Data Analysis NYC Permit Issuance

April 2, 2019

In [13]:
```
# Import libraries
from __future__ import division
import pandas as pd
import seaborn as sns
import geopandas
import matplotlib.pyplot as plt
from geopandas import GeoDataFrame
```

In [2]:
```
data=pd.read_csv('DOB_Permit_Issuance.csv',low_memory=False)
```

In [3]:
```
data.head(5)
```

Out[3]:

	BOROUGH	Bin #	House #	Street Name	Job #	Job doc. #	\
0	BROOKLYN	3138803	830	53 STREET	321583381	1	
1	QUEENS	4446007	40-15	164 STREET	421160745	1	
2	BROOKLYN	3174354	1566	W 6 ST	321268793	1	
3	STATEN ISLAND	5037134	220	LONDON ROAD	520277539	1	
4	BROOKLYN	3190899	2072	W 10 STREET	321365232	1	

	Job Type	Self_Cert	Block	Lot	\
0	A2	Y	05665	00019	
1	A1	N	05339	00009	
2	A1	N	06600	00034	
3	A2	Y	02268	00031	
4	A1	N	07095	00038	

	...	Owners House State	\
0	...	NY	
1	...	NY	
2	...	NY	
3	...	NY	
4	...	NY	

	Owners House Zip Code	Owner's Phone #	DOBRunDate	\
0	11220	9176938038	03/31/2019 12:00:00 AM	
1	11358	7189612050	03/31/2019 12:00:00 AM	
2	11204	9173880821	03/31/2019 12:00:00 AM	
3	10306	5162334845	03/31/2019 12:00:00 AM	

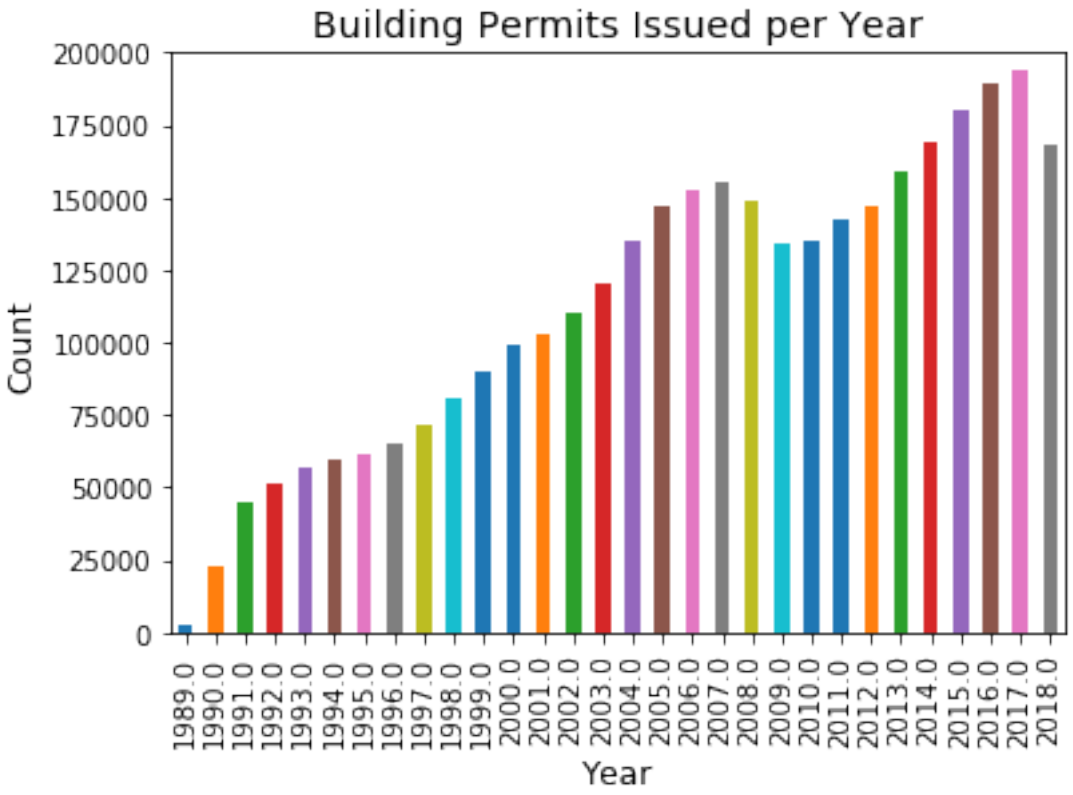
```
4                   11223       9177518899  03/31/2019 12:00:00 AM

  PERMIT_SI_NO   LATITUDE  LONGITUDE COUNCIL_DISTRICT CENSUS_TRACT  \
0      3611957  40.638961 -74.004688             38.0        106.0
1      3611953  40.761361 -73.801957             19.0       1171.0
2      3611958  40.609069 -73.979896             44.0        432.0
3      3611954  40.578749 -74.135101             50.0        279.0
4      3611955  40.596843 -73.981437             47.0        402.0

                                          NTA_NAME
0                                  Sunset Park East
1                                       Murray Hill
2                                  Bensonhurst East
3  Todt Hill-Emerson Hill-Heartland Village-Light...
4                                  Bensonhurst East

[5 rows x 60 columns]
```

In [4]:
```
#How many building permits are issued in NYC each year till 2018?
data = data[data['Permit Status']=='ISSUED']
data['Issuance Date'] = pd.to_datetime(data['Issuance Date'],format='%m/%d/%Y %H:%M:%S
data=data[data['Issuance Date'].dt.year != 2019]
data['Issuance Date'].dt.year.value_counts() #counting values by year using datetime f
```

Out[4]:
```
2017.0    193541
2016.0    188861
2015.0    180409
2014.0    168824
2018.0    167703
2013.0    159146
2007.0    155546
2006.0    152894
2008.0    148436
2005.0    147385
2012.0    146598
2011.0    142490
2004.0    135378
2010.0    134588
2009.0    134317
2003.0    120196
2002.0    109782
2001.0    103214
2000.0     98719
1999.0     89671
1998.0     80866
1997.0     71321
1996.0     65322
1995.0     61669
```

```
1994.0     59758
1993.0     56702
1992.0     51426
1991.0     44578
1990.0     22981
1989.0      2969
Name: Issuance Date, dtype: int64
```

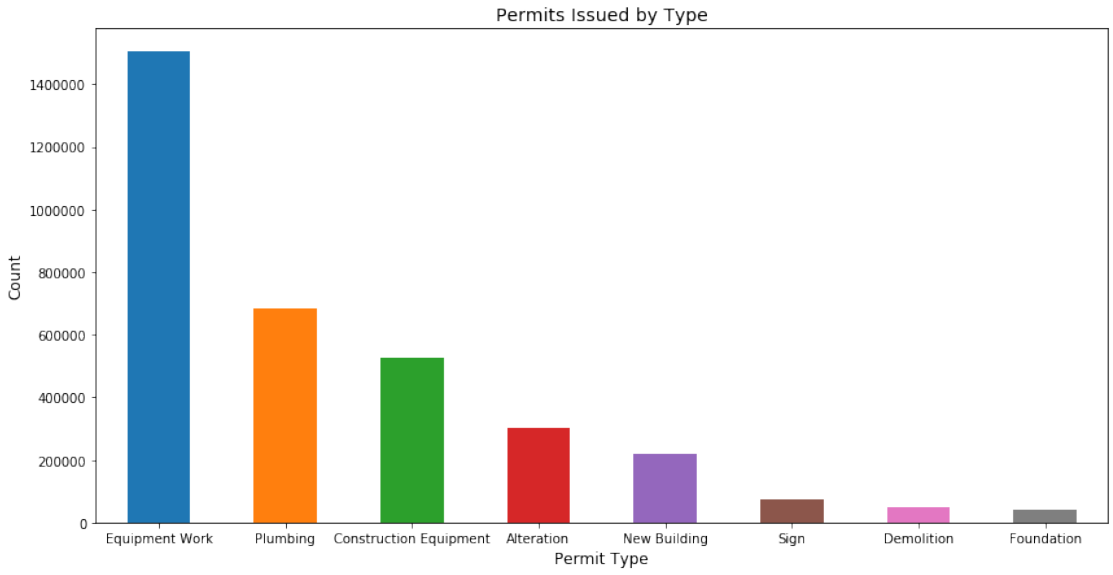
In [5]:
```
#Plotting the data

data['Issuance Date'].dt.year.value_counts().sort_index().plot(kind='bar') #sorting in

plt.title('Building Permits Issued per Year', size=14)
plt.xlabel('Year', size=12)
plt.ylabel('Count', size=12)
plt.ylim(0,200000)
plt.show()
```



In [6]:
```
#Which type of permits are most common?

data['Permit Type'].value_counts().sort_values(ascending=False)
```

```
Out[6]: EW    1503605
        PL     683647
        EQ     524665
        AL     301141
        NB     217252
        SG      74104
        DM      49112
        FO      41784
        Name: Permit Type, dtype: int64
```

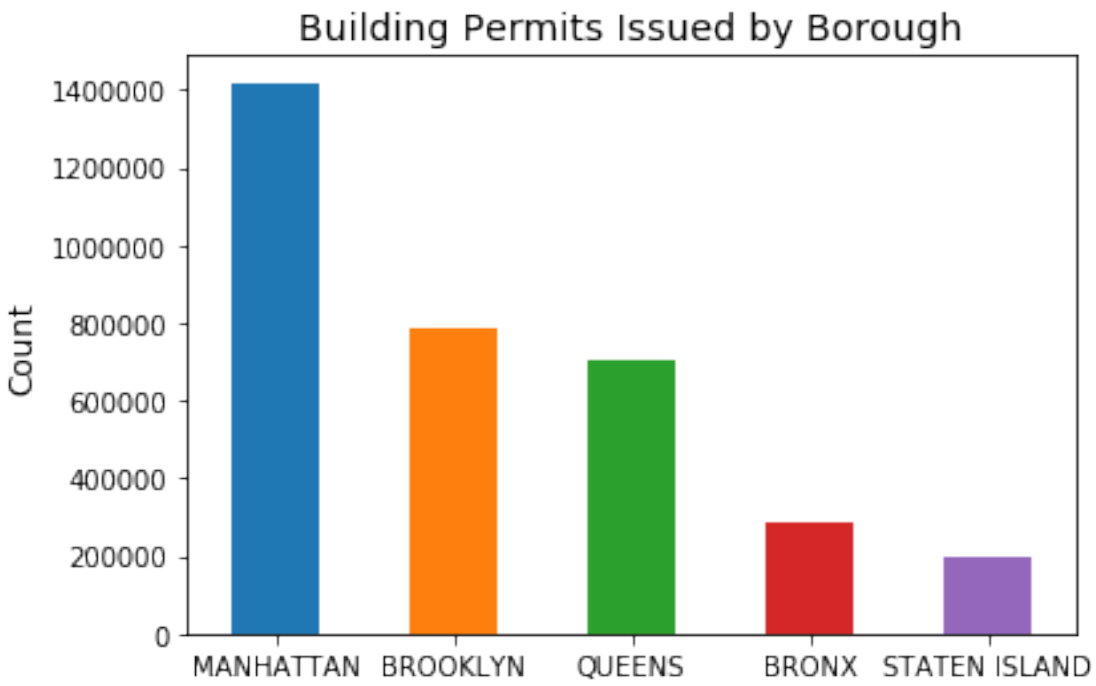
```
In [7]: #Mapping permit type with the full form to make it more readable

        data['Permit Type'] = data['Permit Type'].map({'EW': 'Equipment Work', 'PL': 'Plumbing
                                                       'EQ': 'Construction Equipment', 'AL': 'Alte
                                                       'NB': 'New Building','SG': 'Sign', 'DM': '
                                                       })


        #Plotting the data
        fig = plt.figure(figsize=(14,7))

        data['Permit Type'].value_counts().plot(kind='bar')
        plt.title('Permits Issued by Type', size=14)
        plt.xlabel('Permit Type',size=12)
        plt.ylabel('Count', size=12)
        plt.xticks(rotation='horizontal')

        plt.show()
```



In [8]:
```
# Where the most building permits issued between 1989-2018?

data['BOROUGH'].value_counts()
```

Out[8]:
```
MANHATTAN        1417760
BROOKLYN          785519
QUEENS            707215
BRONX             286574
STATEN ISLAND     198243
Name: BOROUGH, dtype: int64
```

In [9]:
```
#Plotting the above data

#Plotting the data
data['BOROUGH'].value_counts().plot(kind='bar')

plt.title('Building Permits Issued by Borough', size=14)
plt.ylabel('Count', size=12)
plt.xticks(rotation='horizontal')
plt.show()
```



In [10]:
```
#What percentage of borough permits are for residential projects?

boroughs = ['BROOKLYN', 'MANHATTAN', 'QUEENS', 'STATEN ISLAND', 'BRONX'] #list of bor
```

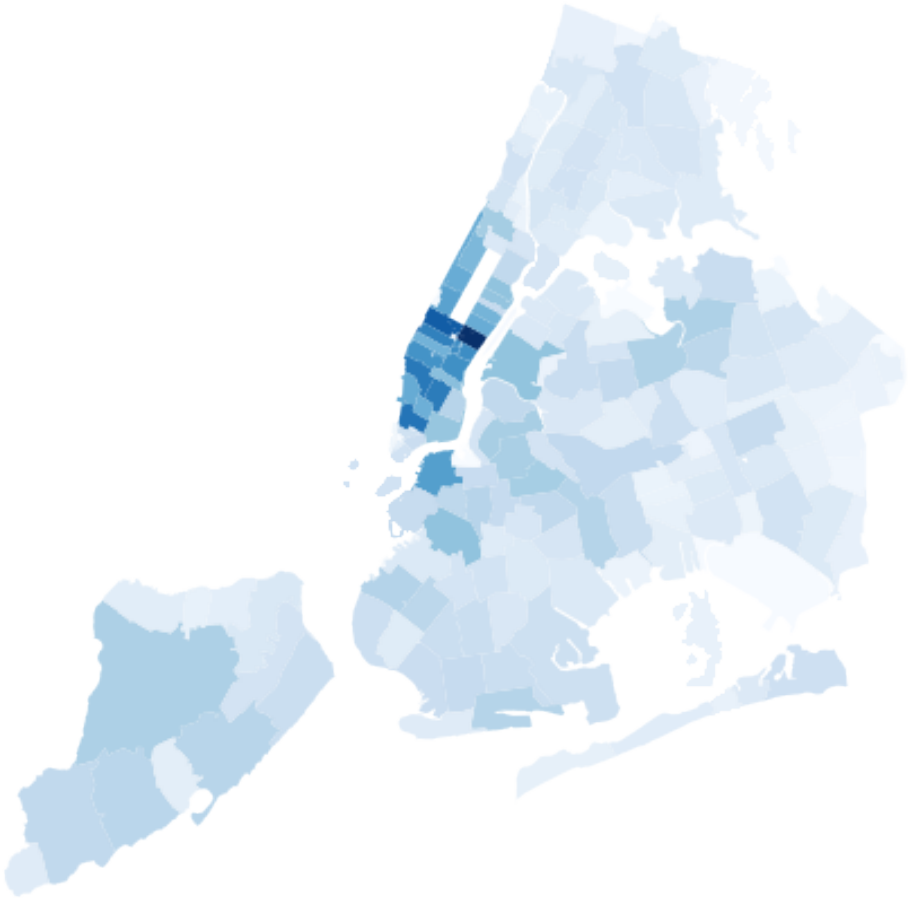
```
        for i in boroughs:
            """
            this for loop returns the percentage of residential permits
            within each borough

            count the number of residential permits then divide by the
            total number of borough permits
            """
            print('\n' + i)
            print(data[data['BOROUGH'] == i]['Residential'].value_counts() / len(data[data['BO
```

```
BROOKLYN
YES    0.479348
Name: Residential, dtype: float64

MANHATTAN
YES    0.258725
Name: Residential, dtype: float64

QUEENS
YES    0.473118
Name: Residential, dtype: float64

STATEN ISLAND
YES    0.602584
Name: Residential, dtype: float64

BRONX
YES    0.419054
Name: Residential, dtype: float64
```

```
In [11]: #How many permits have been issued by zip code?

         #Since zipcode for NYC begin with 10000, removed the erroneous data

         data = data[data['Zip Code'] >= 10000]  #returns only zip codes that are > or = to 10

         print('Permits by zip code \n')
         print(data['Zip Code'].value_counts().sort_index().head(5))  #counting the number of p
         print('\n')
         print('5 zip codes with most permits issued:')
         data['Zip Code'].value_counts().sort_values(ascending=False).head(5) #five zip codes t
```

```
Permits by zip code

10000.0      175
```

```
10001.0    54375
10002.0    34427
10003.0    62068
10004.0    16820
Name: Zip Code, dtype: int64


5 zip codes with most permits issued:


Out[11]: 10022.0    87732
         10019.0    72432
         10013.0    64435
         10011.0    63254
         10003.0    62068
         Name: Zip Code, dtype: int64

In [15]: #Reading data from NYC Zip Code Boundaries Shapefile

         zip_codes = GeoDataFrame.from_file('ZIP_CODE_040114/ZIP_CODE_040114.shp') #read in sh
         zip_codes['zip_code'] = zip_codes['ZIPCODE'].astype(int) #converting zipcode column t
         data['Zip Code'] = data['Zip Code'].astype(int) #converting zipcode column in Permit

In [16]: #Count the number of occurrences for each zip code in the data frame,
         #then converting the data series to a data frame for merging.

         counts = data['Zip Code'].value_counts()
         counts = counts.to_frame(name='count')
         counts = counts.reset_index()

In [22]: #Merge the number of occurences for each zip code, with the corresponding zip code po

         counts = GeoDataFrame(counts.merge(zip_codes, how='left', left_on='index', right_on='z

         #Dropping all NaNs in the geometry column.

         counts = counts.dropna() #drop null values

         #Plotting the data
         fig, ax = plt.subplots(figsize = (8,8))

         counts.plot(column='count', cmap='Blues',alpha=1,linewidth=0.1, ax=ax)

         plt.title('Building Permits by Zipcode', size=20)
         plt.axis('off')
         plt.show()
```


Building Permits by Zipcode