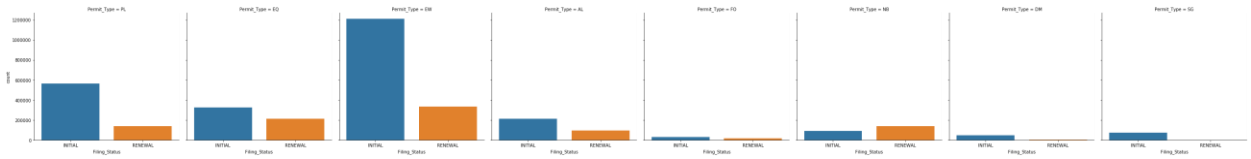
# Analysis of NYC Permit Data

## Background:

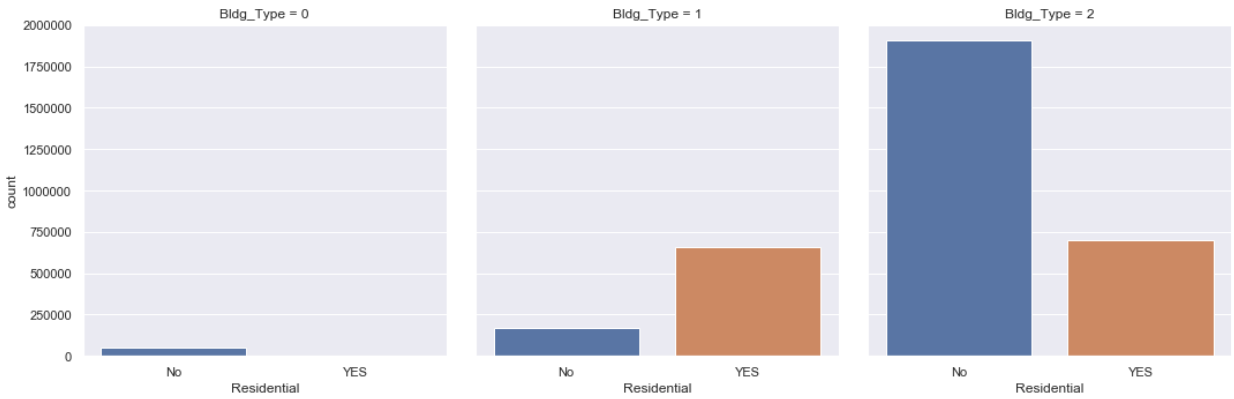
The dataset that we are looking at is collected from NYC Open Data. This dataset contains permit details for Buildings in 5 Boroughs of New York City filed from year 1989 to 2019.The data captures different permit types, Work types, Building Types, Filing statuses, Permit Statuses and Geographical data. We will analyze this data and see if there is anything interesting in the data.

## Data Exploration:

- **What type of permits are renewed Often?:** "New Building" permits are filed for renewals more often than other permit types like Demolitions, equipment etc.

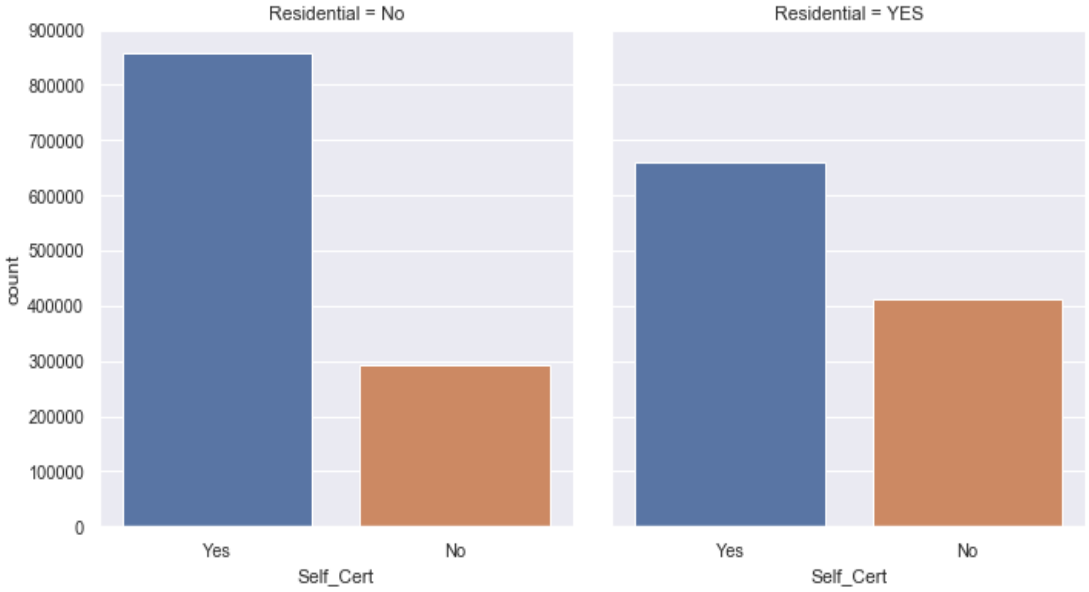


- **Which Building type is Residential?:** Building Type 1 is associated with Residential Buildings and Building Type 2 is associated with more Non-Residential Buildings.

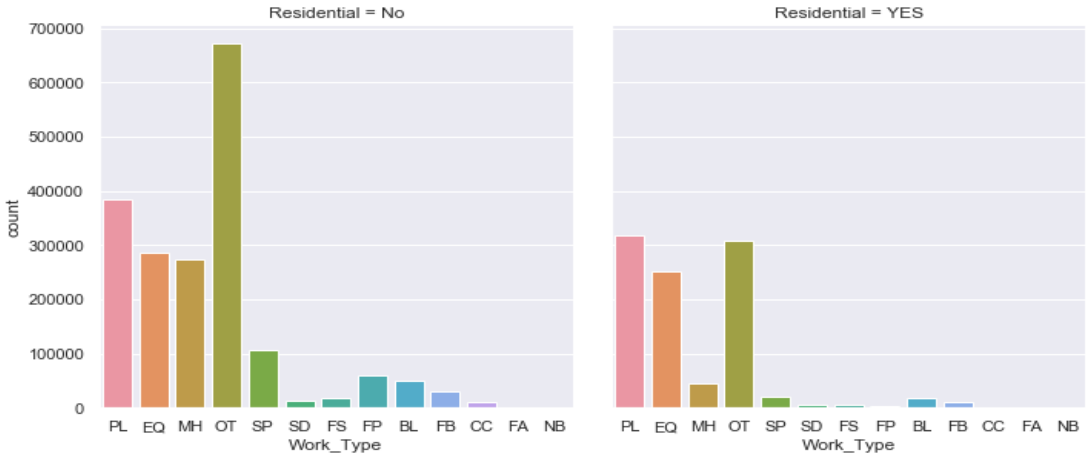



- **Do Residential or Non Residential Buildings self- certify more often**?: Non-Residential Buildings are more frequently self certified where as there is a balance

between self certification status among residential buildings.



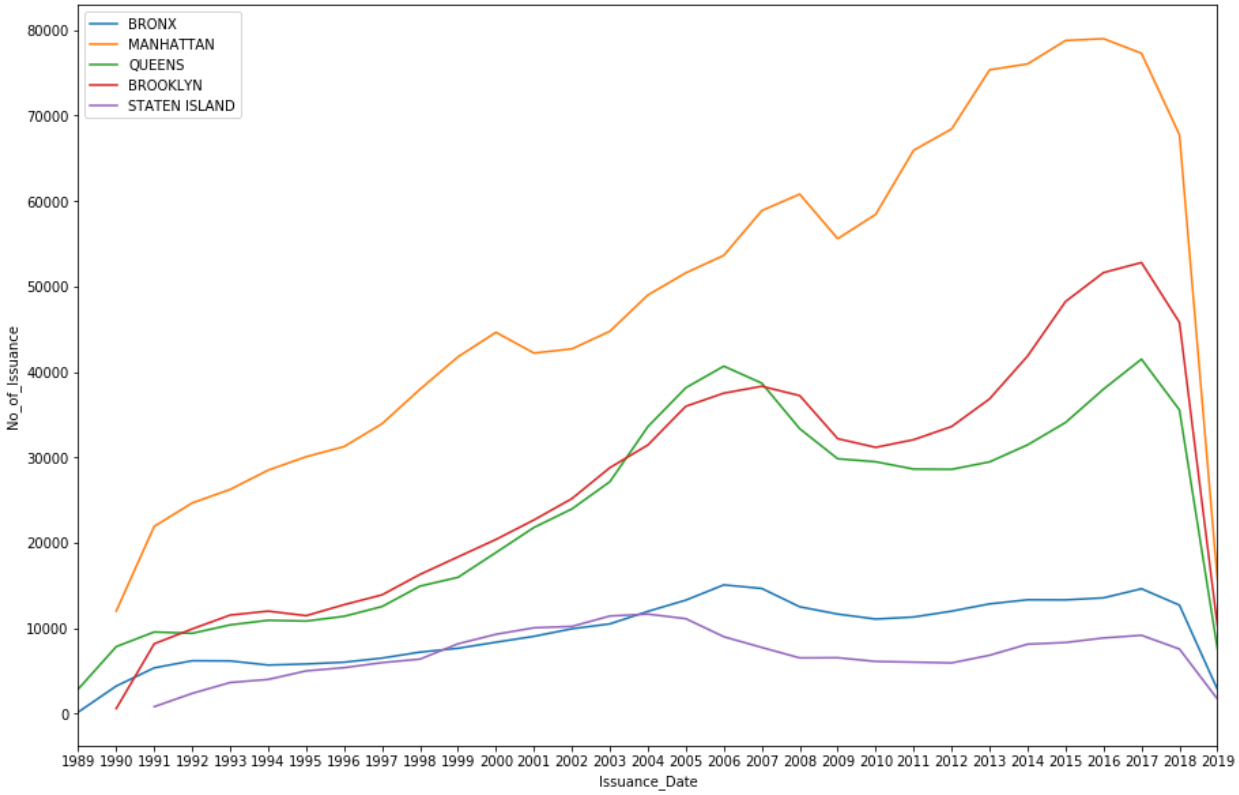

- **What type of work types are required for residential Buildings?:** Plumbing work permits are more filed for residential buildings where as Equipment related permits are more filed for non residential buildings.




## Residencial/Commercial Buildings Trend Analysis:

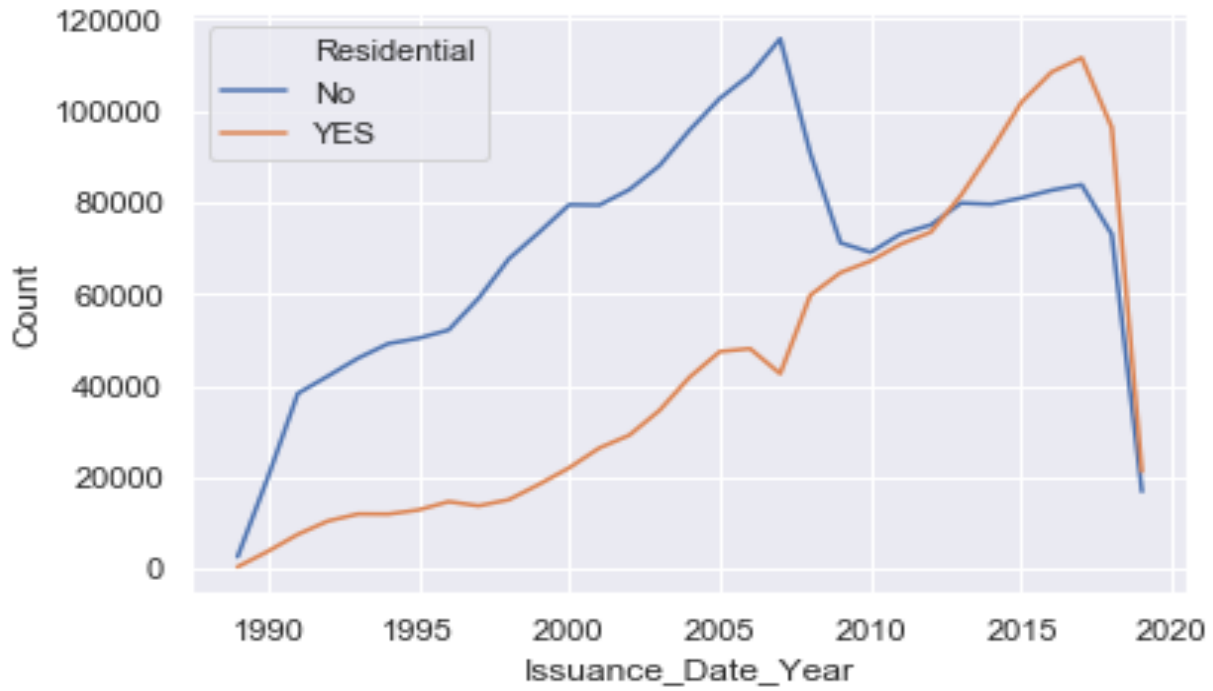
- **Construction Activity trend across Boroughs:** The number of permits being filed has been increasing since 1990 until Today. But it has not been a constant upward trend. As the 2008 Recession dampened the U.S Economy, so it did to the construction activity in New York. There is a sharp decline in permit activity in the 2008,2009,2010 period. The construction activity has resumed since 2010 and has been increasing till today. This is

evident from the following plot.



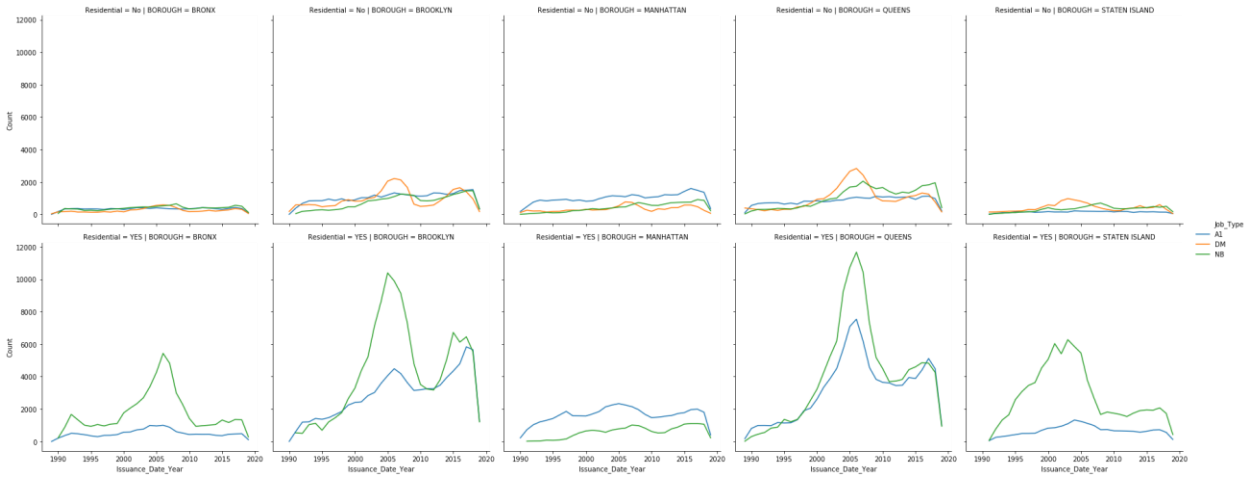

## How did the Recession Affect Commercial/Residential Building Activity?:

As one might have guessed, the recession affected the commercial building activity more than residential buildings. Infact, Resdiential Building construction activity increased at the same time when commercial Building activity declined in 2008.

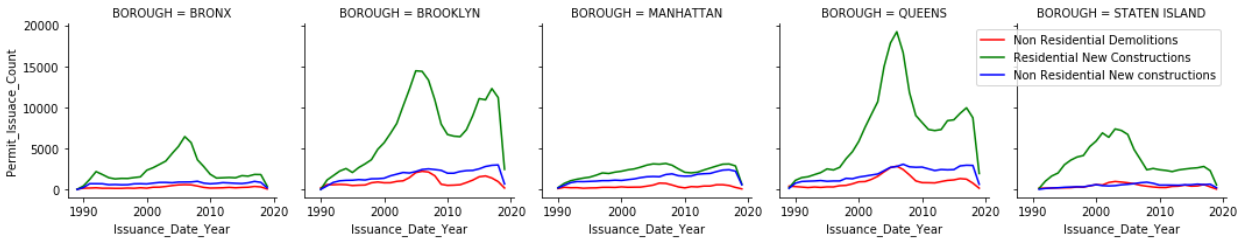



Residential Acitivty across Boroughs: When the recession occurred, the number of permits issued for residential buildings has surpassed the commercial permits in Bronx, Queens, Brooklyn, Staten Island, But for Manhattan, number of permits being issued for commercial buildings is still greater. But these permits include both Demolition and New Building permits, we will dig deeper to see what kind of activity is happening in each of the Boroughs and if the higher permit rate in Manhattan in 2008 is due to demolition permits.

We have to note that there are 4 Major Job Types, NB(New Buildings), A1(Major alteration affecting the occupancy), A2 and A3(Minor Building changes not affecting the occupancy) and DM(Demolitions). The variation of each of these job types across the boroughs over the years is as follows:



Since A1 and NB have same effect of increasing occupancy, we can combine, these two categories




**BRONX**: For Bronx, Residential buildings have increased in 2008 without affecting the existing non residential buildings because, there is enough area available in Bronx that New buildings can be constructed without demolishing existing ones

**BROOKLYN**: For Brooklyn, Commercial buildings have constructions have been consistently increasing, However, when recession occurred, commercial buildings have been demolished and replaced with new Residential Buildings.

**MANHATTAN**: We have earlier seen that nonresidential building permits still exceed residential building permits even after recession. Here we can observe that Residential Permits haven't increased so substantially that commercial buildings have to be demolished. Manhattan still remains the heart of commercial activity and Recession didn't affect Manhattan as much as other boroughs.

**QUEENS:** Recession affected Queens in the same way as Brooklyn. The demolition of commercial buildings is correlated with construction of new residential buildings. However, queens is the quickest to recover from recession and commercial building activity is also on rise in Queens. Queens is the Borough in which there is highest amount of construction activity happening both residential and commercial.

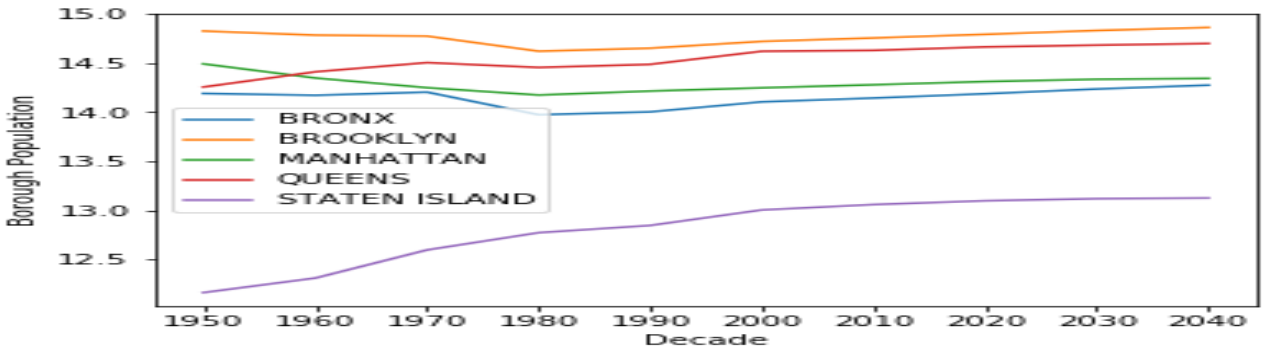
**STATEN ISLAND:** Construction activity of Staten Island is similar to the Bronx. New residential building construction has been on rise with sharp rise during recession. This did not affect the commercial buildings because there is enough area to construct new residential buildings so that Commercial buildings need not be demolished.

**To summarize:**

- Residential building activity is rapidly increasing in Brooklyn, Queens and Staten Island
- Commercial activity increase trend is more in Brooklyn, Queens and Manhattan but not as high as residential building activity.
- Manhattan is an exception that the gap between commercial building activity and residential building activity is not high unlike other Boroughs.

- Recession put a stop the exponentially growing residential building activity particularly in Brooklyn and Queens but the increasing activity resumed in 2013.
- The demolitions of commercial buildings during recession aided the growth of residential new building activity but even the residential building activity growth declined in the immediate years of recession.

Population Data: After looking at the trends of residential and non-residential building activity across boroughs, I thought census data would be good support for my analysis




- Staten Island population increase in not as much high as it was till 2000. This is attributed to the aging population and less people moving into staten island.
- The population trend is correlated with the analysis of residential building activity.
- Based on the building activity trend and population trend, Manhattan population/ Residential buildings are not expected to increase in the near future, but all other boroughs will see an increase in population/ Residential building activity.

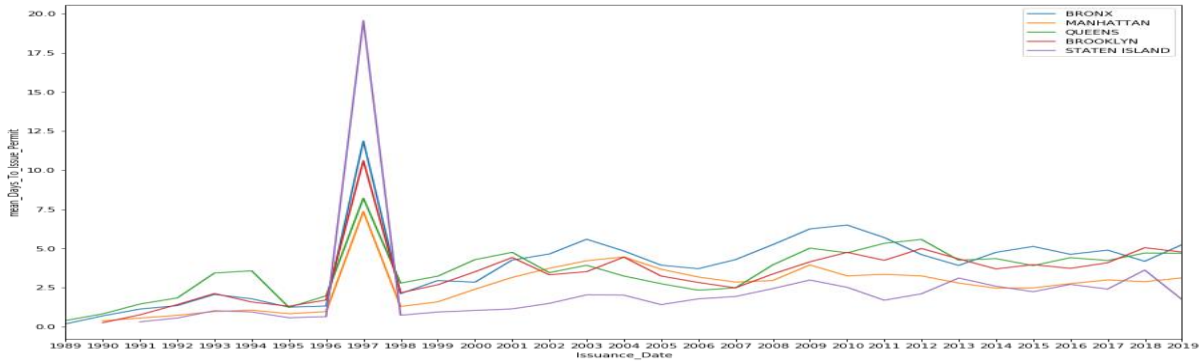
## Conclusion and Insights:

- If you are a builder and looking to build a new residential building Brooklyn or Queens are the boroughs to look for. These are good locations for commercial buildings too, but demand/supply of residential buildings is much higher in these boroughs than commercial ones.
- If you want to build a new Residential building in Manhattan, you have to wait for Recession to hit or companies in Manhattan to do bad, which is unlikely. But Manhattan is a great place along with Brooklyn and Queens to build a Commercial Building.
- Staten Island was once up one a time great place to build residential buildings with soaring incoming population rates, but recently, population growth rate is not as high as it was. Commercial building activity is also historically low in Staten Island, is this the right place to retire in New York? May be or May be not. But what we can say is there is more potential for Residencial/Commercial activity growth in Staten Island.

- The condition of Bronx is similar to Staten Island, Bronx has potential for new Residential/Non Residential Buildings as required by the demand of respective buildings

## What I have tried and failed:

I have tried to see if there is any difference in time taken to issue different types of permits across the boroughs. I have tried a boosting algorithm to identify factors affecting the delay in permit issuance. I could not find any significant factors that contribute to this. Only insights I got from this analysis is that in 1997, There were many permits issued to the buildings for which permits were filed earlier than 1995.




## What more could be done:

We can collect population density, revenue and Land Area, Dwelling units data and can try to estimate the relationship between demand and supply of residential buildings. We can create a formula

**# Demand for residential buildings = (a*Population Density+x)/(b*GDP+y)**
**# Demand for commercial buildings = k/#Demand for residential Buildings**

From this formula we can get insights of demand of residential buildings and commercial buildings. This will help realters and contractors with identifying locations for new constructions.

Thank You! I have enjoyed working on this dataset. I have read medium blogs by Topos and it is pretty exciting to see what Topos is doing. I would love to work at Topos this summer and hopefully you will my work and I get this opportunity.

## References:

Population data has been collected from :
https://www1.nyc.gov/site/planning/data-maps/nyc-population/current-future-populations.page