Customer Service Request Analysis

December 16, 2022

1 Import Required Libraries

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

2 Import a 311 NYC service request

[2]:
```
df = pd.read_csv('311_Service_Requests_from_2010_to_Present.csv')
df.head()
```

[2]:

	Unique Key	Created Date	Closed Date	Agency	Agency Name	Complaint Type	Descriptor	Location Type	Incident Zip	Incident Address	…	Bridge Highway Name	Bridge Highway Direction	\
0	32310363	12/31/2015 11:59:45 PM	01-01-16 0:55	NYPD	New York City Police Department	Noise - Street/Sidewalk	Loud Music/Party	Street/Sidewalk	10034.0	71 VERMILYEA AVENUE	…	NaN	NaN	
1	32309934	12/31/2015 11:59:44 PM	01-01-16 1:26	NYPD	New York City Police Department	Blocked Driveway	No Access	Street/Sidewalk	11105.0	27-07 23 AVENUE	…	NaN	NaN	
2	32309159	12/31/2015 11:59:29 PM	01-01-16 4:51	NYPD	New York City Police Department	Blocked Driveway	No Access	Street/Sidewalk	10458.0					
3	32305098	12/31/2015 11:57:46 PM	01-01-16 7:43	NYPD	New York City Police Department	Illegal Parking	Commercial Overnight Parking	Street/Sidewalk	10461.0					
4	32306529	12/31/2015 11:56:58 PM	01-01-16 3:24	NYPD	New York City Police Department	Illegal Parking	Blocked Sidewalk	Street/Sidewalk	11373.0					

```
2  2897 VALENTINE AVENUE  …                NaN                      NaN
3    2940 BAISLEY AVENUE  …                NaN                      NaN
4          87-14 57 ROAD  …                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]
```

[3]:
```
df.shape
```

[3]:
```
(122877, 53)
```

[4]:
```
df.columns
```

[4]:
```
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')
```

[5]:
```
df['Complaint Type'].unique()
```

[5]:
```
array(['Noise - Street/Sidewalk', 'Blocked Driveway', 'Illegal Parking',
       'Derelict Vehicle', 'Noise - Commercial',
       'Noise - House of Worship', 'Posting Advertisement',
       'Noise - Vehicle', 'Animal Abuse', 'Vending', 'Traffic',
       'Drinking', 'Bike/Roller/Skate Chronic', 'Panhandling',
       'Noise - Park', 'Homeless Encampment', 'Urinating in Public',
       'Graffiti', 'Disorderly Youth', 'Illegal Fireworks'], dtype=object)
```

[6]:
```
df['Descriptor'].unique()
```

[6]:
```
array(['Loud Music/Party', 'No Access', 'Commercial Overnight Parking',
       'Blocked Sidewalk', 'Posted Parking Sign Violation',
       'Blocked Hydrant', 'With License Plate', 'Partial Access',
       'Unauthorized Bus Layover', 'Double Parked Blocking Vehicle',
       'Double Parked Blocking Traffic', 'Vehicle', 'Loud Talking',
       'Banging/Pounding', 'Car/Truck Music', 'Tortured',
       'In Prohibited Area', 'Congestion/Gridlock', 'Neglected',
       'Car/Truck Horn', 'In Public', 'Other (complaint details)', nan,
       'No Shelter', 'Truck Route Violation', 'Unlicensed',
       'Overnight Commercial Storage', 'Engine Idling',
       'After Hours - Licensed Est', 'Detached Trailer',
       'Underage - Licensed Est', 'Chronic Stoplight Violation',
       'Loud Television', 'Chained', 'Building', 'In Car',
       'Police Report Requested', 'Chronic Speeding',
       'Playing in Unsuitable Place', 'Drag Racing',
       'Police Report Not Requested', 'Nuisance/Truant'], dtype=object)
```

[7]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 122877 entries, 0 to 122876
Data columns (total 53 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   Unique Key                      122877 non-null  int64
 1   Created Date                    122877 non-null  object
 2   Closed Date                     122106 non-null  object
 3   Agency                          122877 non-null  object
 4   Agency Name                     122877 non-null  object
 5   Complaint Type                  122877 non-null  object
 6   Descriptor                      120670 non-null  object
 7   Location Type                   122877 non-null  object
```

```
 8   Incident Zip                    121978 non-null  float64
 9   Incident Address                106616 non-null  object
 10  Street Name                     106616 non-null  object
 11  Cross Street 1                  104826 non-null  object
 12  Cross Street 2                  104673 non-null  object
 13  Intersection Street 1           16050 non-null   object
 14  Intersection Street 2           15892 non-null   object
 15  Address Type                    121878 non-null  object
 16  City                            121978 non-null  object
 17  Landmark                        111 non-null     object
 18  Facility Type                   122111 non-null  object
 19  Status                          122877 non-null  object
 20  Due Date                        122877 non-null  object
 21  Resolution Description          122877 non-null  object
 22  Resolution Action Updated Date  122118 non-null  object
 23  Community Board                 122877 non-null  object
 24  Borough                         122877 non-null  object
 25  X Coordinate (State Plane)      121678 non-null  float64
 26  Y Coordinate (State Plane)      121678 non-null  float64
 27  Park Facility Name              122877 non-null  object
 28  Park Borough                    122877 non-null  object
 29  School Name                     122877 non-null  object
 30  School Number                   122877 non-null  object
 31  School Region                   122877 non-null  object
 32  School Code                     122877 non-null  object
 33  School Phone Number             122876 non-null  object
 34  School Address                  122876 non-null  object
 35  School City                     122876 non-null  object
 36  School State                    122876 non-null  object
 37  School Zip                      122876 non-null  object
 38  School Not Found                122876 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             122 non-null     object
 44  Bridge Highway Direction        122 non-null     object
 45  Road Ramp                       108 non-null     object
 46  Bridge Highway Segment          108 non-null     object
 47  Garage Lot Name                 0 non-null       float64
 48  Ferry Direction                 0 non-null       float64
 49  Ferry Terminal Name             0 non-null       float64
 50  Latitude                        121677 non-null  float64
 51  Longitude                       121677 non-null  float64
 52  Location                        121677 non-null  object
dtypes: float64(12), int64(1), object(40)
memory usage: 49.7+ MB
```

[8]:
```
complaintTypecity = pd.DataFrame({'count':
 df.groupby(['Complaint Type','City']).size()}).reset_index()
complaintTypecity
```

[8]:

	Complaint Type	City	count
0	Animal Abuse	ARVERNE	14
1	Animal Abuse	ASTORIA	53
2	Animal Abuse	BAYSIDE	15
3	Animal Abuse	BELLEROSE	4
4	Animal Abuse	BREEZY POINT	1
..	…	…	…
593	Vending	SAINT ALBANS	1
594	Vending	SOUTH RICHMOND HILL	11
595	Vending	STATEN ISLAND	15
596	Vending	SUNNYSIDE	7
597	Vending	WOODSIDE	8

[598 rows x 3 columns]

[9]:
```
df.groupby(['Borough','Complaint Type','Descriptor']).size()
```

[9]:
```
Borough       Complaint Type   Descriptor
BRONX         Animal Abuse     Chained                       48
                               In Car                        11
                               Neglected                    277
                               No Shelter                    31
                               Other (complaint details)    125
                                                             …
Unspecified   Noise - Vehicle  Car/Truck Horn                 4
                               Car/Truck Music                2
                               Engine Idling                  5
              Traffic          Truck Route Violation          1
              Vending          Unlicensed                     1
Length: 270, dtype: int64
```

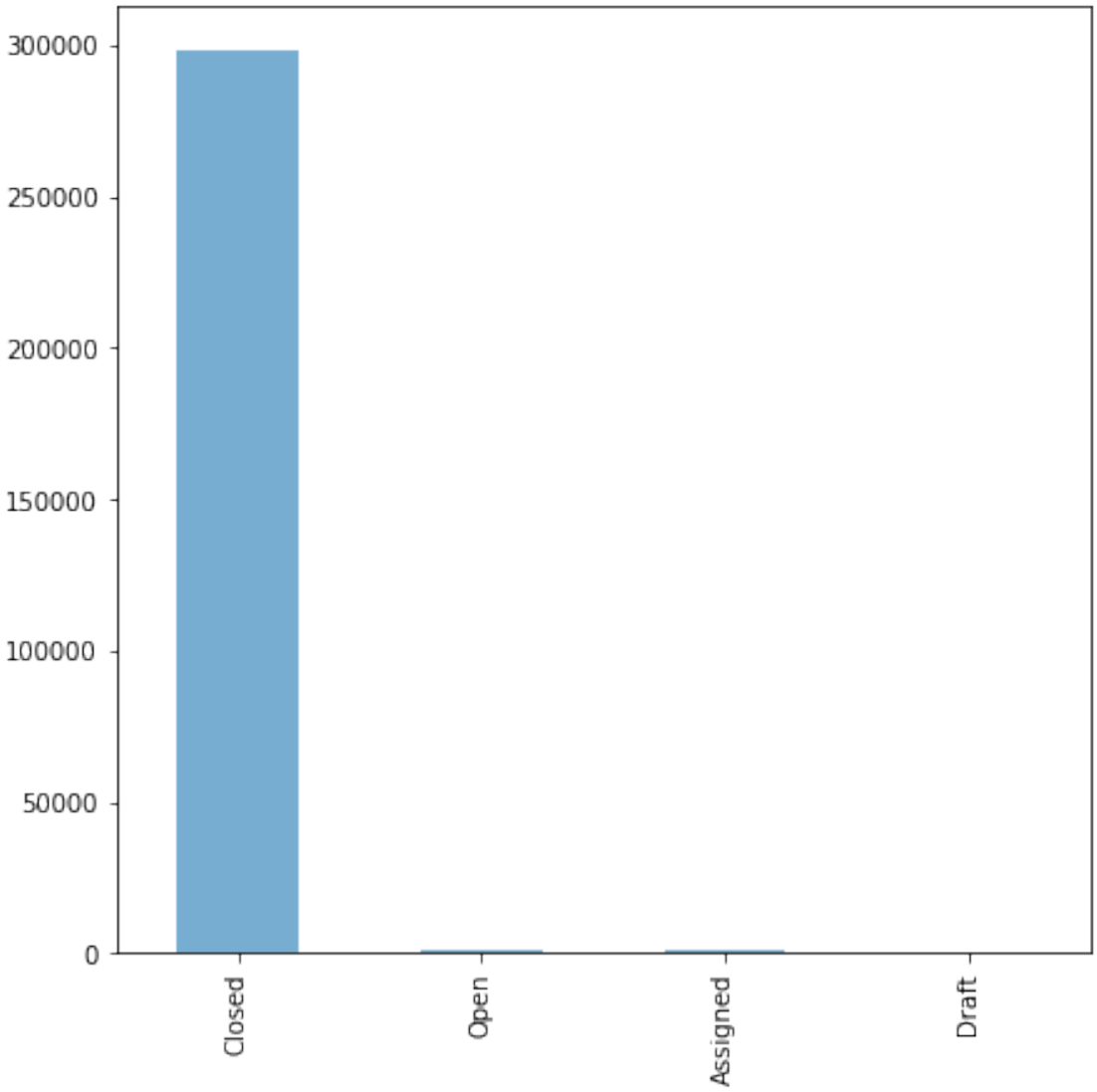
3 Read or convert the columns 'Created Date' and Closed Date' to datetime datatype and create a new column 'Request_Closing_Time' as the time elapsed between request creation and request closing

import datetime

[13]:
```
df = pd.read_csv("311_Service_Requests_from_2010_to_Present.csv",␣
 ↪parse_dates=["Created Date", "Closed Date"])
```

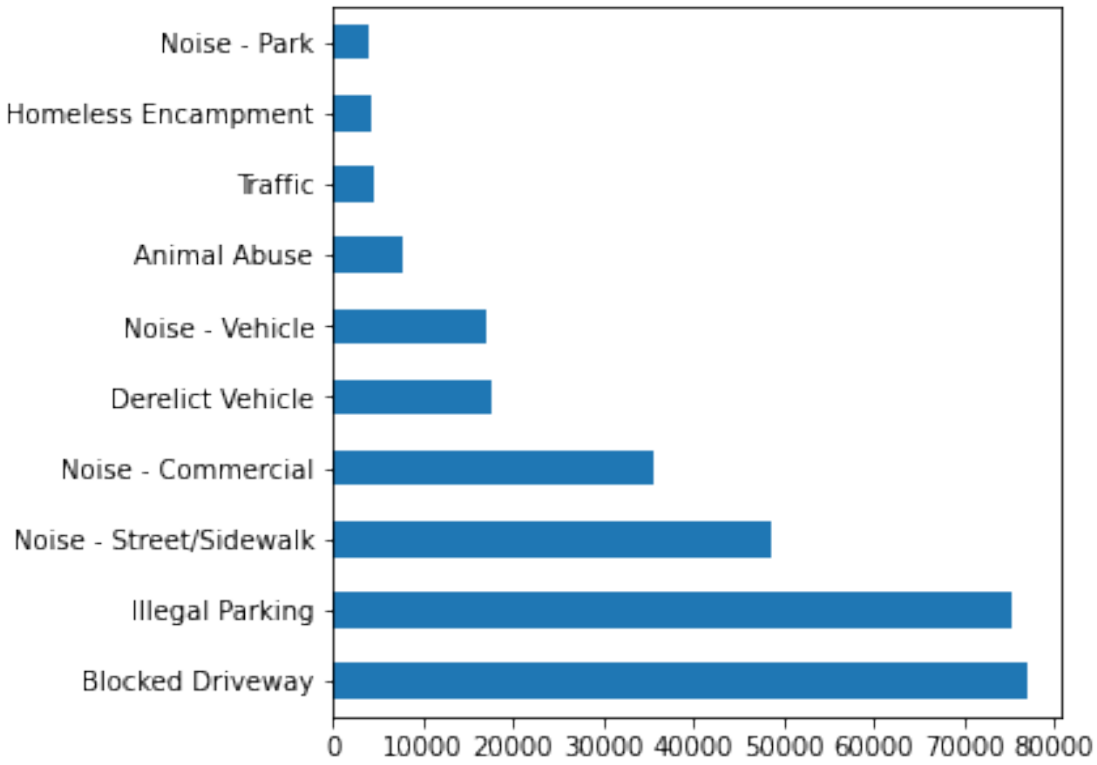
[12]:
```
df["Request_Closing_Time"] = df["Closed Date"] - df["Created Date"]
```

[14]:
```
 df['Status'].value_counts().plot(kind='bar',alpha=0.6,figsize=(7,7))
plt.show()
```



4 Provide major insights/patterns that you can offer in a visual format

[15]:
```
df['Complaint Type'].value_counts().head(10).plot(kind='barh',figsize=(5,5));
```



[16]:
```
df.groupby(["Borough","Complaint Type","Descriptor"]).size()
```

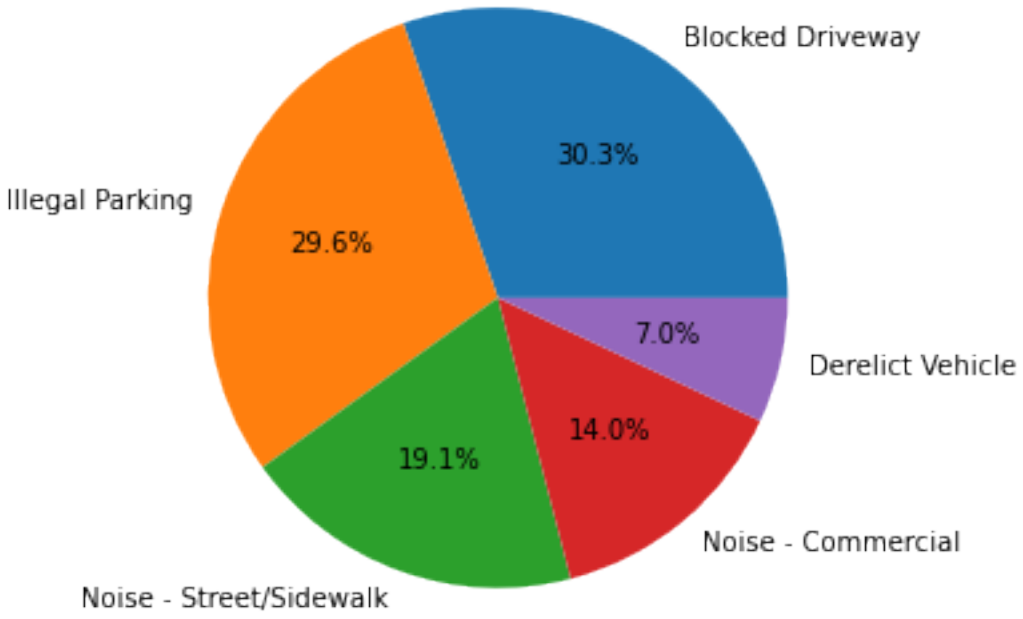
[16]:
```
Borough       Complaint Type          Descriptor
BRONX         Animal Abuse            Chained                      132
                                      In Car                        36
                                      Neglected                    673
                                      No Shelter                    71
                                      Other (complaint details)    311
                                                                   ...
Unspecified   Noise - Vehicle         Engine Idling                 11
              Posting Advertisement   Vehicle                        1
              Traffic                 Truck Route Violation          1
              Vending                 In Prohibited Area             2
                                      Unlicensed                     5
Length: 288, dtype: int64
```

[17]:
```
majorcomplints=df.dropna(subset=["Complaint Type"])
majorcomplints=df.groupby("Complaint Type")
sortedComplaintType = majorcomplints.size().sort_values(ascending = False)
sortedComplaintType = sortedComplaintType.to_frame('count').reset_index()
sortedComplaintType
sortedComplaintType.head(10)
```

[17]:

	Complaint Type	count
0	Blocked Driveway	77044
1	Illegal Parking	75361
2	Noise - Street/Sidewalk	48612
3	Noise - Commercial	35577
4	Derelict Vehicle	17718
5	Noise - Vehicle	17083
6	Animal Abuse	7778
7	Traffic	4498
8	Homeless Encampment	4416
9	Noise - Park	4042

[18]:
```
sortedComplaintType = sortedComplaintType.head()
plt.figure(figsize=(5,5))
plt.pie(sortedComplaintType['count'],labels=sortedComplaintType["Complaint␣
↪Type"], autopct="%1.1f%%")
plt.show()
```



5 Group dataset by complaint type to display plot against city

[19]:
```
groupedby_complainttype = df.groupby('Complaint Type')
```

[20]:
```
grp_data = groupedby_complainttype.get_group('Blocked Driveway')
grp_data.shape
```

[20]:
```
(77044, 53)
```

[21]:
```
#To get nan values in the entire dataset
df.isnull().sum()
```

[21]:
```
Unique Key                          0
Created Date                        0
Closed Date                      2164
Agency                              0
Agency Name                         0
Complaint Type                      0
Descriptor                       5914
Location Type                     131
Incident Zip                     2615
Incident Address                44410
Street Name                     44410
Cross Street 1                  49279
Cross Street 2                  49779
Intersection Street 1          256840
Intersection Street 2          257336
Address Type                     2815
City                             2614
Landmark                       300349
Facility Type                    2171
Status                              0
Due Date                            3
Resolution Description              0
Resolution Action Updated Date   2187
Community Board                     0
Borough                             0
X Coordinate (State Plane)       3540
Y Coordinate (State Plane)       3540
Park Facility Name                  0
Park Borough                        0
School Name                         0
School Number                       0
School Region                       1
School Code                         1
School Phone Number                 0
School Address                      0
```

```
School City                          0
School State                         0
School Zip                           1
School Not Found                     0
School or Citywide Complaint    300698
Vehicle Type                    300698
Taxi Company Borough            300698
Taxi Pick Up Location           300698
Bridge Highway Name             300455
Bridge Highway Direction        300455
Road Ramp                       300485
Bridge Highway Segment          300485
Garage Lot Name                 300698
Ferry Direction                 300697
Ferry Terminal Name             300696
Latitude                          3540
Longitude                         3540
Location                          3540
dtype: int64
```

[22]:
```
#fix blank values in City column
df['City'].dropna(inplace=True)
```

[23]:
```
df['City'].shape
```

[23]: (300698,)

[24]:
```
#count of null values in grouped city column data
grp_data['City'].isnull().sum()
```

[24]: 283

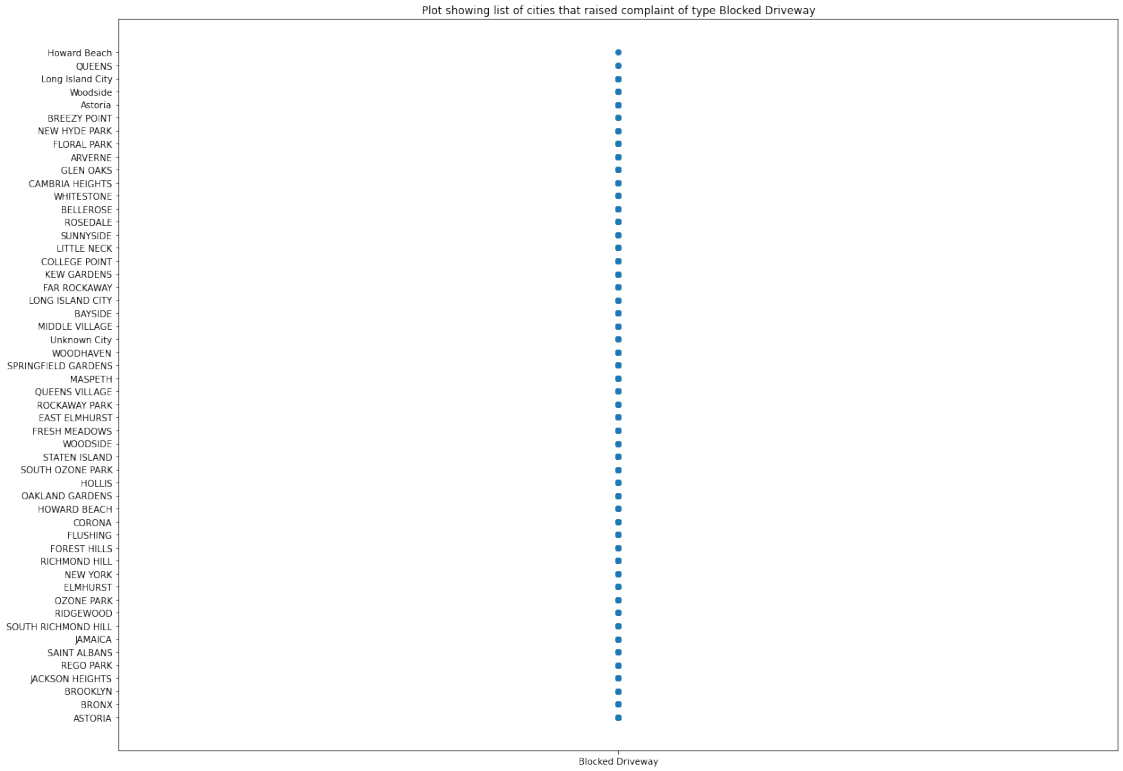
[25]:
```
#fix those NAN with "unknown city" value instead
grp_data['City'].fillna('Unknown City', inplace =True)
```

```
/usr/local/lib/python3.7/site-packages/pandas/core/series.py:4536:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

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

[26]:
```
 #Scatter plot displaying all the cities that raised complaint of type 'Blocked␣
 ↪Driveway'
plt.figure(figsize=(20, 15))
plt.scatter(grp_data['Complaint Type'],grp_data['City'])
```

```
plt.title('Plot showing list of cities that raised complaint of type Blocked␣
 ↪Driveway')
plt.show()
```



[ ]: