NYC 311 Project-01

January 20, 2022

1 NAME-PAPU SWAIN

PROJECT-Customer Service Requests Analysis

DOMAIN-Customer Service

OBJECTIVE-NYC 311's mission is to provide the public with quick and easy access to all New York City government services and information while offering the best customer service. Each day, NYC311 receives thousands of requests related to several hundred types of non-emergency services, including noise complaints, plumbing issues, and illegally parked cars. These requests are received by NYC311 and forwarded to the relevant agencies such as the police, buildings, or transportation. The agency responds to the request, addresses it, and then closes it.

[ ]:
```
import pandas as pd
import numpy as np
```

[58]:
```
nyc=pd.read_csv('311_Service_Requests_from_2010_to_Present.csv')
```

```
C:\Users\hp\anaconda3\lib\site-packages\IPython\core\interactiveshell.py:3418:
DtypeWarning: Columns (48,49) have mixed types.Specify dtype option on import or
set low_memory=False.
  exec(code_obj, self.user_global_ns, self.user_ns)
```

[59]:
```
nyc.head(3)
```

[59]:

	Unique Key	Created Date	Closed Date	Agency	\
0	32310363	12/31/2015 11:59:45 PM	01-01-16 0:55	NYPD	
1	32309934	12/31/2015 11:59:44 PM	01-01-16 1:26	NYPD	
2	32309159	12/31/2015 11:59:29 PM	01-01-16 4:51	NYPD	

	Agency Name	Complaint Type	Descriptor	\
0	New York City Police Department	Noise - Street/Sidewalk	Loud Music/Party	
1	New York City Police Department	Blocked Driveway	No Access	
2	New York City Police Department	Blocked Driveway	No Access	

	Location Type	Incident Zip	Incident Address	…	\
0	Street/Sidewalk	10034.0	71 VERMILYEA AVENUE	…	
1	Street/Sidewalk	11105.0	27-07 23 AVENUE	…	
2	Street/Sidewalk	10458.0	2897 VALENTINE AVENUE	…	

```
  Bridge Highway Name Bridge Highway Direction Road Ramp  \
0                 NaN                       NaN       NaN
1                 NaN                       NaN       NaN
2                 NaN                       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

    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 rows x 53 columns]
```

[60]:
```
nyc.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 300698 entries, 0 to 300697
Data columns (total 53 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   Unique Key                      300698 non-null  int64
 1   Created Date                    300698 non-null  object
 2   Closed Date                     298534 non-null  object
 3   Agency                          300698 non-null  object
 4   Agency Name                     300698 non-null  object
 5   Complaint Type                  300698 non-null  object
 6   Descriptor                      294784 non-null  object
 7   Location Type                   300567 non-null  object
 8   Incident Zip                    298083 non-null  float64
 9   Incident Address                256288 non-null  object
 10  Street Name                     256288 non-null  object
 11  Cross Street 1                  251419 non-null  object
 12  Cross Street 2                  250919 non-null  object
 13  Intersection Street 1           43858 non-null   object
 14  Intersection Street 2           43362 non-null   object
 15  Address Type                    297883 non-null  object
 16  City                            298084 non-null  object
 17  Landmark                        349 non-null     object
 18  Facility Type                   298527 non-null  object
 19  Status                          300698 non-null  object
 20  Due Date                        300695 non-null  object
 21  Resolution Description          300698 non-null  object
```

```
 22  Resolution Action Updated Date  298511 non-null  object
 23  Community Board                 300698 non-null  object
 24  Borough                         300698 non-null  object
 25  X Coordinate (State Plane)      297158 non-null  float64
 26  Y Coordinate (State Plane)      297158 non-null  float64
 27  Park Facility Name              300698 non-null  object
 28  Park Borough                    300698 non-null  object
 29  School Name                     300698 non-null  object
 30  School Number                   300698 non-null  object
 31  School Region                   300697 non-null  object
 32  School Code                     300697 non-null  object
 33  School Phone Number             300698 non-null  object
 34  School Address                  300698 non-null  object
 35  School City                     300698 non-null  object
 36  School State                    300698 non-null  object
 37  School Zip                      300697 non-null  object
 38  School Not Found                300698 non-null  object
 39  School or Citywide Complaint    0 non-null       float64
 40  Vehicle Type                    0 non-null       float64
 41  Taxi Company Borough            0 non-null       float64
 42  Taxi Pick Up Location           0 non-null       float64
 43  Bridge Highway Name             243 non-null     object
 44  Bridge Highway Direction        243 non-null     object
 45  Road Ramp                       213 non-null     object
 46  Bridge Highway Segment          213 non-null     object
 47  Garage Lot Name                 0 non-null       float64
 48  Ferry Direction                 1 non-null       object
 49  Ferry Terminal Name             2 non-null       object
 50  Latitude                        297158 non-null  float64
 51  Longitude                       297158 non-null  float64
 52  Location                        297158 non-null  object
dtypes: float64(10), int64(1), object(42)
memory usage: 121.6+ MB
```

[61]:
```
nyc.drop(nyc.iloc[:,39:50], inplace = True, axis = 1)
```

[62]:
```
nyc=nyc.drop(columns=['Landmark','Intersection Street 1','Intersection Street␣
↪2','Incident Zip','Street Name','Incident Address','Cross Street 1','Cross␣
↪Street 2'])
```

[63]:
```
nyc.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 300698 entries, 0 to 300697
Data columns (total 34 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   Unique Key                      300698 non-null  int64
```

```
 1   Created Date                    300698 non-null  object
 2   Closed Date                     298534 non-null  object
 3   Agency                          300698 non-null  object
 4   Agency Name                     300698 non-null  object
 5   Complaint Type                  300698 non-null  object
 6   Descriptor                      294784 non-null  object
 7   Location Type                   300567 non-null  object
 8   Address Type                    297883 non-null  object
 9   City                            298084 non-null  object
 10  Facility Type                   298527 non-null  object
 11  Status                          300698 non-null  object
 12  Due Date                        300695 non-null  object
 13  Resolution Description          300698 non-null  object
 14  Resolution Action Updated Date  298511 non-null  object
 15  Community Board                 300698 non-null  object
 16  Borough                         300698 non-null  object
 17  X Coordinate (State Plane)      297158 non-null  float64
 18  Y Coordinate (State Plane)      297158 non-null  float64
 19  Park Facility Name              300698 non-null  object
 20  Park Borough                    300698 non-null  object
 21  School Name                     300698 non-null  object
 22  School Number                   300698 non-null  object
 23  School Region                   300697 non-null  object
 24  School Code                     300697 non-null  object
 25  School Phone Number             300698 non-null  object
 26  School Address                  300698 non-null  object
 27  School City                     300698 non-null  object
 28  School State                    300698 non-null  object
 29  School Zip                      300697 non-null  object
 30  School Not Found                300698 non-null  object
 31  Latitude                        297158 non-null  float64
 32  Longitude                       297158 non-null  float64
 33  Location                        297158 non-null  object
dtypes: float64(4), int64(1), object(29)
memory usage: 78.0+ MB
```

[64]:
```
nyc.isna().sum()
```

[64]:
```
Unique Key                          0
Created Date                        0
Closed Date                      2164
Agency                              0
Agency Name                         0
Complaint Type                      0
Descriptor                       5914
Location Type                     131
Address Type                     2815
```

```
City                              2614
Facility Type                     2171
Status                               0
Due Date                             3
Resolution Description               0
Resolution Action Updated Date    2187
Community Board                      0
Borough                              0
X Coordinate (State Plane)        3540
Y Coordinate (State Plane)        3540
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
Latitude                          3540
Longitude                         3540
Location                          3540
dtype: int64
```

[65]:
```
nyc.dtypes
```

[65]:
```
Unique Key                         int64
Created Date                      object
Closed Date                       object
Agency                            object
Agency Name                       object
Complaint Type                    object
Descriptor                        object
Location Type                     object
Address Type                      object
City                              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
Latitude                          float64
Longitude                         float64
Location                           object
dtype: object
```

Convert the columns 'Created Date' and Closed Date' to datetime datatype

[66]:
```
nyc['Created Date']=pd.to_datetime(nyc['Created Date'])
nyc['Closed Date']=pd.to_datetime(nyc['Closed Date'])
```

[67]:
```
nyc.head(2)
```

[67]:
```
   Unique Key        Created Date         Closed Date Agency  \
0    32310363 2015-12-31 23:59:45 2016-01-01 00:55:00   NYPD
1    32309934 2015-12-31 23:59:44 2016-01-01 01:26:00   NYPD

                       Agency Name           Complaint Type        Descriptor  \
0  New York City Police Department  Noise - Street/Sidewalk  Loud Music/Party
1  New York City Police Department         Blocked Driveway         No Access

     Location Type Address Type      City  …  School Code  \
0  Street/Sidewalk      ADDRESS  NEW YORK  …  Unspecified
1  Street/Sidewalk      ADDRESS   ASTORIA  …  Unspecified

  School Phone Number School Address  School City School State   School Zip  \
0         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified
1         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified

  School Not Found   Latitude  Longitude  \
0                N  40.865682 -73.923501
1                N  40.775945 -73.915094

                                  Location
0   (40.86568153633767, -73.92350095571744)
```

```
1  (40.775945312321085, -73.91509393898605)

[2 rows x 34 columns]
```

[68]:
```
nyc=nyc[pd.notna(nyc['Closed Date'])]
```

[69]:
```
nyc[['Closed Date','Created Date']].isna().sum()
```

[69]:
```
Closed Date     0
Created Date    0
dtype: int64
```

New column 'Request_Closing_Time' as the time elapsed between request creation and request closing

[70]:
```
nyc['Request_Closing_Time']=nyc['Closed Date']-nyc['Created Date']
```

[71]:
```
nyc['Request_Closing_Time'].head()
```

[71]:
```
0   0 days 00:55:15
1   0 days 01:26:16
2   0 days 04:51:31
3   0 days 07:45:14
4   0 days 03:27:02
Name: Request_Closing_Time, dtype: timedelta64[ns]
```

[72]:
```
nyc['Request_Closing_Time']=nyc['Request_Closing_Time']/np.timedelta64(1,'s')
```

[73]:
```
nyc['Request_Closing_Time'].head()
```

[73]:
```
0     3315.0
1     5176.0
2    17491.0
3    27914.0
4    12422.0
Name: Request_Closing_Time, dtype: float64
```

[74]:
```
nyc.head()
```

[74]:
```
    Unique Key        Created Date         Closed Date Agency  \
0    32310363 2015-12-31 23:59:45 2016-01-01 00:55:00   NYPD
1    32309934 2015-12-31 23:59:44 2016-01-01 01:26:00   NYPD
2    32309159 2015-12-31 23:59:29 2016-01-01 04:51:00   NYPD
3    32305098 2015-12-31 23:57:46 2016-01-01 07:43:00   NYPD
4    32306529 2015-12-31 23:56:58 2016-01-01 03:24:00   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 Address Type      City  …  \
0              Loud Music/Party  Street/Sidewalk      ADDRESS  NEW YORK  …
1                    No Access  Street/Sidewalk      ADDRESS   ASTORIA  …
2                    No Access  Street/Sidewalk      ADDRESS     BRONX  …
3  Commercial Overnight Parking  Street/Sidewalk      ADDRESS     BRONX  …
4              Blocked Sidewalk  Street/Sidewalk      ADDRESS  ELMHURST  …

  School Phone Number School Address  School City School State   School Zip  \
0         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified
1         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified
2         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified
3         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified
4         Unspecified    Unspecified  Unspecified  Unspecified  Unspecified

  School Not Found   Latitude  Longitude  \
0                N  40.865682 -73.923501
1                N  40.775945 -73.915094
2                N  40.870325 -73.888525
3                N  40.835994 -73.828379
4                N  40.733060 -73.874170

                                  Location Request_Closing_Time
0   (40.86568153633767, -73.92350095571744)               3315.0
1  (40.775945312321085, -73.91509393898605)               5176.0
2  (40.870324522111424, -73.88852464418646)              17491.0
3   (40.83599404683083, -73.82837939584206)              27914.0
4  (40.733059618956815, -73.87416975810375)              12422.0

[5 rows x 35 columns]
```

[75]:
```
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

[76]:
```
nyc.columns
```

[76]:
```
Index(['Unique Key', 'Created Date', 'Closed Date', 'Agency', 'Agency Name',
       'Complaint Type', 'Descriptor', 'Location Type', 'Address Type', 'City',
       'Facility Type', 'Status', 'Due Date', 'Resolution Description',
       'Resolution Action Updated Date', 'Community Board', 'Borough',
       'X Coordinate (State Plane)', 'Y Coordinate (State Plane)',
```

```
       'Park Facility Name', 'Park Borough', 'School Name', 'School Number',
       'School Region', 'School Code', 'School Phone Number', 'School Address',
       'School City', 'School State', 'School Zip', 'School Not Found',
       'Latitude', 'Longitude', 'Location', 'Request_Closing_Time'],
      dtype='object')
```

[78]:
```
nyc1=nyc.groupby(["City","Complaint Type"]).size().unstack().fillna(0)
nyc1
```

[78]:

Complaint Type	Animal Abuse	Blocked Driveway	Derelict Vehicle
City			
ARVERNE	38.0	35.0	27.0
ASTORIA	125.0	2618.0	351.0
Astoria	0.0	116.0	12.0
BAYSIDE	37.0	377.0	198.0
BELLEROSE	7.0	95.0	89.0
BREEZY POINT	2.0	3.0	3.0
BRONX	1415.0	12754.0	1952.0
BROOKLYN	2394.0	28147.0	5179.0
CAMBRIA HEIGHTS	11.0	147.0	115.0
CENTRAL PARK	0.0	0.0	0.0
COLLEGE POINT	28.0	435.0	184.0
CORONA	61.0	2761.0	57.0
EAST ELMHURST	59.0	1408.0	113.0
ELMHURST	38.0	1446.0	78.0
East Elmhurst	0.0	0.0	1.0
FAR ROCKAWAY	89.0	284.0	187.0
FLORAL PARK	2.0	20.0	56.0
FLUSHING	143.0	2794.0	440.0
FOREST HILLS	45.0	663.0	52.0
FRESH MEADOWS	45.0	503.0	291.0
GLEN OAKS	5.0	30.0	49.0
HOLLIS	33.0	342.0	143.0
HOWARD BEACH	31.0	167.0	138.0
Howard Beach	0.0	1.0	0.0
JACKSON HEIGHTS	42.0	568.0	29.0
JAMAICA	229.0	2817.0	953.0
KEW GARDENS	19.0	313.0	14.0
LITTLE NECK	15.0	121.0	61.0
LONG ISLAND CITY	30.0	772.0	195.0
Long Island City	0.0	34.0	4.0
MASPETH	36.0	732.0	434.0
MIDDLE VILLAGE	22.0	457.0	296.0
NEW HYDE PARK	1.0	53.0	14.0
NEW YORK	1525.0	2070.0	537.0
OAKLAND GARDENS	19.0	132.0	86.0
OZONE PARK	48.0	1259.0	420.0

QUEENS	0.0	2.0	1.0
QUEENS VILLAGE	66.0	585.0	370.0
REGO PARK	26.0	611.0	81.0
RICHMOND HILL	32.0	871.0	166.0
RIDGEWOOD	117.0	1693.0	330.0
ROCKAWAY PARK	30.0	70.0	9.0
ROSEDALE	33.0	211.0	208.0
SAINT ALBANS	30.0	244.0	202.0
SOUTH OZONE PARK	55.0	942.0	358.0
SOUTH RICHMOND HILL	26.0	1548.0	289.0
SPRINGFIELD GARDENS	24.0	262.0	210.0
STATEN ISLAND	557.0	2142.0	1766.0
SUNNYSIDE	35.0	206.0	10.0
WHITESTONE	28.0	208.0	227.0
WOODHAVEN	45.0	1059.0	308.0
WOODSIDE	69.0	1613.0	247.0
Woodside	0.0	11.0	2.0

Complaint Type City	Disorderly Youth	Drinking	Graffiti	\
ARVERNE	2.0	1.0	1.0	
ASTORIA	3.0	35.0	4.0	
Astoria	0.0	0.0	0.0	
BAYSIDE	1.0	1.0	3.0	
BELLEROSE	2.0	1.0	0.0	
BREEZY POINT	0.0	1.0	0.0	
BRONX	63.0	188.0	9.0	
BROOKLYN	72.0	257.0	43.0	
CAMBRIA HEIGHTS	0.0	0.0	0.0	
CENTRAL PARK	0.0	0.0	0.0	
COLLEGE POINT	1.0	0.0	1.0	
CORONA	6.0	33.0	2.0	
EAST ELMHURST	1.0	9.0	3.0	
ELMHURST	2.0	13.0	0.0	
East Elmhurst	0.0	0.0	0.0	
FAR ROCKAWAY	1.0	4.0	0.0	
FLORAL PARK	1.0	1.0	0.0	
FLUSHING	2.0	40.0	4.0	
FOREST HILLS	1.0	1.0	3.0	
FRESH MEADOWS	0.0	2.0	0.0	
GLEN OAKS	0.0	0.0	0.0	
HOLLIS	1.0	3.0	0.0	
HOWARD BEACH	1.0	4.0	0.0	
Howard Beach	0.0	0.0	0.0	
JACKSON HEIGHTS	0.0	9.0	0.0	
JAMAICA	8.0	34.0	3.0	
KEW GARDENS	0.0	1.0	0.0	

LITTLE NECK	2.0	1.0	0.0
LONG ISLAND CITY	1.0	7.0	2.0
Long Island City	0.0	0.0	0.0
MASPETH	2.0	9.0	0.0
MIDDLE VILLAGE	0.0	2.0	0.0
NEW HYDE PARK	0.0	0.0	0.0
NEW YORK	69.0	295.0	22.0
OAKLAND GARDENS	1.0	1.0	0.0
OZONE PARK	4.0	19.0	0.0
QUEENS	0.0	0.0	0.0
QUEENS VILLAGE	0.0	5.0	1.0
REGO PARK	0.0	4.0	1.0
RICHMOND HILL	0.0	9.0	1.0
RIDGEWOOD	3.0	10.0	2.0
ROCKAWAY PARK	4.0	20.0	0.0
ROSEDALE	0.0	2.0	1.0
SAINT ALBANS	1.0	3.0	0.0
SOUTH OZONE PARK	2.0	13.0	0.0
SOUTH RICHMOND HILL	2.0	23.0	0.0
SPRINGFIELD GARDENS	0.0	6.0	0.0
STATEN ISLAND	23.0	175.0	2.0
SUNNYSIDE	2.0	10.0	1.0
WHITESTONE	1.0	2.0	1.0
WOODHAVEN	0.0	3.0	0.0
WOODSIDE	1.0	15.0	3.0
Woodside	0.0	0.0	0.0

Complaint Type	Homeless Encampment	Illegal Parking	Noise - Commercial	\
City				
ARVERNE	4.0	58.0	2.0	
ASTORIA	32.0	1068.0	1293.0	
Astoria	0.0	213.0	261.0	
BAYSIDE	2.0	514.0	40.0	
BELLEROSE	1.0	106.0	37.0	
BREEZY POINT	0.0	15.0	4.0	
BRONX	247.0	7859.0	2433.0	
BROOKLYN	857.0	27461.0	11458.0	
CAMBRIA HEIGHTS	5.0	76.0	12.0	
CENTRAL PARK	0.0	2.0	0.0	
COLLEGE POINT	3.0	352.0	35.0	
CORONA	19.0	660.0	248.0	
EAST ELMHURST	2.0	876.0	35.0	
ELMHURST	32.0	621.0	81.0	
East Elmhurst	0.0	13.0	0.0	
FAR ROCKAWAY	14.0	295.0	48.0	
FLORAL PARK	0.0	64.0	3.0	
FLUSHING	26.0	1829.0	175.0	

FOREST HILLS	18.0	505.0	141.0
FRESH MEADOWS	5.0	885.0	14.0
GLEN OAKS	0.0	74.0	78.0
HOLLIS	9.0	151.0	25.0
HOWARD BEACH	3.0	281.0	258.0
Howard Beach	0.0	0.0	0.0
JACKSON HEIGHTS	11.0	183.0	463.0
JAMAICA	79.0	1421.0	429.0
KEW GARDENS	5.0	212.0	164.0
LITTLE NECK	0.0	249.0	76.0
LONG ISLAND CITY	10.0	794.0	230.0
Long Island City	0.0	52.0	18.0
MASPETH	10.0	976.0	52.0
MIDDLE VILLAGE	5.0	877.0	10.0
NEW HYDE PARK	0.0	28.0	0.0
NEW YORK	2775.0	12125.0	14544.0
OAKLAND GARDENS	1.0	263.0	0.0
OZONE PARK	6.0	619.0	115.0
QUEENS	2.0	8.0	6.0
QUEENS VILLAGE	15.0	578.0	43.0
REGO PARK	6.0	537.0	79.0
RICHMOND HILL	28.0	394.0	216.0
RIDGEWOOD	23.0	1842.0	398.0
ROCKAWAY PARK	4.0	317.0	63.0
ROSEDALE	4.0	277.0	25.0
SAINT ALBANS	8.0	181.0	29.0
SOUTH OZONE PARK	4.0	494.0	70.0
SOUTH RICHMOND HILL	11.0	462.0	198.0
SPRINGFIELD GARDENS	5.0	238.0	36.0
STATEN ISLAND	71.0	4886.0	677.0
SUNNYSIDE	11.0	122.0	161.0
WHITESTONE	0.0	525.0	16.0
WOODHAVEN	9.0	682.0	175.0
WOODSIDE	33.0	891.0	209.0
Woodside	0.0	100.0	2.0

Complaint Type	Noise - House of Worship	…	Noise - Vehicle	\
City		…		
ARVERNE	11.0	…	7.0	
ASTORIA	19.0	…	204.0	
Astoria	0.0	…	0.0	
BAYSIDE	2.0	…	16.0	
BELLEROSE	1.0	…	10.0	
BREEZY POINT	0.0	…	1.0	
BRONX	79.0	…	3396.0	
BROOKLYN	340.0	…	5176.0	
CAMBRIA HEIGHTS	2.0	…	77.0	

```
CENTRAL PARK                    0.0  …     0.0
COLLEGE POINT                   0.0  …   131.0
CORONA                          3.0  …   100.0
EAST ELMHURST                  18.0  …    61.0
ELMHURST                        5.0  …    47.0
East Elmhurst                   0.0  …     0.0
FAR ROCKAWAY                    1.0  …    77.0
FLORAL PARK                     0.0  …     2.0
FLUSHING                        5.0  …   129.0
FOREST HILLS                    1.0  …    57.0
FRESH MEADOWS                   0.0  …    88.0
GLEN OAKS                       0.0  …     4.0
HOLLIS                        187.0  …    47.0
HOWARD BEACH                    1.0  …     5.0
Howard Beach                    0.0  …     0.0
JACKSON HEIGHTS                 2.0  …    58.0
JAMAICA                        13.0  …   302.0
KEW GARDENS                     1.0  …    18.0
LITTLE NECK                     0.0  …     5.0
LONG ISLAND CITY                0.0  …   107.0
Long Island City                0.0  …     0.0
MASPETH                         2.0  …    19.0
MIDDLE VILLAGE                  0.0  …    42.0
NEW HYDE PARK                   0.0  …     2.0
NEW YORK                      194.0  …  5484.0
OAKLAND GARDENS                 0.0  …     5.0
OZONE PARK                      3.0  …    71.0
QUEENS                          1.0  …     2.0
QUEENS VILLAGE                  2.0  …    41.0
REGO PARK                       1.0  …    43.0
RICHMOND HILL                   0.0  …    64.0
RIDGEWOOD                       2.0  …   217.0
ROCKAWAY PARK                   0.0  …    27.0
ROSEDALE                        2.0  …    25.0
SAINT ALBANS                    1.0  …    41.0
SOUTH OZONE PARK                3.0  …    85.0
SOUTH RICHMOND HILL             3.0  …    81.0
SPRINGFIELD GARDENS             1.0  …    42.0
STATEN ISLAND                  17.0  …   356.0
SUNNYSIDE                       0.0  …    48.0
WHITESTONE                      0.0  …    28.0
WOODHAVEN                       3.0  …    74.0
WOODSIDE                        3.0  …   105.0
Woodside                        0.0  …     0.0

Complaint Type       Panhandling  Urinating in Public  Vending  \
City
```

ARVERNE	1.0	1.0	1.0
ASTORIA	1.0	9.0	54.0
Astoria	0.0	0.0	0.0
BAYSIDE	0.0	0.0	2.0
BELLEROSE	1.0	1.0	0.0
BREEZY POINT	0.0	0.0	0.0
BRONX	19.0	51.0	379.0
BROOKLYN	49.0	136.0	515.0
CAMBRIA HEIGHTS	0.0	0.0	0.0
CENTRAL PARK	0.0	0.0	0.0
COLLEGE POINT	0.0	0.0	1.0
CORONA	1.0	7.0	62.0
EAST ELMHURST	0.0	5.0	9.0
ELMHURST	3.0	10.0	21.0
East Elmhurst	0.0	0.0	0.0
FAR ROCKAWAY	0.0	1.0	9.0
FLORAL PARK	0.0	0.0	0.0
FLUSHING	2.0	12.0	33.0
FOREST HILLS	5.0	2.0	10.0
FRESH MEADOWS	1.0	1.0	1.0
GLEN OAKS	0.0	2.0	18.0
HOLLIS	0.0	2.0	0.0
HOWARD BEACH	1.0	0.0	5.0
Howard Beach	0.0	0.0	0.0
JACKSON HEIGHTS	1.0	2.0	78.0
JAMAICA	3.0	33.0	20.0
KEW GARDENS	0.0	3.0	1.0
LITTLE NECK	0.0	1.0	0.0
LONG ISLAND CITY	2.0	3.0	30.0
Long Island City	0.0	0.0	0.0
MASPETH	0.0	2.0	6.0
MIDDLE VILLAGE	0.0	0.0	0.0
NEW HYDE PARK	0.0	0.0	0.0
NEW YORK	193.0	251.0	2398.0
OAKLAND GARDENS	0.0	0.0	2.0
OZONE PARK	7.0	4.0	1.0
QUEENS	0.0	1.0	0.0
QUEENS VILLAGE	1.0	5.0	2.0
REGO PARK	0.0	1.0	3.0
RICHMOND HILL	0.0	5.0	13.0
RIDGEWOOD	0.0	8.0	8.0
ROCKAWAY PARK	0.0	1.0	2.0
ROSEDALE	0.0	0.0	16.0
SAINT ALBANS	0.0	1.0	2.0
SOUTH OZONE PARK	0.0	2.0	5.0
SOUTH RICHMOND HILL	0.0	0.0	24.0
SPRINGFIELD GARDENS	2.0	3.0	1.0

STATEN ISLAND	12.0	14.0	25.0
SUNNYSIDE	0.0	2.0	15.0
WHITESTONE	0.0	0.0	1.0
WOODHAVEN	0.0	2.0	6.0
WOODSIDE	0.0	8.0	15.0
Woodside	0.0	0.0	0.0

Complaint Type	Bike/Roller/Skate Chronic	Illegal Fireworks	\
City			
ARVERNE	0.0	0.0	
ASTORIA	15.0	4.0	
Astoria	0.0	0.0	
BAYSIDE	0.0	0.0	
BELLEROSE	1.0	1.0	
BREEZY POINT	0.0	0.0	
BRONX	20.0	24.0	
BROOKLYN	111.0	61.0	
CAMBRIA HEIGHTS	0.0	1.0	
CENTRAL PARK	0.0	0.0	
COLLEGE POINT	0.0	0.0	
CORONA	0.0	0.0	
EAST ELMHURST	1.0	0.0	
ELMHURST	2.0	1.0	
East Elmhurst	0.0	0.0	
FAR ROCKAWAY	0.0	0.0	
FLORAL PARK	0.0	0.0	
FLUSHING	3.0	2.0	
FOREST HILLS	5.0	1.0	
FRESH MEADOWS	0.0	0.0	
GLEN OAKS	0.0	0.0	
HOLLIS	0.0	0.0	
HOWARD BEACH	1.0	3.0	
Howard Beach	0.0	0.0	
JACKSON HEIGHTS	2.0	1.0	
JAMAICA	2.0	4.0	
KEW GARDENS	0.0	0.0	
LITTLE NECK	0.0	0.0	
LONG ISLAND CITY	3.0	0.0	
Long Island City	0.0	0.0	
MASPETH	1.0	1.0	
MIDDLE VILLAGE	1.0	0.0	
NEW HYDE PARK	0.0	0.0	
NEW YORK	225.0	36.0	
OAKLAND GARDENS	2.0	0.0	
OZONE PARK	1.0	1.0	
QUEENS	0.0	0.0	
QUEENS VILLAGE	0.0	5.0	

REGO PARK	0.0	0.0
RICHMOND HILL	0.0	4.0
RIDGEWOOD	3.0	2.0
ROCKAWAY PARK	0.0	0.0
ROSEDALE	2.0	0.0
SAINT ALBANS	0.0	0.0
SOUTH OZONE PARK	1.0	1.0
SOUTH RICHMOND HILL	1.0	2.0
SPRINGFIELD GARDENS	0.0	1.0
STATEN ISLAND	7.0	10.0
SUNNYSIDE	2.0	0.0
WHITESTONE	4.0	1.0
WOODHAVEN	2.0	0.0
WOODSIDE	4.0	1.0
Woodside	0.0	0.0

Complaint Type City	Posting Advertisement	Traffic	Squeegee	\
ARVERNE	0.0	0.0	0.0	
ASTORIA	1.0	47.0	0.0	
Astoria	0.0	0.0	0.0	
BAYSIDE	0.0	9.0	0.0	
BELLEROSE	1.0	7.0	0.0	
BREEZY POINT	0.0	0.0	0.0	
BRONX	17.0	355.0	0.0	
BROOKLYN	45.0	1085.0	0.0	
CAMBRIA HEIGHTS	0.0	6.0	0.0	
CENTRAL PARK	0.0	0.0	0.0	
COLLEGE POINT	0.0	14.0	0.0	
CORONA	1.0	12.0	0.0	
EAST ELMHURST	1.0	20.0	0.0	
ELMHURST	1.0	14.0	0.0	
East Elmhurst	0.0	0.0	0.0	
FAR ROCKAWAY	0.0	10.0	0.0	
FLORAL PARK	0.0	0.0	0.0	
FLUSHING	1.0	47.0	0.0	
FOREST HILLS	3.0	60.0	0.0	
FRESH MEADOWS	0.0	13.0	0.0	
GLEN OAKS	0.0	3.0	0.0	
HOLLIS	0.0	11.0	0.0	
HOWARD BEACH	0.0	9.0	0.0	
Howard Beach	0.0	0.0	0.0	
JACKSON HEIGHTS	1.0	13.0	0.0	
JAMAICA	7.0	560.0	0.0	
KEW GARDENS	0.0	10.0	0.0	
LITTLE NECK	1.0	17.0	0.0	
LONG ISLAND CITY	1.0	72.0	0.0	

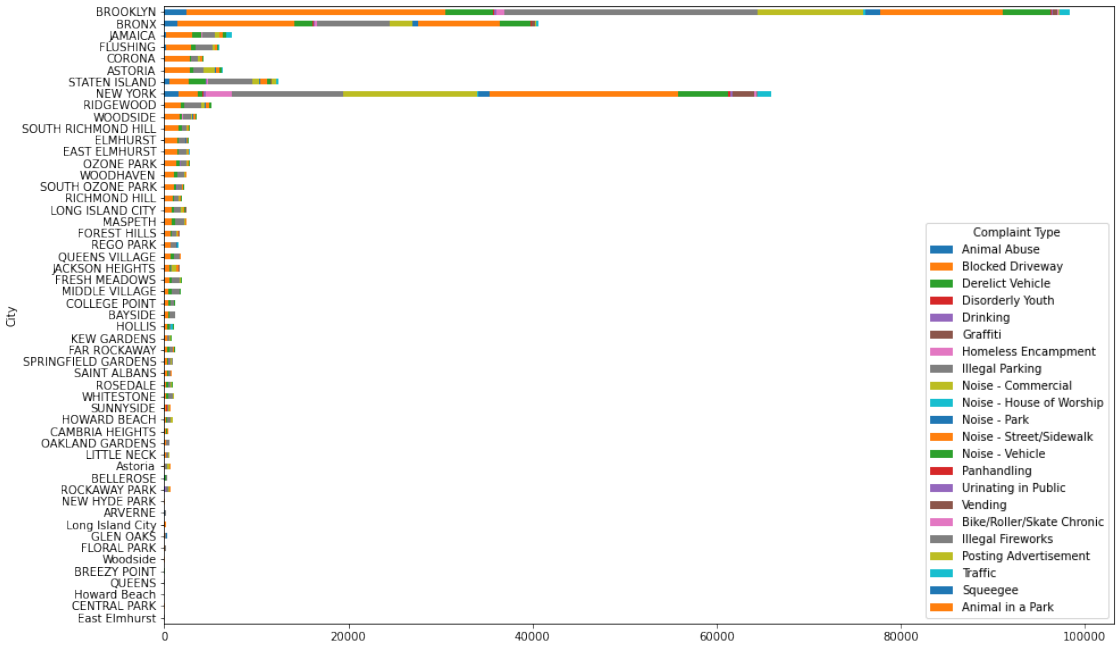
Long Island City	0.0	0.0	0.0
MASPETH	0.0	55.0	0.0
MIDDLE VILLAGE	0.0	12.0	0.0
NEW HYDE PARK	0.0	0.0	0.0
NEW YORK	41.0	1548.0	4.0
OAKLAND GARDENS	0.0	6.0	0.0
OZONE PARK	3.0	19.0	0.0
QUEENS	0.0	2.0	0.0
QUEENS VILLAGE	1.0	26.0	0.0
REGO PARK	0.0	14.0	0.0
RICHMOND HILL	1.0	7.0	0.0
RIDGEWOOD	1.0	42.0	0.0
ROCKAWAY PARK	0.0	7.0	0.0
ROSEDALE	0.0	23.0	0.0
SAINT ALBANS	0.0	11.0	0.0
SOUTH OZONE PARK	1.0	28.0	0.0
SOUTH RICHMOND HILL	0.0	11.0	0.0
SPRINGFIELD GARDENS	2.0	11.0	0.0
STATEN ISLAND	515.0	200.0	0.0
SUNNYSIDE	2.0	16.0	0.0
WHITESTONE	0.0	17.0	0.0
WOODHAVEN	0.0	6.0	0.0
WOODSIDE	0.0	39.0	0.0
Woodside	0.0	0.0	0.0

Complaint Type City	Animal in a Park
ARVERNE	0.0
ASTORIA	0.0
Astoria	0.0
BAYSIDE	0.0
BELLEROSE	0.0
BREEZY POINT	0.0
BRONX	0.0
BROOKLYN	0.0
CAMBRIA HEIGHTS	0.0
CENTRAL PARK	0.0
COLLEGE POINT	0.0
CORONA	0.0
EAST ELMHURST	0.0
ELMHURST	0.0
East Elmhurst	0.0
FAR ROCKAWAY	0.0
FLORAL PARK	0.0
FLUSHING	0.0
FOREST HILLS	0.0
FRESH MEADOWS	0.0

```
GLEN OAKS                       0.0
HOLLIS                          0.0
HOWARD BEACH                    0.0
Howard Beach                    0.0
JACKSON HEIGHTS                 0.0
JAMAICA                         0.0
KEW GARDENS                     0.0
LITTLE NECK                     0.0
LONG ISLAND CITY                0.0
Long Island City                0.0
MASPETH                         0.0
MIDDLE VILLAGE                  0.0
NEW HYDE PARK                   0.0
NEW YORK                        0.0
OAKLAND GARDENS                 0.0
OZONE PARK                      0.0
QUEENS                          1.0
QUEENS VILLAGE                  0.0
REGO PARK                       0.0
RICHMOND HILL                   0.0
RIDGEWOOD                       0.0
ROCKAWAY PARK                   0.0
ROSEDALE                        0.0
SAINT ALBANS                    0.0
SOUTH OZONE PARK                0.0
SOUTH RICHMOND HILL             0.0
SPRINGFIELD GARDENS             0.0
STATEN ISLAND                   0.0
SUNNYSIDE                       0.0
WHITESTONE                      0.0
WOODHAVEN                       0.0
WOODSIDE                        0.0
Woodside                        0.0

[53 rows x 22 columns]
```

[81]:
```
nyc1.sort_values('Blocked Driveway',axis=0,ascending=True).
↪plot(kind="barh",stacked=True,figsize=(15,10))
```

[81]: <AxesSubplot:ylabel='City'>



1.0.1 Brooklyn has maximum complaint types.

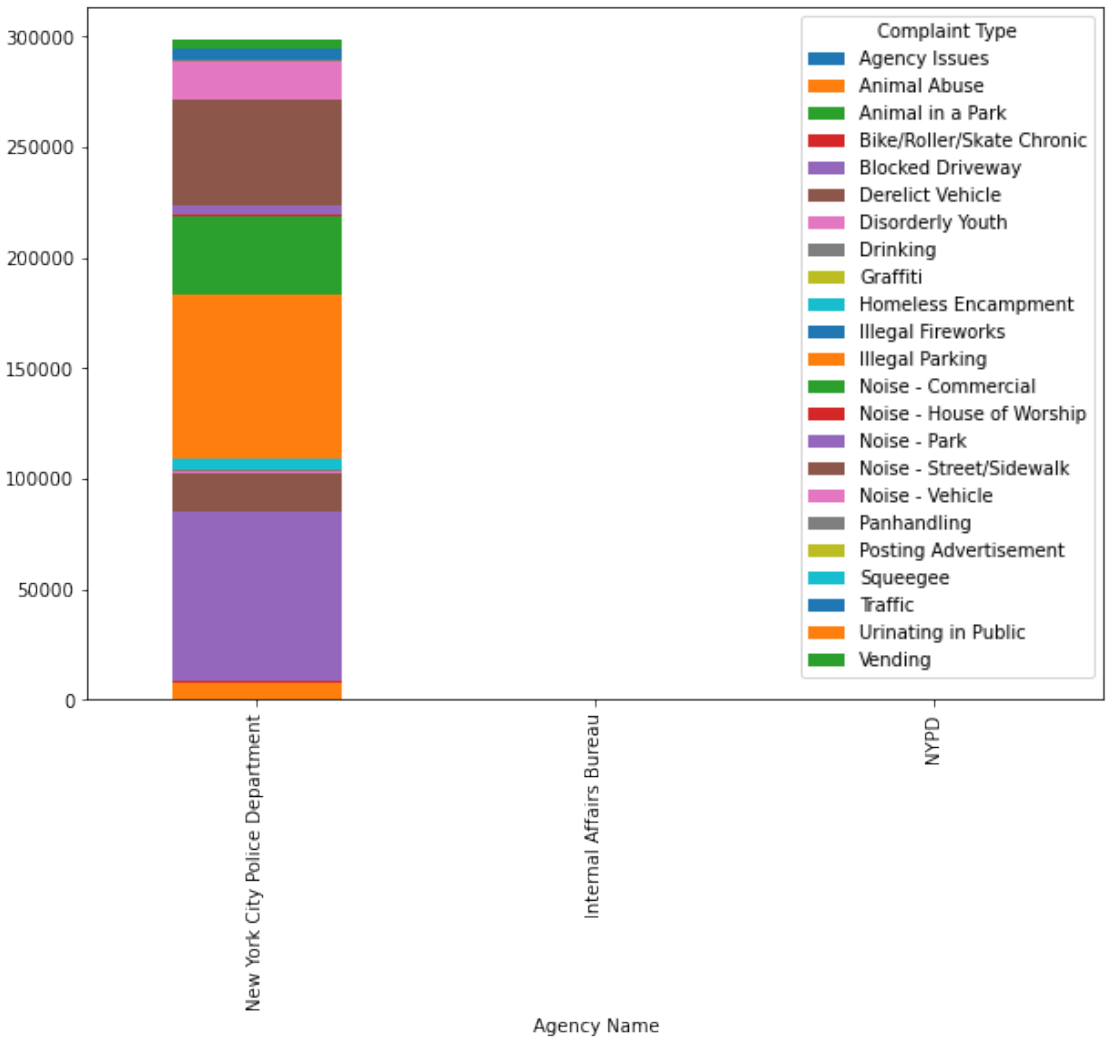
[91]:
```
nyc2=nyc.groupby(['Agency Name','Complaint Type']).size().unstack().head(50)
nyc2
```

[91]:
```
Complaint Type                  Agency Issues  Animal Abuse  \
Agency Name
Internal Affairs Bureau                   6.0           NaN
NYPD                                      NaN           NaN
New York City Police Department           NaN        7768.0

Complaint Type                  Animal in a Park  Bike/Roller/Skate Chronic  \
Agency Name
Internal Affairs Bureau                      NaN                        NaN
NYPD                                         NaN                        NaN
New York City Police Department              1.0                      424.0

Complaint Type                  Blocked Driveway  Derelict Vehicle  \
Agency Name
Internal Affairs Bureau                      NaN               NaN
NYPD                                         1.0               NaN
New York City Police Department          76809.0           17588.0

Complaint Type                  Disorderly Youth  Drinking  Graffiti  \
Agency Name
Internal Affairs Bureau                      NaN       NaN       NaN
```

```
NYPD                                          NaN       NaN       NaN
New York City Police Department             286.0    1275.0     113.0

Complaint Type                  Homeless Encampment  …  \
Agency Name                                          …
Internal Affairs Bureau                         NaN  …
NYPD                                            NaN  …
New York City Police Department                4416.0  …

Complaint Type                  Noise - House of Worship  Noise - Park  \
Agency Name
Internal Affairs Bureau                              NaN           NaN
NYPD                                                 NaN           NaN
New York City Police Department                    929.0        4022.0

Complaint Type                  Noise - Street/Sidewalk  Noise - Vehicle  \
Agency Name
Internal Affairs Bureau                             NaN              NaN
NYPD                                                NaN              NaN
New York City Police Department                 48076.0          17033.0

Complaint Type                  Panhandling  Posting Advertisement  Squeegee  \
Agency Name
Internal Affairs Bureau                 NaN                    NaN       NaN
NYPD                                    NaN                    NaN       NaN
New York City Police Department       305.0                  648.0       4.0

Complaint Type                  Traffic  Urinating in Public  Vending
Agency Name
Internal Affairs Bureau             NaN                  NaN      NaN
NYPD                                NaN                  NaN      NaN
New York City Police Department  4496.0                592.0   3795.0

[3 rows x 23 columns]
```

[98]:
```
nyc2.sort_values('Animal Abuse',axis=0,ascending=True).
↪plot(kind="bar",stacked=True,figsize=(10,7))
```

[98]:
```
<AxesSubplot:xlabel='Agency Name'>
```

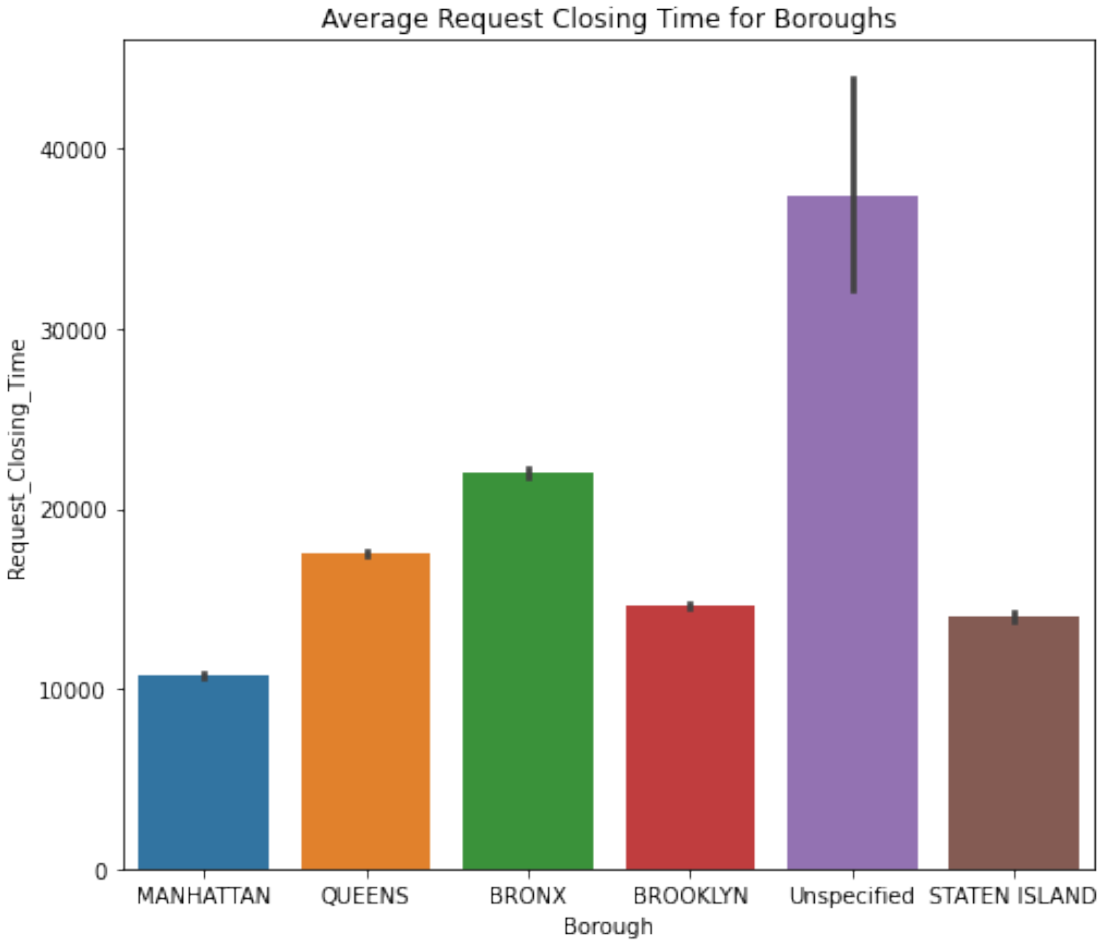


[101]:
```
nyc['Request_Closing_Time']
```

[101]:
```
0          3315.0
1          5176.0
2         17491.0
3         27914.0
4         12422.0
             ...
300692     2309.0
300694     7231.0
300695    11237.0
300696    14733.0
300697    14929.0
Name: Request_Closing_Time, Length: 298534, dtype: float64
```

[108]:
```
plt.figure(figsize=(8,7))
sns.barplot(x='Borough', y='Request_Closing_Time', data=nyc)
plt.title('Average Request Closing Time for Boroughs')
```

[108]:
```
Text(0.5, 1.0, 'Average Request Closing Time for Boroughs')
```

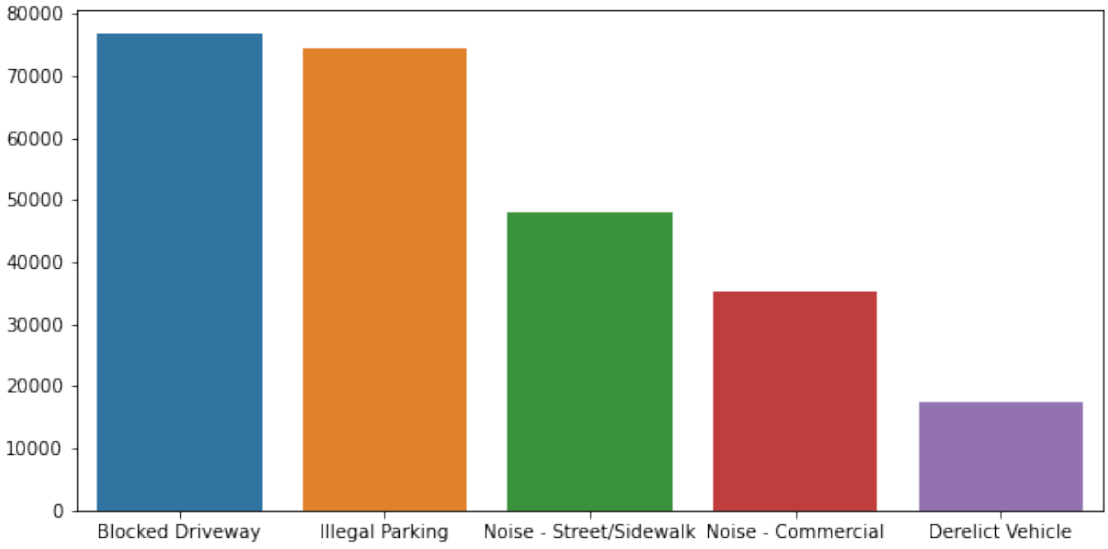


[125]:
```
nyc3=nyc['Complaint Type'].value_counts()
nyc3.nlargest()
```

[125]:
```
Blocked Driveway           76810
Illegal Parking            74532
Noise - Street/Sidewalk    48076
Noise - Commercial         35247
Derelict Vehicle           17588
Name: Complaint Type, dtype: int64
```

[119]:
```
plt.figure(figsize=(10,5))
sns.barplot(x=nyc3.nlargest().index, y= nyc3.nlargest().values)
```

[119]: <AxesSubplot:>



Order the complaint types based on the average 'Request_Closing_Time' for different location

[134]:
```
nyc.groupby(['City','Complaint Type'])['Request_Closing_Time'].mean().unstack().
↪fillna(0).head(3)
```

[134]:
```
Complaint Type  Animal Abuse  Blocked Driveway  Derelict Vehicle  \
City
ARVERNE          7753.052632       9093.485714      10685.592593
ASTORIA         18000.608000      17338.024064      34881.299145
Astoria             0.000000      17692.663793      22450.166667

Complaint Type  Disorderly Youth      Drinking  Graffiti  Homeless Encampment  \
City
ARVERNE              12928.500000    859.000000   5520.00            6533.2500
ASTORIA              10449.333333  17000.714286  50742.25           17703.3125
Astoria                  0.000000      0.000000      0.00               0.0000

Complaint Type  Illegal Parking  Noise - Commercial  Noise - House of Worship  \
City
ARVERNE             8338.913793         8234.000000               5623.909091
ASTORIA            17400.207865        11278.904872               7280.000000
Astoria            16960.643192        12750.804598                  0.000000

Complaint Type  …  Noise - Vehicle  Panhandling  Urinating in Public  \
```

```
City            …
ARVERNE         …      6695.571429       3720.0          2491.000000
ASTORIA         …     12633.034314       4140.0         16652.555556
Astoria         …         0.000000          0.0             0.000000

Complaint Type  Vending  Bike/Roller/Skate Chronic  Illegal Fireworks  \
City
ARVERNE          1740.0                   0.000000               0.0
ASTORIA         17767.5                6261.533333            9984.5
Astoria             0.0                   0.000000               0.0

Complaint Type  Posting Advertisement       Traffic  Squeegee  \
City
ARVERNE                           0.0      0.000000       0.0
ASTORIA                       21132.0  19476.659574       0.0
Astoria                           0.0      0.000000       0.0

Complaint Type  Animal in a Park
City
ARVERNE                     0.0
ASTORIA                     0.0
Astoria                     0.0

[3 rows x 22 columns]
```

Normality check

[135]:
```
from scipy.stats import shapiro
```

[147]:
```
stats,p=shapiro(nyc['Request_Closing_Time'])
print(stats)
print(p)
```

```
0.5144980549812317
0.0
```

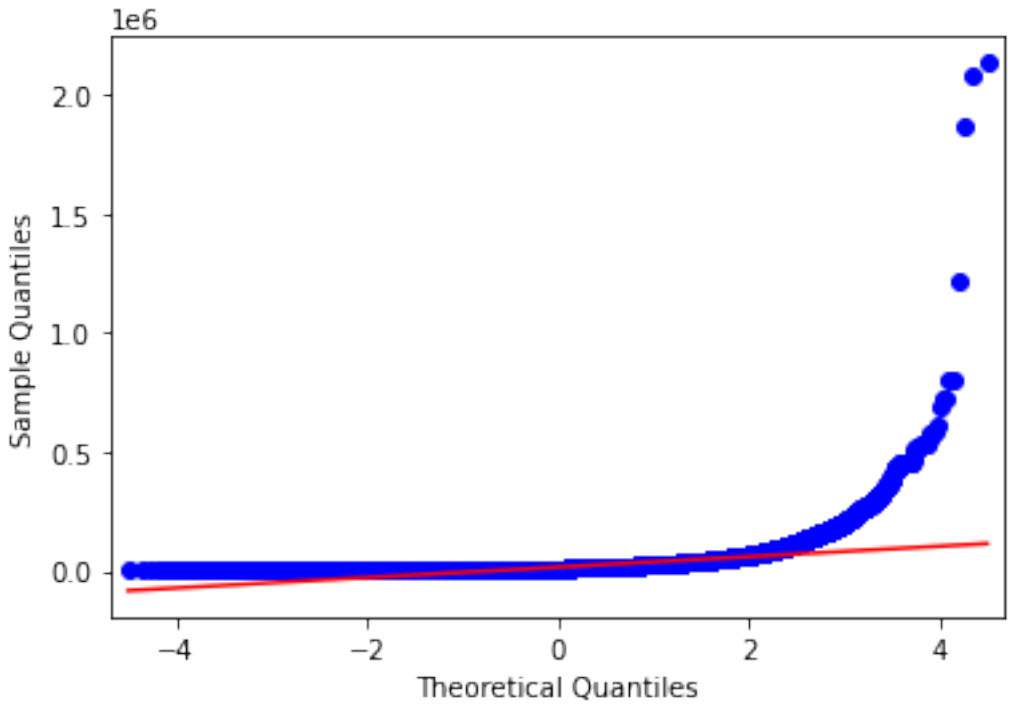
```
C:\Users\hp\anaconda3\lib\site-packages\scipy\stats\morestats.py:1681:
UserWarning: p-value may not be accurate for N > 5000.
  warnings.warn("p-value may not be accurate for N > 5000.")
```

As p-value is less than 0.05,we can reject null hypothesis and it shows that it's not normally distributed.

[148]:
```
import statsmodels.api as sm
import pylab
```

[171]:
```
sm.qqplot(nyc['Request_Closing_Time'],line='s')
pylab.show
```

[171]: <function matplotlib.pyplot.show(close=None, block=None)>



QQplot shows that the data is not normally distributed.

[157]:
```
complaint_types=nyc['Complaint Type'].unique()
complaint_types
```

[157]:
```
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)
```

[156]:
```
len(complaint_types)
```

[156]: 23

[178]:
```
dataset={}
for i in complaint_types:
    dataset[i]= np.log(nyc[nyc['Complaint Type']==i]['Request_Closing_Time'])
```

[179]:
```
dataset.keys()
```

[179]:
```
dict_keys(['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'])
```

ANOVA Analysis (Checking for top 5 complaints)

Null Hypothesis: The average response time across complaint types is not different

Alternate Hypothesis: The average response time across complaint types is different

[180]:
```
from scipy.stats import f_oneway
stat,p = f_oneway(dataset['Noise - Street/Sidewalk'], dataset['Blocked␣
↪Driveway'], dataset['Illegal Parking'], dataset['Derelict Vehicle'],
                  dataset['Noise - Commercial'])

alpha=0.05
if p>0.05:
    print('Null Hypothesis is accepted')
else:
    print('Null hypothesis is rejected')
```

```
Null hypothesis is rejected
```

[181]:
```
nyc4=nyc[['Complaint Type','Location','Latitude','Longitude','City','Borough']]
nyc4.head(2)
```

[181]:

	Complaint Type	Location	Latitude	Longitude	City	Borough
0	Noise - Street/Sidewalk	(40.86568153633767, -73.92350095571744)	40.865682	-73.923501	NEW YORK	MANHATTAN
1	Blocked Driveway	(40.775945312321085, -73.91509393898605)	40.775945	-73.915094	ASTORIA	QUEENS

[182]:
```
nyc4['Complaint Type']=nyc4['Complaint Type'].astype('category').cat.codes
nyc4['City']= nyc4['City'].astype('category').cat.codes
nyc4['Borough']= nyc4['Borough'].astype('category').cat.codes
```

```
<ipython-input-182-450965263652>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
```

```
  nyc4['Complaint Type']=nyc4['Complaint Type'].astype('category').cat.codes
<ipython-input-182-450965263652>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  nyc4['City']= nyc4['City'].astype('category').cat.codes
<ipython-input-182-450965263652>:3: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  nyc4['Borough']= nyc4['Borough'].astype('category').cat.codes
```

[184]:
```
nyc4.dtypes
```

[184]:
```
Complaint Type       int8
Location           object
Latitude          float64
Longitude         float64
City                 int8
Borough              int8
dtype: object
```

[185]:
```
nyc4.head(2)
```

[185]:
```
   Complaint Type                                  Location   Latitude  \
0              15   (40.86568153633767, -73.92350095571744)  40.865682
1               4  (40.775945312321085, -73.91509393898605)  40.775945

   Longitude  City  Borough
0 -73.923501    33        2
1 -73.915094     1        3
```

[187]:
```
nyc4.corr()
```

[187]:
```
                Complaint Type  Latitude  Longitude      City   Borough
Complaint Type        1.000000  0.152829  -0.181022  0.094572 -0.065506
Latitude              0.152829  1.000000   0.364962 -0.000568 -0.249488
Longitude            -0.181022  0.364962   1.000000 -0.123858  0.021363
City                  0.094572 -0.000568  -0.123858  1.000000  0.705705
Borough              -0.065506 -0.249488   0.021363  0.705705  1.000000
```

From the first line,it can be seen that the complaint types does not depend upon the location.

2 THANK YOU