CustSerAnalysis-Part2

November 23, 2022

1 Customer Service Dataset Part2-Perform basic data exploratory analysis:

[15]:
```
import pandas as pd
```

[16]:
```
data =pd.read_csv('/home/labsuser/Applied DS/
↪311_Service_Requests_from_2010_to_Present.csv',low_memory=False)
```

[ ]:
```

```

2 Perform basic data exploratory analysis:

[5]:
```
#following are the columns that does have nulls in all rows. SO we can drop␣
↪them from dataframe
data.columns[data.isna().all()]
```

[5]:
```
Index(['School or Citywide Complaint', 'Vehicle Type', 'Taxi Company Borough',
       'Taxi Pick Up Location', 'Garage Lot Name'],
      dtype='object')
```

[17]:
```
#we can drop these 5 columns where all are NANs
newDF = data.dropna(axis=1, how='all')
```

[4]:
```
newDF.shape # now new dataframe has 48 columns from the original 53 columns
```

[4]:
```
(364558, 48)
```

3 Analyze the date column and remove the entries if it has an incorrect timeline

[ ]:
```
#for this lets convert date columns to datetime type
```

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

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 364558 entries, 0 to 364557
Data columns (total 48 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   Unique Key                      364558 non-null  int64
 1   Created Date                    364558 non-null  object
 2   Closed Date                     362177 non-null  object
 3   Agency                          364558 non-null  object
 4   Agency Name                     364558 non-null  object
 5   Complaint Type                  364558 non-null  object
 6   Descriptor                      358057 non-null  object
 7   Location Type                   364425 non-null  object
 8   Incident Zip                    361560 non-null  float64
 9   Incident Address                312859 non-null  object
 10  Street Name                     312859 non-null  object
 11  Cross Street 1                  307370 non-null  object
 12  Cross Street 2                  306753 non-null  object
 13  Intersection Street 1           51120 non-null   object
 14  Intersection Street 2           50512 non-null   object
 15  Address Type                    361306 non-null  object
 16  City                            361561 non-null  object
 17  Landmark                        375 non-null     object
 18  Facility Type                   362169 non-null  object
 19  Status                          364558 non-null  object
 20  Due Date                        364555 non-null  object
 21  Resolution Description          364558 non-null  object
 22  Resolution Action Updated Date  362156 non-null  object
 23  Community Board                 364558 non-null  object
 24  Borough                         364558 non-null  object
 25  X Coordinate (State Plane)      360528 non-null  float64
 26  Y Coordinate (State Plane)      360528 non-null  float64
 27  Park Facility Name              364558 non-null  object
 28  Park Borough                    364558 non-null  object
 29  School Name                     364558 non-null  object
 30  School Number                   364558 non-null  object
 31  School Region                   364557 non-null  object
 32  School Code                     364557 non-null  object
 33  School Phone Number             364558 non-null  object
 34  School Address                  364558 non-null  object
 35  School City                     364558 non-null  object
 36  School State                    364558 non-null  object
 37  School Zip                      364557 non-null  object
 38  School Not Found                364558 non-null  object
 39  Bridge Highway Name             297 non-null     object
```

```
 40  Bridge Highway Direction        297 non-null     object
 41  Road Ramp                       262 non-null     object
 42  Bridge Highway Segment          262 non-null     object
 43  Ferry Direction                 1 non-null       object
 44  Ferry Terminal Name             2 non-null       object
 45  Latitude                        360528 non-null  float64
 46  Longitude                       360528 non-null  float64
 47  Location                        360528 non-null  object
dtypes: float64(5), int64(1), object(42)
memory usage: 133.5+ MB
```

[10]:
```
## There are 4 date columns named
# Created Date
#Closed Date
#Due Date
#Resolution Action Updated Date
#Lets observe the first few rows for tehse values

newDF[['Created Date','Closed Date','Resolution Action Updated Date','Due␣
 ↪Date']]
```

[10]:

	Created Date	Closed Date	Resolution Action Updated Date	Due Date
0	12/31/2015 11:59:45 PM	01/01/2016 12:55:15 AM	01/01/2016 12:55:15 AM	01/01/2016 07:59:45 AM
1	12/31/2015 11:59:44 PM	01/01/2016 01:26:57 AM	01/01/2016 01:26:57 AM	01/01/2016 07:59:44 AM
2	12/31/2015 11:59:29 PM	01/01/2016 04:51:03 AM	01/01/2016 04:51:03 AM	01/01/2016 07:59:29 AM
3	12/31/2015 11:57:46 PM	01/01/2016 07:43:13 AM	01/01/2016 07:43:13 AM	01/01/2016 07:57:46 AM
4	12/31/2015 11:56:58 PM	01/01/2016 03:24:42 AM	01/01/2016 03:24:42 AM	01/01/2016 07:56:58 AM
…	…	…	…	…
364553	01/01/2015 12:04:44 AM	01/01/2015 10:22:31 AM	01/01/2015 10:22:31 AM	01/01/2015 08:04:44 AM
364554	01/01/2015 12:04:28 AM	01/01/2015 02:25:02 AM	01/01/2015 02:25:02 AM	01/01/2015 08:04:28 AM
364555	01/01/2015 12:01:30 AM	01/01/2015 12:20:33 AM	01/01/2015 12:20:33 AM	01/01/2015 08:01:30 AM
364556	01/01/2015 12:01:29 AM	01/01/2015 02:42:22 AM	01/01/2015 02:42:22 AM	01/01/2015 08:01:29 AM
364557	01/01/2015 12:00:50 AM	01/01/2015 02:47:50 AM	01/01/2015 02:47:50 AM	01/01/2015 08:00:50 AM

```
[364558 rows x 4 columns]
```

[ ]:
```
# lets convert them to dateTime objects
newDF['Created Date'] = pd.to_datetime(newDF['Created Date'],format='%m/%d/%Y␣
↪%H:%M:%S %p');
newDF['Closed Date'] = pd.to_datetime(newDF['Closed Date'],format='%m/%d/%Y %H:
↪%M:%S %p');
newDF['Resolution Action Updated Date'] = pd.to_datetime(newDF['Resolution␣
↪Action Updated Date'],format='%m/%d/%Y %H:%M:%S %p');
newDF['Due Date'] = pd.to_datetime(newDF['Due Date'],format='%m/%d/%Y %H:%M:%S␣
↪%p');
```

[22]:
```
newDF.dtypes
```

[22]:
```
Unique Key                             int64
Created Date                  datetime64[ns]
Closed Date                   datetime64[ns]
Agency                                object
Agency Name                           object
Complaint Type                        object
Descriptor                            object
Location Type                         object
Incident Zip                         float64
Incident Address                      object
Street Name                           object
Cross Street 1                        object
Cross Street 2                        object
Intersection Street 1                 object
Intersection Street 2                 object
Address Type                          object
City                                  object
Landmark                              object
Facility Type                         object
Status                                object
Due Date                      datetime64[ns]
Resolution Description                object
Resolution Action Updated Date    datetime64[ns]
Community Board                       object
Borough                               object
X Coordinate (State Plane)           float64
Y Coordinate (State Plane)           float64
Park Facility Name                    object
Park Borough                          object
School Name                           object
School Number                         object
School Region                         object
School Code                           object
```

```
School Phone Number                     object
School Address                          object
School City                             object
School State                            object
School Zip                              object
School Not Found                        object
Bridge Highway Name                     object
Bridge Highway Direction                object
Road Ramp                               object
Bridge Highway Segment                  object
Ferry Direction                         object
Ferry Terminal Name                     object
Latitude                               float64
Longitude                              float64
Location                                object
dtype: object
```

[23]:
```
#All 4 of the date columns are  now changed to DateTime Types
```

[30]:
```
newDF.head()
```

[30]:

	Unique Key	Created Date	Closed Date	Agency	Agency Name	Complaint Type	Descriptor	Location Type	Incident Zip	Incident Address	…	School Not Found	Bridge Highway Name
0	32310363	2015-12-31 11:59:45	2016-01-01 12:55:15	NYPD	New York City Police Department	Noise - Street/Sidewalk	Loud Music/Party	Street/Sidewalk	10034.0	71 VERMILYEA AVENUE	…	N	NaN
1	32309934	2015-12-31 11:59:44	2016-01-01 01:26:57	NYPD	New York City Police Department	Blocked Driveway	No Access	Street/Sidewalk	11105.0	27-07 23 AVENUE	…	N	NaN
2	32309159	2015-12-31 11:59:29	2016-01-01 04:51:03	NYPD	New York City Police Department	Blocked Driveway	No Access	Street/Sidewalk	10458.0	2897 VALENTINE AVENUE	…	N	NaN
3	32305098	2015-12-31 11:57:46	2016-01-01 07:43:13	NYPD	New York City Police Department	Illegal Parking	Commercial Overnight Parking	Street/Sidewalk	10461.0	2940 BAISLEY AVENUE	…	N	NaN
4	32306529	2015-12-31 11:56:58	2016-01-01 03:24:42	NYPD	New York City Police Department	Illegal Parking	Blocked Sidewalk	Street/Sidewalk	11373.0				

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

  Bridge Highway Direction Road Ramp Bridge Highway Segment 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 48 columns]
```

[31]:
```
newDF.to_csv('newDF.csv')
```

4 Draw a frequency plot for city-wise complaints

[12]:
```
#extract city wide complainst data
cityComplaintsDF=newDF.filter(['City','Complaint Type'],axis=1)
cityComplaintsDF.isnull().sum()

# City              2997
# Complaint Type       0
# dtype: int64
#There are 2997 null Cities for ComplaintType. So lets drop null fields
```

[12]:
```
City              2997
Complaint Type       0
dtype: int64
```

[15]:
```
cityComplaintsDF.dropna(inplace=True)
cityComplaintsDF.isnull().sum() ## all nulls are removed. total 36151 records
```

[15]:
```
City              0
Complaint Type    0
dtype: int64
```

[16]:
```
cityComplaintsDF.shape
```

[16]:
```
(361561, 2)
```

[ ]:
```
#citywise complaints bar plot
```

[22]:
```
cityComplaintsDF['City'].value_counts()
```

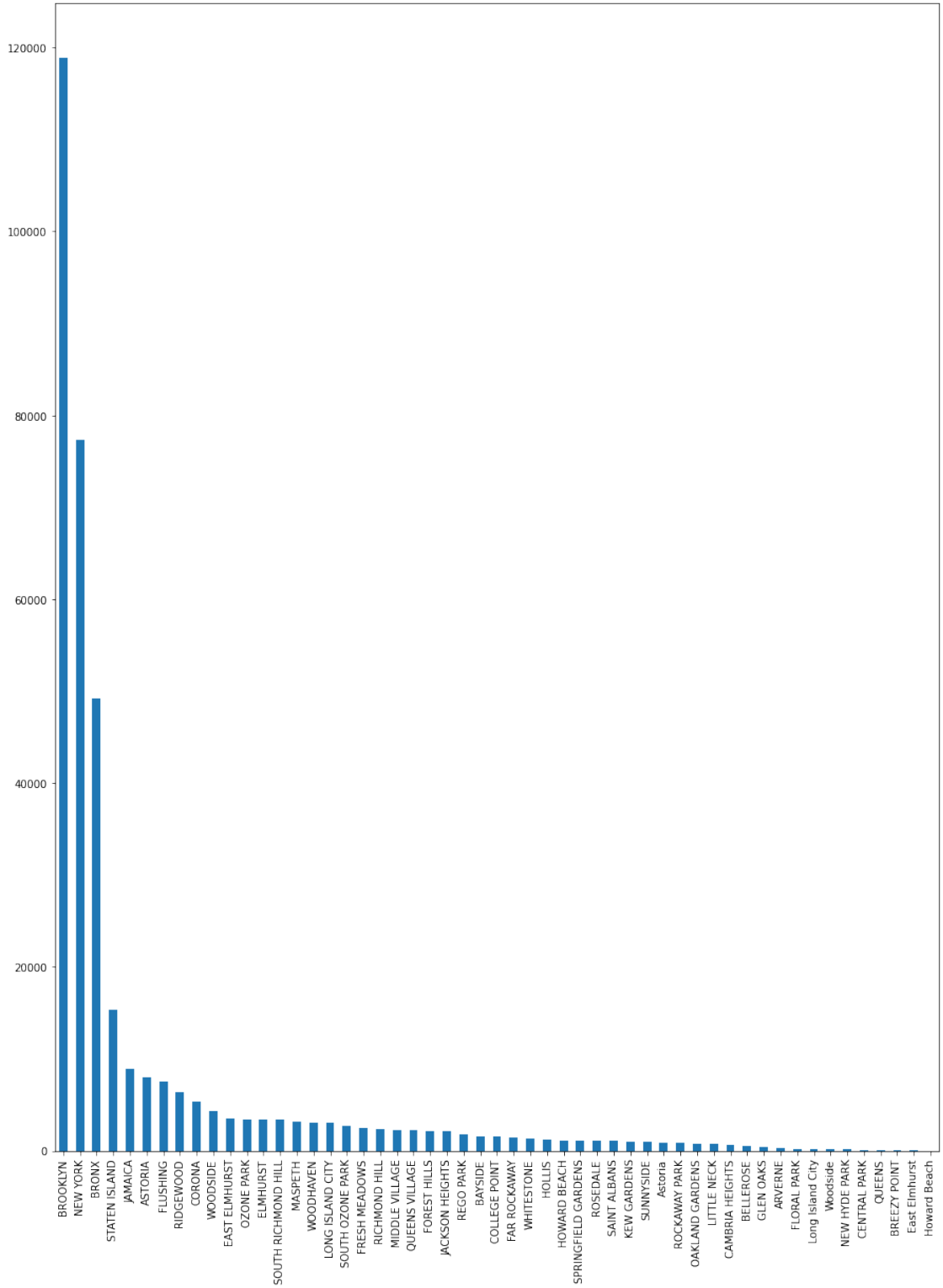
[22]:
```
BROOKLYN               118862
NEW YORK                77312
BRONX                   49171
STATEN ISLAND           15340
JAMAICA                  8932
ASTORIA                  7991
FLUSHING                 7487
RIDGEWOOD                6392
CORONA                   5383
WOODSIDE                 4357
EAST ELMHURST            3558
OZONE PARK               3446
ELMHURST                 3438
SOUTH RICHMOND HILL      3431
MASPETH                  3118
WOODHAVEN                3103
LONG ISLAND CITY         3028
SOUTH OZONE PARK         2668
FRESH MEADOWS            2453
RICHMOND HILL            2335
MIDDLE VILLAGE           2291
QUEENS VILLAGE           2251
FOREST HILLS             2122
JACKSON HEIGHTS          2106
REGO PARK                1807
BAYSIDE                  1550
COLLEGE POINT            1544
FAR ROCKAWAY             1397
WHITESTONE               1369
HOLLIS                   1231
HOWARD BEACH             1144
SPRINGFIELD GARDENS      1094
ROSEDALE                 1091
SAINT ALBANS             1047
KEW GARDENS              1008
```

```
SUNNYSIDE                 944
Astoria                   906
ROCKAWAY PARK             831
OAKLAND GARDENS           717
LITTLE NECK               712
CAMBRIA HEIGHTS           617
BELLEROSE                 487
GLEN OAKS                 361
ARVERNE                   259
FLORAL PARK               196
Long Island City          170
Woodside                  166
NEW HYDE PARK             129
CENTRAL PARK              110
QUEENS                     37
BREEZY POINT               31
East Elmhurst              30
Howard Beach                1
Name: City, dtype: int64
```

[11]:
```
#import matplot lib for plots
import matplotlib.pyplot as plt
```

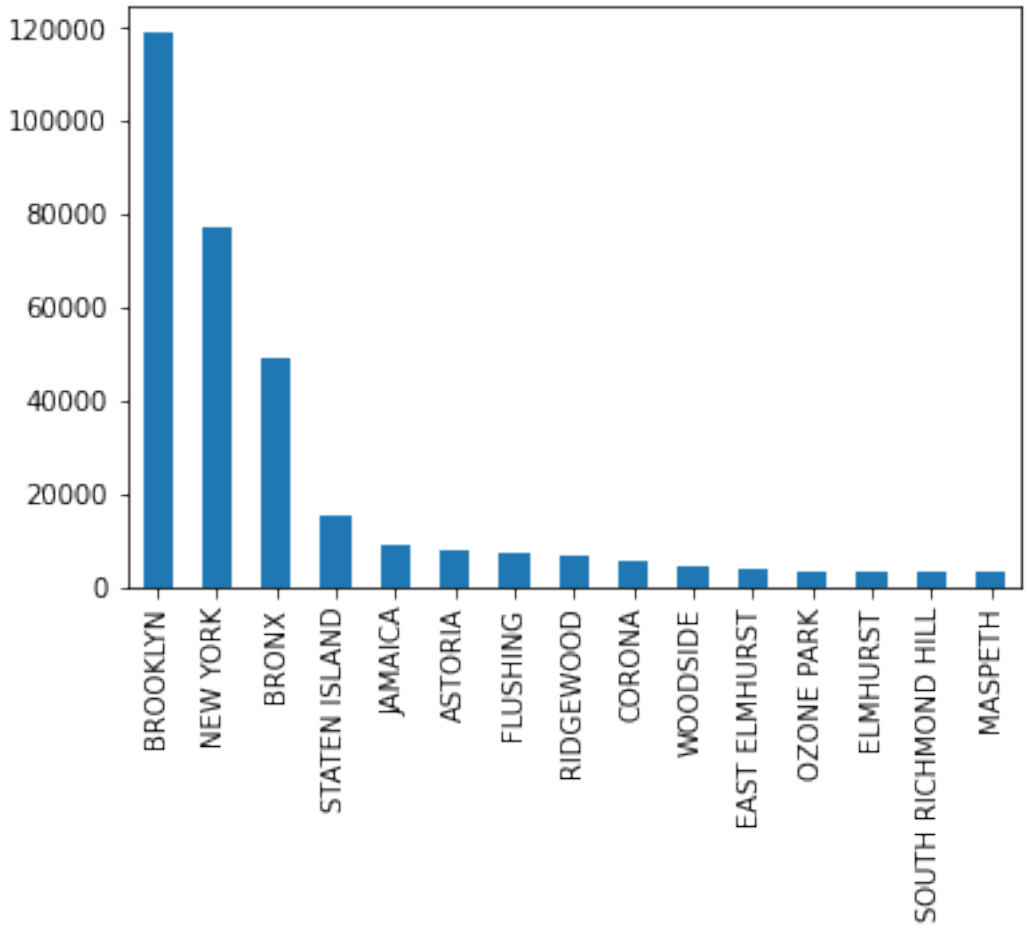
[20]:
```
fig, ax = plt.subplots(figsize=(15,20))
plt.xticks(rotation=90)
cityComplaintsDF['City'].value_counts().plot(kind='bar')
```

[20]:
```
<AxesSubplot:>
```


120000
100000
80000
60000
40000
20000
0
BROOKLYN
NEW YORK
BRONX
STATEN ISLAND
JAMAICA
ASTORIA
FLUSHING
RIDGEWOOD
CORONA
WOODSIDE
EAST ELMHURST
OZONE PARK
ELMHURST
SOUTH RICHMOND HILL
MASPETH
WOODHAVEN
LONG ISLAND CITY
SOUTH OZONE PARK
FRESH MEADOWS
RICHMOND HILL
MIDDLE VILLAGE
QUEENS VILLAGE
FOREST HILLS
JACKSON HEIGHTS
REGO PARK
BAYSIDE
COLLEGE POINT
FAR ROCKAWAY
WHITESTONE
HOLLIS
HOWARD BEACH
SPRINGFIELD GARDENS
ROSEDALE
SAINT ALBANS
KEW GARDENS
SUNNYSIDE
Astoria
ROCKAWAY PARK
OAKLAND GARDENS
LITTLE NECK
CAMBRIA HEIGHTS
BELLEROSE
GLEN OAKS
ARVERNE
FLORAL PARK
Long Island City
Woodside
NEW HYDE PARK
CENTRAL PARK
QUEENS
BREEZY POINT
East Elmhurst
Howard Beach

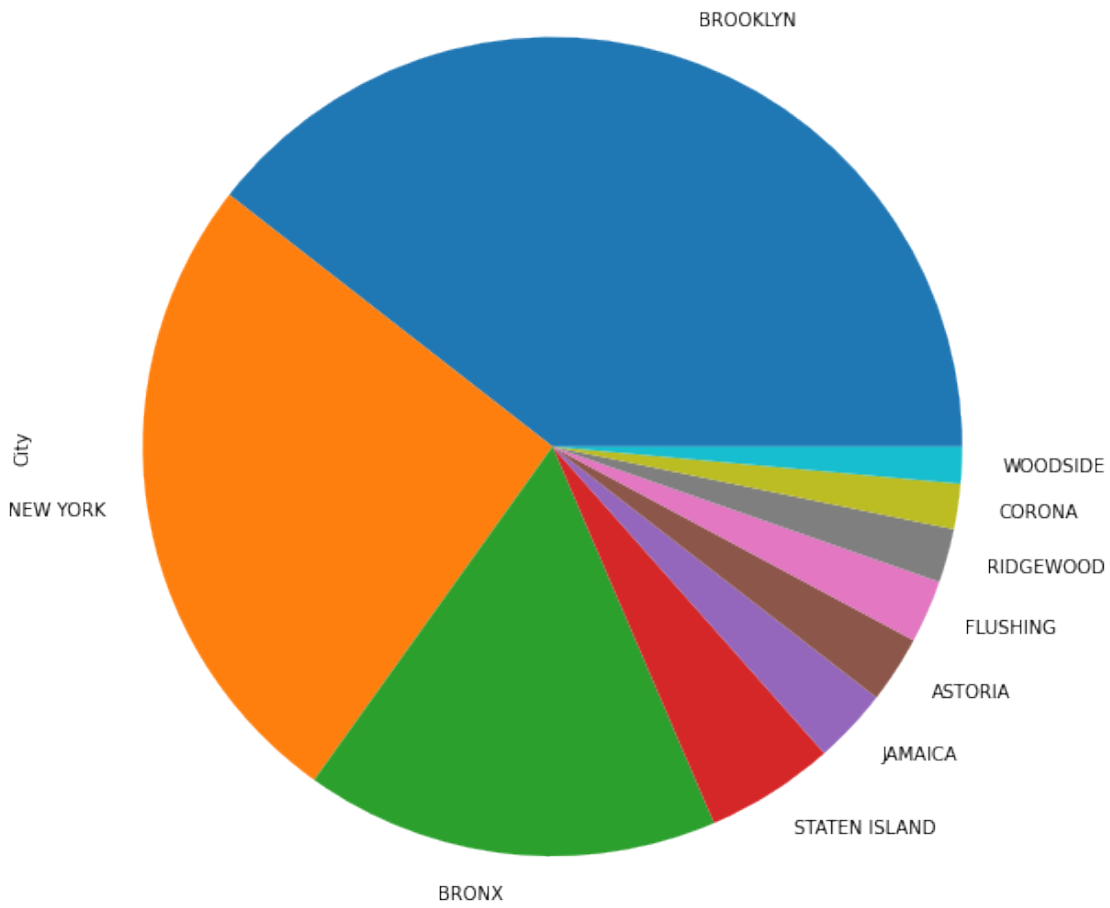
[21]:
```
# Lets draw a plot for the top 15 cities that has more complaints
cityComplaintsDF['City'].value_counts()[:15].plot(kind='bar')
```

[21]: <AxesSubplot:>



[26]:
```
#lest do a pie chart
fig, ax = plt.subplots(figsize=(10,15))
cityComplaintsDF['City'].value_counts().head(10).plot(kind='pie')
```

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



5 Draw scatter and hexbin plots for complaint concentration across Brooklyn

[31]:
```
#extract Brooklyn dataframe
brooklynDF = newDF.loc[newDF['City'] == 'BROOKLYN']
```

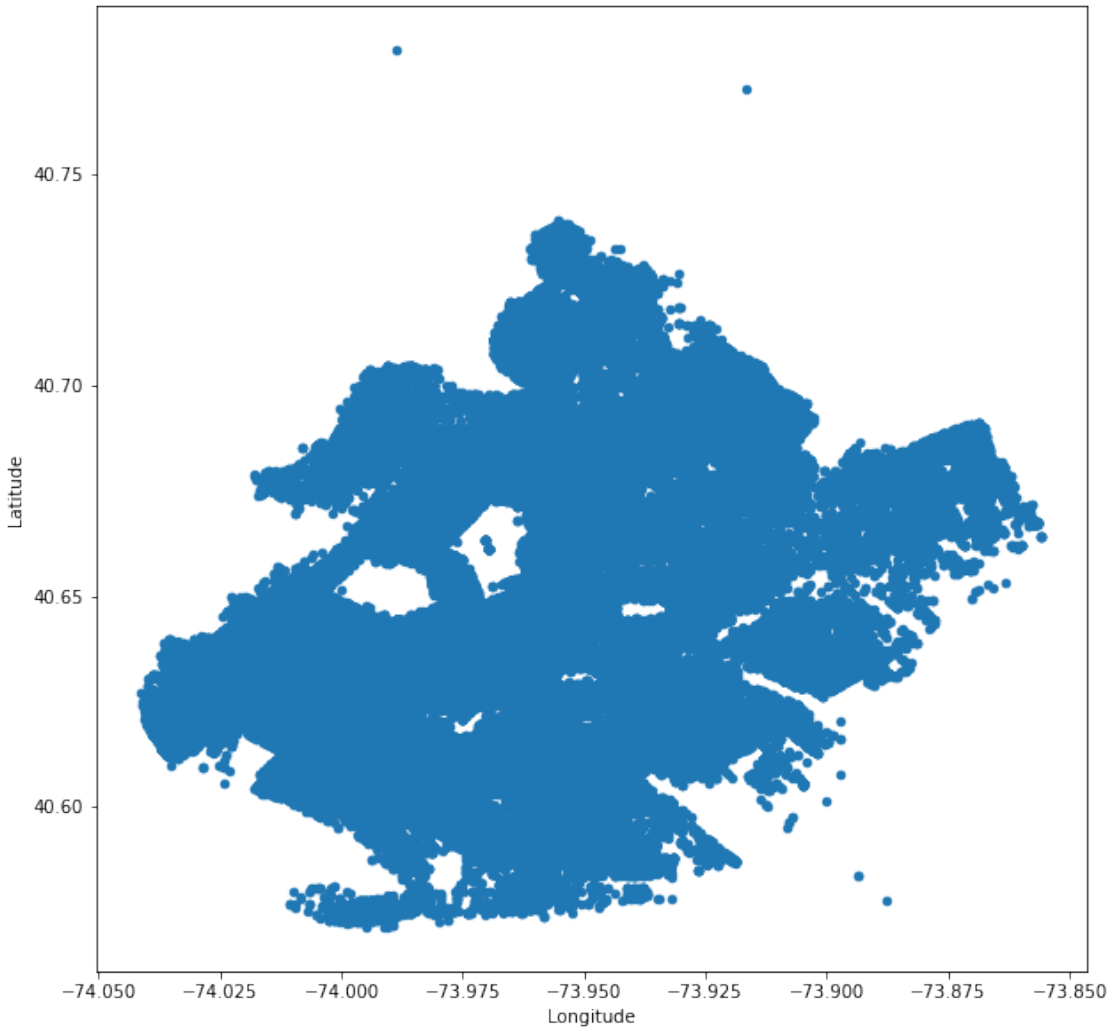
[32]:
```
brooklynDF.shape
```

[32]: (118862, 48)

[33]:
```
# scatter plot
```

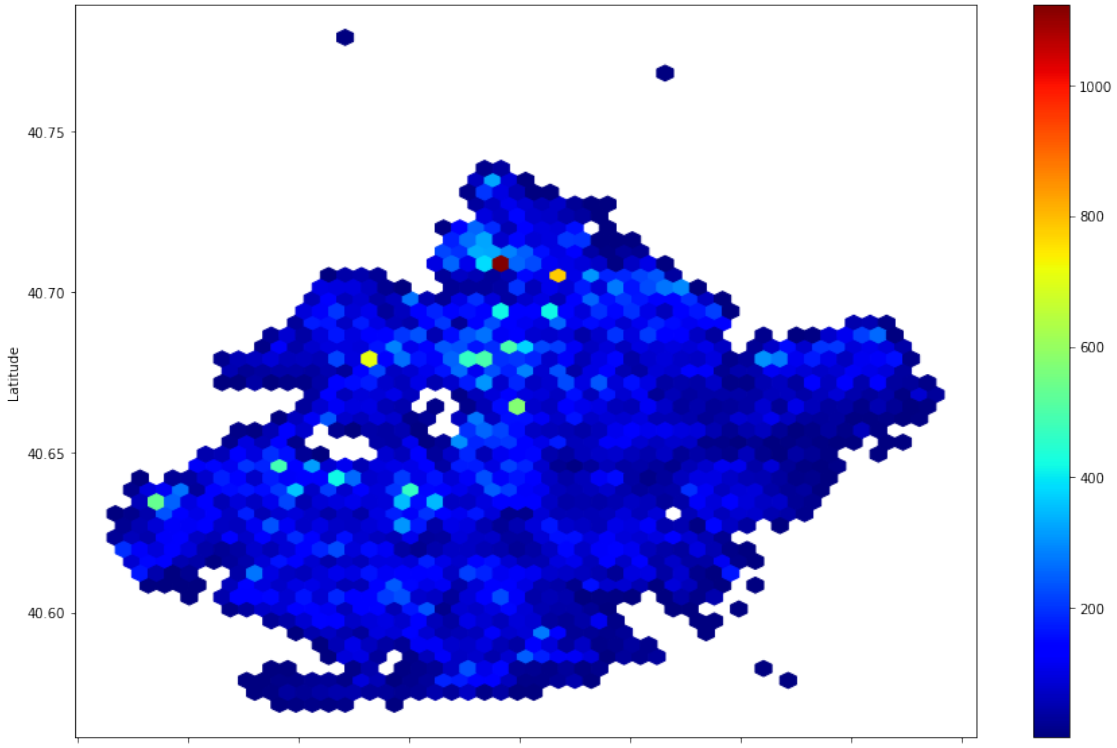
```
brooklynDF[['Longitude', 'Latitude']].
 ↪plot(kind='scatter',x='Longitude',y='Latitude',figsize=(10,10))
```

[33]: <AxesSubplot:xlabel='Longitude', ylabel='Latitude'>



[39]:
```
# Draw hexbin plot for complaint concentration across Brooklyn
# plt.figure(figsize=(10,10))
brklyDF[['Longitude', 'Latitude']].
 ↪plot(kind='hexbin',x='Longitude',y='Latitude', gridsize=50, mincnt=1,␣
 ↪colormap = 'jet',figsize=(15,10))
```

[39]: <AxesSubplot:xlabel='Longitude', ylabel='Latitude'>


40.75
40.70
40.65
40.60
Latitude
1000
800
600
400
200

[ ]: