dtype: int64


FAR ROCKAWAY
Complaint Type
Animal Abuse                  103
Blocked Driveway              366
Derelict Vehicle              200
Disorderly Youth                1
Drinking                        4
Homeless Encampment            14
Illegal Parking               318
Noise - Commercial             54
Noise - House of Worship        1
Noise - Park                   19
Noise - Street/Sidewalk       132
Noise - Vehicle                80
Traffic                        11
Urinating in Public             1
Vending                         8
dtype: int64


BELLEROSE
Complaint Type
Animal Abuse                   15
Bike/Roller/Skate Chronic       1
Blocked Driveway              133
Derelict Vehicle              106
Disorderly Youth                2
```

```
Drinking                     1
Homeless Encampment          1
Illegal Parking            123
Noise - Commercial          37
Noise - House of Worship     1
Noise - Park                 1
Noise - Street/Sidewalk     13
Noise - Vehicle             11
Panhandling                  1
Posting Advertisement        1
Traffic                      8
Urinating in Public          1
dtype: int64


LITTLE NECK
Complaint Type
Animal Abuse                21
Blocked Driveway           160
Derelict Vehicle            73
Disorderly Youth             2
Drinking                     1
Illegal Parking            304
Noise - Commercial          75
Noise - Park                 2
Noise - Street/Sidewalk      9
Noise - Vehicle              7
Posting Advertisement        1
Traffic                     19
dtype: int64


CAMBRIA HEIGHTS
Complaint Type
Animal Abuse                13
Blocked Driveway           164
Derelict Vehicle           137
Homeless Encampment          5
Illegal Fireworks            1
Illegal Parking            109
Noise - Commercial          19
Noise - House of Worship     2
Noise - Street/Sidewalk     27
Noise - Vehicle             91
Traffic                      7
dtype: int64
```

```
ROSEDALE
Complaint Type
Animal Abuse                    41
Bike/Roller/Skate Chronic        2
Blocked Driveway               249
Derelict Vehicle               231
Drinking                         2
Graffiti                         1
Homeless Encampment              4
Illegal Parking                301
Noise - Commercial              25
Noise - House of Worship         2
Noise - Park                    69
Noise - Street/Sidewalk         26
Noise - Vehicle                 23
Traffic                         24
Vending                         18
dtype: int64


SUNNYSIDE
Complaint Type
Animal Abuse                    36
Bike/Roller/Skate Chronic        2
Blocked Driveway               263
Derelict Vehicle                17
Disorderly Youth                 2
Drinking                        10
Graffiti                         1
Homeless Encampment             12
Illegal Parking                158
Noise - Commercial             223
Noise - Park                    14
Noise - Street/Sidewalk         64
Noise - Vehicle                 43
Posting Advertisement            2
Traffic                         17
Urinating in Public              2
Vending                         15
dtype: int64


OAKLAND GARDENS
Complaint Type
Animal Abuse                    28
Bike/Roller/Skate Chronic        2
Blocked Driveway               168
Derelict Vehicle               116
```

```
Disorderly Youth          1
Drinking                  2
Homeless Encampment       1
Illegal Parking         318
Noise - Commercial        2
Noise - Park             12
Noise - Street/Sidewalk  18
Noise - Vehicle           7
Traffic                   6
Vending                   2
dtype: int64


WHITESTONE
Complaint Type
Animal Abuse             40
Bike/Roller/Skate Chronic 3
Blocked Driveway        265
Derelict Vehicle        262
Drinking                  2
Graffiti                  1
Illegal Fireworks         1
Illegal Parking         590
Noise - Commercial       21
Noise - Park              7
Noise - Street/Sidewalk  32
Noise - Vehicle          30
Traffic                  31
Vending                   1
dtype: int64


ARVERNE
Complaint Type
Animal Abuse             39
Blocked Driveway         49
Derelict Vehicle         30
Disorderly Youth          2
Drinking                  1
Graffiti                  1
Homeless Encampment       3
Illegal Parking          57
Noise - Commercial        1
Noise - House of Worship 12
Noise - Park              2
Noise - Street/Sidewalk  29
Noise - Vehicle           8
Panhandling               1
```

```
Traffic                       1
Urinating in Public           1
Vending                       1
dtype: int64


FLORAL PARK
Complaint Type
Animal Abuse                  5
Blocked Driveway             31
Derelict Vehicle             68
Disorderly Youth              1
Illegal Parking              68
Noise - Commercial            3
Noise - Street/Sidewalk       3
Noise - Vehicle               2
dtype: int64


CENTRAL PARK
Complaint Type
Illegal Parking               5
Noise - Street/Sidewalk      97
dtype: int64


BREEZY POINT
Complaint Type
Animal Abuse                  2
Blocked Driveway              3
Derelict Vehicle              3
Drinking                      1
Illegal Parking              16
Noise - Commercial            4
Noise - Street/Sidewalk       1
Noise - Vehicle               1
dtype: int64


NEW HYDE PARK
Complaint Type
Animal Abuse                  1
Blocked Driveway             73
Derelict Vehicle             13
Illegal Parking              32
Noise - Commercial            4
Noise - Vehicle               2
dtype: int64
```

```
QUEENS
Complaint Type
Animal in a Park            1
Blocked Driveway           3
Homeless Encampment        2
Illegal Parking           10
Noise - Commercial         6
Noise - House of Worship   1
Noise - Street/Sidewalk    5
Noise - Vehicle            2
Traffic                    2
Urinating in Public        1
dtype: int64
```

[27]:
```python
# 3.5 Create a DataFrame, df_new, which contains cities as
# columns and complaint types in rows
complaint_type = df['Complaint Type'].unique()

new_column_list = ['City']
new_column_list.extend(complaint_type)

groups = df.groupby('City')
city_names = df['City'].unique()

index = []
series = []

for city in city_names:
    city_group = df.loc[df['City'] == city]
    complaint_type_list = city_group['Complaint Type'].unique()
    for complaint_type in complaint_type_list:

        group = city_group.loc[city_group['Complaint Type'] == complaint_type]

        index += [(city,complaint_type)]
        series += [group.size]


index_df = pd.MultiIndex.from_tuples(index)
series_df = pd.Series(series, index=index_df)

complaints_df = series_df.unstack()
```

```
complaints_df
```

[27]:

	Agency Issues	Animal Abuse	Animal in a Park
ARVERNE	NaN	2106.0	NaN
ASTORIA	NaN	8694.0	NaN
BAYSIDE	NaN	2754.0	NaN
BELLEROSE	NaN	810.0	NaN
BREEZY POINT	NaN	108.0	NaN
BRONX	NaN	98982.0	NaN
BROOKLYN	NaN	162756.0	NaN
CAMBRIA HEIGHTS	NaN	702.0	NaN
CENTRAL PARK	NaN	NaN	NaN
COLLEGE POINT	NaN	1782.0	NaN
CORONA	NaN	5346.0	NaN
EAST ELMHURST	NaN	4320.0	NaN
ELMHURST	NaN	3024.0	NaN
FAR ROCKAWAY	NaN	5562.0	NaN
FLORAL PARK	NaN	270.0	NaN
FLUSHING	NaN	9666.0	NaN
FOREST HILLS	NaN	3780.0	NaN
FRESH MEADOWS	NaN	3132.0	NaN
GLEN OAKS	NaN	216.0	NaN
HOLLIS	NaN	1998.0	NaN
HOWARD BEACH	NaN	2484.0	NaN
JACKSON HEIGHTS	NaN	2484.0	NaN
JAMAICA	NaN	15984.0	NaN
KEW GARDENS	NaN	1404.0	NaN
LITTLE NECK	NaN	1134.0	NaN
LONG ISLAND CITY	NaN	1836.0	NaN
MASPETH	NaN	2700.0	NaN
MIDDLE VILLAGE	NaN	1782.0	NaN
NEW HYDE PARK	NaN	54.0	NaN
NEW YORK	NaN	98820.0	NaN
OAKLAND GARDENS	NaN	1512.0	NaN
OZONE PARK	NaN	3564.0	NaN
QUEENS	NaN	NaN	54.0
QUEENS VILLAGE	NaN	4482.0	NaN
REGO PARK	NaN	1620.0	NaN
RICHMOND HILL	NaN	2808.0	NaN
RIDGEWOOD	NaN	7668.0	NaN
ROCKAWAY PARK	NaN	1728.0	NaN
ROSEDALE	NaN	2214.0	NaN
SAINT ALBANS	NaN	2106.0	NaN
SOUTH OZONE PARK	NaN	3618.0	NaN

SOUTH RICHMOND HILL	NaN	2106.0	NaN
SPRINGFIELD GARDENS	NaN	2106.0	NaN
STATEN ISLAND	NaN	40068.0	NaN
SUNNYSIDE	NaN	1944.0	NaN
Unknown City	432.0	54.0	NaN
WHITESTONE	NaN	2160.0	NaN
WOODHAVEN	NaN	2970.0	NaN
WOODSIDE	NaN	5724.0	NaN

	Bike/Roller/Skate Chronic	Blocked Driveway \
ARVERNE	NaN	2646.0
ASTORIA	756.0	182250.0
BAYSIDE	NaN	26028.0
BELLEROSE	54.0	7182.0
BREEZY POINT	NaN	162.0
BRONX	1188.0	866484.0
BROOKLYN	6264.0	1845180.0
CAMBRIA HEIGHTS	NaN	8856.0
CENTRAL PARK	NaN	NaN
COLLEGE POINT	NaN	30348.0
CORONA	NaN	181818.0
EAST ELMHURST	54.0	97632.0
ELMHURST	108.0	101304.0
FAR ROCKAWAY	NaN	19764.0
FLORAL PARK	NaN	1674.0
FLUSHING	162.0	184086.0
FOREST HILLS	324.0	44388.0
FRESH MEADOWS	NaN	35424.0
GLEN OAKS	NaN	2430.0
HOLLIS	NaN	22194.0
HOWARD BEACH	54.0	10908.0
JACKSON HEIGHTS	108.0	35856.0
JAMAICA	162.0	183060.0
KEW GARDENS	NaN	21654.0
LITTLE NECK	NaN	8640.0
LONG ISLAND CITY	162.0	55350.0
MASPETH	54.0	51084.0
MIDDLE VILLAGE	54.0	33642.0
NEW HYDE PARK	NaN	3942.0
NEW YORK	12906.0	138510.0
OAKLAND GARDENS	108.0	9072.0
OZONE PARK	54.0	85914.0
QUEENS	NaN	162.0
QUEENS VILLAGE	NaN	38826.0
REGO PARK	NaN	39312.0
RICHMOND HILL	NaN	55188.0
RIDGEWOOD	162.0	109458.0

ROCKAWAY PARK	NaN	4158.0
ROSEDALE	108.0	13446.0
SAINT ALBANS	NaN	16038.0
SOUTH OZONE PARK	54.0	60966.0
SOUTH RICHMOND HILL	54.0	98064.0
SPRINGFIELD GARDENS	NaN	16848.0
STATEN ISLAND	486.0	143424.0
SUNNYSIDE	108.0	14202.0
Unknown City	108.0	4482.0
WHITESTONE	162.0	14310.0
WOODHAVEN	108.0	69012.0
WOODSIDE	216.0	103842.0

	Derelict Vehicle	Disorderly Youth	Drinking	Graffiti \
ARVERNE	1620.0	108.0	54.0	54.0
ASTORIA	21870.0	270.0	2214.0	162.0
BAYSIDE	12258.0	108.0	54.0	162.0
BELLEROSE	5724.0	108.0	54.0	NaN
BREEZY POINT	162.0	NaN	54.0	NaN
BRONX	123336.0	3294.0	10422.0	702.0
BROOKLYN	317520.0	4212.0	14310.0	3078.0
CAMBRIA HEIGHTS	7398.0	NaN	NaN	NaN
CENTRAL PARK	NaN	NaN	NaN	NaN
COLLEGE POINT	10908.0	54.0	54.0	108.0
CORONA	3618.0	270.0	1782.0	216.0
EAST ELMHURST	7182.0	54.0	486.0	162.0
ELMHURST	4644.0	108.0	648.0	54.0
FAR ROCKAWAY	10800.0	54.0	216.0	NaN
FLORAL PARK	3672.0	54.0	NaN	NaN
FLUSHING	27432.0	108.0	2268.0	324.0
FOREST HILLS	3456.0	54.0	54.0	162.0
FRESH MEADOWS	17604.0	NaN	108.0	NaN
GLEN OAKS	3024.0	NaN	NaN	NaN
HOLLIS	8154.0	54.0	108.0	NaN
HOWARD BEACH	8856.0	54.0	216.0	NaN
JACKSON HEIGHTS	2160.0	NaN	540.0	54.0
JAMAICA	57456.0	486.0	2160.0	162.0
KEW GARDENS	864.0	NaN	54.0	NaN
LITTLE NECK	3942.0	108.0	54.0	NaN
LONG ISLAND CITY	11286.0	108.0	432.0	162.0
MASPETH	26838.0	108.0	432.0	54.0
MIDDLE VILLAGE	18738.0	NaN	108.0	NaN
NEW HYDE PARK	702.0	NaN	NaN	NaN
NEW YORK	35208.0	4212.0	16308.0	1242.0
OAKLAND GARDENS	6264.0	54.0	108.0	NaN
OZONE PARK	25110.0	216.0	918.0	NaN
QUEENS	NaN	NaN	NaN	NaN

QUEENS VILLAGE	24030.0	NaN	270.0	54.0
REGO PARK	4752.0	NaN	162.0	54.0
RICHMOND HILL	10800.0	NaN	540.0	54.0
RIDGEWOOD	26190.0	162.0	486.0	108.0
ROCKAWAY PARK	918.0	162.0	1188.0	NaN
ROSEDALE	12474.0	NaN	108.0	54.0
SAINT ALBANS	12852.0	54.0	162.0	NaN
SOUTH OZONE PARK	21114.0	NaN	702.0	108.0
SOUTH RICHMOND HILL	18846.0	54.0	1134.0	NaN
SPRINGFIELD GARDENS	13608.0	NaN	324.0	NaN
STATEN ISLAND	111186.0	1188.0	9774.0	324.0
SUNNYSIDE	918.0	108.0	540.0	54.0
Unknown City	3294.0	NaN	162.0	NaN
WHITESTONE	14148.0	NaN	108.0	54.0
WOODHAVEN	19926.0	NaN	162.0	NaN
WOODSIDE	15606.0	54.0	810.0	216.0

	Homeless Encampment	…	Noise - House of Worship \
ARVERNE	162.0	…	648.0
ASTORIA	1512.0	…	972.0
BAYSIDE	108.0	…	162.0
BELLEROSE	54.0	…	54.0
BREEZY POINT	NaN	…	NaN
BRONX	14094.0	…	4698.0
BROOKLYN	49140.0	…	19818.0
CAMBRIA HEIGHTS	270.0	…	108.0
CENTRAL PARK	NaN	…	NaN
COLLEGE POINT	108.0	…	108.0
CORONA	1350.0	…	162.0
EAST ELMHURST	108.0	…	1296.0
ELMHURST	1728.0	…	324.0
FAR ROCKAWAY	756.0	…	54.0
FLORAL PARK	NaN	…	NaN
FLUSHING	1350.0	…	216.0
FOREST HILLS	972.0	…	54.0
FRESH MEADOWS	270.0	…	NaN
GLEN OAKS	NaN	…	NaN
HOLLIS	486.0	…	11070.0
HOWARD BEACH	162.0	…	54.0
JACKSON HEIGHTS	540.0	…	108.0
JAMAICA	4644.0	…	810.0
KEW GARDENS	270.0	…	54.0
LITTLE NECK	NaN	…	NaN
LONG ISLAND CITY	378.0	…	NaN
MASPETH	594.0	…	54.0
MIDDLE VILLAGE	270.0	…	NaN
NEW HYDE PARK	NaN	…	NaN

NEW YORK	156762.0	…	11448.0
OAKLAND GARDENS	54.0	…	NaN
OZONE PARK	432.0	…	216.0
QUEENS	108.0	…	54.0
QUEENS VILLAGE	972.0	…	108.0
REGO PARK	324.0	…	54.0
RICHMOND HILL	1350.0	…	NaN
RIDGEWOOD	1188.0	…	108.0
ROCKAWAY PARK	216.0	…	NaN
ROSEDALE	216.0	…	108.0
SAINT ALBANS	432.0	…	54.0
SOUTH OZONE PARK	270.0	…	270.0
SOUTH RICHMOND HILL	594.0	…	162.0
SPRINGFIELD GARDENS	378.0	…	54.0
STATEN ISLAND	3672.0	…	918.0
SUNNYSIDE	648.0	…	NaN
Unknown City	54.0	…	NaN
WHITESTONE	NaN	…	NaN
WOODHAVEN	540.0	…	162.0
WOODSIDE	1944.0	…	216.0

	Noise - Park	Noise - Street/Sidewalk	Noise - Vehicle \
ARVERNE	108.0	1566.0	432.0
ASTORIA	3402.0	28404.0	11556.0
BAYSIDE	216.0	864.0	1188.0
BELLEROSE	54.0	702.0	594.0
BREEZY POINT	NaN	54.0	54.0
BRONX	28026.0	463158.0	181062.0
BROOKLYN	80784.0	707292.0	301590.0
CAMBRIA HEIGHTS	NaN	1458.0	4914.0
CENTRAL PARK	NaN	5238.0	NaN
COLLEGE POINT	108.0	1620.0	6804.0
CORONA	1134.0	12366.0	5886.0
EAST ELMHURST	270.0	5508.0	4374.0
ELMHURST	1728.0	11664.0	3510.0
FAR ROCKAWAY	1026.0	7128.0	4320.0
FLORAL PARK	NaN	162.0	108.0
FLUSHING	3078.0	12204.0	7722.0
FOREST HILLS	972.0	5238.0	3510.0
FRESH MEADOWS	324.0	2376.0	4968.0
GLEN OAKS	1944.0	324.0	216.0
HOLLIS	864.0	2052.0	2808.0
HOWARD BEACH	108.0	1188.0	486.0
JACKSON HEIGHTS	378.0	11934.0	3780.0
JAMAICA	1944.0	18198.0	17010.0
KEW GARDENS	NaN	702.0	1134.0
LITTLE NECK	108.0	486.0	378.0

LONG ISLAND CITY	2700.0	7992.0	6264.0
MASPETH	162.0	5940.0	1242.0
MIDDLE VILLAGE	216.0	1728.0	2268.0
NEW HYDE PARK	NaN	NaN	108.0
NEW YORK	62640.0	1129896.0	320598.0
OAKLAND GARDENS	648.0	972.0	378.0
OZONE PARK	972.0	7074.0	4104.0
QUEENS	NaN	270.0	108.0
QUEENS VILLAGE	108.0	3348.0	2700.0
REGO PARK	1080.0	3240.0	3078.0
RICHMOND HILL	162.0	4698.0	3294.0
RIDGEWOOD	1350.0	22518.0	12420.0
ROCKAWAY PARK	54.0	11124.0	1458.0
ROSEDALE	3726.0	1404.0	1242.0
SAINT ALBANS	54.0	4158.0	2484.0
SOUTH OZONE PARK	216.0	5346.0	4968.0
SOUTH RICHMOND HILL	108.0	4752.0	4644.0
SPRINGFIELD GARDENS	54.0	2106.0	2376.0
STATEN ISLAND	3564.0	44928.0	21708.0
SUNNYSIDE	756.0	3456.0	2322.0
Unknown City	270.0	5076.0	486.0
WHITESTONE	378.0	1728.0	1620.0
WOODHAVEN	162.0	4482.0	4050.0
WOODSIDE	1836.0	13608.0	6912.0

	Panhandling	Posting Advertisement	Squeegee	Traffic \
ARVERNE	54.0	NaN	NaN	54.0
ASTORIA	108.0	162.0	NaN	3024.0
BAYSIDE	NaN	NaN	NaN	486.0
BELLEROSE	54.0	54.0	NaN	432.0
BREEZY POINT	NaN	NaN	NaN	NaN
BRONX	1026.0	810.0	NaN	21600.0
BROOKLYN	2538.0	2862.0	NaN	64152.0
CAMBRIA HEIGHTS	NaN	NaN	NaN	378.0
CENTRAL PARK	NaN	NaN	NaN	NaN
COLLEGE POINT	NaN	NaN	NaN	864.0
CORONA	54.0	54.0	NaN	756.0
EAST ELMHURST	NaN	54.0	NaN	1242.0
ELMHURST	162.0	54.0	NaN	918.0
FAR ROCKAWAY	NaN	NaN	NaN	594.0
FLORAL PARK	NaN	NaN	NaN	NaN
FLUSHING	108.0	NaN	NaN	2808.0
FOREST HILLS	270.0	216.0	NaN	3240.0
FRESH MEADOWS	54.0	NaN	NaN	648.0
GLEN OAKS	NaN	NaN	NaN	162.0
HOLLIS	NaN	NaN	NaN	594.0
HOWARD BEACH	108.0	NaN	NaN	486.0

JACKSON HEIGHTS	NaN	54.0	NaN	648.0
JAMAICA	162.0	432.0	NaN	32076.0
KEW GARDENS	NaN	54.0	NaN	540.0
LITTLE NECK	NaN	54.0	NaN	1026.0
LONG ISLAND CITY	108.0	54.0	NaN	4158.0
MASPETH	NaN	NaN	NaN	3456.0
MIDDLE VILLAGE	NaN	NaN	NaN	756.0
NEW HYDE PARK	NaN	NaN	NaN	NaN
NEW YORK	10584.0	2538.0	216.0	89694.0
OAKLAND GARDENS	NaN	NaN	NaN	324.0
OZONE PARK	378.0	162.0	NaN	1026.0
QUEENS	NaN	NaN	NaN	108.0
QUEENS VILLAGE	54.0	54.0	NaN	1350.0
REGO PARK	NaN	NaN	NaN	810.0
RICHMOND HILL	NaN	108.0	NaN	432.0
RIDGEWOOD	NaN	54.0	NaN	2430.0
ROCKAWAY PARK	NaN	NaN	NaN	324.0
ROSEDALE	NaN	NaN	NaN	1296.0
SAINT ALBANS	NaN	NaN	NaN	648.0
SOUTH OZONE PARK	NaN	54.0	NaN	1728.0
SOUTH RICHMOND HILL	NaN	NaN	NaN	648.0
SPRINGFIELD GARDENS	108.0	108.0	NaN	540.0
STATEN ISLAND	594.0	26352.0	NaN	11610.0
SUNNYSIDE	NaN	108.0	NaN	918.0
Unknown City	54.0	NaN	NaN	54.0
WHITESTONE	NaN	NaN	NaN	1674.0
WOODHAVEN	54.0	NaN	NaN	378.0
WOODSIDE	NaN	NaN	NaN	2430.0
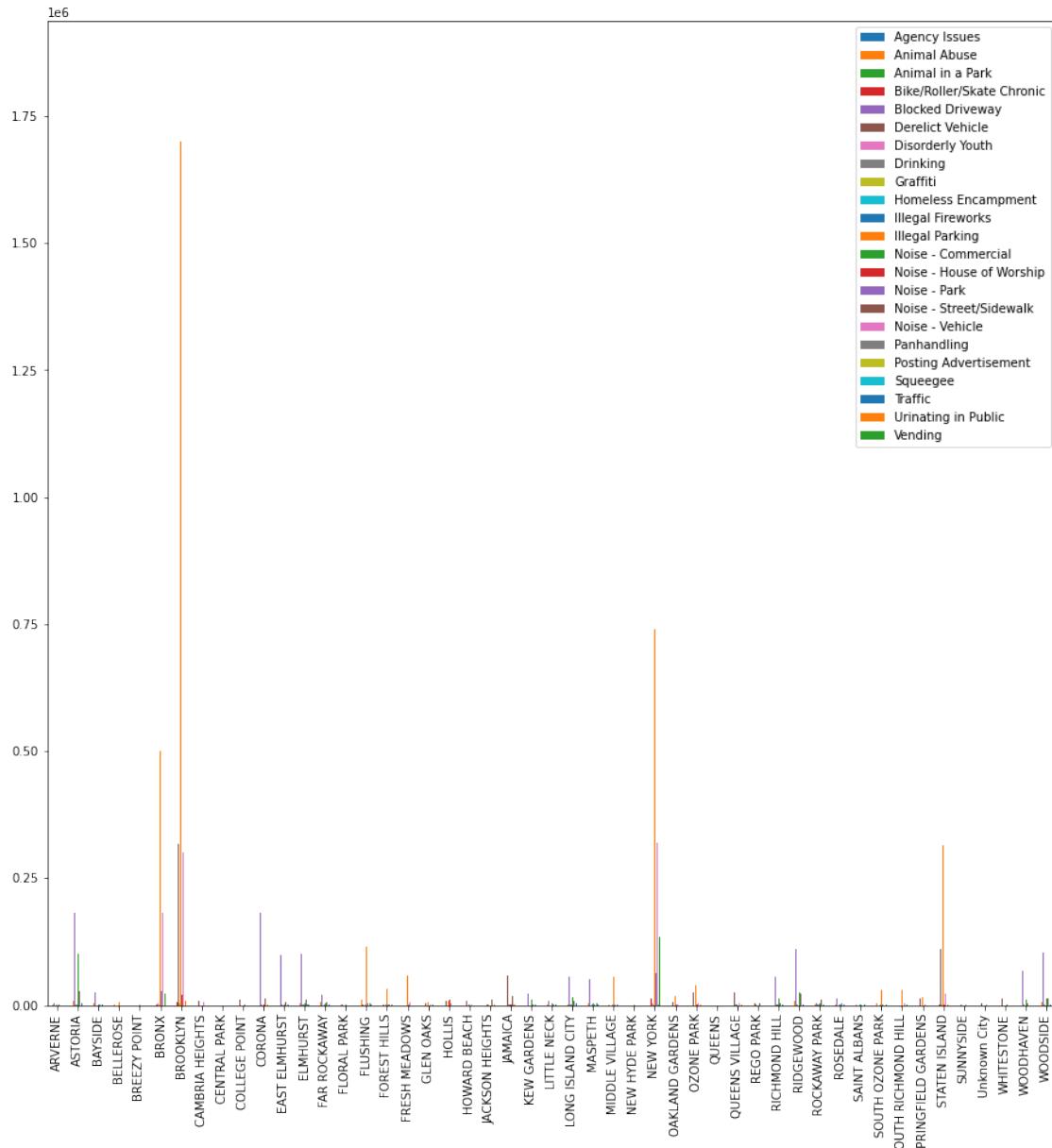
	Urinating in Public	Vending
ARVERNE	54.0	54.0
ASTORIA	540.0	3024.0
BAYSIDE	NaN	108.0
BELLEROSE	54.0	NaN
BREEZY POINT	NaN	NaN
BRONX	2538.0	22086.0
BROOKLYN	7938.0	29268.0
CAMBRIA HEIGHTS	NaN	NaN
CENTRAL PARK	NaN	NaN
COLLEGE POINT	NaN	54.0
CORONA	378.0	3240.0
EAST ELMHURST	324.0	486.0
ELMHURST	540.0	1242.0
FAR ROCKAWAY	54.0	432.0
FLORAL PARK	NaN	NaN
FLUSHING	486.0	1944.0
FOREST HILLS	108.0	540.0

```
FRESH MEADOWS                    54.0       54.0
GLEN OAKS                       108.0     1026.0
HOLLIS                          108.0        NaN
HOWARD BEACH                      NaN      162.0
JACKSON HEIGHTS                 162.0     4320.0
JAMAICA                        1890.0     1242.0
KEW GARDENS                     162.0       54.0
LITTLE NECK                       NaN        NaN
LONG ISLAND CITY                162.0     1674.0
MASPETH                         108.0      378.0
MIDDLE VILLAGE                    NaN        NaN
NEW HYDE PARK                     NaN        NaN
NEW YORK                      13770.0   134838.0
OAKLAND GARDENS                   NaN      108.0
OZONE PARK                      216.0       54.0
QUEENS                           54.0        NaN
QUEENS VILLAGE                  270.0      108.0
REGO PARK                        54.0      162.0
RICHMOND HILL                   270.0      756.0
RIDGEWOOD                       432.0      486.0
ROCKAWAY PARK                    54.0      108.0
ROSEDALE                          NaN      972.0
SAINT ALBANS                     54.0      108.0
SOUTH OZONE PARK                108.0      270.0
SOUTH RICHMOND HILL              54.0     1296.0
SPRINGFIELD GARDENS             162.0       54.0
STATEN ISLAND                   972.0     1242.0
SUNNYSIDE                       108.0      810.0
Unknown City                      NaN       54.0
WHITESTONE                        NaN       54.0
WOODHAVEN                       108.0      324.0
WOODSIDE                        378.0      756.0

[49 rows x 23 columns]
```
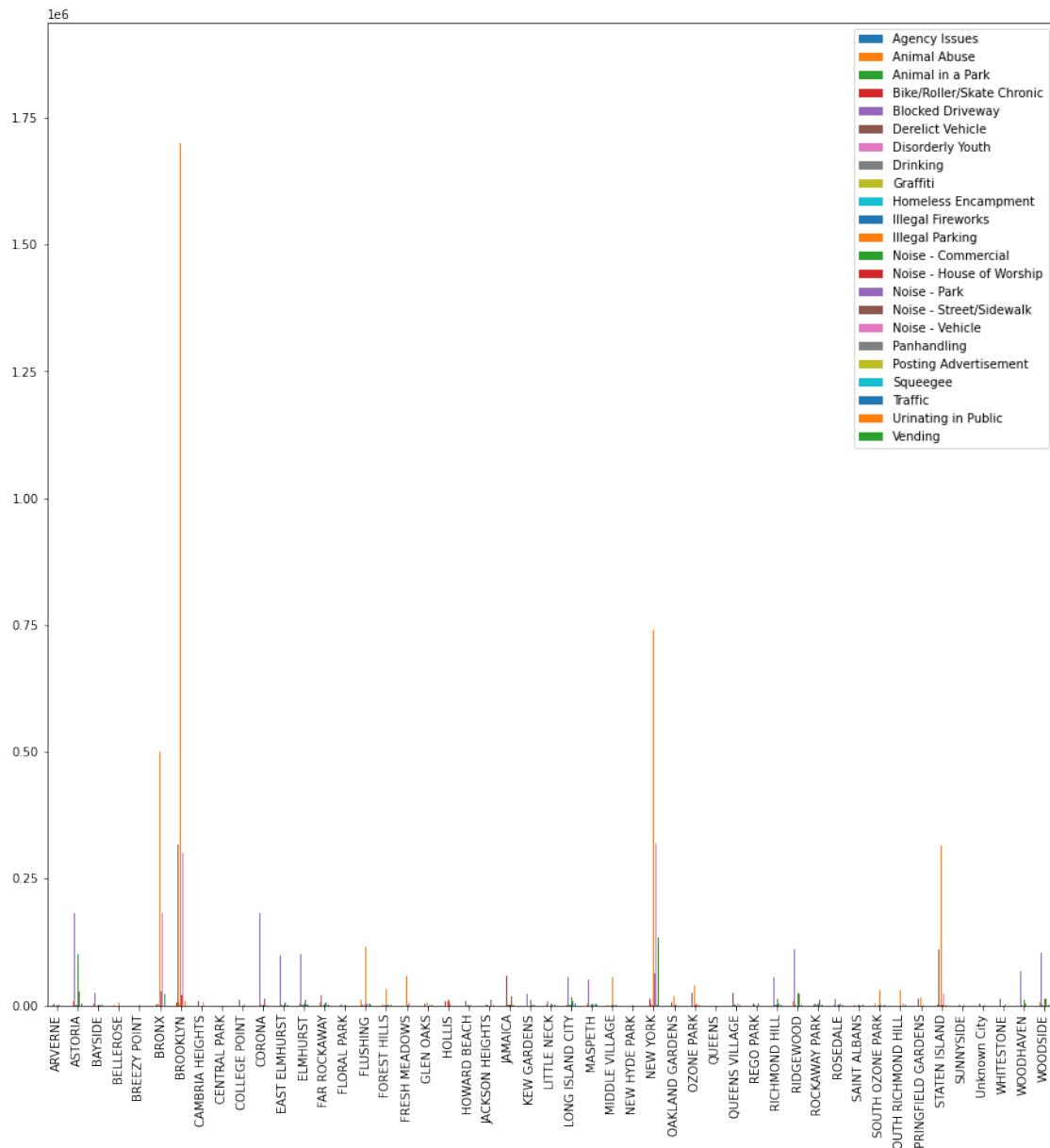
```python
# 4. Visualize the major types of complaints in each city

complaints_df.plot(kind="bar", figsize = (15, 15))
plt.savefig('Capture15.jpg')
```
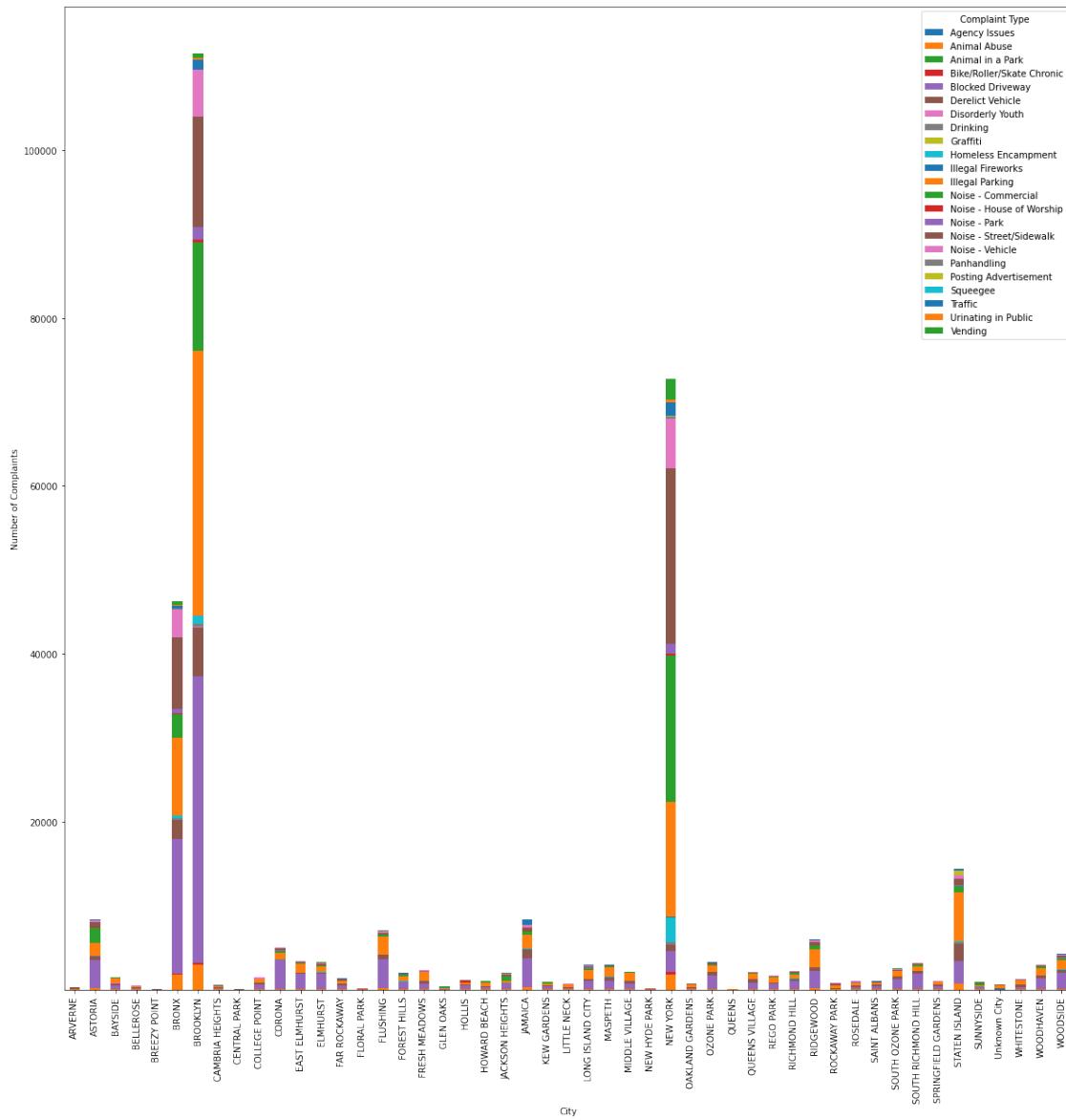
The legend shows the following complaint types:
- Agency Issues
- Animal Abuse
- Animal in a Park
- Bike/Roller/Skate Chronic
- Blocked Driveway
- Derelict Vehicle
- Disorderly Youth
- Drinking
- Graffiti
- Homeless Encampment
- Illegal Fireworks
- Illegal Parking
- Noise - Commercial
- Noise - House of Worship
- Noise - Park
- Noise - Street/Sidewalk
- Noise - Vehicle
- Panhandling
- Posting Advertisement
- Squeegee
- Traffic
- Urinating in Public
- Vending

[31]:
```python
# 4.1 Draw another chart that shows the types of complaints in
# each city in a single chart, where different colors show the
# different types of complaints

df.groupby("City")["Complaint Type"].value_counts().unstack().plot.
 ↪bar(figsize=(20,20),stacked = True)
plt.xlabel("City")
plt.ylabel("Number of Complaints")
plt.savefig("Capture16.jpg")
# plt.show()
```

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The chart shows "Number of Complaints" on the y-axis (ranging from 0 to 100000) and "City" on the x-axis, with a legend titled "Complaint Type" listing: Agency Issues, Animal Abuse, Animal in a Park, Bike/Roller/Skate Chronic, Blocked Driveway, Derelict Vehicle, Disorderly Youth, Drinking, Graffiti, Homeless Encampment, Illegal Fireworks, Illegal Parking, Noise - Commercial, Noise - House of Worship, Noise - Park, Noise - Street/Sidewalk, Noise - Vehicle, Panhandling, Posting Advertisement, Squeegee, Traffic, Urinating in Public, Vending.

[29]:
```python
# 4.2 Sort the complaint types based on the average
# Request_Closing_Time grouping them for different
# locations

complaint_type = df['Complaint Type'].unique()

new_column_list = ['City']
new_column_list.extend(complaint_type)

groups = df.groupby('City')
city_names = df['City'].unique()
```

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```
index = []
series = []

for city in city_names:
    city_group = df.loc[df['City'] == city]
    complaint_type_list = city_group['Complaint Type'].unique()

    arr = []
    for complaint_type in complaint_type_list:

        group = city_group.loc[city_group['Complaint Type'] == complaint_type]
        mean_closing_time = group['Time Elapsed'].mean()
        arr += [[complaint_type,mean_closing_time]]

    print(city)
    print(sorted(arr,key = lambda x:x[1], reverse = True))
```

NEW YORK
[['Graffiti', 17122.0], ['Derelict Vehicle', 14663.315950920245], ['Squeegee',
14560.25], ['Homeless Encampment', 13125.683775404754], ['Panhandling',
12682.933673469388], ['Animal Abuse', 12613.551912568306], ['Blocked Driveway',
12334.858479532164], ['Vending', 11894.62474969964], ['Illegal Parking',
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10918.334437086092], ['Urinating in Public', 10334.388235294118],
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Vehicle', 9232.869967997305], ['Disorderly Youth', 8171.166666666667], ['Noise -
House of Worship', 7843.801886792453], ['Illegal Fireworks', 7503.666666666667]]
ASTORIA
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in Public', 15886.6], ['Drinking', 14952.390243902439], ['Noise - Vehicle',
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BRONX
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['Urinating in Public', 19891.72340425532], ['Noise - Vehicle',
19697.830301222784], ['Noise - Street/Sidewalk', 18756.156115191792],
['Traffic', 17390.53], ['Noise - Park', 16847.77649325626], ['Noise -
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16071.816091954022], ['Disorderly Youth', 15060.88524590164],
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ELMHURST
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BROOKLYN
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['Traffic', 10881.694444444445], ['Noise - Commercial', 10675.258199257425],
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KEW GARDENS
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Encampment', 6839.8], ['Noise - House of Worship', 4186.0], ['Drinking',
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JACKSON HEIGHTS
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MIDDLE VILLAGE
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REGO PARK
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SAINT ALBANS
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JAMAICA
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SOUTH RICHMOND HILL
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Unknown City
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HOWARD BEACH
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GLEN OAKS
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BELLEROSE
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ROSEDALE
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[32]:
```python
# 5. See whether the average response time across different
# complaint types is similar (overall)

complaint_types = df['Complaint Type'].unique()

temporary_df = df[['Complaint Type','Time Elapsed']]

complaint_groups = temporary_df.groupby('Complaint Type')

average_response_time_dict = {}
```

```
for complaint_type in complaint_types:
    group = complaint_groups.get_group(complaint_type)
    mean_time_elapsed = group.mean()
    average_response_time_dict[complaint_type] = mean_time_elapsed
    print([complaint_type,mean_time_elapsed])
```

['Noise - Street/Sidewalk', Time Elapsed   12214.868299
dtype: float64]
['Blocked Driveway', Time Elapsed   16179.661252
dtype: float64]
['Illegal Parking', Time Elapsed   15610.235731
dtype: float64]
['Derelict Vehicle', Time Elapsed   25277.165126
dtype: float64]
['Noise - Commercial', Time Elapsed   11093.320287
dtype: float64]
['Noise - House of Worship', Time Elapsed   11377.188363
dtype: float64]
['Posting Advertisement', Time Elapsed   7074.148903
dtype: float64]
['Noise - Vehicle', Time Elapsed   12514.456491
dtype: float64]
['Animal Abuse', Time Elapsed   17891.782234
dtype: float64]
['Vending', Time Elapsed   14436.126956
dtype: float64]
['Traffic', Time Elapsed   12255.5125
dtype: float64]
['Drinking', Time Elapsed   13527.460366
dtype: float64]
['Bike/Roller/Skate Chronic', Time Elapsed   13272.17226
dtype: float64]
['Panhandling', Time Elapsed   15927.207792
dtype: float64]
['Noise - Park', Time Elapsed   12103.251819
dtype: float64]
['Homeless Encampment', Time Elapsed   15398.076407
dtype: float64]
['Urinating in Public', Time Elapsed   12970.401316
dtype: float64]
['Graffiti', Time Elapsed   23358.204082
dtype: float64]
['Disorderly Youth', Time Elapsed   12450.875421
dtype: float64]
['Illegal Fireworks', Time Elapsed   10245.278481
```

```
dtype: float64]
['Agency Issues', Time Elapsed    18289.125
dtype: float64]
['Squeegee', Time Elapsed    14560.25
dtype: float64]
['Animal in a Park', Time Elapsed    1212634.0
dtype: float64]
```

[33]:
```python
# 5.1 Visualize the average of Request_Closing_Time

x_axis = []
y_axis = []

for key in average_response_time_dict:
    x_axis += [key]
    y_axis += [average_response_time_dict[key]]

plt.plot(x_axis,y_axis)
plt.xlabel('Complaint Type')
plt.ylabel('Response Time in seconds')
plt.xticks(rotation=90)
plt.savefig('Capture18.jpg')
```
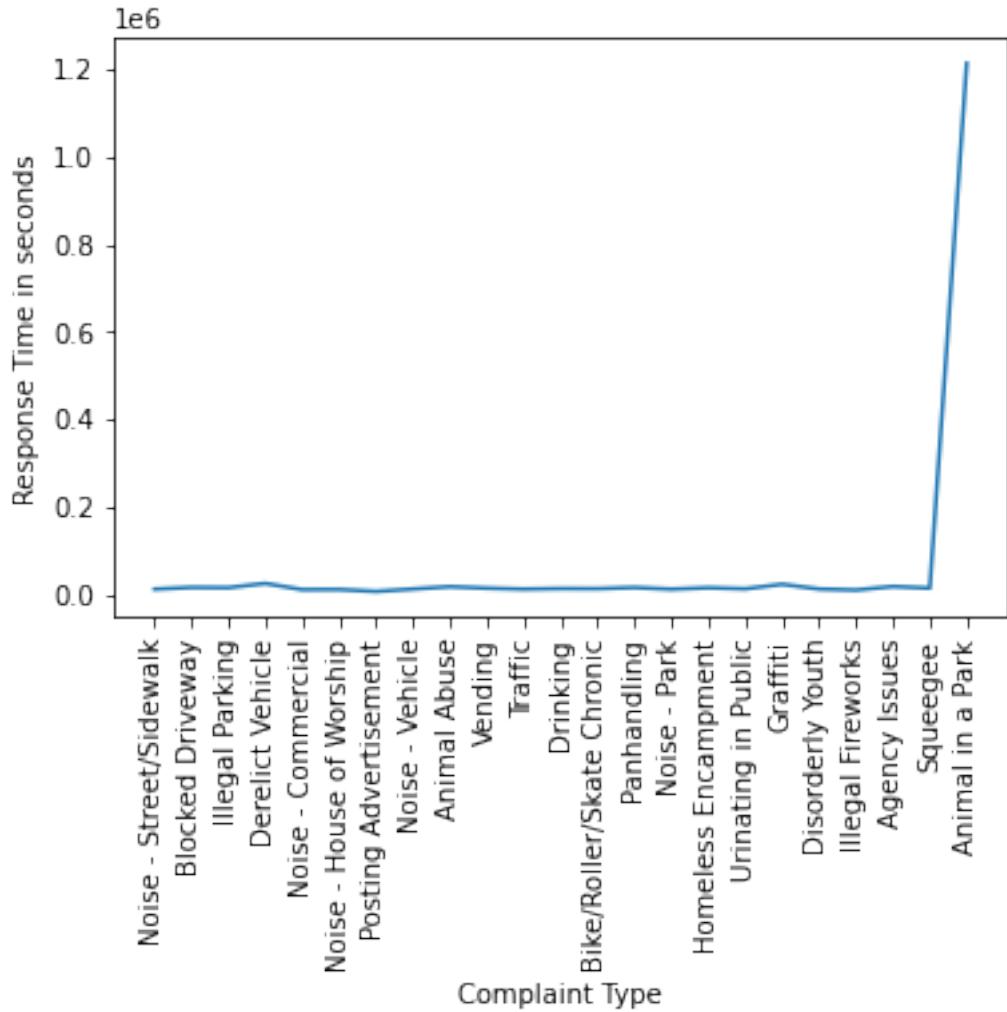
```
[37]:  # 6. (Optional) Identify the significant variables by performing statistical
       # analysis using p-values.Perform a Kruskal-Wallis H test
       # 6.1 Fail to reject H0: All sample distributions are equal
       # 6.2 Reject H0: One or more sample distributions are not
       # equal
       from scipy import stats

       h_test, p_value = stats.kruskal(*average_response_time_dict.values())

       print("Kruskal Wallis H-Test statistics: " , h_test)
       print("p-value: ", p_value)
```

```
Kruskal Wallis H-Test statistics:  22.0
p-value:  0.4598887026936868
```

[34]:

[35]:
```
# 7. Present your observations
In this case, the test statistic comes out to be equal to 22.0 and the
 ↪corresponding p-value is
0.4598887026936868. As the p-value is not less than 0.05, we cannot reject the
 ↪null hypothesis.
```