

Customer Service Requests Analysis

In [1]:	<pre># Import necessary libraries import numpy as np import pandas as pd import matplotlib.pyplot as plt import matplotlib matplotlib.rcParams['figure.dpi'] = 100</pre>																																																																																																																																																										
In [2]:	<pre># Load the dataset service_request = pd.read_csv('311_Service_Requests_from_2010_to_Present.csv')</pre> <p>C:\Users\meeta\AppData\Local\Temp\ipykernel_24476\2261520460.py:2: DtypeWarning: Columns (45,49) have mixed type. Casting to np.float64. This may result in many empty rows.</p> <pre>service_request.head()</pre>																																																																																																																																																										
In [3]:	<pre># View the top 30 rows of the dataset service_request.head(10)</pre>																																																																																																																																																										
Out[3]:	<table><thead><tr><th></th><th>Unique Key</th><th>Created Date</th><th>Closed Date</th><th>Agency</th><th>Agency Name</th><th>Complaint Type</th><th>Descriptor</th><th>Location Type</th><th>Incident Zip</th><th>Incident Address</th><th>...</th><th>Bridge Highway Name</th><th>Bridge Direction</th></tr></thead><tbody><tr><td>0</td><td>32310363</td><td>12/31/2015 11:59:45 PM</td><td>01-01-2016 05:55</td><td>16 NYPD</td><td>New York City Police Department</td><td>Noise - Street/Sidewalk</td><td>Music/Party</td><td>Street/Sidewalk</td><td>100340</td><td>71 VERMILYEA AVENUE</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>1</td><td>32309934</td><td>12/31/2015 11:59:44 PM</td><td>01-01-2016 1:26</td><td>16 NYPD</td><td>New York City Police Department</td><td>Blocked Driveway</td><td>No Access</td><td>Street/Sidewalk</td><td>111050</td><td>27-07 23 AVENUE</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>2</td><td>32309159</td><td>12/31/2015 11:59:29 PM</td><td>01-01-2016 4:51</td><td>16 NYPD</td><td>New York City Police Department</td><td>Blocked Driveway</td><td>No Access</td><td>Street/Sidewalk</td><td>104580</td><td>2897 VALENTINE AVENUE</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>3</td><td>32305098</td><td>12/31/2015 11:57:46 PM</td><td>01-01-2016 7:43</td><td>16 NYPD</td><td>New York City Police Department</td><td>Illegal Parking</td><td>Commercial Overnight Parking</td><td>Street/Sidewalk</td><td>104610</td><td>2940 BAILEY AVENUE</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>4</td><td>32306529</td><td>12/31/2015 11:56:58 PM</td><td>01-01-2016 3:24</td><td>16 NYPD</td><td>New York City Police Department</td><td>Illegal Parking</td><td>Blocked Sidewalk</td><td>Street/Sidewalk</td><td>113730</td><td>87-14 57 ROAD</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>5</td><td>32306554</td><td>12/31/2015 11:56:30 PM</td><td>01-01-2016 1:50</td><td>16 NYPD</td><td>New York City Police Department</td><td>Illegal Parking</td><td>Posted Parking Sign Violation</td><td>Street/Sidewalk</td><td>112150</td><td>260 21 STREET</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>6</td><td>32306559</td><td>12/31/2015 11:55:21 PM</td><td>01-01-2016 1:53</td><td>16 NYPD</td><td>New York City Police Department</td><td>Illegal Parking</td><td>Blocked Hydrant</td><td>Street/Sidewalk</td><td>100320</td><td>524 WEST 169 STREET</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>7</td><td>32307009</td><td>12/31/2015 11:54:05 PM</td><td>01-01-2016 1:42</td><td>16 NYPD</td><td>New York City Police Department</td><td>Blocked Driveway</td><td>No Access</td><td>Street/Sidewalk</td><td>104570</td><td>501 EAST 171 STREET</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>8</td><td>32308581</td><td>12/31/2015 11:53:58 PM</td><td>01-01-2016 8:27</td><td>16 NYPD</td><td>New York City Police Department</td><td>Illegal Parking</td><td>Posted Parking Sign Violation</td><td>Street/Sidewalk</td><td>114150</td><td>83-44 LEFFERTS BOULEVARD</td><td>...</td><td>NaN</td><td>Nat</td></tr><tr><td>9</td><td>32308391</td><td>12/31/2015 11:53:58 PM</td><td>01-01-2016 1:17</td><td>16 NYPD</td><td>New York City Police Department</td><td>Blocked Driveway</td><td>No Access</td><td>Street/Sidewalk</td><td>112190</td><td>1408 66 STREET</td><td>...</td><td>NaN</td><td>Nat</td></tr></tbody></table>		Unique Key	Created Date	Closed Date	Agency	Agency Name	Complaint Type	Descriptor	Location Type	Incident Zip	Incident Address	...	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In [7]:	<pre># To display the content service_request.describe()</pre>																																																																																																																																																										
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In [8]:	<pre># Print the columns print(service_request.columns)</pre>																																																																																																																																																										
Out[8]:	<pre>Index(['Unique Key', 'Created Date', 'Closed Date', 'Agency', 'Agency Name', 'Complaint Type', 'Descriptor', 'Location Type', 'Incident Zip', 'Incident Address', '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')</pre>																																																																																																																																																										
In [9]:	<pre># Print the index service_request.index</pre>																																																																																																																																																										
Out[9]:	<pre>RangeIndex(start=0, stop=30698, step=1)</pre>																																																																																																																																																										
In [10]:	<pre># Make a copy of the dataframe df = service_request.copy()</pre>																																																																																																																																																										
In [11]:	<pre># Drop the columns with too many NaN values df = df.dropna(subset=['Taxi Pick Up Location', 'Bridge Highway Name', 'Bridge Highway Direction', 'Road Ramp', 'Bridge Highway Segment', 'Garage Lot Name', 'Ferry Terminal Name', 'School or Citywide Complaint', 'Vehicle Type', 'Taxi Company 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', 'Bridge Highway Name', 'Bridge Highway Direction', 'Road Ramp', 'Bridge Highway Segment', 'Garage Lot Name', 'Ferry Direction', 'Ferry Terminal Name', 'Latitude', 'Longitude', 'Location'])</pre>																																																																																																																																																										
In [12]:	<pre># Drop all the duplicate columns df = df.drop_duplicates(subset=['Agency Name', 'Park Borough', 'Borough', 'Facility Type', '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'])</pre>																																																																																																																																																										
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In [14]:	<pre># Convert all the city name to upper case df['City'] = df['City'].str.upper()</pre>																																																																																																																																																										
In [15]:	<pre># Convert the Created Date and Closed Date into datetime datatype df['Created Date'] = pd.to_datetime(df['Created Date']) df['Closed Date'] = pd.to_datetime(df['Closed Date'])</pre>																																																																																																																																																										
In [16]:	<pre># Check the datatypes of the created date and closed date df['Created Date'].dtypes</pre>																																																																																																																																																										
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In [19]:	<pre># Calculate the difference between the complaint created time and closed time df['Request Closing Time'] = df['Closed Date'] - df['Created Date']</pre>																																																																																																																																																										
In [20]:	<pre># Filter a new column with the time difference df['Request Closing Time'] = df['Request Closing Time'].dt.total_seconds() / 60</pre>																																																																																																																																																										
In [21]:	<pre>df = df.dropna(subset=['Request Closing Time'])</pre>																																																																																																																																																										
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In [22]:	<pre># Replace the missing values in the 'City' column with the string, 'Unknown' df['City'] = df['City'].fillna('Unknown')</pre>																																																																																																																																																										
In [23]:	<pre># Replace the missing values in the 'Location Type' column with the string, 'Unspecified' df['Location Type'] = df['Location Type'].fillna('Unspecified')</pre>																																																																																																																																																										
In [24]:	<pre># In order to replace NaN values with 0, first we have to exclude datetime datatype columns df = df.dropna(subset=['Created Date', 'Closed Date', 'Request Closing Time'])</pre>																																																																																																																																																										
In [25]:	<pre># Fill NaN columns with 0 df = df.fillna(0)</pre>																																																																																																																																																										
In [26]:	<pre># Print the last 5 rows of the dataframe df.tail(5)</pre>																																																																																																																																																										
Out[26]:	<table><thead><tr><th></th><th>Unique Key</th><th>Created Date</th><th>Closed Date</th><th>Request Closing Time</th><th>Agency</th><th>Complaint Type</th><th>Descriptor</th><th>Location Type</th><th>Incident Zip</th><th>Incident Address</th><th>...</th><th>Cross Street 1</th><th>Cross Street 2</th><th>City</th></tr></thead><tbody><tr><td>30693</td><td>30281872</td><td>03-29-2015 00:33:41</td><td>NaN</td><td>NaN</td><td>Nat</td><td>Noise - Commercial</td><td>Music/Party</td><td>Club/Bar/Restaurant</td><td>0.0</td><td>CRESCENT AVENUE</td><td>...</td><td>0</td><td>UNKNOWN</td><td>NEW YORK</td></tr><tr><td>30694</td><td>30281230</td><td>03-29-2015 00:33:28</td><td>03-29-2015 02:03:35</td><td>0 days 02:00:31</td><td>NYPD</td><td>Blocked Driveway</td><td>Partial Access</td><td>Street/Sidewalk</td><td>114180</td><td>100-17 87 AVENUE</td><td>...</td><td>102 RICHMOND STREET</td><td>HOFFMAN DRIVE</td><td>ASTORIA</td></tr><tr><td>30695</td><td>30283424</td><td>03-29-2015 00:33:03</td><td>03-29-2015 03:40:20</td><td>0 days 03:07:17</td><td>NYPD</td><td>Noise - Commercial</td><td>Music/Party</td><td>Club/Bar/Restaurant</td><td>112060</td><td>162 THROOP AVENUE</td><td>...</td><td>ELLERY STREET</td><td>BROOKLYN</td><td>NEW YORK</td></tr><tr><td>30696</td><td>30280004</td><td>03-29-2015 00:33:02</td><td>03-29-2015 04:05:33</td><td>0 days 04:05:33</td><td>NYPD</td><td>Noise - Commercial</td><td>Music/Party</td><td>Club/Bar/Restaurant</td><td>104610</td><td>3151 EAST TREMONT AVENUE</td><td>...</td><td>LA SALLE AVENUE</td><td>BROOKLYN</td><td>NEW YORK</td></tr><tr><td>30697</td><td>30281825</td><td>03-29-2015 00:33:01</td><td>03-29-2015 04:08:49</td><td>0 days 04:08:49</td><td>NYPD</td><td>Noise - Commercial</td><td>Music/Party</td><td>Store/Commercial</td><td>100360</td><td>251 WEST 48 STREET</td><td>...</td><td>8 AVENUE</td><td>NEW YORK</td><td>NEW YORK</td></tr></tbody></table>		Unique Key	Created Date	Closed Date	Request Closing Time	Agency	Complaint Type	Descriptor	Location Type	Incident Zip	Incident Address	...	Cross Street 1	Cross Street 2	City	30693	30281872	03-29-2015 00:33:41	NaN	NaN	Nat	Noise - Commercial	Music/Party	Club/Bar/Restaurant	0.0	CRESCENT AVENUE	...	0	UNKNOWN	NEW YORK	30694	30281230	03-29-2015 00:33:28	03-29-2015 02:03:35	0 days 02:00:31	NYPD	Blocked Driveway	Partial Access	Street/Sidewalk	114180	100-17 87 AVENUE	...	102 RICHMOND STREET	HOFFMAN DRIVE	ASTORIA	30695	30283424	03-29-2015 00:33:03	03-29-2015 03:40:20	0 days 03:07:17	NYPD	Noise - Commercial	Music/Party	Club/Bar/Restaurant	112060	162 THROOP AVENUE	...	ELLERY STREET	BROOKLYN	NEW YORK	30696	30280004	03-29-2015 00:33:02	03-29-2015 04:05:33	0 days 04:05:33	NYPD	Noise - Commercial	Music/Party	Club/Bar/Restaurant	104610	3151 EAST TREMONT AVENUE	...	LA SALLE AVENUE	BROOKLYN	NEW YORK	30697	30281825	03-29-2015 00:33:01	03-29-2015 04:08:49	0 days 04:08:49	NYPD	Noise - Commercial	Music/Party	Store/Commercial	100360	251 WEST 48 STREET	...	8 AVENUE	NEW YORK	NEW YORK																																																																
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In [27]:	<pre># Fill NaN in 'Closed Date' column with -- as the complaint is still open df['Closed Date'] = df['Closed Date'].fillna('--')</pre>																																																																																																																																																										
In [28]:	<pre># Select relevant columns for the analysis df = df[['Unique Key', 'Created Date', 'Closed Date', 'Request Closing Time', 'Agency', 'Complaint Type', 'Descriptor', 'Location Type', 'Incident Zip', 'Incident Address', 'Cross Street 1', 'Cross Street 2', 'City']]</pre>																																																																																																																																																										
In [29]:	<pre># Check the type and shape of the new dataframe print(df.dtypes) print(df.shape)</pre>																																																																																																																																																										
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In [30]:	<pre># Print the top 5 rows df.head(5)</pre>																																																																																																																																																										
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