Customer Service requests Analysis project 2

November 19, 2022

```
[1]: import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     %matplotlib inline
     import scipy.stats as stats
     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]: dataframe = pd.read_csv('311_Service_Requests_from_2010_to_Present.
     ↪csv',low_memory=False)
```

```
[4]: dataframe
```

```
[4]:         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
     3          32305098  12/31/2015 11:57:46 PM        01-01-16 7:43   NYPD
     4          32306529  12/31/2015 11:56:58 PM        01-01-16 3:24   NYPD
     ...             ...                   ...                   ...    ...
     300693     30281872  03/29/2015 12:33:41 AM                  NaN   NYPD
     300694     30281230  03/29/2015 12:33:28 AM  03/29/2015 02:33:59 AM   NYPD
     300695     30283424  03/29/2015 12:33:03 AM  03/29/2015 03:40:20 AM   NYPD
     300696     30280004  03/29/2015 12:33:02 AM  03/29/2015 04:38:35 AM   NYPD
     300697     30281825  03/29/2015 12:33:01 AM  03/29/2015 04:41:50 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
     ...                                 ...                      ...
```

1

```
300693  New York City Police Department      Noise - Commercial
300694  New York City Police Department       Blocked Driveway
300695  New York City Police Department      Noise - Commercial
300696  New York City Police Department      Noise - Commercial
300697  New York City Police Department      Noise - Commercial

                          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
…                                …                  …              …
300693           Loud Music/Party  Club/Bar/Restaurant           NaN
300694            Partial Access     Street/Sidewalk         11418.0
300695           Loud Music/Party  Club/Bar/Restaurant         11206.0
300696           Loud Music/Party  Club/Bar/Restaurant         10461.0
300697           Loud Music/Party    Store/Commercial         10036.0

                 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
…                              …                   …                   …
300693          CRESCENT AVENUE     CRESCENT AVENUE             EAST 186
300694            100-17 87 AVENUE          87 AVENUE             DEAD END
300695           162 THROOP AVENUE      THROOP AVENUE       HOPKINS STREET
300696  3151 EAST TREMONT AVENUE  EAST TREMONT AVENUE  CODDINGTON AVENUE
300697          251 WEST 48 STREET      WEST 48 STREET             BROADWAY

          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  …
…                      …                    …                   …  …  …
300693             NaN              east 186                   NaN  …
300694       102 STREET                  NaN                   NaN  …
300695     ELLERY STREET                  NaN                   NaN  …
300696  LA SALLE AVENUE                  NaN                   NaN  …
300697          8 AVENUE                  NaN                   NaN  …

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

2

```
1                        N                                NaN        NaN
2                        N                                NaN        NaN
3                        N                                NaN        NaN
4                        N                                NaN        NaN
...                     ...                               ...        ...
300693                   N                                NaN        NaN
300694                   N                                NaN        NaN
300695                   N                                NaN        NaN
300696                   N                                NaN        NaN
300697                   N                                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
...                      ...                  ...                  ...
300693                   NaN                  NaN                  NaN
300694                   NaN                  NaN                  NaN
300695                   NaN                  NaN                  NaN
300696                   NaN                  NaN                  NaN
300697                   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
...                          ...       ...                    ...
300693                       NaN       NaN                    NaN
300694                       NaN       NaN                    NaN
300695                       NaN       NaN                    NaN
300696                       NaN       NaN                    NaN
300697                       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
...                 ...             ...                 ...        ...
300693              NaN             NaN                 NaN        NaN
300694              NaN             NaN                 NaN  40.694077
300695              NaN             NaN                 NaN  40.699590
```

```
300696           NaN            NaN                 NaN  40.837708
300697           NaN            NaN                 NaN  40.760583

        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)
...            ...                                      ...
300693         NaN                                      NaN
300694  -73.846087   (40.69407728322387, -73.8460866160573)
300695  -73.944234  (40.69959035300927, -73.94423377144169)
300696  -73.834587    (40.8377075854206, -73.83458731019586)
300697  -73.985922  (40.76058322950115, -73.98592204392392)

[300698 rows x 53 columns]
```

[5]: `dataframe.head()`

```
[5]:   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
    3   32305098  12/31/2015 11:57:46 PM  01-01-16 7:43   NYPD
    4   32306529  12/31/2015 11:56:58 PM  01-01-16 3:24   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]
```

[7]: `dataframe.shape`

[7]: (300698, 53)

[8]: dataframe.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
```

[9]: `dataframe.describe()`

[9]:

	Unique Key	Incident Zip	X Coordinate (State Plane) \
count	3.006980e+05	298083.000000	2.971580e+05
mean	3.130054e+07	10848.888645	1.004854e+06
std	5.738547e+05	583.182081	2.175338e+04
min	3.027948e+07	83.000000	9.133570e+05
25%	3.080118e+07	10310.000000	9.919752e+05
50%	3.130436e+07	11208.000000	1.003158e+06
75%	3.178446e+07	11238.000000	1.018372e+06
max	3.231065e+07	11697.000000	1.067173e+06

	Y Coordinate (State Plane)	School or Citywide Complaint	Vehicle Type \
count	297158.000000	0.0	0.0
mean	203754.534416	NaN	NaN
std	29880.183529	NaN	NaN
min	121219.000000	NaN	NaN
25%	183343.000000	NaN	NaN
50%	201110.500000	NaN	NaN
75%	224125.250000	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

             Latitude      Longitude
count   297158.000000   297158.000000
mean        40.725885      -73.925630
std          0.082012        0.078454
min         40.499135      -74.254937
25%         40.669796      -73.972142
50%         40.718661      -73.931781
75%         40.781840      -73.876805
max         40.912869      -73.700760
```

[43]: `dataframe.head(4)`

[43]:
```
   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


                        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


                   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


         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


  Intersection Street 1 Intersection Street 2  …  \
0                   NaN                   NaN  …
1                   NaN                   NaN  …
2                   NaN                   NaN  …
3                   NaN                   NaN  …


  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

  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

  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

  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

                                       Location Request_Closing_Time
0   (40.86568153633767, -73.92350095571744)       0 days 00:55:15
1   (40.775945312321085, -73.91509393898605)      0 days 01:26:16
2   (40.870324522111424, -73.88852464418646)      0 days 04:51:31
3   (40.83599404683083, -73.82837939584206)       0 days 07:45:14

[4 rows x 54 columns]
```

```
[22]: dataframe['Created Date'] = pd.to_datetime(dataframe['Created Date'])
      dataframe['Closed Date'] = pd.to_datetime(dataframe['Closed Date'])
      dataframe
```

```
[22]:         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
      ...            ...                 ...                 ...    ...
      300693    30281872 2015-03-29 00:33:41                 NaT   NYPD
      300694    30281230 2015-03-29 00:33:28 2015-03-29 02:33:59   NYPD
      300695    30283424 2015-03-29 00:33:03 2015-03-29 03:40:20   NYPD
      300696    30280004 2015-03-29 00:33:02 2015-03-29 04:38:35   NYPD
      300697    30281825 2015-03-29 00:33:01 2015-03-29 04:41:50   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
...                                 ...                       ...
300693  New York City Police Department        Noise - Commercial
300694  New York City Police Department          Blocked Driveway
300695  New York City Police Department        Noise - Commercial
300696  New York City Police Department        Noise - Commercial
300697  New York City Police Department        Noise - Commercial

                           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
...                               ...                  ...           ...
300693              Loud Music/Party  Club/Bar/Restaurant           NaN
300694                Partial Access      Street/Sidewalk       11418.0
300695              Loud Music/Party  Club/Bar/Restaurant       11206.0
300696              Loud Music/Party  Club/Bar/Restaurant       10461.0
300697              Loud Music/Party     Store/Commercial       10036.0

                  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
...                            ...                   ...                 ...
300693            CRESCENT AVENUE       CRESCENT AVENUE            EAST 186
300694            100-17 87 AVENUE             87 AVENUE            DEAD END
300695            162 THROOP AVENUE        THROOP AVENUE      HOPKINS STREET
300696  3151 EAST TREMONT AVENUE   EAST TREMONT AVENUE  CODDINGTON AVENUE
300697            251 WEST 48 STREET        WEST 48 STREET            BROADWAY

           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  ...
...                 ...                    ...                    ...  ...
300693              NaN               east 186                    NaN  ...
```

```
300694        102 STREET                    NaN                    NaN  …
300695     ELLERY STREET                    NaN                    NaN  …
300696  LA SALLE AVENUE                     NaN                    NaN  …
300697         8 AVENUE                     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
…                    …                              …            …
300693                 N                            NaN          NaN
300694                 N                            NaN          NaN
300695                 N                            NaN          NaN
300696                 N                            NaN          NaN
300697                 N                            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
…                        …                     …                   …
300693                   NaN                   NaN                 NaN
300694                   NaN                   NaN                 NaN
300695                   NaN                   NaN                 NaN
300696                   NaN                   NaN                 NaN
300697                   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
…                            …         …                       …
300693                       NaN       NaN                     NaN
300694                       NaN       NaN                     NaN
300695                       NaN       NaN                     NaN
300696                       NaN       NaN                     NaN
300697                       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
...             ...              ...              ...        ...
300693          NaN              NaN              NaN        NaN
300694          NaN              NaN              NaN  40.694077
300695          NaN              NaN              NaN  40.699590
300696          NaN              NaN              NaN  40.837708
300697          NaN              NaN              NaN  40.760583

          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)
...             ...                                       ...
300693          NaN                                       NaN
300694   -73.846087    (40.69407728322387, -73.8460866160573)
300695   -73.944234   (40.69959035300927, -73.94423377144169)
300696   -73.834587    (40.8377075854206, -73.83458731019586)
300697   -73.985922   (40.76058322950115, -73.98592204392392)

[300698 rows x 53 columns]
```

```python
[56]: dataframe["Request_Closing_Time"] = (dataframe["Closed Date"] -
      dataframe["Created Date"])
      Request_Closing_Time = []
      for x in (dataframe["Closed Date"] - dataframe["Created Date"]):
          close = x.total_seconds()/60
          Request_Closing_Time.append(close)
      dataframe["Request_Closing_Time"] = Request_Closing_Time
```

```python
[27]: dataframe['Agency'].unique
```

```
[27]: <bound method Series.unique of 0          NYPD
      1          NYPD
      2          NYPD
      3          NYPD
      4          NYPD

      300693     NYPD
      300694     NYPD
      300695     NYPD
      300696     NYPD
      300697     NYPD
      Name: Agency, Length: 300698, dtype: object>
```

```
[41]: dataframe['Agency'].unique()
```

```
[41]: array(['NYPD'], dtype=object)
```

```
[57]: sns.distplot(dataframe["Request_Closing_Time"])
      plt.show
```

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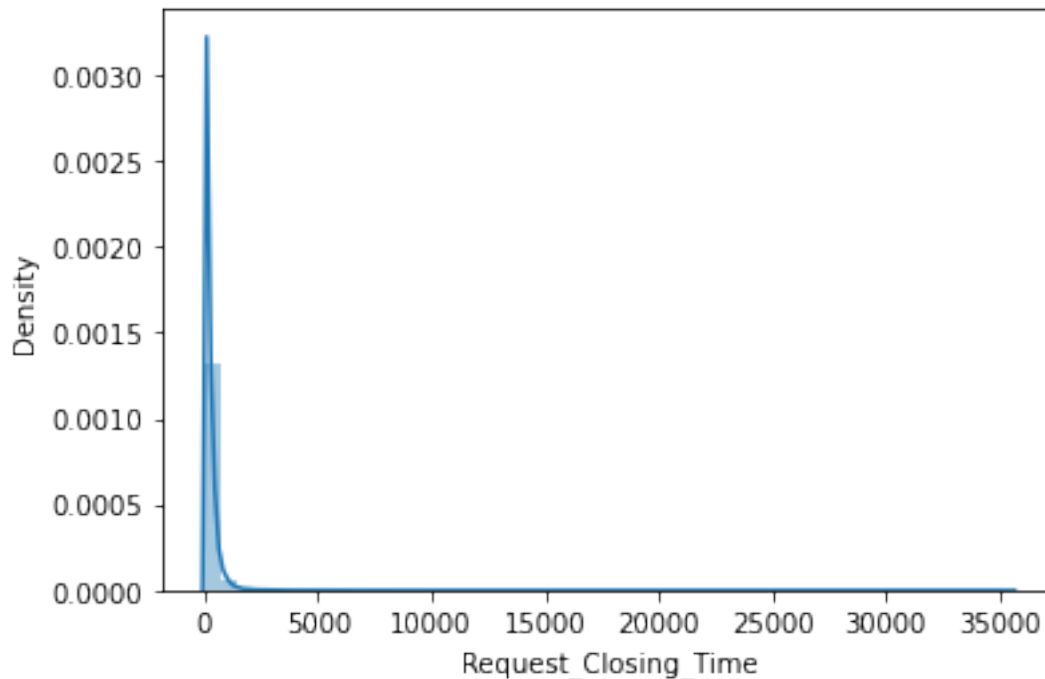


```
[59]: print("Total Number of Concerns : ",len(dataframe),"\n")
      print("Percentage of Requests took less than 100 hour to get solved    :␣
       ↪",round((len(dataframe)-(dataframe["Request_Closing_Time"]>100).sum())/
       ↪len(dataframe)*100,2),"%")
      print("Percentage of Requests took less than 1000 hour to get solved :␣
       ↪",round((len(dataframe)-(dataframe["Request_Closing_Time"]>1000).sum())/
       ↪len(dataframe)*100,2),"%")
```

```
Total Number of Concerns :  300698

Percentage of Requests took less than 100 hour to get solved    :  33.32 %
Percentage of Requests took less than 1000 hour to get solved :  97.19 %
```

```
[62]: sns.distplot(dataframe["Request_Closing_Time"])
      plt.xlim((0,5000))
      plt.ylim((0,0.0003))
```

```
plt.show()
```
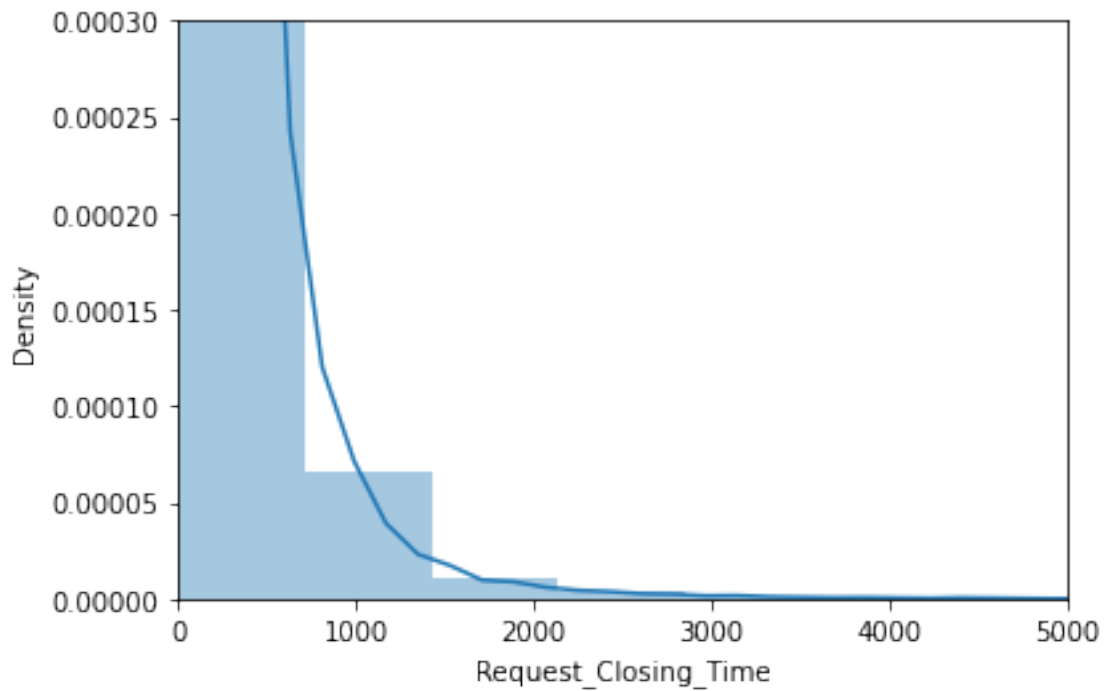

[63]:
```
dataframe['Complaint Type'].value_counts()[:10].plot(kind='barh',alpha=0.
↪6,figsize=(15,10))
plt.show()
```
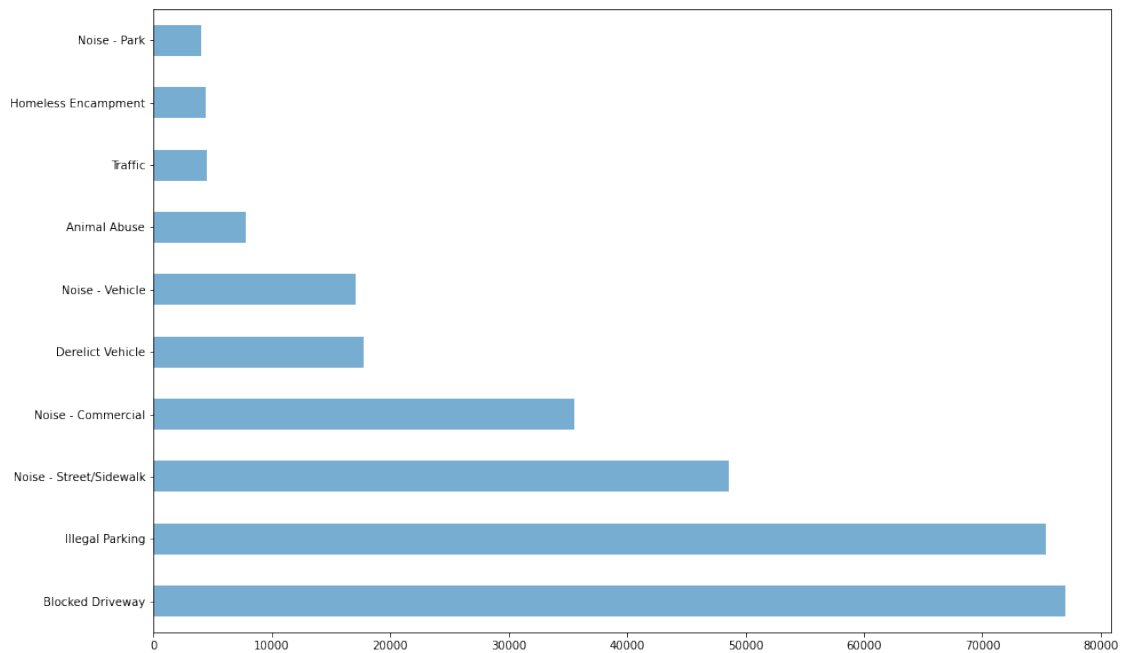
```
[64]: g=sns.catplot(x='Complaint Type', y="Request_Closing_Time",data=dataframe)
      g.fig.set_figwidth(15)
      g.fig.set_figheight(7)
      plt.xticks(rotation=90)
      plt.ylim((0,5000))
      plt.show()
```
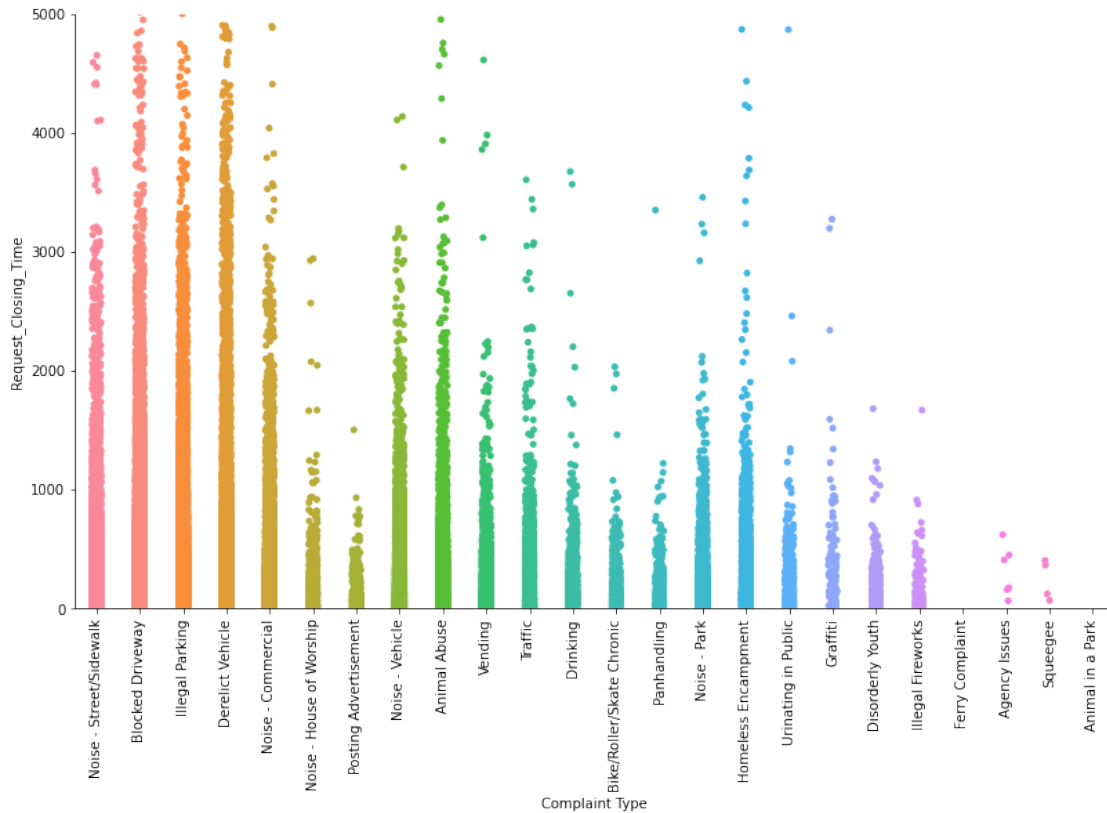


```
[65]: dataframe['Status'].value_counts().plot(kind='bar',alpha=0.6,figsize=(15,7))
      plt.show()
```
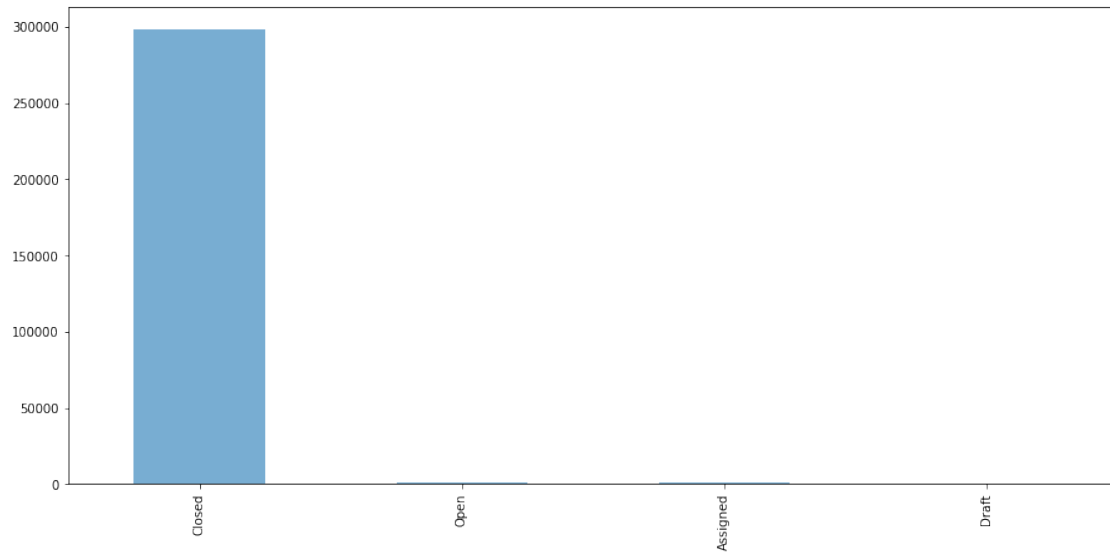
```
[66]: plt.figure(figsize=(12,7))
      dataframe['Borough'].value_counts().plot(kind='bar',alpha=0.7)
      plt.show()
```
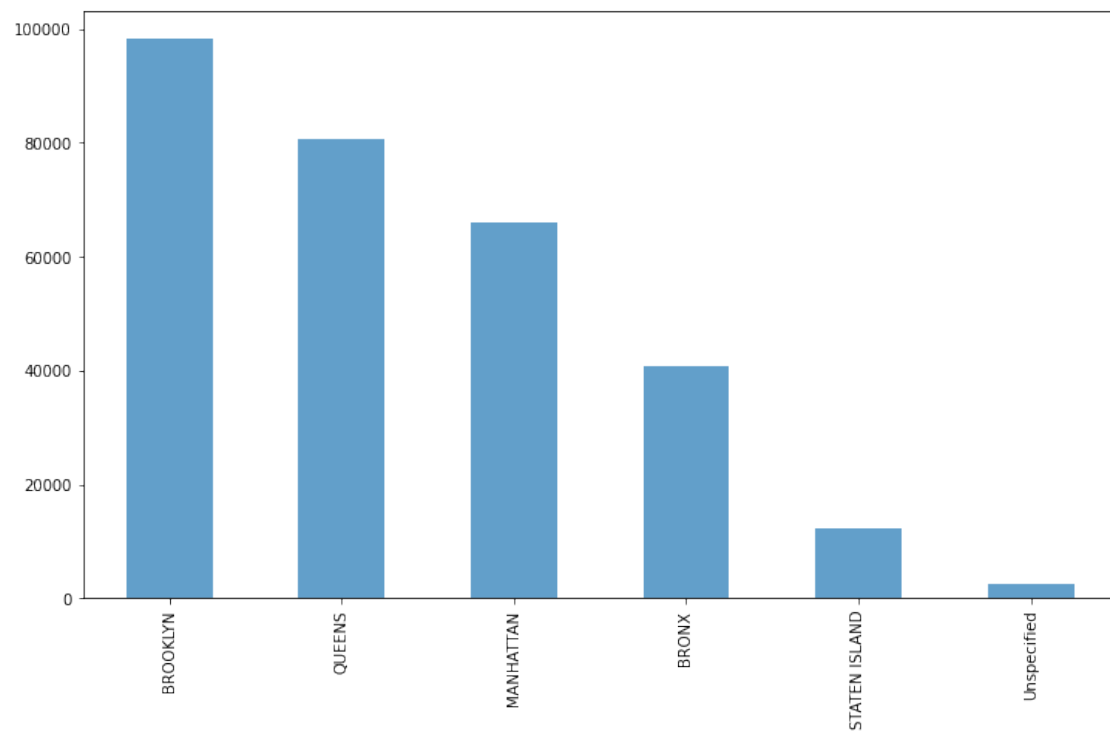
```
[68]:  for x in dataframe["Borough"].unique():
           print("Percentage of Request from ",x," Division :␣
       →",round((dataframe["Borough"]==x).sum()/len(dataframe)*100,2))
```

```
Percentage of Request from  MANHATTAN  Division :  21.99
Percentage of Request from  QUEENS  Division :  26.82
Percentage of Request from  BRONX  Division :  13.54
Percentage of Request from  BROOKLYN  Division :  32.69
Percentage of Request from  Unspecified  Division :  0.86
Percentage of Request from  STATEN ISLAND  Division :  4.1
```

```
[69]:  dataframe["Location Type"].unique()
```

```
[69]:  array(['Street/Sidewalk', 'Club/Bar/Restaurant', 'Store/Commercial',
              'House of Worship', 'Residential Building/House',
              'Residential Building', 'Park/Playground', 'Vacant Lot',
              'House and Store', 'Highway', 'Commercial', 'Roadway Tunnel',
              'Subway Station', 'Parking Lot', 'Bridge', 'Terminal', nan,
              'Ferry', 'Park'], dtype=object)
```

```
[70]:  pd.DataFrame(dataframe.groupby("Location Type")["Request_Closing_Time"].mean()).
       →sort_values("Request_Closing_Time")
```

[70]:

Location Type	Request_Closing_Time
Subway Station	142.250980
Club/Bar/Restaurant	186.074330
House of Worship	191.833279
Store/Commercial	198.089073
Park/Playground	207.137129
Highway	223.424221
Bridge	229.158333
Roadway Tunnel	266.525714
Street/Sidewalk	268.515306
Residential Building	289.089941
House and Store	300.795699
Residential Building/House	309.505679
Parking Lot	320.130342
Commercial	320.566129
Vacant Lot	448.435498
Park	20210.083333
Ferry	NaN
Terminal	NaN

```
[71]:  pd.DataFrame(dataframe.groupby("City")["Request_Closing_Time"].mean()).
       →sort_values("Request_Closing_Time")
```

```
[71]:                      Request_Closing_Time
       City
       ARVERNE                        135.895606
       ROCKAWAY PARK                  139.133736
       LITTLE NECK                    154.660316
       OAKLAND GARDENS                157.853146
       BAYSIDE                        160.759992
       FAR ROCKAWAY                   167.399774
       NEW YORK                       178.357371
       FLUSHING                       181.081826
       FOREST HILLS                   193.449032
       CORONA                         193.670512
       WHITESTONE                     194.688843
       FRESH MEADOWS                  195.843207
       COLLEGE POINT                  196.417842
       JACKSON HEIGHTS                196.419964
       CENTRAL PARK                   197.658591
       ELMHURST                       198.631095
       REGO PARK                      207.665668
       BREEZY POINT                   209.789444
       EAST ELMHURST                  214.659709
       STATEN ISLAND                  232.796699
       Howard Beach                   241.750000
       BROOKLYN                       242.878848
       Long Island City               246.045522
       Astoria                        251.076304
       RIDGEWOOD                      266.507613
       ASTORIA                        275.934779
       SAINT ALBANS                   283.252098
       KEW GARDENS                    302.578556
       Woodside                       312.083333
       JAMAICA                        312.606051
       SOUTH OZONE PARK               319.678662
       MIDDLE VILLAGE                 323.097583
       RICHMOND HILL                  329.658614
       WOODHAVEN                      335.728705
       MASPETH                        335.985805
       SOUTH RICHMOND HILL            337.049201
       OZONE PARK                     340.863702
       HOLLIS                         345.610161
       East Elmhurst                  362.867857
       BRONX                          365.769723
       HOWARD BEACH                   369.652291
       LONG ISLAND CITY               392.351457
       SUNNYSIDE                      411.120332
       WOODSIDE                       413.606029
       NEW HYDE PARK                  453.365646
```

```
              GLEN OAKS                  528.943900
              SPRINGFIELD GARDENS        551.145130
              ROSEDALE                   601.867552
              CAMBRIA HEIGHTS            607.426555
              BELLEROSE                  633.386578
              QUEENS VILLAGE            654.411273
              FLORAL PARK                703.171272
              QUEENS                     815.586458
```

[72]:
```python
pd.DataFrame((dataframe.isnull().sum()/dataframe.shape[0]*100)).
    ↪sort_values(0,ascending=False)[:20]
```

[72]:
```
                                         0
     School or Citywide Complaint  100.000000
     Garage Lot Name               100.000000
     Vehicle Type                  100.000000
     Taxi Pick Up Location         100.000000
     Taxi Company Borough          100.000000
     Ferry Direction                99.999667
     Ferry Terminal Name            99.999335
     Road Ramp                      99.929165
     Bridge Highway Segment         99.929165
     Bridge Highway Direction       99.919188
     Bridge Highway Name            99.919188
     Landmark                       99.883937
     Intersection Street 2          85.579552
     Intersection Street 1          85.414602
     Cross Street 2                 16.554483
     Cross Street 1                 16.388203
     Street Name                    14.768971
     Incident Address               14.768971
     Descriptor                      1.966757
     Latitude                        1.177261
```

[73]:
```python
new_dataframe=dataframe.loc[:,(dataframe.isnull().sum()/dataframe.
    ↪shape[0]*100)<=50]
```

[74]:
```python
new_dataframe
```

[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
     …               …                  …                   …      …
     300693     30281872 2015-03-29 00:33:41                 NaT   NYPD
```

```
300694    30281230 2015-03-29 00:33:28 2015-03-29 02:33:59    NYPD
300695    30283424 2015-03-29 00:33:03 2015-03-29 03:40:20    NYPD
300696    30280004 2015-03-29 00:33:02 2015-03-29 04:38:35    NYPD
300697    30281825 2015-03-29 00:33:01 2015-03-29 04:41:50    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
...                                 ...                      ...
300693  New York City Police Department        Noise - Commercial
300694  New York City Police Department         Blocked Driveway
300695  New York City Police Department        Noise - Commercial
300696  New York City Police Department        Noise - Commercial
300697  New York City Police Department        Noise - Commercial

                          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
...                            ...                  ...            ...
300693            Loud Music/Party  Club/Bar/Restaurant            NaN
300694              Partial Access       Street/Sidewalk        11418.0
300695            Loud Music/Party  Club/Bar/Restaurant        11206.0
300696            Loud Music/Party  Club/Bar/Restaurant        10461.0
300697            Loud Music/Party     Store/Commercial        10036.0

                  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
...                          ...                  ...                ...
300693           CRESCENT AVENUE       CRESCENT AVENUE           EAST 186
300694           100-17 87 AVENUE            87 AVENUE           DEAD END
300695           162 THROOP AVENUE       THROOP AVENUE     HOPKINS STREET
300696  3151 EAST TREMONT AVENUE  EAST TREMONT AVENUE  CODDINGTON AVENUE
300697           251 WEST 48 STREET       WEST 48 STREET          BROADWAY

           Cross Street 2 Address Type         City  … Park Borough  \
0       WEST 204 STREET       ADDRESS     NEW YORK   …    MANHATTAN
1            28 STREET         ADDRESS      ASTORIA   …       QUEENS
```

```
2          EAST 199 STREET      ADDRESS          BRONX  …          BRONX
3                B STREET       ADDRESS          BRONX  …          BRONX
4          HOFFMAN DRIVE        ADDRESS       ELMHURST  …         QUEENS
…                    …              …              …  … …             …
300693                NaN           NaN            NaN  …    Unspecified
300694         102 STREET        ADDRESS  RICHMOND HILL  …         QUEENS
300695      ELLERY STREET        ADDRESS       BROOKLYN  …       BROOKLYN
300696   LA SALLE AVENUE         ADDRESS          BRONX  …          BRONX
300697          8 AVENUE         ADDRESS       NEW YORK  …      MANHATTAN

            School Name School Number School Region  School Code  \
0          Unspecified   Unspecified   Unspecified  Unspecified
1          Unspecified   Unspecified   Unspecified  Unspecified
2          Unspecified   Unspecified   Unspecified  Unspecified
3          Unspecified   Unspecified   Unspecified  Unspecified
4          Unspecified   Unspecified   Unspecified  Unspecified
…                    …             …             …            …
300693     Unspecified   Unspecified   Unspecified  Unspecified
300694     Unspecified   Unspecified   Unspecified  Unspecified
300695     Unspecified   Unspecified   Unspecified  Unspecified
300696     Unspecified   Unspecified   Unspecified  Unspecified
300697     Unspecified   Unspecified   Unspecified  Unspecified

            School Phone Number School Address  School City  School State  \
0                  Unspecified     Unspecified  Unspecified   Unspecified
1                  Unspecified     Unspecified  Unspecified   Unspecified
2                  Unspecified     Unspecified  Unspecified   Unspecified
3                  Unspecified     Unspecified  Unspecified   Unspecified
4                  Unspecified     Unspecified  Unspecified   Unspecified
…                            …               …            …             …
300693             Unspecified     Unspecified  Unspecified   Unspecified
300694             Unspecified     Unspecified  Unspecified   Unspecified
300695             Unspecified     Unspecified  Unspecified   Unspecified
300696             Unspecified     Unspecified  Unspecified   Unspecified
300697             Unspecified     Unspecified  Unspecified   Unspecified

            School Zip School Not Found   Latitude  Longitude  \
0          Unspecified               N  40.865682 -73.923501
1          Unspecified               N  40.775945 -73.915094
2          Unspecified               N  40.870325 -73.888525
3          Unspecified               N  40.835994 -73.828379
4          Unspecified               N  40.733060 -73.874170
…                    …               …          …          …
300693     Unspecified               N        NaN        NaN
300694     Unspecified               N  40.694077 -73.846087
300695     Unspecified               N  40.699590 -73.944234
300696     Unspecified               N  40.837708 -73.834587
```

```
300697  Unspecified                    N  40.760583 -73.985922

                                        Location Request_Closing_Time
0        (40.86568153633767, -73.92350095571744)              55.250000
1       (40.775945312321085, -73.91509393898605)              86.266667
2       (40.870324522111424, -73.88852464418646)             291.516667
3        (40.83599404683083, -73.82837939584206)             465.233333
4       (40.733059618956815, -73.87416975810375)             207.033333
…                                            …                       …
300693                                      NaN                     NaN
300694     (40.69407728322387, -73.8460866160573)             120.516667
300695    (40.69959035300927, -73.94423377144169)             187.283333
300696     (40.8377075854206, -73.83458731019586)             245.550000
300697    (40.76058322950115, -73.98592204392392)             248.816667

[300698 rows x 40 columns]
```

[75]: `new_dataframe.head(4)`

[75]:
```
   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


                        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


                    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


          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


  Address Type       City  … Park Borough  School Name School Number  \
0      ADDRESS   NEW YORK  …    MANHATTAN  Unspecified   Unspecified
1      ADDRESS    ASTORIA  …       QUEENS  Unspecified   Unspecified
2      ADDRESS      BRONX  …        BRONX  Unspecified   Unspecified
```

```
3     ADDRESS      BRONX  …        BRONX   Unspecified    Unspecified
```

```
   School Region  School Code School Phone Number School Address  School City  \
0   Unspecified  Unspecified          Unspecified     Unspecified   Unspecified
1   Unspecified  Unspecified          Unspecified     Unspecified   Unspecified
2   Unspecified  Unspecified          Unspecified     Unspecified   Unspecified
3   Unspecified  Unspecified          Unspecified     Unspecified   Unspecified

   School State   School Zip School Not Found   Latitude  Longitude  \
0   Unspecified  Unspecified                N  40.865682 -73.923501
1   Unspecified  Unspecified                N  40.775945 -73.915094
2   Unspecified  Unspecified                N  40.870325 -73.888525
3   Unspecified  Unspecified                N  40.835994 -73.828379

                                  Location Request_Closing_Time
0   (40.86568153633767, -73.92350095571744)            55.250000
1   (40.775945312321085, -73.91509393898605)           86.266667
2   (40.870324522111424, -73.88852464418646)          291.516667
3    (40.83599404683083, -73.82837939584206)          465.233333

[4 rows x 40 columns]
```

[76]: `new_dataframe.tail()`

[76]:
```
        Unique Key        Created Date         Closed Date Agency  \
300693    30281872 2015-03-29 00:33:41                 NaT   NYPD
300694    30281230 2015-03-29 00:33:28 2015-03-29 02:33:59   NYPD
300695    30283424 2015-03-29 00:33:03 2015-03-29 03:40:20   NYPD
300696    30280004 2015-03-29 00:33:02 2015-03-29 04:38:35   NYPD
300697    30281825 2015-03-29 00:33:01 2015-03-29 04:41:50   NYPD

                             Agency Name       Complaint Type        Descriptor  \
300693  New York City Police Department   Noise - Commercial  Loud Music/Party
300694  New York City Police Department      Blocked Driveway    Partial Access
300695  New York City Police Department   Noise - Commercial  Loud Music/Party
300696  New York City Police Department   Noise - Commercial  Loud Music/Party
300697  New York City Police Department   Noise - Commercial  Loud Music/Party

            Location Type  Incident Zip         Incident Address  \
300693  Club/Bar/Restaurant           NaN          CRESCENT AVENUE
300694      Street/Sidewalk       11418.0         100-17 87 AVENUE
300695  Club/Bar/Restaurant       11206.0         162 THROOP AVENUE
300696  Club/Bar/Restaurant       10461.0  3151 EAST TREMONT AVENUE
300697     Store/Commercial       10036.0         251 WEST 48 STREET

              Street Name  Cross Street 1  Cross Street 2 Address Type  \
300693    CRESCENT AVENUE        EAST 186             NaN          NaN
```

```
300694            87 AVENUE           DEAD END      102 STREET        ADDRESS
300695        THROOP AVENUE    HOPKINS STREET   ELLERY STREET        ADDRESS
300696  EAST TREMONT AVENUE  CODDINGTON AVENUE  LA SALLE AVENUE        ADDRESS
300697        WEST 48 STREET          BROADWAY        8 AVENUE        ADDRESS

                City  … Park Borough  School Name School Number  \
300693           NaN  …   Unspecified  Unspecified   Unspecified
300694  RICHMOND HILL  …       QUEENS  Unspecified   Unspecified
300695      BROOKLYN  …     BROOKLYN  Unspecified   Unspecified
300696        BRONX  …        BRONX  Unspecified   Unspecified
300697      NEW YORK  …    MANHATTAN  Unspecified   Unspecified

       School Region  School Code School Phone Number School Address  \
300693   Unspecified  Unspecified         Unspecified    Unspecified
300694   Unspecified  Unspecified         Unspecified    Unspecified
300695   Unspecified  Unspecified         Unspecified    Unspecified
300696   Unspecified  Unspecified         Unspecified    Unspecified
300697   Unspecified  Unspecified         Unspecified    Unspecified

       School City School State   School Zip School Not Found   Latitude  \
300693  Unspecified  Unspecified  Unspecified               N        NaN
300694  Unspecified  Unspecified  Unspecified               N  40.694077
300695  Unspecified  Unspecified  Unspecified               N  40.699590
300696  Unspecified  Unspecified  Unspecified               N  40.837708
300697  Unspecified  Unspecified  Unspecified               N  40.760583

        Longitude                                 Location  \
300693        NaN                                      NaN
300694 -73.846087   (40.69407728322387, -73.8460866160573)
300695 -73.944234  (40.69959035300927, -73.94423377144169)
300696 -73.834587   (40.8377075854206, -73.83458731019586)
300697 -73.985922  (40.76058322950115, -73.98592204392392)

       Request_Closing_Time
300693                  NaN
300694           120.516667
300695           187.283333
300696           245.550000
300697           248.816667

[5 rows x 40 columns]
```

```
[77]: print("Old DataFrame Shape :",dataframe.shape)
      print("New DataFrame Shape : ",new_dataframe.shape)
```

```
Old DataFrame Shape : (300698, 54)
New DataFrame Shape :  (300698, 40)
```

```
[78]: rem=[]
      for x in new_dataframe.columns.tolist():
          if new_dataframe[x].nunique()<=3:
              print(x+ " "*10+" : ",new_dataframe[x].unique())
              rem.append(x)
```

```
Agency              :  ['NYPD']
Agency Name              :  ['New York City Police Department' 'NYPD' 'Internal
Affairs Bureau']
Facility Type            :  ['Precinct' nan]
Park Facility Name           :  ['Unspecified' 'Alley Pond Park - Nature
Center']
School Name              :  ['Unspecified' 'Alley Pond Park - Nature Center']
School Number            :  ['Unspecified' 'Q001']
School Region            :  ['Unspecified' nan]
School Code              :  ['Unspecified' nan]
School Phone Number          :  ['Unspecified' '7182176034']
School Address              :  ['Unspecified' 'Grand Central Parkway, near the
soccer field']
School City              :  ['Unspecified' 'QUEENS']
School State             :  ['Unspecified' 'NY']
School Zip               :  ['Unspecified' nan]
School Not Found            :  ['N']
```

```
[79]: new_dataframe.drop(rem,axis=1,inplace=True)
```

```
[81]: new_dataframe.shape
```

```
[81]: (300698, 26)
```

```
[82]: rem1=["Unique Key","Incident Address","Descriptor","Street Name","Cross Street␣
      ↪1","Cross Street 2","Due Date","Resolution Description","Resolution Action␣
      ↪Updated Date","Community Board","X Coordinate (State Plane)","Y Coordinate␣
      ↪(State Plane)","Park Borough","Latitude","Longitude","Location"]

      new_dataframe.drop(rem1,axis=1,inplace=True)
```

```
[83]: new_dataframe.head(3)
```

```
[83]:           Created Date        Closed Date        Complaint Type  \
      0 2015-12-31 23:59:45 2016-01-01 00:55:00  Noise - Street/Sidewalk
      1 2015-12-31 23:59:44 2016-01-01 01:26:00         Blocked Driveway
      2 2015-12-31 23:59:29 2016-01-01 04:51:00         Blocked Driveway

           Location Type  Incident Zip Address Type       City  Status    Borough  \
      0  Street/Sidewalk       10034.0      ADDRESS  NEW YORK  Closed  MANHATTAN
      1  Street/Sidewalk       11105.0      ADDRESS    ASTORIA  Closed     QUEENS
```
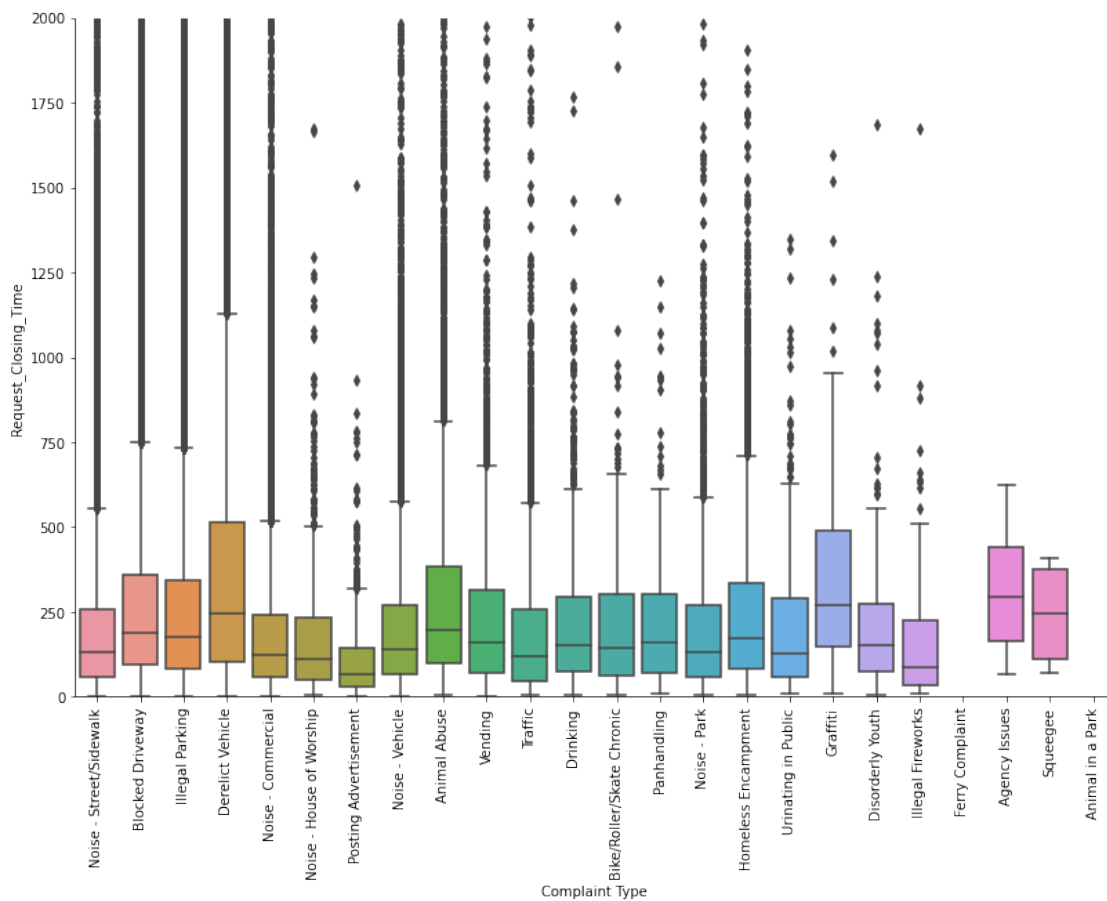
```
2    Street/Sidewalk        10458.0        ADDRESS      BRONX  Closed        BRONX

     Request_Closing_Time
0               55.250000
1               86.266667
2              291.516667
```

[84]:
```python
g=sns.catplot(x="Complaint␣
 ↪Type",y="Request_Closing_Time",kind="box",data=new_dataframe)
g.fig.set_figheight(8)
g.fig.set_figwidth(15)
plt.xticks(rotation=90)
plt.ylim((0,2000))
```

[84]: (0.0, 2000.0)

[89]:
```python
anova_dataframe=pd.DataFrame()
anova_dataframe["Request_Closing_Time"]=new_dataframe["Request_Closing_Time"]
anova_dataframe["Complaint"]=new_dataframe["Complaint Type"]
```

```
anova_dataframe.dropna(inplace=True)
anova_dataframe
```

[89]:
```
        Request_Closing_Time              Complaint
0                   55.250000   Noise - Street/Sidewalk
1                   86.266667          Blocked Driveway
2                  291.516667          Blocked Driveway
3                  465.233333           Illegal Parking
4                  207.033333           Illegal Parking
...                       ...                       ...
300692              38.483333         Noise - Commercial
300694             120.516667          Blocked Driveway
300695             187.283333         Noise - Commercial
300696             245.550000         Noise - Commercial
300697             248.816667         Noise - Commercial

[298534 rows x 2 columns]
```

[91]:
```
anova_dataframe.head()
```

[91]:
```
   Request_Closing_Time              Complaint
0             55.250000   Noise - Street/Sidewalk
1             86.266667          Blocked Driveway
2            291.516667          Blocked Driveway
3            465.233333           Illegal Parking
4            207.033333           Illegal Parking
```

[92]:
```
anova_dataframe.tail()
```

[92]:
```
        Request_Closing_Time              Complaint
300692             38.483333  Noise - Commercial
300694            120.516667    Blocked Driveway
300695            187.283333  Noise - Commercial
300696            245.550000  Noise - Commercial
300697            248.816667  Noise - Commercial
```

[98]:
```
import statsmodels.api as sm
from statsmodels.formula.api import ols
```

[99]:
```
lm = ols("Request_Closing_Time~Complaint",data=anova_dataframe).fit()
table=sm.stats.anova_lm(lm)
table
```

[99]:
```
                  df        sum_sq       mean_sq           F  PR(>F)
Complaint       22.0  1.455049e+09  6.613860e+07  514.177089     0.0
Residual    298511.0  3.839747e+10  1.286300e+05         NaN     NaN
```

```
[100]: from scipy import stats
       from scipy.stats import chi2_contingency
```

```
[101]: chi_sq=pd.DataFrame()
       chi_sq["Location Type"]=new_dataframe["Location Type"]
       chi_sq["Complaint Type"]=new_dataframe["Complaint Type"]

       chi_sq.dropna(inplace=True)
```

```
[102]: data_crosstab = pd.crosstab( chi_sq["Location Type"],chi_sq["Complaint Type"])
```

```
[103]: stat, p, dof, expected = chi2_contingency(data_crosstab)

       alpha = 0.05
       if p <= alpha:
           print('Dependent (reject H0)')
       else:
           print('Independent (H0 holds true)')
```

```
Dependent (reject H0)
```

```
[ ]: #Conclusions
     #Maximum Complaints are raised in road and parking (vehicle) related sectors
     #On an average complains are closed in an span of 150 to 300 hours
     #Transport and Road related issues are taking more time to get resolved as␣
     ↪number of these cases are quite high.
     #Number of cases from Borough goes as follows BROOKLYN > QUEENS > MANHATTAN >␣
     ↪BRONX > STATEN ISLAND
     #Complaint Type are Depentent on Location Type.
     #Time taken for solving different complaint type are different
```