# Customer Service requests analysis

May 8, 2023

Customer Service Requests Analysis. Course-end Project 1

DESCRIPTION

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

Note: Download 311-service-requests-nyc.zip file using the link given in the Customer Service Requests Analysis project problem statement and extract the 311_Service_Requests_from_2010_to_Present.csv file

[1]:
```
import pandas as pd
import numpy as np
import scipy.stats as stats
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
import warnings
```

[2]:
```
pd.set_option('display.max_columns',30)
pd.set_option('display.max_rows',800)

warnings.simplefilter('ignore')
```

[3]:
```
data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
↪csv')
data
```

[3]:

| | Unique Key | Created Date | Closed Date | Agency | \ |
|---|---|---|---|---|---|
| 0 | 32310363 | 12/31/2015 11:59:45 PM | 01/01/2016 12:55:15 AM | NYPD | |
| 1 | 32309934 | 12/31/2015 11:59:44 PM | 01/01/2016 01:26:57 AM | NYPD | |
| 2 | 32309159 | 12/31/2015 11:59:29 PM | 01/01/2016 04:51:03 AM | NYPD | |
| 3 | 32305098 | 12/31/2015 11:57:46 PM | 01/01/2016 07:43:13 AM | NYPD | |
| 4 | 32306529 | 12/31/2015 11:56:58 PM | 01/01/2016 03:24:42 AM | NYPD | |
| … | … | … | … | … | |
| 191402 | 31024399 | 07/07/2015 09:47:21 PM | 07/08/2015 12:32:03 AM | NYPD | |
| 191403 | 31025431 | 07/07/2015 09:43:41 PM | 07/07/2015 11:13:32 PM | NYPD | |
| 191404 | 31023497 | 07/07/2015 09:42:44 PM | 07/08/2015 02:59:07 AM | NYPD | |

```
191405    31027084  07/07/2015 09:42:10 PM  07/08/2015 01:34:24 AM   NYPD
191406    31026613  07/07/2015 09:42:09 PM  07/07/2015 11:13:32 PM   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
…                                   …                       …
191402  New York City Police Department       Noise - Commercial
191403  New York City Police Department  Noise - Street/Sidewalk
191404  New York City Police Department  Noise - Street/Sidewalk
191405  New York City Police Department         Blocked Driveway
191406  New York City Police Department  Noise - Street/Sidewalk

                         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
…                                …               …           …
191402             Banging/Pounding  Store/Commercial       11207.0
191403             Loud Music/Party   Street/Sidewalk       10009.0
191404             Loud Music/Party   Street/Sidewalk       10473.0
191405                   No Access   Street/Sidewalk       11249.0
191406             Loud Music/Party   Street/Sidewalk       10009.0

             Incident Address       Street Name    Cross Street 1  \
0         71 VERMILYEA AVENUE  VERMILYEA AVENUE    ACADEMY STREET
1             27-07 23 AVENUE         23 AVENUE         27 STREET
2       2897 VALENTINE AVENUE  VALENTINE AVENUE   EAST 198 STREET
3         2940 BAISLEY AVENUE    BAISLEY AVENUE     EDISON AVENUE
4               87-14 57 ROAD           57 ROAD    SEABURY STREET
…                         …               …               …
191402     258 JAMAICA AVENUE    JAMAICA AVENUE  VAN SICLEN COURT
191403           134 AVENUE D          AVENUE D     EAST 9 STREET
191404                    NaN               NaN               NaN
191405       376 WYTHE AVENUE      WYTHE AVENUE    SOUTH 3 STREET
191406     464 EAST 10 STREET    EAST 10 STREET          AVENUE D

         Cross Street 2 Intersection Street 1 Intersection Street 2  …  \
0       WEST 204 STREET                   NaN                   NaN  …
1             28 STREET                   NaN                   NaN  …
2       EAST 199 STREET                   NaN                   NaN  …
3              B STREET                   NaN                   NaN  …
```

```
4          HOFFMAN DRIVE                    NaN                    NaN  …
…                  …                      …                      …  …
191402   HENDRIX STREET                     NaN                    NaN  …
191403   EAST 10 STREET                     NaN                    NaN  …
191404              NaN      UNDERHILL AVENUE      PATTERSON AVENUE  …
191405   SOUTH 4 STREET                     NaN                    NaN  …
191406      F D R DRIVE                     NaN                    NaN  …

       School Not Found School or Citywide Complaint Vehicle Type  \
0                     N                          NaN          NaN
1                     N                          NaN          NaN
2                     N                          NaN          NaN
3                     N                          NaN          NaN
4                     N                          NaN          NaN
…                   …                            …          …
191402                N                          NaN          NaN
191403                N                          NaN          NaN
191404                N                          NaN          NaN
191405                N                          NaN          NaN
191406              NaN                          NaN          NaN

       Taxi Company Borough Taxi Pick Up Location Bridge Highway Name  \
0                       NaN                    NaN                 NaN
1                       NaN                    NaN                 NaN
2                       NaN                    NaN                 NaN
3                       NaN                    NaN                 NaN
4                       NaN                    NaN                 NaN
…                     …                        …                   …
191402                  NaN                    NaN                 NaN
191403                  NaN                    NaN                 NaN
191404                  NaN                    NaN                 NaN
191405                  NaN                    NaN                 NaN
191406                  NaN                    NaN                 NaN

       Bridge Highway Direction Road Ramp Bridge Highway Segment  \
0                           NaN       NaN                    NaN
1                           NaN       NaN                    NaN
2                           NaN       NaN                    NaN
3                           NaN       NaN                    NaN
4                           NaN       NaN                    NaN
…                         …       …                      …
191402                      NaN       NaN                    NaN
191403                      NaN       NaN                    NaN
191404                      NaN       NaN                    NaN
191405                      NaN       NaN                    NaN
191406                      NaN       NaN                    NaN
```

```
       Garage Lot Name  Ferry Direction  Ferry Terminal Name   Latitude  \
0                  NaN              NaN                  NaN  40.865682
1                  NaN              NaN                  NaN  40.775945
2                  NaN              NaN                  NaN  40.870325
3                  NaN              NaN                  NaN  40.835994
4                  NaN              NaN                  NaN  40.733060
…                  …                …                    …        …
191402             NaN              NaN                  NaN  40.680817
191403             NaN              NaN                  NaN  40.724447
191404             NaN              NaN                  NaN  40.813297
191405             NaN              NaN                  NaN  40.713207
191406             NaN              NaN                  NaN        NaN

        Longitude                                  Location
0      -73.923501   (40.86568153633767, -73.92350095571744)
1      -73.915094  (40.775945312321085, -73.91509393898605)
2      -73.888525  (40.870324522111424, -73.88852464418646)
3      -73.828379   (40.83599404683083, -73.82837939584206)
4      -73.874170  (40.733059618956815, -73.87416975810375)
…           …                                        …
191402 -73.891794   (40.68081718662283, -73.89179426953243)
191403 -73.975464    (40.72444683419667, -73.9754635220889)
191404 -73.858213   (40.81329732471253, -73.85821295014048)
191405 -73.965642  (40.713207275795135, -73.96564173712595)
191406        NaN                                       NaN

[191407 rows x 53 columns]
```

[4]:
```
data.head()
```

[4]:
```
   Unique Key            Created Date             Closed Date Agency  \
0    32310363  12/31/2015 11:59:45 PM  01/01/2016 12:55:15 AM   NYPD
1    32309934  12/31/2015 11:59:44 PM  01/01/2016 01:26:57 AM   NYPD
2    32309159  12/31/2015 11:59:29 PM  01/01/2016 04:51:03 AM   NYPD
3    32305098  12/31/2015 11:57:46 PM  01/01/2016 07:43:13 AM   NYPD
4    32306529  12/31/2015 11:56:58 PM  01/01/2016 03:24:42 AM   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       Street Name   Cross Street 1   Cross Street 2  \
0    71 VERMILYEA AVENUE  VERMILYEA AVENUE   ACADEMY STREET  WEST 204 STREET
1         27-07 23 AVENUE         23 AVENUE        27 STREET        28 STREET
2  2897 VALENTINE AVENUE  VALENTINE AVENUE  EAST 198 STREET  EAST 199 STREET
3    2940 BAISLEY AVENUE    BAISLEY AVENUE    EDISON AVENUE         B STREET
4          87-14 57 ROAD           57 ROAD   SEABURY STREET    HOFFMAN DRIVE

  Intersection Street 1 Intersection Street 2  … School Not Found  \
0                   NaN                   NaN  …                N
1                   NaN                   NaN  …                N
2                   NaN                   NaN  …                N
3                   NaN                   NaN  …                N
4                   NaN                   NaN  …                N

  School or Citywide Complaint Vehicle Type Taxi Company Borough  \
0                          NaN          NaN                  NaN
1                          NaN          NaN                  NaN
2                          NaN          NaN                  NaN
3                          NaN          NaN                  NaN
4                          NaN          NaN                  NaN

  Taxi Pick Up Location Bridge Highway Name Bridge Highway Direction  \
0                   NaN                 NaN                       NaN
1                   NaN                 NaN                       NaN
2                   NaN                 NaN                       NaN
3                   NaN                 NaN                       NaN
4                   NaN                 NaN                       NaN

  Road Ramp Bridge Highway Segment Garage Lot Name  Ferry Direction  \
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

   Ferry Terminal Name   Latitude  Longitude  \
0                  NaN  40.865682 -73.923501
1                  NaN  40.775945 -73.915094
2                  NaN  40.870325 -73.888525
3                  NaN  40.835994 -73.828379
4                  NaN  40.733060 -73.874170

                                Location
```

```
0   (40.86568153633767, -73.92350095571744)
1  (40.775945312321085, -73.91509393898605)
2  (40.870324522111424, -73.88852464418646)
3   (40.83599404683083, -73.82837939584206)
4  (40.733059618956815, -73.87416975810375)

[5 rows x 53 columns]
```

[5]:
```
data.columns
```

[5]:
```
Index(['Unique Key', 'Created Date', 'Closed Date', 'Agency', 'Agency Name',
       'Complaint Type', 'Descriptor', 'Location Type', 'Incident Zip',
       'Incident Address', 'Street Name', 'Cross Street 1', 'Cross Street 2',
       'Intersection Street 1', 'Intersection Street 2', 'Address Type',
       'City', 'Landmark', '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', 'School or Citywide Complaint',
       'Vehicle Type', 'Taxi Company Borough', 'Taxi Pick Up Location',
       'Bridge Highway Name', 'Bridge Highway Direction', 'Road Ramp',
       'Bridge Highway Segment', 'Garage Lot Name', 'Ferry Direction',
       'Ferry Terminal Name', 'Latitude', 'Longitude', 'Location'],
      dtype='object')
```

[6]:
```
data.shape
```

[6]:
```
(191407, 53)
```

[7]:
```
data[["Complaint Type","City",]]
```

[7]:
```
                 Complaint Type      City
0       Noise - Street/Sidewalk  NEW YORK
1              Blocked Driveway   ASTORIA
2              Blocked Driveway     BRONX
3               Illegal Parking     BRONX
4               Illegal Parking  ELMHURST
…                           …       …
191402       Noise - Commercial  BROOKLYN
191403  Noise - Street/Sidewalk  NEW YORK
191404  Noise - Street/Sidewalk     BRONX
191405         Blocked Driveway  BROOKLYN
191406  Noise - Street/Sidewalk  NEW YORK

[191407 rows x 2 columns]
```

[8]:
```
data.isnull()
```

[8]:

| | Unique Key | Created Date | Closed Date | Agency | Agency Name | \ |
|---|---|---|---|---|---|---|
| 0 | False | False | False | False | False | |
| 1 | False | False | False | False | False | |
| 2 | False | False | False | False | False | |
| 3 | False | False | False | False | False | |
| 4 | False | False | False | False | False | |
| … | … | … | … | … | … | |
| 191402 | False | False | False | False | False | |
| 191403 | False | False | False | False | False | |
| 191404 | False | False | False | False | False | |
| 191405 | False | False | False | False | False | |
| 191406 | False | False | False | False | False | |

| | Complaint Type | Descriptor | Location Type | Incident Zip | \ |
|---|---|---|---|---|---|
| 0 | False | False | False | False | |
| 1 | False | False | False | False | |
| 2 | False | False | False | False | |
| 3 | False | False | False | False | |
| 4 | False | False | False | False | |
| … | … | … | … | … | |
| 191402 | False | False | False | False | |
| 191403 | False | False | False | False | |
| 191404 | False | False | False | False | |
| 191405 | False | False | False | False | |
| 191406 | False | False | False | False | |

| | Incident Address | Street Name | Cross Street 1 | Cross Street 2 | \ |
|---|---|---|---|---|---|
| 0 | False | False | False | False | |
| 1 | False | False | False | False | |
| 2 | False | False | False | False | |
| 3 | False | False | False | False | |
| 4 | False | False | False | False | |
| … | … | … | … | … | |
| 191402 | False | False | False | False | |
| 191403 | False | False | False | False | |
| 191404 | True | True | True | True | |
| 191405 | False | False | False | False | |
| 191406 | False | False | False | False | |

| | Intersection Street 1 | Intersection Street 2 | … | School Not Found | \ |
|---|---|---|---|---|---|
| 0 | True | True | … | False | |
| 1 | True | True | … | False | |
| 2 | True | True | … | False | |
| 3 | True | True | … | False | |
| 4 | True | True | … | False | |

```
…                      …                      …  …                …
191402                  True                    True  …             False
191403                  True                    True  …             False
191404                 False                   False  …             False
191405                  True                    True  …             False
191406                  True                    True  …              True

        School or Citywide Complaint  Vehicle Type  Taxi Company Borough  \
0                               True          True                  True
1                               True          True                  True
2                               True          True                  True
3                               True          True                  True
4                               True          True                  True
…                               …             …                     …
191402                          True          True                  True
191403                          True          True                  True
191404                          True          True                  True
191405                          True          True                  True
191406                          True          True                  True

        Taxi Pick Up Location  Bridge Highway Name  Bridge Highway Direction  \
0                        True                 True                      True
1                        True                 True                      True
2                        True                 True                      True
3                        True                 True                      True
4                        True                 True                      True
…                        …                    …                         …
191402                   True                 True                      True
191403                   True                 True                      True
191404                   True                 True                      True
191405                   True                 True                      True
191406                   True                 True                      True

        Road Ramp  Bridge Highway Segment  Garage Lot Name  Ferry Direction  \
0            True                    True             True             True
1            True                    True             True             True
2            True                    True             True             True
3            True                    True             True             True
4            True                    True             True             True
…            …                       …                …                …
191402       True                    True             True             True
191403       True                    True             True             True
191404       True                    True             True             True
191405       True                    True             True             True
191406       True                    True             True             True

        Ferry Terminal Name  Latitude  Longitude  Location
```

```
0                      True     False      False     False
1                      True     False      False     False
2                      True     False      False     False
3                      True     False      False     False
4                      True     False      False     False
…                       …        …          …         …
191402                 True     False      False     False
191403                 True     False      False     False
191404                 True     False      False     False
191405                 True     False      False     False
191406                 True      True       True      True

[191407 rows x 53 columns]
```

[9]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 191407 entries, 0 to 191406
Data columns (total 53 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   Unique Key                      191407 non-null  int64
 1   Created Date                    191407 non-null  object
 2   Closed Date                     189985 non-null  object
 3   Agency                          191407 non-null  object
 4   Agency Name                     191407 non-null  object
 5   Complaint Type                  191407 non-null  object
 6   Descriptor                      187478 non-null  object
 7   Location Type                   191280 non-null  object
 8   Incident Zip                    189723 non-null  float64
 9   Incident Address                164239 non-null  object
 10  Street Name                     164239 non-null  object
 11  Cross Street 1                  161105 non-null  object
 12  Cross Street 2                  160806 non-null  object
 13  Intersection Street 1           26824 non-null   object
 14  Intersection Street 2           26521 non-null   object
 15  Address Type                    189595 non-null  object
 16  City                            189723 non-null  object
 17  Landmark                        224 non-null     object
 18  Facility Type                   189984 non-null  object
 19  Status                          191407 non-null  object
 20  Due Date                        191405 non-null  object
 21  Resolution Description          191407 non-null  object
 22  Resolution Action Updated Date  189961 non-null  object
 23  Community Board                 191407 non-null  object
 24  Borough                         191406 non-null  object
 25  X Coordinate (State Plane)      189159 non-null  float64
```

```
 26  Y Coordinate (State Plane)      189159 non-null  float64
 27  Park Facility Name              191406 non-null  object
 28  Park Borough                    191406 non-null  object
 29  School Name                     191406 non-null  object
 30  School Number                   191406 non-null  object
 31  School Region                   191406 non-null  object
 32  School Code                     191406 non-null  object
 33  School Phone Number             191406 non-null  object
 34  School Address                  191406 non-null  object
 35  School City                     191406 non-null  object
 36  School State                    191406 non-null  object
 37  School Zip                      191406 non-null  object
 38  School Not Found                191406 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             162 non-null     object
 44  Bridge Highway Direction        162 non-null     object
 45  Road Ramp                       143 non-null     object
 46  Bridge Highway Segment          143 non-null     object
 47  Garage Lot Name                 0 non-null       float64
 48  Ferry Direction                 0 non-null       float64
 49  Ferry Terminal Name             1 non-null       object
 50  Latitude                        189159 non-null  float64
 51  Longitude                       189159 non-null  float64
 52  Location                        189159 non-null  object
dtypes: float64(11), int64(1), object(41)
memory usage: 77.4+ MB
```

[13]:
```
data.duplicated().sum()
```

[13]:
```
0
```

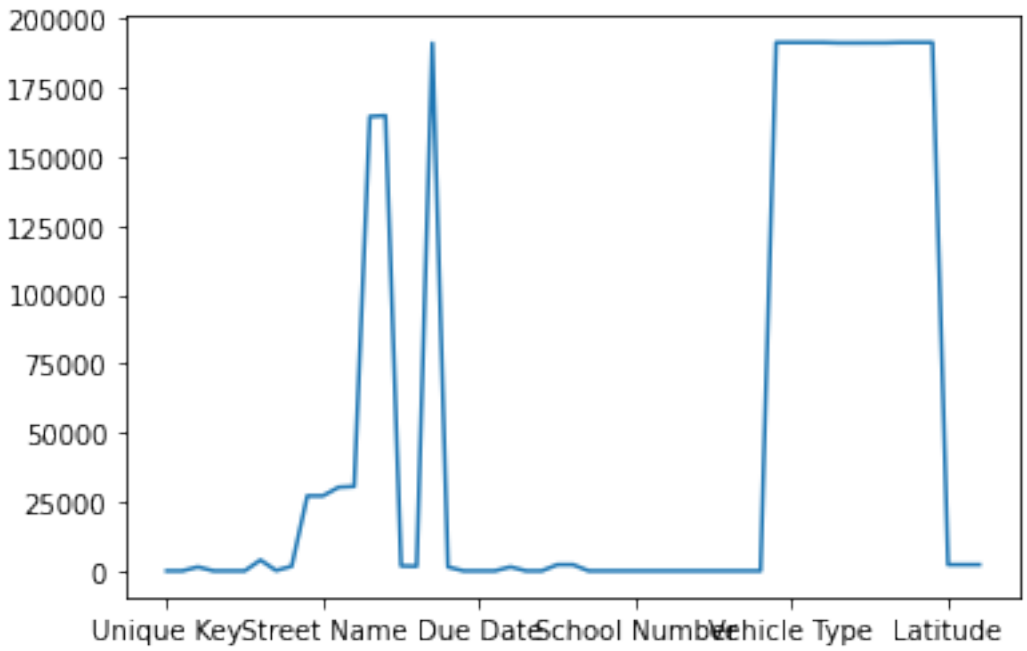
[14]:
```
data.isna().sum()
```

[14]:
```
Unique Key                      0
Created Date                    0
Closed Date                  1422
Agency                          0
Agency Name                     0
Complaint Type                  0
Descriptor                   3929
Location Type                 127
Incident Zip                 1684
Incident Address            27168
Street Name                 27168
```

```
Cross Street 1                    30302
Cross Street 2                    30601
Intersection Street 1            164583
Intersection Street 2            164886
Address Type                       1812
City                               1684
Landmark                         191183
Facility Type                      1423
Status                                0
Due Date                              2
Resolution Description                0
Resolution Action Updated Date     1446
Community Board                       0
Borough                               1
X Coordinate (State Plane)         2248
Y Coordinate (State Plane)         2248
Park Facility Name                    1
Park Borough                          1
School Name                           1
School Number                         1
School Region                         1
School Code                           1
School Phone Number                   1
School Address                        1
School City                           1
School State                          1
School Zip                            1
School Not Found                      1
School or Citywide Complaint     191407
Vehicle Type                     191407
Taxi Company Borough             191407
Taxi Pick Up Location            191407
Bridge Highway Name              191245
Bridge Highway Direction         191245
Road Ramp                        191264
Bridge Highway Segment           191264
Garage Lot Name                  191407
Ferry Direction                  191407
Ferry Terminal Name              191406
Latitude                           2248
Longitude                          2248
Location                           2248
dtype: int64
```

[15]:
```
data.isnull().sum().plot()
```

[15]:
```
<AxesSubplot:>
```




[16]:
```
data.drop
```

[16]:
```
<bound method DataFrame.drop of         Unique Key            Created Date
Closed Date Agency  \
0         32310363  12/31/2015 11:59:45 PM  01/01/2016 12:55:15 AM   NYPD
1         32309934  12/31/2015 11:59:44 PM  01/01/2016 01:26:57 AM   NYPD
2         32309159  12/31/2015 11:59:29 PM  01/01/2016 04:51:03 AM   NYPD
3         32305098  12/31/2015 11:57:46 PM  01/01/2016 07:43:13 AM   NYPD
4         32306529  12/31/2015 11:56:58 PM  01/01/2016 03:24:42 AM   NYPD
…              …                       …                       …    …
191402    31024399  07/07/2015 09:47:21 PM  07/08/2015 12:32:03 AM   NYPD
191403    31025431  07/07/2015 09:43:41 PM  07/07/2015 11:13:32 PM   NYPD
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191405    31027084  07/07/2015 09:42:10 PM  07/08/2015 01:34:24 AM   NYPD
191406    31026613  07/07/2015 09:42:09 PM  07/07/2015 11:13:32 PM   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
…                                   …                       …
191402  New York City Police Department       Noise - Commercial
191403  New York City Police Department  Noise - Street/Sidewalk
```

```
191404  New York City Police Department  Noise - Street/Sidewalk
191405  New York City Police Department         Blocked Driveway
191406  New York City Police Department  Noise - Street/Sidewalk

                        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
…                                …              …           …
191402             Banging/Pounding  Store/Commercial       11207.0
191403             Loud Music/Party   Street/Sidewalk       10009.0
191404             Loud Music/Party   Street/Sidewalk       10473.0
191405                    No Access   Street/Sidewalk       11249.0
191406             Loud Music/Party   Street/Sidewalk       10009.0

             Incident Address       Street Name    Cross Street 1  \
0         71 VERMILYEA AVENUE  VERMILYEA AVENUE    ACADEMY STREET
1             27-07 23 AVENUE         23 AVENUE         27 STREET
2       2897 VALENTINE AVENUE  VALENTINE AVENUE   EAST 198 STREET
3         2940 BAISLEY AVENUE    BAISLEY AVENUE     EDISON AVENUE
4               87-14 57 ROAD           57 ROAD    SEABURY STREET
…                         …              …              …
191402     258 JAMAICA AVENUE    JAMAICA AVENUE  VAN SICLEN COURT
191403           134 AVENUE D          AVENUE D     EAST 9 STREET
191404                    NaN               NaN               NaN
191405       376 WYTHE AVENUE      WYTHE AVENUE    SOUTH 3 STREET
191406     464 EAST 10 STREET    EAST 10 STREET          AVENUE D

         Cross Street 2 Intersection Street 1 Intersection Street 2  …  \
0       WEST 204 STREET                   NaN                   NaN  …
1            28 STREET                    NaN                   NaN  …
2       EAST 199 STREET                   NaN                   NaN  …
3             B STREET                    NaN                   NaN  …
4         HOFFMAN DRIVE                   NaN                   NaN  …
…                   …                     …                   …  …
191402   HENDRIX STREET                   NaN                   NaN  …
191403   EAST 10 STREET                   NaN                   NaN  …
191404              NaN      UNDERHILL AVENUE      PATTERSON AVENUE  …
191405   SOUTH 4 STREET                   NaN                   NaN  …
191406      F D R DRIVE                   NaN                   NaN  …

       School Not Found School or Citywide Complaint Vehicle Type  \
0                     N                          NaN          NaN
1                     N                          NaN          NaN
2                     N                          NaN          NaN
```

```
3                    N                          NaN          NaN
4                    N                          NaN          NaN
…                  …                            …          …
191402               N                          NaN          NaN
191403               N                          NaN          NaN
191404               N                          NaN          NaN
191405               N                          NaN          NaN
191406             NaN                          NaN          NaN

       Taxi Company Borough Taxi Pick Up Location Bridge Highway Name  \
0                       NaN                    NaN                  NaN
1                       NaN                    NaN                  NaN
2                       NaN                    NaN                  NaN
3                       NaN                    NaN                  NaN
4                       NaN                    NaN                  NaN
…                     …                        …                  …
191402                  NaN                    NaN                  NaN
191403                  NaN                    NaN                  NaN
191404                  NaN                    NaN                  NaN
191405                  NaN                    NaN                  NaN
191406                  NaN                    NaN                  NaN

       Bridge Highway Direction Road Ramp Bridge Highway Segment  \
0                           NaN       NaN                    NaN
1                           NaN       NaN                    NaN
2                           NaN       NaN                    NaN
3                           NaN       NaN                    NaN
4                           NaN       NaN                    NaN
…                         …       …                      …
191402                      NaN       NaN                    NaN
191403                      NaN       NaN                    NaN
191404                      NaN       NaN                    NaN
191405                      NaN       NaN                    NaN
191406                      NaN       NaN                    NaN

       Garage Lot Name  Ferry Direction  Ferry Terminal Name   Latitude  \
0                  NaN              NaN                  NaN  40.865682
1                  NaN              NaN                  NaN  40.775945
2                  NaN              NaN                  NaN  40.870325
3                  NaN              NaN                  NaN  40.835994
4                  NaN              NaN                  NaN  40.733060
…                …                …                    …        …
191402             NaN              NaN                  NaN  40.680817
191403             NaN              NaN                  NaN  40.724447
191404             NaN              NaN                  NaN  40.813297
191405             NaN              NaN                  NaN  40.713207
191406             NaN              NaN                  NaN        NaN
```

```
        Longitude                                     Location
0      -73.923501   (40.86568153633767, -73.92350095571744)
1      -73.915094  (40.775945312321085, -73.91509393898605)
2      -73.888525  (40.870324522111424, -73.88852464418646)
3      -73.828379   (40.83599404683083, -73.82837939584206)
4      -73.874170  (40.733059618956815, -73.87416975810375)
…             …                                         …
191402 -73.891794   (40.68081718662283, -73.89179426953243)
191403 -73.975464    (40.72444683419667, -73.9754635220889)
191404 -73.858213   (40.81329732471253, -73.85821295014048)
191405 -73.965642  (40.713207275795135, -73.96564173712595)
191406        NaN                                       NaN

[191407 rows x 53 columns]>
```

[17]:
```
data.dropna(subset=["Closed Date"])
```

[17]:
```
        Unique Key            Created Date            Closed Date Agency  \
0         32310363  12/31/2015 11:59:45 PM  01/01/2016 12:55:15 AM   NYPD
1         32309934  12/31/2015 11:59:44 PM  01/01/2016 01:26:57 AM   NYPD
2         32309159  12/31/2015 11:59:29 PM  01/01/2016 04:51:03 AM   NYPD
3         32305098  12/31/2015 11:57:46 PM  01/01/2016 07:43:13 AM   NYPD
4         32306529  12/31/2015 11:56:58 PM  01/01/2016 03:24:42 AM   NYPD
…              …                       …                       …    …
191402    31024399  07/07/2015 09:47:21 PM  07/08/2015 12:32:03 AM   NYPD
191403    31025431  07/07/2015 09:43:41 PM  07/07/2015 11:13:32 PM   NYPD
191404    31023497  07/07/2015 09:42:44 PM  07/08/2015 02:59:07 AM   NYPD
191405    31027084  07/07/2015 09:42:10 PM  07/08/2015 01:34:24 AM   NYPD
191406    31026613  07/07/2015 09:42:09 PM  07/07/2015 11:13:32 PM   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
…                                   …                       …
191402  New York City Police Department       Noise - Commercial
191403  New York City Police Department  Noise - Street/Sidewalk
191404  New York City Police Department  Noise - Street/Sidewalk
191405  New York City Police Department         Blocked Driveway
191406  New York City Police Department  Noise - Street/Sidewalk

                        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
…                                …              …           …
191402               Banging/Pounding  Store/Commercial       11207.0
191403               Loud Music/Party   Street/Sidewalk       10009.0
191404               Loud Music/Party   Street/Sidewalk       10473.0
191405                      No Access   Street/Sidewalk       11249.0
191406               Loud Music/Party   Street/Sidewalk       10009.0

              Incident Address       Street Name    Cross Street 1  \
0          71 VERMILYEA AVENUE  VERMILYEA AVENUE    ACADEMY STREET
1              27-07 23 AVENUE         23 AVENUE         27 STREET
2         2897 VALENTINE AVENUE  VALENTINE AVENUE   EAST 198 STREET
3           2940 BAISLEY AVENUE    BAISLEY AVENUE     EDISON AVENUE
4                87-14 57 ROAD           57 ROAD    SEABURY STREET
…                          …              …              …
191402      258 JAMAICA AVENUE    JAMAICA AVENUE  VAN SICLEN COURT
191403            134 AVENUE D          AVENUE D     EAST 9 STREET
191404                     NaN               NaN               NaN
191405        376 WYTHE AVENUE      WYTHE AVENUE    SOUTH 3 STREET
191406      464 EAST 10 STREET    EAST 10 STREET          AVENUE D

          Cross Street 2 Intersection Street 1 Intersection Street 2  …  \
0        WEST 204 STREET                   NaN                   NaN  …
1              28 STREET                   NaN                   NaN  …
2        EAST 199 STREET                   NaN                   NaN  …
3                B STREET                  NaN                   NaN  …
4          HOFFMAN DRIVE                   NaN                   NaN  …
…                    …                     …                     …  …
191402    HENDRIX STREET                   NaN                   NaN  …
191403    EAST 10 STREET                   NaN                   NaN  …
191404               NaN      UNDERHILL AVENUE      PATTERSON AVENUE  …
191405    SOUTH 4 STREET                   NaN                   NaN  …
191406       F D R DRIVE                   NaN                   NaN  …

        School Not Found School or Citywide Complaint Vehicle Type  \
0                      N                          NaN          NaN
1                      N                          NaN          NaN
2                      N                          NaN          NaN
3                      N                          NaN          NaN
4                      N                          NaN          NaN
…                    …                            …            …
191402                 N                          NaN          NaN
191403                 N                          NaN          NaN
191404                 N                          NaN          NaN
191405                 N                          NaN          NaN
```

```
191406              NaN                           NaN          NaN

       Taxi Company Borough Taxi Pick Up Location Bridge Highway Name  \
0                       NaN                    NaN                 NaN
1                       NaN                    NaN                 NaN
2                       NaN                    NaN                 NaN
3                       NaN                    NaN                 NaN
4                       NaN                    NaN                 NaN
…                       …                      …                   …
191402                  NaN                    NaN                 NaN
191403                  NaN                    NaN                 NaN
191404                  NaN                    NaN                 NaN
191405                  NaN                    NaN                 NaN
191406                  NaN                    NaN                 NaN

       Bridge Highway Direction Road Ramp Bridge Highway Segment  \
0                           NaN       NaN                    NaN
1                           NaN       NaN                    NaN
2                           NaN       NaN                    NaN
3                           NaN       NaN                    NaN
4                           NaN       NaN                    NaN
…                           …         …                      …
191402                      NaN       NaN                    NaN
191403                      NaN       NaN                    NaN
191404                      NaN       NaN                    NaN
191405                      NaN       NaN                    NaN
191406                      NaN       NaN                    NaN

       Garage Lot Name  Ferry Direction  Ferry Terminal Name   Latitude  \
0                  NaN              NaN                  NaN  40.865682
1                  NaN              NaN                  NaN  40.775945
2                  NaN              NaN                  NaN  40.870325
3                  NaN              NaN                  NaN  40.835994
4                  NaN              NaN                  NaN  40.733060
…                  …                …                    …       …
191402             NaN              NaN                  NaN  40.680817
191403             NaN              NaN                  NaN  40.724447
191404             NaN              NaN                  NaN  40.813297
191405             NaN              NaN                  NaN  40.713207
191406             NaN              NaN                  NaN        NaN

        Longitude                                Location
0      -73.923501   (40.86568153633767, -73.92350095571744)
1      -73.915094  (40.775945312321085, -73.91509393898605)
2      -73.888525  (40.870324522111424, -73.88852464418646)
3      -73.828379   (40.83599404683083, -73.82837939584206)
4      -73.874170  (40.733059618956815, -73.87416975810375)
```

```
…           …                                                …
191402 -73.891794   (40.68081718662283, -73.89179426953243)
191403 -73.975464    (40.72444683419667, -73.9754635220889)
191404 -73.858213   (40.81329732471253, -73.85821295014048)
191405 -73.965642  (40.713207275795135, -73.96564173712595)
191406        NaN                                        NaN

[189985 rows x 53 columns]
```

[18]:
```
import time
```

[19]:
```
Closed_Time = time.time()
Creation_Date = time.time()
elapsed_time = Closed_Time - Creation_Date
print(elapsed_time)
```

```
-3.1948089599609375e-05
```

[20]:
```
from datetime import datetime

seconds = -3.218650817871094e-05
data = datetime.fromtimestamp(seconds).strftime('%Y-%m-%d %H:%M:%S.%f')
print('seconds is:', data)
```

```
seconds is: 1969-12-31 23:59:59.999968
```

[26]:
```
import numpy as np
import pandas as pd

data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
 ↪csv')
data

import datetime as datetime
data.describe()
```

[26]:
```
         Unique Key   Incident Zip  X Coordinate (State Plane)  \
count  1.914070e+05  189723.000000                1.891590e+05
mean   3.166035e+07   10855.280398                1.004803e+06
std    3.692353e+05     574.951853                2.195427e+04
min    3.101905e+07      83.000000                9.133570e+05
25%    3.134816e+07   10312.000000                9.919740e+05
50%    3.163755e+07   11209.000000                1.003202e+06
75%    3.197382e+07   11238.000000                1.018645e+06
max    3.231065e+07   11697.000000                1.067173e+06

       Y Coordinate (State Plane)  School or Citywide Complaint  Vehicle Type  \
```

```
count               189159.000000                         0.0          0.0
mean                203402.653826                         NaN          NaN
std                  29962.071501                         NaN          NaN
min                 121411.000000                         NaN          NaN
25%                 182791.500000                         NaN          NaN
50%                 200763.000000                         NaN          NaN
75%                 223350.000000                         NaN          NaN
max                 271876.000000                         NaN          NaN

       Taxi Company Borough  Taxi Pick Up Location  Garage Lot Name  \
count                   0.0                    0.0              0.0
mean                    NaN                    NaN              NaN
std                     NaN                    NaN              NaN
min                     NaN                    NaN              NaN
25%                     NaN                    NaN              NaN
50%                     NaN                    NaN              NaN
75%                     NaN                    NaN              NaN
max                     NaN                    NaN              NaN

       Ferry Direction       Latitude      Longitude
count              0.0  189159.000000  189159.000000
mean               NaN      40.724918     -73.925812
std                NaN       0.082237       0.079177
min                NaN      40.499673     -74.254937
25%                NaN      40.668300     -73.972159
50%                NaN      40.717707     -73.931613
75%                NaN      40.779653     -73.875893
max                NaN      40.912869     -73.700760
```

[27]:
```
data[data['Complaint Type'].isnull()]
```

[27]:
```
Empty DataFrame
Columns: [Unique Key, Created Date, Closed Date, Agency, Agency Name, Complaint
Type, Descriptor, Location Type, Incident Zip, Incident Address, Street Name,
Cross Street 1, Cross Street 2, Intersection Street 1, Intersection Street 2,
Address Type, City, Landmark, 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,
School or Citywide Complaint, Vehicle Type, Taxi Company Borough, Taxi Pick Up
Location, Bridge Highway Name, Bridge Highway Direction, Road Ramp, Bridge
Highway Segment, Garage Lot Name, Ferry Direction, Ferry Terminal Name,
Latitude, Longitude, Location]
Index: []

[0 rows x 53 columns]
```

[28]:
```
data[data['City'].isnull()]
```

[28]:

| | Unique Key | Created Date | Closed Date | Agency | \ |
|---|---|---|---|---|---|
| 33 | 32306700 | 12/31/2015 11:18:10 PM | 01/02/2016 01:04:03 AM | NYPD | |
| 283 | 32309451 | 12/31/2015 05:40:16 PM | 01/01/2016 10:59:11 AM | NYPD | |
| 302 | 32309860 | 12/31/2015 05:05:30 PM | 01/01/2016 08:17:35 AM | NYPD | |
| 416 | 32305700 | 12/31/2015 02:16:04 PM | NaN | NYPD | |
| 611 | 32309308 | 12/31/2015 09:58:06 AM | NaN | NYPD | |
| … | … | … | … | … | |
| 190471 | 31035423 | 07/08/2015 09:21:29 PM | NaN | NYPD | |
| 190506 | 31029533 | 07/08/2015 08:56:56 PM | NaN | NYPD | |
| 190878 | 31029169 | 07/08/2015 12:13:02 PM | NaN | NYPD | |
| 191024 | 31032791 | 07/08/2015 09:13:48 AM | NaN | NYPD | |
| 191255 | 31019413 | 07/08/2015 12:23:43 AM | NaN | NYPD | |

| | Agency Name | Complaint Type | \ |
|---|---|---|---|
| 33 | New York City Police Department | Illegal Parking | |
| 283 | New York City Police Department | Illegal Parking | |
| 302 | New York City Police Department | Blocked Driveway | |
| 416 | New York City Police Department | Illegal Parking | |
| 611 | New York City Police Department | Noise - Street/Sidewalk | |
| … | … | … | |
| 190471 | New York City Police Department | Noise - Commercial | |
| 190506 | New York City Police Department | Illegal Parking | |
| 190878 | New York City Police Department | Blocked Driveway | |
| 191024 | New York City Police Department | Illegal Parking | |
| 191255 | New York City Police Department | Noise - Street/Sidewalk | |

| | Descriptor | Location Type | Incident Zip | \ |
|---|---|---|---|---|
| 33 | Double Parked Blocking Traffic | Street/Sidewalk | NaN | |
| 283 | Blocked Hydrant | Street/Sidewalk | NaN | |
| 302 | Partial Access | Street/Sidewalk | NaN | |
| 416 | Posted Parking Sign Violation | Street/Sidewalk | NaN | |
| 611 | Loud Music/Party | Street/Sidewalk | NaN | |
| … | … | … | … | |
| 190471 | Loud Music/Party | Club/Bar/Restaurant | NaN | |
| 190506 | Posted Parking Sign Violation | Street/Sidewalk | NaN | |
| 190878 | Partial Access | Street/Sidewalk | NaN | |
| 191024 | Double Parked Blocking Traffic | Street/Sidewalk | NaN | |
| 191255 | Loud Music/Party | Street/Sidewalk | NaN | |

| | Incident Address | Street Name | Cross Street 1 | \ |
|---|---|---|---|---|
| 33 | 25-0-25-54 12TH STREET | 12TH STREET | NaN | |
| 283 | 72-23-72-2 72ND PLACE | 72ND PLACE | NaN | |
| 302 | 9-15-9-99 CORNAGA AVENUE | CORNAGA AVENUE | NaN | |
| 416 | 5426-5526 90TH ST | 90TH ST | NaN | |
| 611 | 30 STREET | 30 STREET | 30 AVENUE | |

```
…                          …                          …              …
190471              NAGLE AVENUE               NAGLE AVENUE  HILLSIDE AVENUE
190506  2701-2765 BRIGHTON 8TH ST            BRIGHTON 8TH ST             NaN
190878  HORACE HARDING EXPRESSWAY  HORACE HARDING EXPRESSWAY      99TH STREET
191024     60-6-60-18 37TH AVENUE                37TH AVENUE             NaN
191255          CABRINI BOULEVARD          CABRINI BOULEVARD  W. 187TH STREET

       Cross Street 2 Intersection Street 1 Intersection Street 2  …  \
33                NaN                   NaN                   NaN  …
283               NaN                   NaN                   NaN  …
302               NaN                   NaN                   NaN  …
416               NaN                   NaN                   NaN  …
611               NaN            30 AVENUE                    NaN  …
…                 …                     …                     …  …
190471            NaN       HILLSIDE AVENUE                   NaN  …
190506            NaN                   NaN                   NaN  …
190878            NaN           99th street                   NaN  …
191024            NaN                   NaN                   NaN  …
191255            NaN       W. 187th Street                   NaN  …

       School Not Found School or Citywide Complaint Vehicle Type  \
33                    N                          NaN          NaN
283                   N                          NaN          NaN
302                   N                          NaN          NaN
416                   N                          NaN          NaN
611                   N                          NaN          NaN
…                 …                          …          …
190471                N                          NaN          NaN
190506                N                          NaN          NaN
190878                N                          NaN          NaN
191024                N                          NaN          NaN
191255                N                          NaN          NaN

       Taxi Company Borough Taxi Pick Up Location Bridge Highway Name  \
33                      NaN                   NaN                  NaN
283                     NaN                   NaN                  NaN
302                     NaN                   NaN                  NaN
416                     NaN                   NaN                  NaN
611                     NaN                   NaN                  NaN
…                       …                     …                    …
190471                  NaN                   NaN                  NaN
190506                  NaN                   NaN                  NaN
190878                  NaN                   NaN                  NaN
191024                  NaN                   NaN                  NaN
191255                  NaN                   NaN                  NaN

       Bridge Highway Direction Road Ramp Bridge Highway Segment  \
```

```
33                          NaN       NaN                    NaN
283                         NaN       NaN                    NaN
302                         NaN       NaN                    NaN
416                         NaN       NaN                    NaN
611                         NaN       NaN                    NaN
…                           …         …                      …
190471                      NaN       NaN                    NaN
190506                      NaN       NaN                    NaN
190878                      NaN       NaN                    NaN
191024                      NaN       NaN                    NaN
191255                      NaN       NaN                    NaN

       Garage Lot Name  Ferry Direction  Ferry Terminal Name Latitude  \
33                 NaN              NaN                  NaN      NaN
283                NaN              NaN                  NaN      NaN
302                NaN              NaN                  NaN      NaN
416                NaN              NaN                  NaN      NaN
611                NaN              NaN                  NaN      NaN
…                  …                …                    …        …
190471             NaN              NaN                  NaN      NaN
190506             NaN              NaN                  NaN      NaN
190878             NaN              NaN                  NaN      NaN
191024             NaN              NaN                  NaN      NaN
191255             NaN              NaN                  NaN      NaN

       Longitude Location
33           NaN      NaN
283          NaN      NaN
302          NaN      NaN
416          NaN      NaN
611          NaN      NaN
…            …        …
190471       NaN      NaN
190506       NaN      NaN
190878       NaN      NaN
191024       NaN      NaN
191255       NaN      NaN

[1684 rows x 53 columns]
```

[88]:
```
data['City'].isna().mode()
```

[88]:
```
0    False
dtype: bool
```

[86]:
```
data['City'] = data['City'].fillna(data['City'].mode())
```

[89]:
```
data['City'].isna().mode()
```

[89]:
```
0    False
dtype: bool
```

[3]:
```
import numpy as np
import pandas as pd

data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
 ↪csv')
data
print(data.fillna('unknown_City'))
```

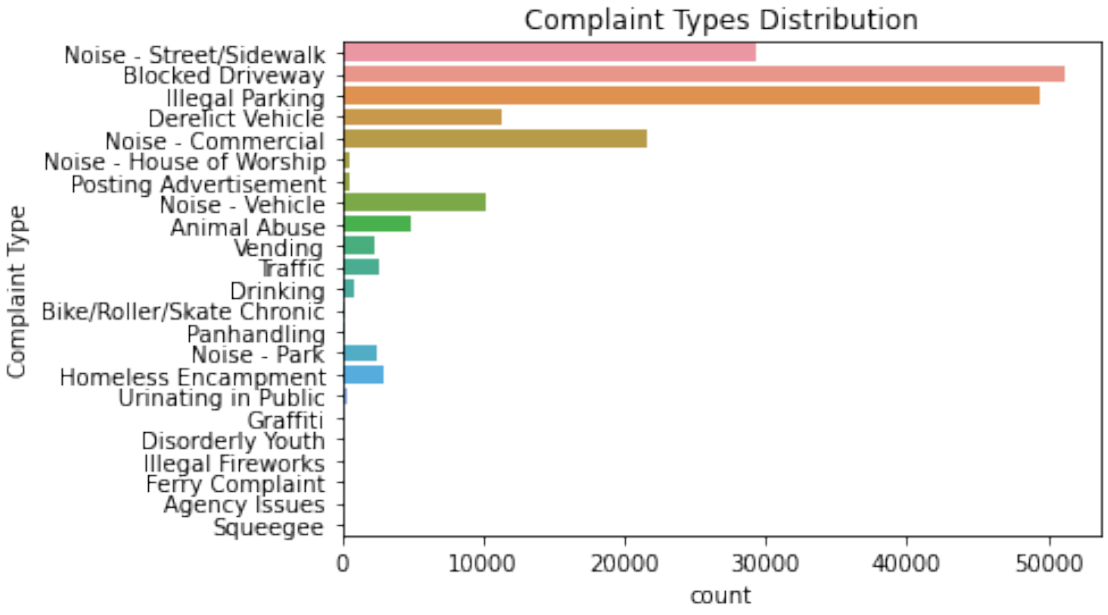
```
/usr/local/lib/python3.7/site-packages/IPython/core/interactiveshell.py:3063:
DtypeWarning: Columns (49) have mixed types.Specify dtype option on import or
set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
        Unique Key            Created Date              Closed Date Agency  \
0         32310363  12/31/2015 11:59:45 PM  01/01/2016 12:55:15 AM   NYPD
1         32309934  12/31/2015 11:59:44 PM  01/01/2016 01:26:57 AM   NYPD
2         32309159  12/31/2015 11:59:29 PM  01/01/2016 04:51:03 AM   NYPD
3         32305098  12/31/2015 11:57:46 PM  01/01/2016 07:43:13 AM   NYPD
4         32306529  12/31/2015 11:56:58 PM  01/01/2016 03:24:42 AM   NYPD
…              …                       …                       …    …
191402    31024399  07/07/2015 09:47:21 PM  07/08/2015 12:32:03 AM   NYPD
191403    31025431  07/07/2015 09:43:41 PM  07/07/2015 11:13:32 PM   NYPD
191404    31023497  07/07/2015 09:42:44 PM  07/08/2015 02:59:07 AM   NYPD
191405    31027084  07/07/2015 09:42:10 PM  07/08/2015 01:34:24 AM   NYPD
191406    31026613  07/07/2015 09:42:09 PM  07/07/2015 11:13:32 PM   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
…                                   …                       …
191402  New York City Police Department       Noise - Commercial
191403  New York City Police Department  Noise - Street/Sidewalk
191404  New York City Police Department  Noise - Street/Sidewalk
191405  New York City Police Department         Blocked Driveway
191406  New York City Police Department  Noise - Street/Sidewalk

                         Descriptor     Location Type Incident Zip  \
0                 Loud Music/Party   Street/Sidewalk        10034
1                        No Access   Street/Sidewalk        11105
2                        No Access   Street/Sidewalk        10458
```

```
3       Commercial Overnight Parking   Street/Sidewalk        10461
4                    Blocked Sidewalk   Street/Sidewalk        11373
…                                 …              …          …
191402               Banging/Pounding  Store/Commercial        11207
191403               Loud Music/Party   Street/Sidewalk        10009
191404               Loud Music/Party   Street/Sidewalk        10473
191405                     No Access    Street/Sidewalk        11249
191406               Loud Music/Party   Street/Sidewalk        10009

              Incident Address  … Bridge Highway Name  \
0          71 VERMILYEA AVENUE  …        unknown_City
1              27-07 23 AVENUE  …        unknown_City
2        2897 VALENTINE AVENUE  …        unknown_City
3          2940 BAISLEY AVENUE  …        unknown_City
4                87-14 57 ROAD  …        unknown_City
…                          …  …                …
191402      258 JAMAICA AVENUE  …        unknown_City
191403            134 AVENUE D  …        unknown_City
191404            unknown_City  …        unknown_City
191405        376 WYTHE AVENUE  …        unknown_City
191406      464 EAST 10 STREET  …        unknown_City

       Bridge Highway Direction     Road Ramp Bridge Highway Segment  \
0                  unknown_City  unknown_City           unknown_City
1                  unknown_City  unknown_City           unknown_City
2                  unknown_City  unknown_City           unknown_City
3                  unknown_City  unknown_City           unknown_City
4                  unknown_City  unknown_City           unknown_City
…                         …           …                     …
191402             unknown_City  unknown_City           unknown_City
191403             unknown_City  unknown_City           unknown_City
191404             unknown_City  unknown_City           unknown_City
191405             unknown_City  unknown_City           unknown_City
191406             unknown_City  unknown_City           unknown_City

       Garage Lot Name Ferry Direction Ferry Terminal Name      Latitude  \
0         unknown_City    unknown_City        unknown_City       40.8657
1         unknown_City    unknown_City        unknown_City       40.7759
2         unknown_City    unknown_City        unknown_City       40.8703
3         unknown_City    unknown_City        unknown_City        40.836
4         unknown_City    unknown_City        unknown_City       40.7331
…                  …               …                   …          …
191402    unknown_City    unknown_City        unknown_City       40.6808
191403    unknown_City    unknown_City        unknown_City       40.7244
191404    unknown_City    unknown_City        unknown_City       40.8133
191405    unknown_City    unknown_City        unknown_City       40.7132
191406    unknown_City    unknown_City        unknown_City  unknown_City
```

```
           Longitude                                   Location
0            -73.9235    (40.86568153633767, -73.92350095571744)
1            -73.9151   (40.775945312321085, -73.91509393898605)
2            -73.8885   (40.870324522111424, -73.88852464418646)
3            -73.8284    (40.83599404683083, -73.82837939584206)
4            -73.8742   (40.733059618956815, -73.87416975810375)
…                 …                                         …
191402       -73.8918    (40.68081718662283, -73.89179426953243)
191403       -73.9755     (40.72444683419667, -73.9754635220889)
191404       -73.8582    (40.81329732471253, -73.85821295014048)
191405       -73.9656   (40.713207275795135, -73.96564173712595)
191406  unknown_City                                unknown_City

[191407 rows x 53 columns]
```

[87]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

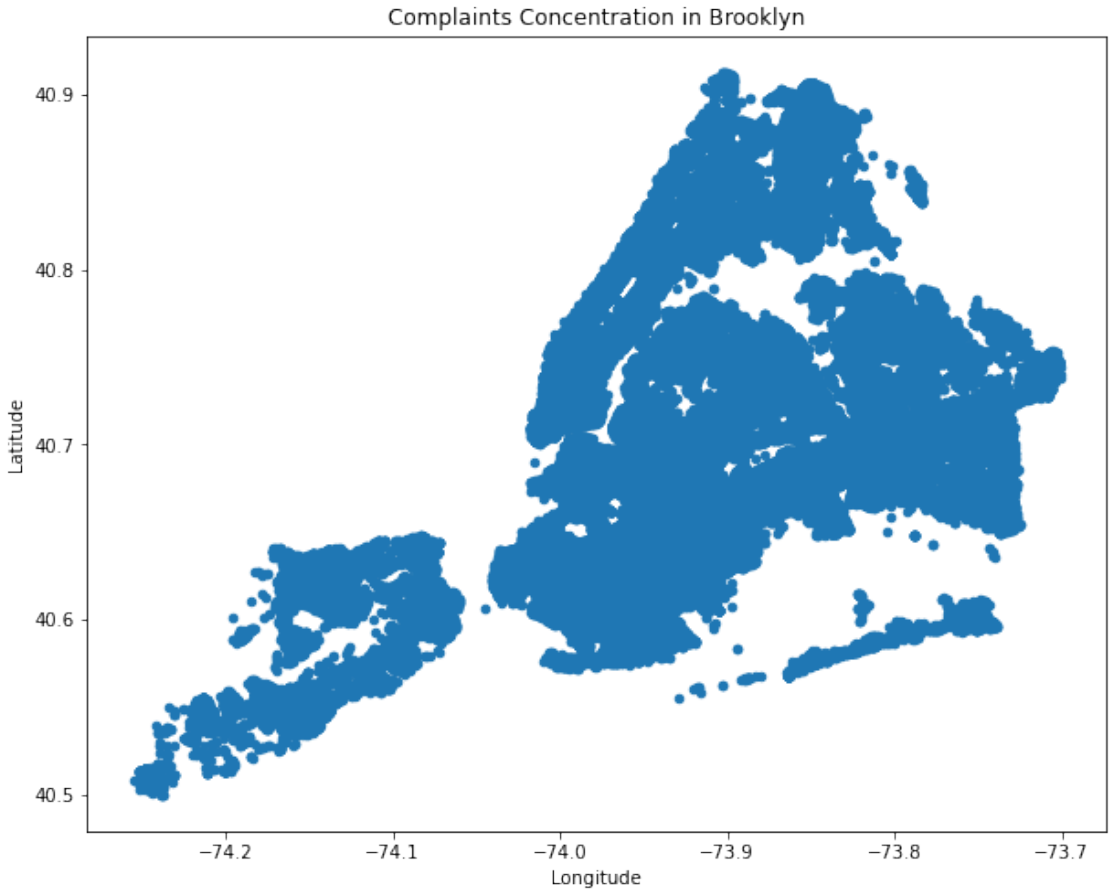
[30]:
```
plt.title('Complaint Types Distribution')
sns.countplot(y= 'Complaint Type' , data=data)
plt.show()
```




[31]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

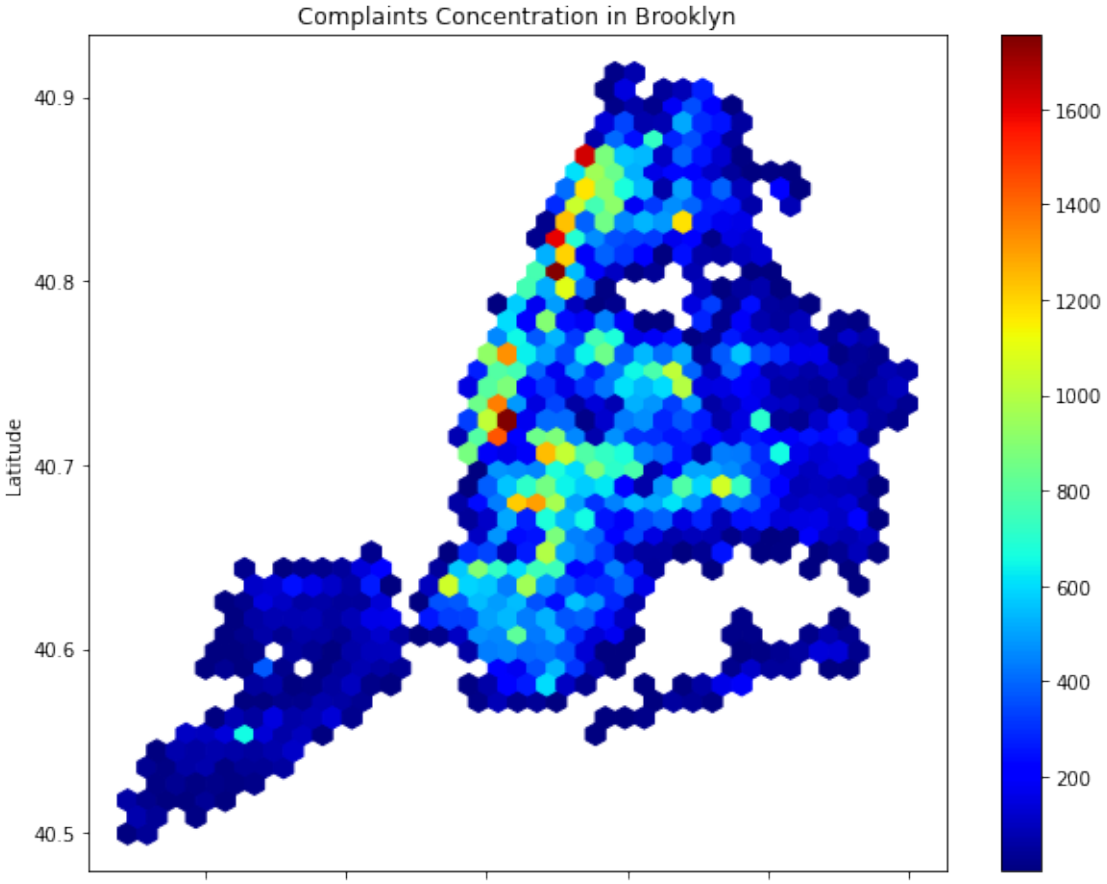
```
import seaborn as sns

data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
↪csv')
data

data[['Longitude', 'Latitude']].plot(kind = 'scatter', x='Longitude',␣
↪y='Latitude', title = 'Complaints Concentration in Brooklyn', figsize = (10,␣
↪8))
```

[31]:
```
<AxesSubplot:title={'center':'Complaints Concentration in Brooklyn'},
xlabel='Longitude', ylabel='Latitude'>
```



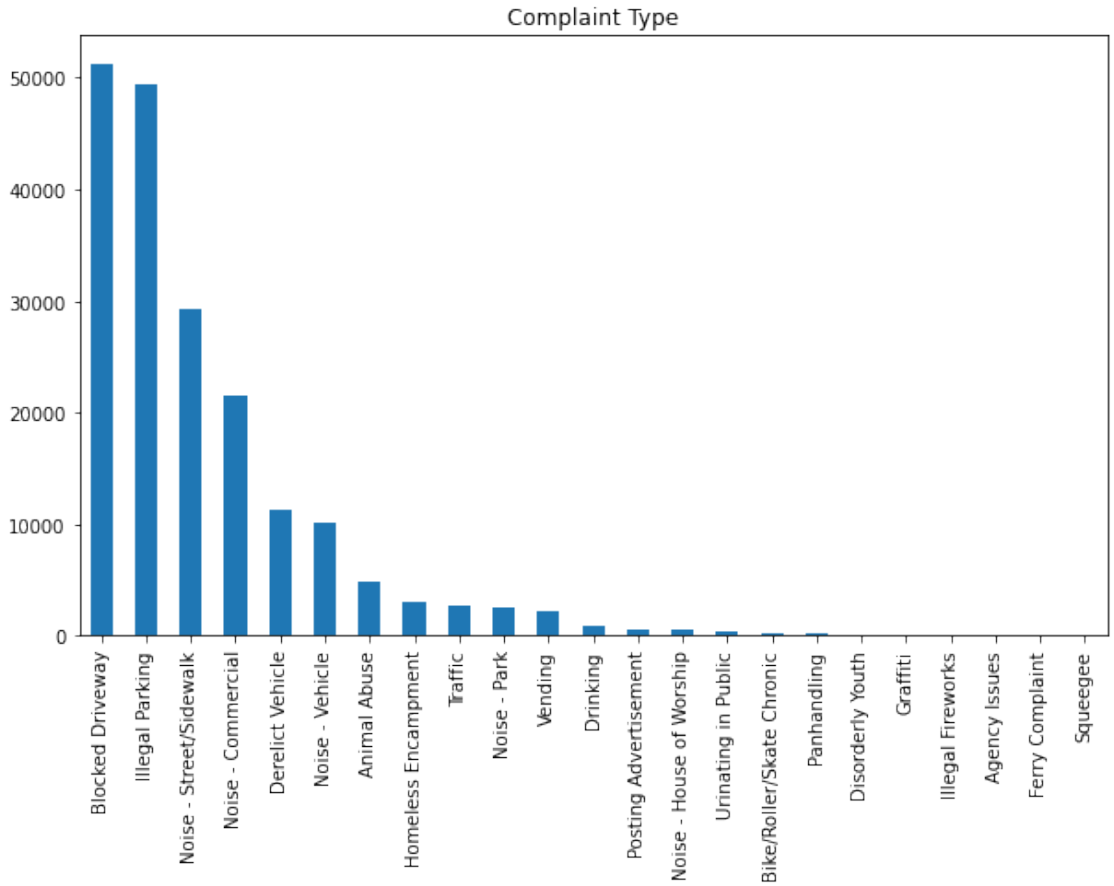

[32]:
```
data[['Longitude', 'Latitude']].plot(kind = 'hexbin', x='Longitude',␣
↪y='Latitude', gridsize=40,
    colormap = 'jet', mincnt=1, title = 'Complaints Concentration in Brooklyn',␣
↪figsize = (10, 8))
```

[32]:
```
<AxesSubplot:title={'center':'Complaints Concentration in Brooklyn'},
xlabel='Longitude', ylabel='Latitude'>
```



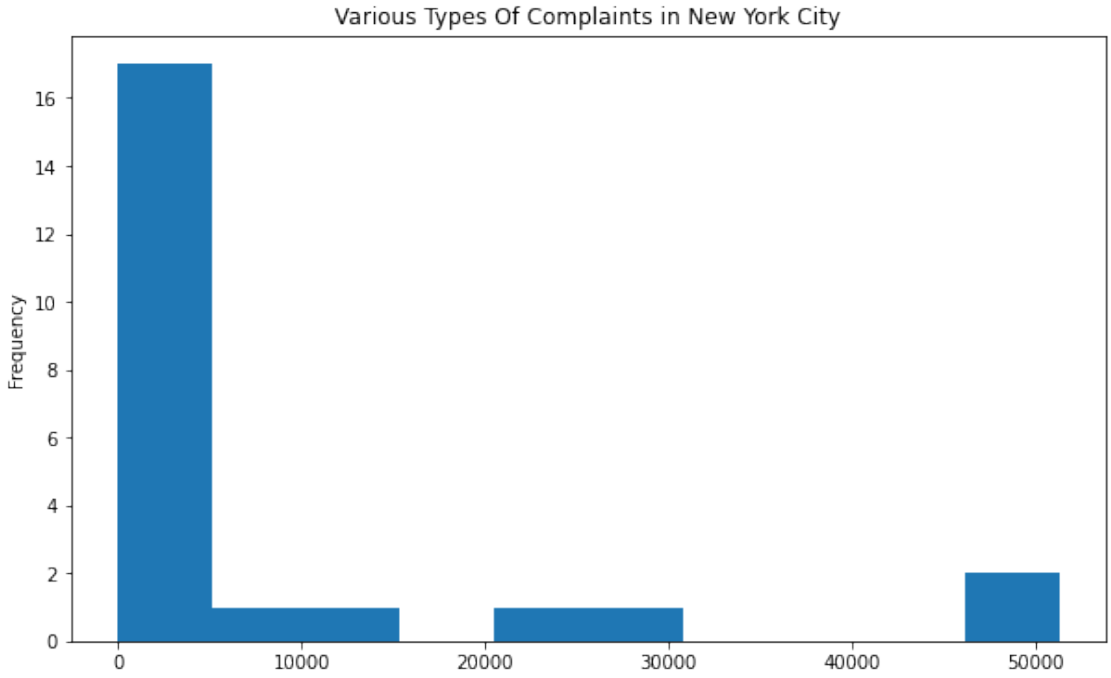

[33]:
```
data['Complaint Type'].value_counts().plot(kind = 'bar',figsize=(10,6), title =␣
↪'Complaint Type')
```

[33]:
```
<AxesSubplot:title={'center':'Complaint Type'}>
```




[34]:
```
(data['Complaint Type'].value_counts()).head(25).plot(kind='hist',
                    figsize=(10,6), title = 'Various Types Of Complaints in New␣
↪York City')
```

[34]:
```
<AxesSubplot:title={'center':'Various Types Of Complaints in New York City'},
ylabel='Frequency'>
```




[35]:
```
import pandas as pd
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
 ↪csv')

complaint = data['Complaint Type'].unique()
complaint

complaint[:10]
```

[35]:
```
array(['Noise - Street/Sidewalk', 'Blocked Driveway', 'Illegal Parking',
       'Derelict Vehicle', 'Noise - Commercial',
       'Noise - House of Worship', 'Posting Advertisement',
       'Noise - Vehicle', 'Animal Abuse', 'Vending'], dtype=object)
```

[36]:
```
import pandas as pd
import numpy as np

data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
 ↪csv')
```

```
a=pd.DataFrame(data)
a[['Complaint Type','City']]
```

[36]:
```
                  Complaint Type      City
0       Noise - Street/Sidewalk  NEW YORK
1              Blocked Driveway   ASTORIA
2              Blocked Driveway     BRONX
3               Illegal Parking     BRONX
4               Illegal Parking  ELMHURST
…                           …       …
191402       Noise - Commercial  BROOKLYN
191403  Noise - Street/Sidewalk  NEW YORK
191404  Noise - Street/Sidewalk     BRONX
191405         Blocked Driveway  BROOKLYN
191406  Noise - Street/Sidewalk  NEW YORK

[191407 rows x 2 columns]
```

[37]:
```
df_new = pd.crosstab(data['Complaint Type'], data['City'])
df_new
```

[37]:
```
City                        ARVERNE  ASTORIA  Astoria  BAYSIDE  BELLEROSE  \
Complaint Type
Animal Abuse                     26       75        0       24          6
Bike/Roller/Skate Chronic         0       14        0        0          1
Blocked Driveway                 26     1803       60      240         60
Derelict Vehicle                 11      234        9      128         51
Disorderly Youth                  1        2        0        1          1
Drinking                          0       24        0        0          0
Graffiti                          0        0        0        3          0
Homeless Encampment               3       24        0        2          1
Illegal Fireworks                 0        1        0        0          0
Illegal Parking                  40      709      111      315         71
Noise - Commercial                2      695      100       31          9
Noise - House of Worship          3        6        0        1          0
Noise - Park                      0       43        0        3          1
Noise - Street/Sidewalk          14      242       53        5          8
Noise - Vehicle                   4      114        0        8          4
Panhandling                       1        1        0        0          1
Posting Advertisement             0        0        0        0          0
Squeegee                          0        0        0        0          0
Traffic                           0       27        0        7          4
Urinating in Public               1        6        0        0          1
Vending                           1       36        0        0          0

City                        BREEZY POINT  BRONX  BROOKLYN  CAMBRIA HEIGHTS  \
Complaint Type
```

| | | | | |
|---|---|---|---|---|
| Animal Abuse | 1 | 901 | 1465 | 7 |
| Bike/Roller/Skate Chronic | 0 | 12 | 69 | 0 |
| Blocked Driveway | 3 | 8396 | 18812 | 99 |
| Derelict Vehicle | 0 | 1272 | 3369 | 69 |
| Disorderly Youth | 0 | 27 | 40 | 0 |
| Drinking | 0 | 120 | 154 | 0 |
| Graffiti | 0 | 7 | 24 | 0 |
| Homeless Encampment | 0 | 148 | 595 | 2 |
| Illegal Fireworks | 0 | 8 | 13 | 0 |
| Illegal Parking | 13 | 5189 | 17919 | 53 |
| Noise - Commercial | 3 | 1636 | 6777 | 7 |
| Noise - House of Worship | 0 | 50 | 231 | 0 |
| Noise - Park | 0 | 337 | 1008 | 0 |
| Noise - Street/Sidewalk | 1 | 5320 | 8099 | 12 |
| Noise - Vehicle | 1 | 1978 | 3079 | 36 |
| Panhandling | 0 | 14 | 33 | 0 |
| Posting Advertisement | 0 | 12 | 40 | 0 |
| Squeegee | 0 | 0 | 0 | 0 |
| Traffic | 0 | 232 | 697 | 4 |
| Urinating in Public | 0 | 31 | 93 | 0 |
| Vending | 0 | 199 | 312 | 0 |

| City | CENTRAL PARK | COLLEGE POINT | CORONA | EAST ELMHURST | \ |
|---|---|---|---|---|---|
| Complaint Type | | | | | |
| Animal Abuse | 0 | 21 | 33 | 41 | |
| Bike/Roller/Skate Chronic | 0 | 0 | 0 | 0 | |
| Blocked Driveway | 0 | 287 | 1880 | 935 | |
| Derelict Vehicle | 0 | 95 | 35 | 78 | |
| Disorderly Youth | 0 | 0 | 2 | 0 | |
| Drinking | 0 | 0 | 22 | 4 | |
| Graffiti | 0 | 1 | 0 | 2 | |
| Homeless Encampment | 0 | 1 | 14 | 1 | |
| Illegal Fireworks | 0 | 0 | 0 | 0 | |
| Illegal Parking | 0 | 217 | 452 | 618 | |
| Noise - Commercial | 0 | 25 | 154 | 27 | |
| Noise - House of Worship | 0 | 0 | 3 | 11 | |
| Noise - Park | 0 | 1 | 17 | 1 | |
| Noise - Street/Sidewalk | 50 | 25 | 133 | 62 | |
| Noise - Vehicle | 0 | 107 | 54 | 33 | |
| Panhandling | 0 | 0 | 1 | 0 | |
| Posting Advertisement | 0 | 0 | 1 | 1 | |
| Squeegee | 0 | 0 | 0 | 0 | |
| Traffic | 0 | 7 | 9 | 10 | |
| Urinating in Public | 0 | 0 | 5 | 3 | |
| Vending | 0 | 1 | 48 | 2 | |

| City | ELMHURST | East Elmhurst | … | REGO PARK | \ |
|---|---|---|---|---|---|

| Complaint Type | | | … | |
|---|---|---|---|---|
| Animal Abuse | 23 | 0 | … | 17 |
| Bike/Roller/Skate Chronic | 1 | 0 | … | 0 |
| Blocked Driveway | 956 | 0 | … | 435 |
| Derelict Vehicle | 61 | 1 | … | 54 |
| Disorderly Youth | 0 | 0 | … | 0 |
| Drinking | 4 | 0 | … | 2 |
| Graffiti | 0 | 0 | … | 1 |
| Homeless Encampment | 26 | 0 | … | 5 |
| Illegal Fireworks | 1 | 0 | … | 0 |
| Illegal Parking | 419 | 3 | … | 373 |
| Noise - Commercial | 45 | 0 | … | 48 |
| Noise - House of Worship | 2 | 0 | … | 1 |
| Noise - Park | 25 | 0 | … | 12 |
| Noise - Street/Sidewalk | 161 | 0 | … | 31 |
| Noise - Vehicle | 33 | 0 | … | 36 |
| Panhandling | 2 | 0 | … | 0 |
| Posting Advertisement | 0 | 0 | … | 0 |
| Squeegee | 0 | 0 | … | 0 |
| Traffic | 8 | 0 | … | 8 |
| Urinating in Public | 7 | 0 | … | 0 |
| Vending | 14 | 0 | … | 1 |

| City | RICHMOND HILL | RIDGEWOOD | ROCKAWAY PARK | ROSEDALE | \ |
|---|---|---|---|---|---|
| Complaint Type | | | | | |
| Animal Abuse | 19 | 75 | 16 | 15 | |
| Bike/Roller/Skate Chronic | 0 | 1 | 0 | 0 | |
| Blocked Driveway | 521 | 1084 | 45 | 152 | |
| Derelict Vehicle | 93 | 183 | 6 | 133 | |
| Disorderly Youth | 0 | 0 | 1 | 0 | |
| Drinking | 7 | 6 | 15 | 2 | |
| Graffiti | 1 | 1 | 0 | 1 | |
| Homeless Encampment | 19 | 10 | 2 | 2 | |
| Illegal Fireworks | 3 | 1 | 0 | 0 | |
| Illegal Parking | 238 | 1259 | 216 | 151 | |
| Noise - Commercial | 152 | 229 | 57 | 17 | |
| Noise - House of Worship | 0 | 0 | 0 | 0 | |
| Noise - Park | 3 | 20 | 1 | 37 | |
| Noise - Street/Sidewalk | 63 | 275 | 100 | 14 | |
| Noise - Vehicle | 32 | 124 | 17 | 6 | |
| Panhandling | 0 | 0 | 0 | 0 | |
| Posting Advertisement | 1 | 0 | 0 | 0 | |
| Squeegee | 0 | 0 | 0 | 0 | |
| Traffic | 6 | 22 | 4 | 17 | |
| Urinating in Public | 4 | 6 | 1 | 0 | |
| Vending | 13 | 1 | 2 | 3 | |

| City | SAINT ALBANS | SOUTH OZONE PARK | \ |
|---|---|---|---|
| Complaint Type | | | |
| Animal Abuse | 16 | 40 | |
| Bike/Roller/Skate Chronic | 0 | 0 | |
| Blocked Driveway | 164 | 643 | |
| Derelict Vehicle | 133 | 237 | |
| Disorderly Youth | 1 | 0 | |
| Drinking | 2 | 9 | |
| Graffiti | 0 | 0 | |
| Homeless Encampment | 3 | 3 | |
| Illegal Fireworks | 0 | 0 | |
| Illegal Parking | 143 | 302 | |
| Noise - Commercial | 17 | 35 | |
| Noise - House of Worship | 0 | 1 | |
| Noise - Park | 0 | 3 | |
| Noise - Street/Sidewalk | 55 | 54 | |
| Noise - Vehicle | 16 | 56 | |
| Panhandling | 0 | 0 | |
| Posting Advertisement | 0 | 0 | |
| Squeegee | 0 | 0 | |
| Traffic | 8 | 16 | |
| Urinating in Public | 0 | 1 | |
| Vending | 1 | 2 | |

| City | SOUTH RICHMOND HILL | SPRINGFIELD GARDENS | \ |
|---|---|---|---|
| Complaint Type | | | |
| Animal Abuse | 15 | 15 | |
| Bike/Roller/Skate Chronic | 1 | 0 | |
| Blocked Driveway | 1002 | 186 | |
| Derelict Vehicle | 182 | 139 | |
| Disorderly Youth | 1 | 0 | |
| Drinking | 13 | 2 | |
| Graffiti | 0 | 0 | |
| Homeless Encampment | 10 | 2 | |
| Illegal Fireworks | 0 | 0 | |
| Illegal Parking | 329 | 149 | |
| Noise - Commercial | 155 | 24 | |
| Noise - House of Worship | 3 | 1 | |
| Noise - Park | 0 | 1 | |
| Noise - Street/Sidewalk | 54 | 20 | |
| Noise - Vehicle | 41 | 26 | |
| Panhandling | 0 | 1 | |
| Posting Advertisement | 0 | 1 | |
| Squeegee | 0 | 0 | |
| Traffic | 9 | 8 | |
| Urinating in Public | 0 | 1 | |
| Vending | 14 | 0 | |

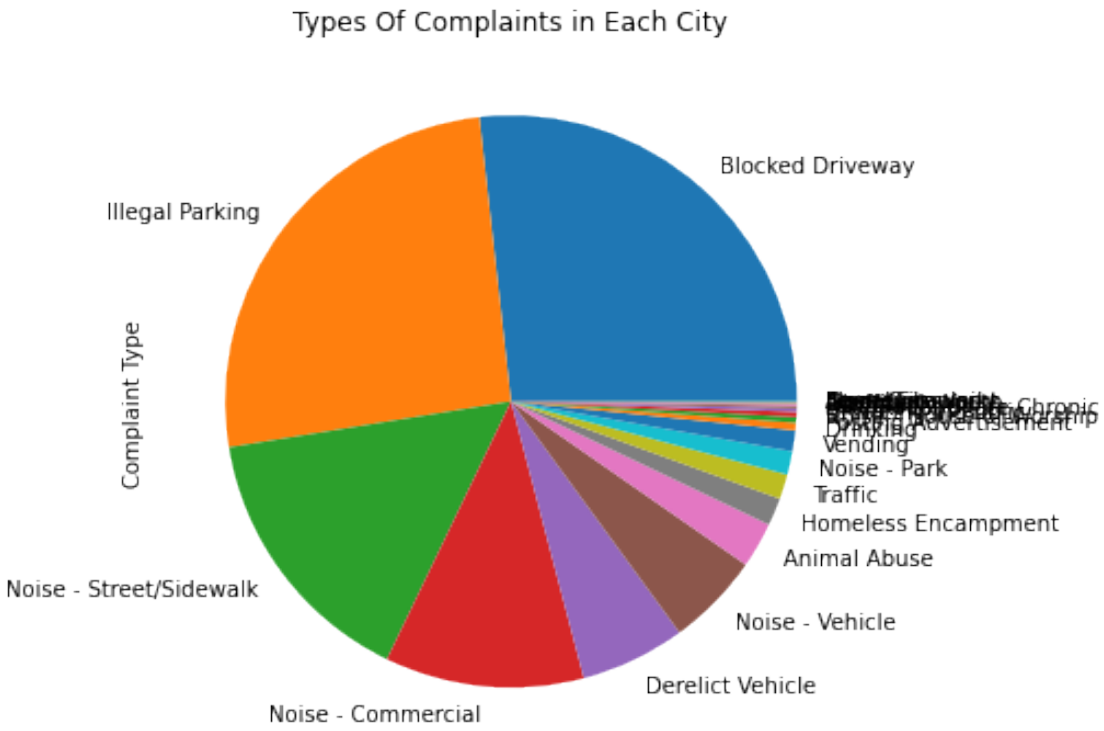
| City | STATEN ISLAND | SUNNYSIDE | WHITESTONE | WOODHAVEN | \ |
|---|---|---|---|---|---|
| Complaint Type | | | | | |
| Animal Abuse | 341 | 21 | 20 | 33 | |
| Bike/Roller/Skate Chronic | 4 | 2 | 3 | 2 | |
| Blocked Driveway | 1471 | 144 | 137 | 728 | |
| Derelict Vehicle | 1138 | 10 | 147 | 213 | |
| Disorderly Youth | 6 | 0 | 0 | 0 | |
| Drinking | 152 | 4 | 0 | 1 | |
| Graffiti | 2 | 1 | 0 | 0 | |
| Homeless Encampment | 52 | 5 | 0 | 8 | |
| Illegal Fireworks | 5 | 0 | 0 | 0 | |
| Illegal Parking | 3312 | 70 | 351 | 458 | |
| Noise - Commercial | 425 | 70 | 9 | 96 | |
| Noise - House of Worship | 10 | 0 | 0 | 2 | |
| Noise - Park | 32 | 9 | 2 | 2 | |
| Noise - Street/Sidewalk | 416 | 40 | 20 | 53 | |
| Noise - Vehicle | 200 | 27 | 11 | 24 | |
| Panhandling | 10 | 0 | 0 | 0 | |
| Posting Advertisement | 514 | 2 | 0 | 0 | |
| Squeegee | 0 | 0 | 0 | 0 | |
| Traffic | 139 | 7 | 7 | 3 | |
| Urinating in Public | 7 | 2 | 0 | 2 | |
| Vending | 18 | 13 | 0 | 1 | |

| City | WOODSIDE | Woodside |
|---|---|---|
| Complaint Type | | |
| Animal Abuse | 42 | 0 |
| Bike/Roller/Skate Chronic | 3 | 0 |
| Blocked Driveway | 1067 | 7 |
| Derelict Vehicle | 164 | 1 |
| Disorderly Youth | 0 | 0 |
| Drinking | 11 | 0 |
| Graffiti | 1 | 0 |
| Homeless Encampment | 14 | 0 |
| Illegal Fireworks | 1 | 0 |
| Illegal Parking | 542 | 22 |
| Noise - Commercial | 134 | 0 |
| Noise - House of Worship | 2 | 0 |
| Noise - Park | 24 | 0 |
| Noise - Street/Sidewalk | 141 | 0 |
| Noise - Vehicle | 74 | 0 |
| Panhandling | 0 | 0 |
| Posting Advertisement | 0 | 0 |
| Squeegee | 0 | 0 |
| Traffic | 29 | 0 |
| Urinating in Public | 5 | 0 |

```
Vending                          13          0

[21 rows x 52 columns]
```

[38]:
```
(data['Complaint Type'].value_counts()).head(25).plot(kind='pie',
                    figsize=(10,6), title = 'Types Of Complaints in Each City')
```

[38]:
```
<AxesSubplot:title={'center':'Types Of Complaints in Each City'},
ylabel='Complaint Type'>
```




[48]:
```
import numpy as np
import pandas as pd

data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
 ↪csv')
data
data.groupby(["Complaint Type","Closed Date"]).size()
```

[48]:
```
Complaint Type  Closed Date
Agency Issues   07/11/2015 04:43:58 PM    1
                07/13/2015 12:33:00 AM    1
Animal Abuse    07/08/2015 01:04:04 PM    1
```

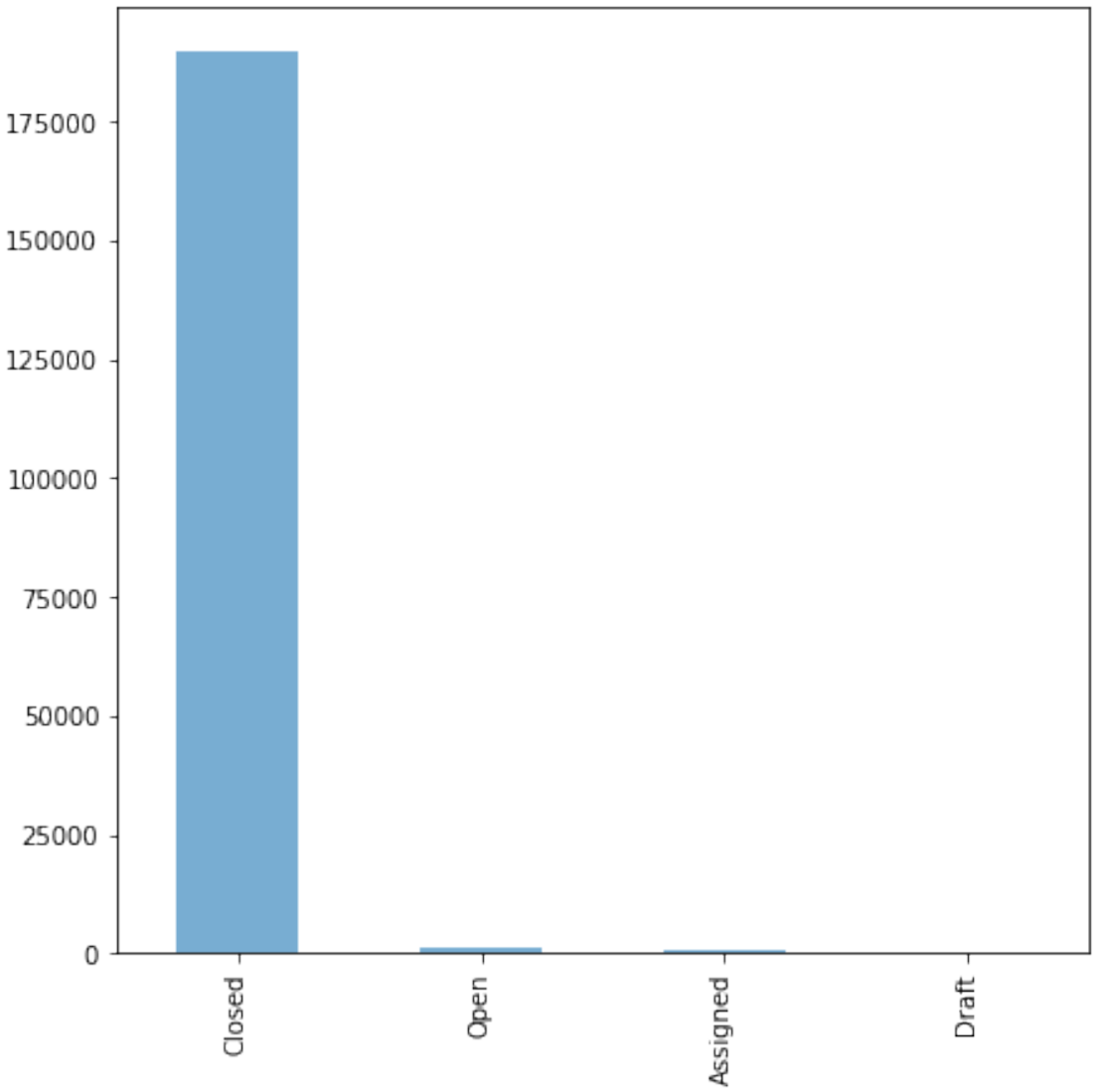
```
                  07/08/2015 01:22:46 PM    1
                  07/08/2015 02:31:39 PM    1
                                            ..
Vending           12/31/2015 11:07:48 AM    1
                  12/31/2015 11:19:50 AM    1
                  12/31/2015 11:19:51 AM    1
                  12/31/2015 11:28:51 AM    1
                  12/31/2015 11:28:52 AM    1
Length: 186176, dtype: int64
```

[43]:
```
import datetime
data = pd.read_csv(r'customer service/311_Service_Requests_from_2010_to_Present.
 ↪csv',parse_dates=["Created Date","Closed Date"])
```

[ ]:
```
Data["Request_Closing_Time"] = data["Closed Date"]- data["Created Date"]
```

[61]:
```
data['Status'].value_counts().plot(kind= 'bar',alpha=0.6,figsize=(7,7))
```

[61]:
```
<AxesSubplot:>
```




[4]:
```
from numpy.random import seed
from numpy.random import randn
from scipy.stats import wilcoxon
# contingency table
seed(1)

#generate two independent samples
data1 = 5 * randn(100) + 50
data2 = 5 * randn(100) + 51

#interpret test-statistic
stat, p = wilcoxon(data1, data2)
print('statistics=%.3f, p=%.3f' % (stat, p))
```

```
#interpret p values
alpha = 0.05
if p > alpha:
  print('Same distribution (fail to reject H0)')
else:
  print('different distribution (reject H0)')
```

```
statistics=1886.000, p=0.028
different distribution (reject H0)
```

Based on all the analyses done, the NYC311 Service is a very well-liked and dependable channel and resource for the NYC neighborhoods to inform the neighborhood organizations and citizen service providers about a variety of issues that are crucial to the society's health and well-being. I was able to pinpoint general trends and issues affecting the major boroughs of the New York Metropolitan Area, but even more significantly, I was able to identify distinctive themes and patterns that were more prevalent in each one. This gave me a better understanding of the unique needs, challenges, and local dynamics that each borough community faces on a daily basis. Surprisingly, the majority of the "nyc311" tweets' sentiment analysis results show that they are favorable or neutral (67%), which is a relatively small percentage.