




# Capstone Project – The Battle of the Neighborhoods (Week 2)

Applied Data Science Capstone by IBM/Coursera

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# Introduction: Business Problem

- In this project we have tried to find an optimal location for a **Café**
- Specifically, this report is targeted towards stakeholders interested in opening a **Café** in a neighborhood in **Brooklyn**, New York City
- Parameters considered:
  1. Population of the neighborhood
  2. Average Household income of the neighborhood
  3. Average asking rent PSF (Ground Floor Retail) in the neighborhood
  4. Most visited venues in the neighborhood (using Foursquare API)



# Introduction: Business Problem (Contd.)

- Major Brooklyn Corridors in consideration:
  1. Greenpoint
  2. Williamsburg
  3. DUMBO-Downtown Brooklyn-Boerum Hill
  4. Brooklyn Heights-Cobble Hill
  5. Prospect Heights
  6. Park Slope
  7. Bay Ridge-Fort Hamilton
- Some of the neighborhoods were combined as one entity as in the geojson file which will be used to plot maps



# Data



- Following data sources were used to extract the required information:
  1. To obtain the population data, <https://www.worldatlas.com/articles/brooklyn-neighborhoods-by-population.html> was referred
  2. Average Household income data of the neighborhoods was taken from the website <https://www.point2homes.com/US/Neighborhood/NY/Brooklyn-Demographics.html>
  3. Average asking rent PSF (Ground Floor Retail) in the neighborhoods was taken from the website [https://www.rebny.com/content/dam/rebny/Documents/PDF/News/Research/Retail%20Reports/2020\\_Winter\\_BrooklynRetailReport.pdf](https://www.rebny.com/content/dam/rebny/Documents/PDF/News/Research/Retail%20Reports/2020_Winter_BrooklynRetailReport.pdf) . This is the **Winter 2020 report** published on date 17th March, 2020 by **REBNY**
  4. The data of most visited venues in the neighborhoods was obtained using **Foursquare API**
- Data was arranged into a separate excel file for each parameter



# Methodology



- The methodology for selection of the optimum location will be as follows:
  1. Neighborhoods with larger population will be targeted. This will be visualized with the help of Choropleth map
  2. Neighborhoods with higher Average Household Income will be given preference. A bar Chart will help to make it easy to pick such neighborhoods
  3. Neighborhoods with comparatively lesser Average Asking Rent PSF will be given priority. A bar chart will make this comparison easier
  4. Neighborhoods where Cafés are visited frequently will be favored. This data will be obtained from Foursquare API
- Results from all the four parameters will be combined to reach to the final solution
- The neighborhood which has favorable conditions according to all the four parameters will be selected as the best location for the Café

# Analysis - Population

Dataframe for population of the neighborhoods

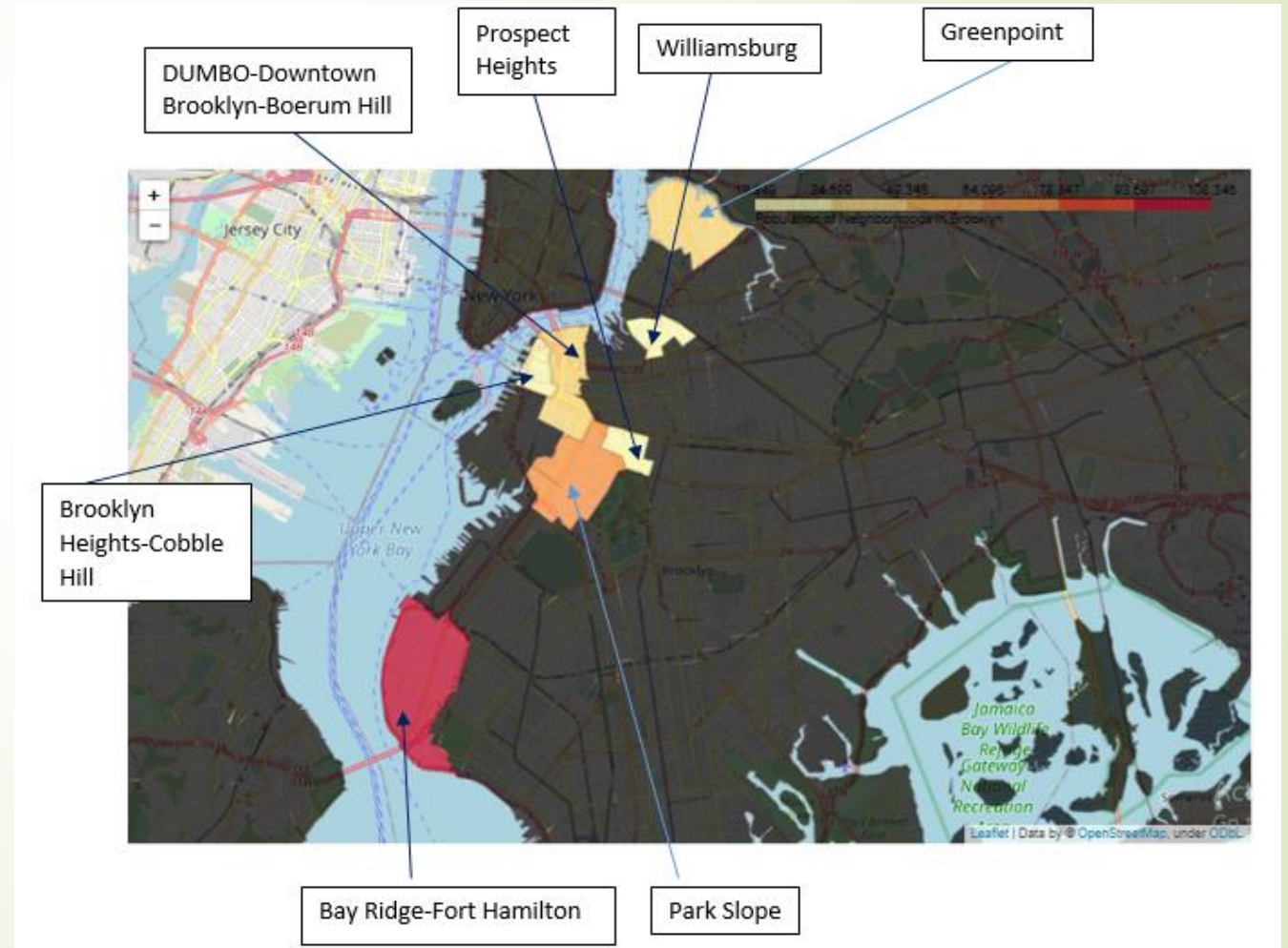
	Neighborhood	Population
0	Greenpoint	34719
1	Williamsburg	32926
2	DUMBO-Downtown Brooklyn-Boerum Hill	35120
3	Brooklyn Heights-Cobble Hill	28101
4	Prospect Heights	19849
5	Park Slope	65047
6	Bay Ridge-Fort Hamilton	108346



# Analysis – Population (Contd.)

## Choropleth Map of Neighborhoods in Brooklyn depicting Concentration of Population

From this map, we can see that the neighborhoods **Bay Ridge-Fort Hamilton, Park Slope, DUMBO-Downtown Brooklyn-Boerum Hill and Greenpoint** have the maximum population





# Analysis – Average Household Income

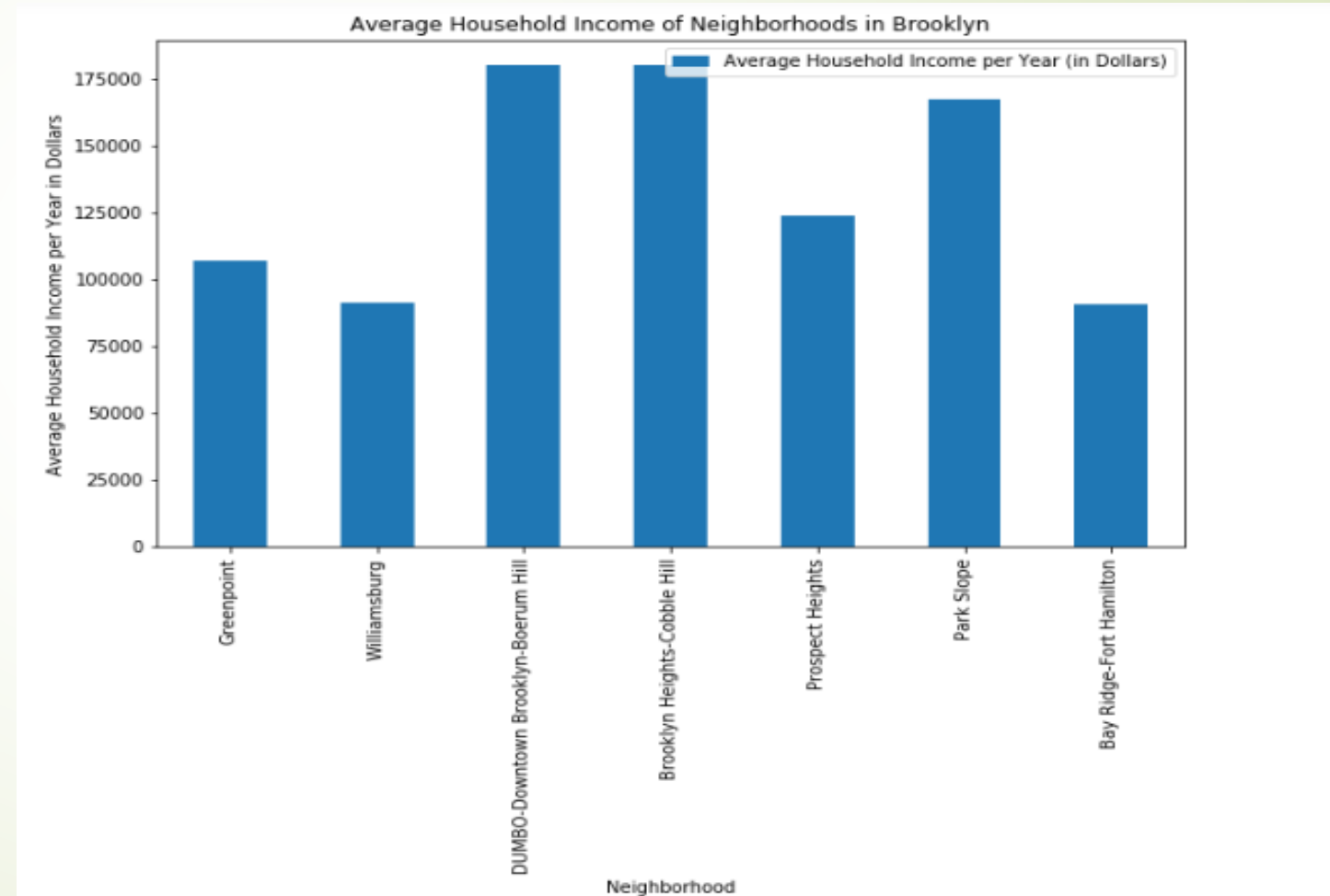
Dataframe for Average Household Income of Neighborhoods

	Neighborhood	Average Household Income per Year (in Dollars)
0	Greenpoint	106860
1	Williamsburg	91311
2	DUMBO-Downtown Brooklyn-Boerum Hill	179785
3	Brooklyn Heights-Cobble Hill	180237
4	Prospect Heights	123950
5	Park Slope	167058
6	Bay Ridge-Fort Hamilton	90551

# Analysis – Average Household Income (Contd.)

Bar Chart for Average Household Income of Neighborhoods

As per the bar chart, we can see that the neighborhoods **DUMBO-Downtown Brooklyn-Boerum Hill, Brooklyn Heights-Cobble Hill, Park Slope and Prospect Heights** have a good Average Household Income



# Analysis – Average Asking Rent PSF

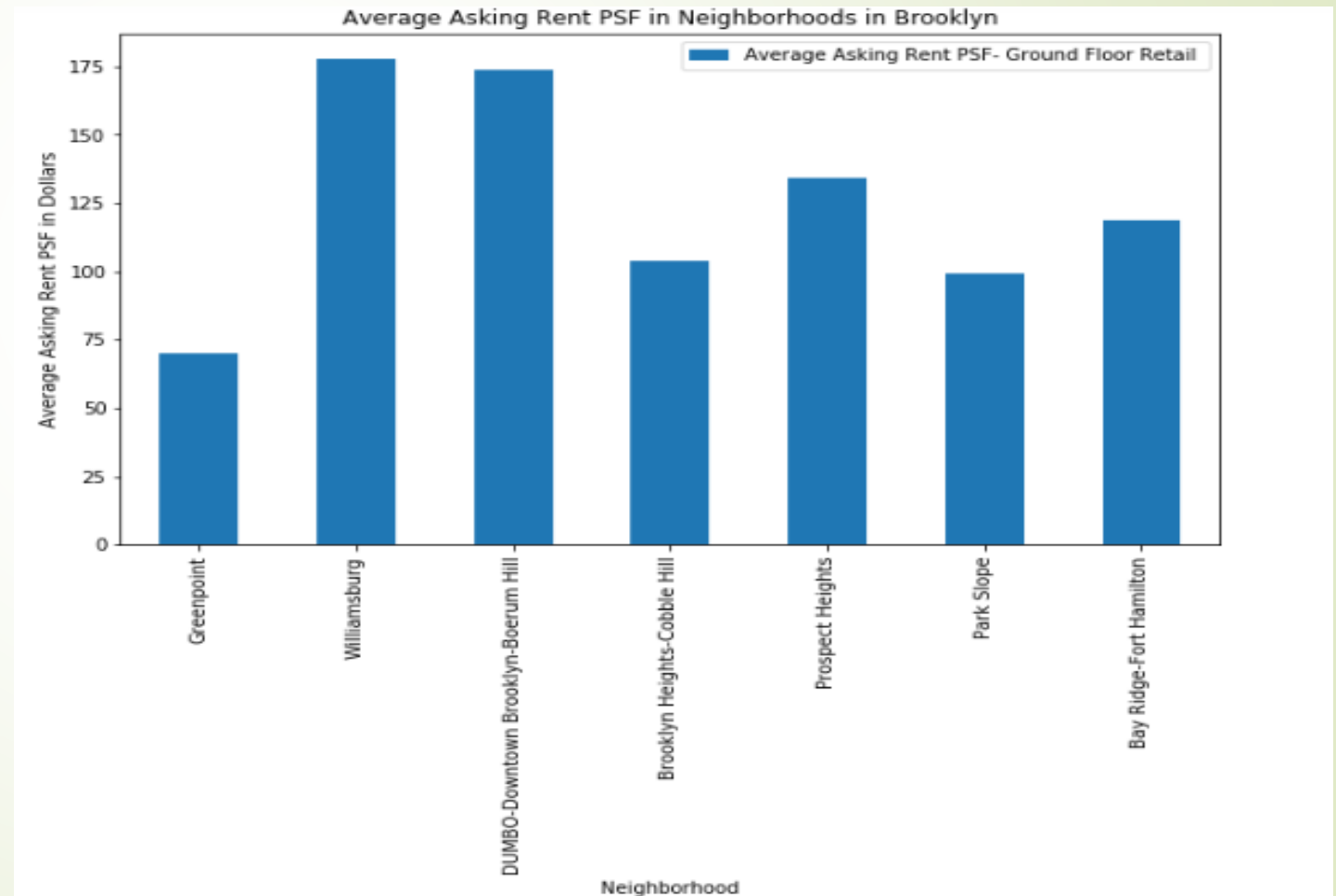
Dataframe for Average Asking Rent PSF for Neighborhoods

	Neighborhood	Average Asking Rent PSF- Ground Floor Retail
0	Greenpoint	70
1	Williamsburg	178
2	DUMBO-Downtown Brooklyn-Boerum Hill	174
3	Brooklyn Heights-Cobble Hill	104
4	Prospect Heights	134
5	Park Slope	99
6	Bay Ridge-Fort Hamilton	119

# Analysis – Average Asking Rent PSF (Contd.)

Bar Chart for Average Asking Rent PSF for Neighborhoods

As per the bar chart, we can see that the neighborhoods **Greenpoint**, **Park Slope**, **Brooklyn Heights-Cobble Hill** and **Bay Ridge-Fort Hamilton** have a low Average Asking Rent PSF



# Most Visited Venues using Foursquare API

- The neighborhoods were clustered in 4 clusters to identify neighborhoods where Cafés are among the most visited venues
- A radius of 500 metres and a limit of 50 was set while making the API call

**Dataframe for Geographical Coordinates of the Neighborhoods**

	Neighborhood	Latitude	Longitude
0	Greenpoint	40.730201	-73.954241
1	Williamsburg	40.707144	-73.958115
2	DUMBO	40.703176	-73.988753
3	Downtown Brooklyn	40.690844	-73.983463
4	Boerum Hill	40.685683	-73.983748
5	Brooklyn Heights	40.695864	-73.993782
6	Cobble Hill	40.687920	-73.998561
7	Prospect Heights	40.676822	-73.964859
8	Park Slope	40.672321	-73.977050
9	Bay Ridge	40.625801	-74.030621
10	Fort Hamilton	40.614768	-74.031979

# Most Visited Venues using Foursquare API (Contd.)

## 10 Most Visited Venues in each Neighborhood

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Bay Ridge	Spa	Italian Restaurant	Pizza Place	American Restaurant	Hookah Bar	Greek Restaurant	Grocery Store	Bagel Shop	Ice Cream Shop	Bar
1	Boerum Hill	Bar	Coffee Shop	Furniture / Home Store	French Restaurant	Cosmetics Shop	Sandwich Place	Spa	Yoga Studio	Gift Shop	Indian Restaurant
2	Brooklyn Heights	Yoga Studio	Park	Ice Cream Shop	Italian Restaurant	Deli / Bodega	Coffee Shop	Gym	Scenic Lookout	Bar	Bakery
3	Cobble Hill	Cocktail Bar	Yoga Studio	Italian Restaurant	Bookstore	Middle Eastern Restaurant	Restaurant	Bar	Thai Restaurant	Flower Shop	Ice Cream Shop
4	DUMBO	Park	Coffee Shop	Bakery	Yoga Studio	American Restaurant	Gym	Art Gallery	Boxing Gym	Café	Scenic Lookout
5	Downtown Brooklyn	Coffee Shop	Sandwich Place	Burger Joint	Grocery Store	Performing Arts Venue	Diner	Burrito Place	Roof Deck	Café	Plaza
6	Fort Hamilton	Chinese Restaurant	Bank	Sandwich Place	Pizza Place	Steakhouse	Pub	Deli / Bodega	Cocktail Bar	Gym / Fitness Center	Japanese Restaurant
7	Greenpoint	Bar	Coffee Shop	Cocktail Bar	Pizza Place	Yoga Studio	Café	Mexican Restaurant	Gastropub	Liquor Store	Beer Store
8	Park Slope	Coffee Shop	Bagel Shop	Pizza Place	Italian Restaurant	Mexican Restaurant	Bakery	Burger Joint	Spa	Furniture / Home Store	Yoga Studio
9	Prospect Heights	Bar	Cocktail Bar	Thai Restaurant	Mexican Restaurant	Beer Bar	Coffee Shop	Bakery	New American Restaurant	Ice Cream Shop	Wine Shop
10	Williamsburg	Bar	Coffee Shop	Bagel Shop	Pizza Place	Yoga Studio	Steakhouse	Japanese Restaurant	Clothing Store	Breakfast Spot	Korean Restaurant



# Most Visited Venues using Foursquare API (Contd.) - Clusters

## ➡ Cluster 1:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
2	DUMBO	Park	Coffee Shop	Bakery	Yoga Studio	American Restaurant	Gym	Art Gallery	Boxing Gym	Café	Scenic Lookout
5	Brooklyn Heights	Yoga Studio	Park	Ice Cream Shop	Italian Restaurant	Deli / Bodega	Coffee Shop	Gym	Scenic Lookout	Bar	Bakery

# Most Visited Venues using Foursquare API (Contd.) - Clusters

## ➡ Cluster 2:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
3	Downtown Brooklyn	Coffee Shop	Sandwich Place	Burger Joint	Grocery Store	Performing Arts Venue	Diner	Burrito Place	Roof Deck	Café	Plaza
4	Boerum Hill	Bar	Coffee Shop	Furniture / Home Store	French Restaurant	Cosmetics Shop	Sandwich Place	Spa	Yoga Studio	Gift Shop	Indian Restaurant
10	Fort Hamilton	Chinese Restaurant	Bank	Sandwich Place	Pizza Place	Steakhouse	Pub	Deli / Bodega	Cocktail Bar	Gym / Fitness Center	Japanese Restaurant

# Most Visited Venues using Foursquare API (Contd.) - Clusters

## ➡ Cluster 3:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Greenpoint	Bar	Coffee Shop	Cocktail Bar	Pizza Place	Yoga Studio	Café	Mexican Restaurant	Gastropub	Liquor Store	Beer Store
6	Cobble Hill	Cocktail Bar	Yoga Studio	Italian Restaurant	Bookstore	Middle Eastern Restaurant	Restaurant	Bar	Thai Restaurant	Flower Shop	Ice Cream Shop
7	Prospect Heights	Bar	Cocktail Bar	Thai Restaurant	Mexican Restaurant	Beer Bar	Coffee Shop	Bakery	New American Restaurant	Ice Cream Shop	Wine Shop

# Most Visited Venues using Foursquare API (Contd.) - Clusters

## Cluster 4:

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
1	Williamsburg	Bar	Coffee Shop	Bagel Shop	Pizza Place	Yoga Studio	Steakhouse	Japanese Restaurant	Clothing Store	Breakfast Spot	Korean Restaurant
8	Park Slope	Coffee Shop	Bagel Shop	Pizza Place	Italian Restaurant	Mexican Restaurant	Bakery	Burger Joint	Spa	Furniture / Home Store	Yoga Studio
9	Bay Ridge	Spa	Italian Restaurant	Pizza Place	American Restaurant	Hookah Bar	Greek Restaurant	Grocery Store	Bagel Shop	Ice Cream Shop	Bar

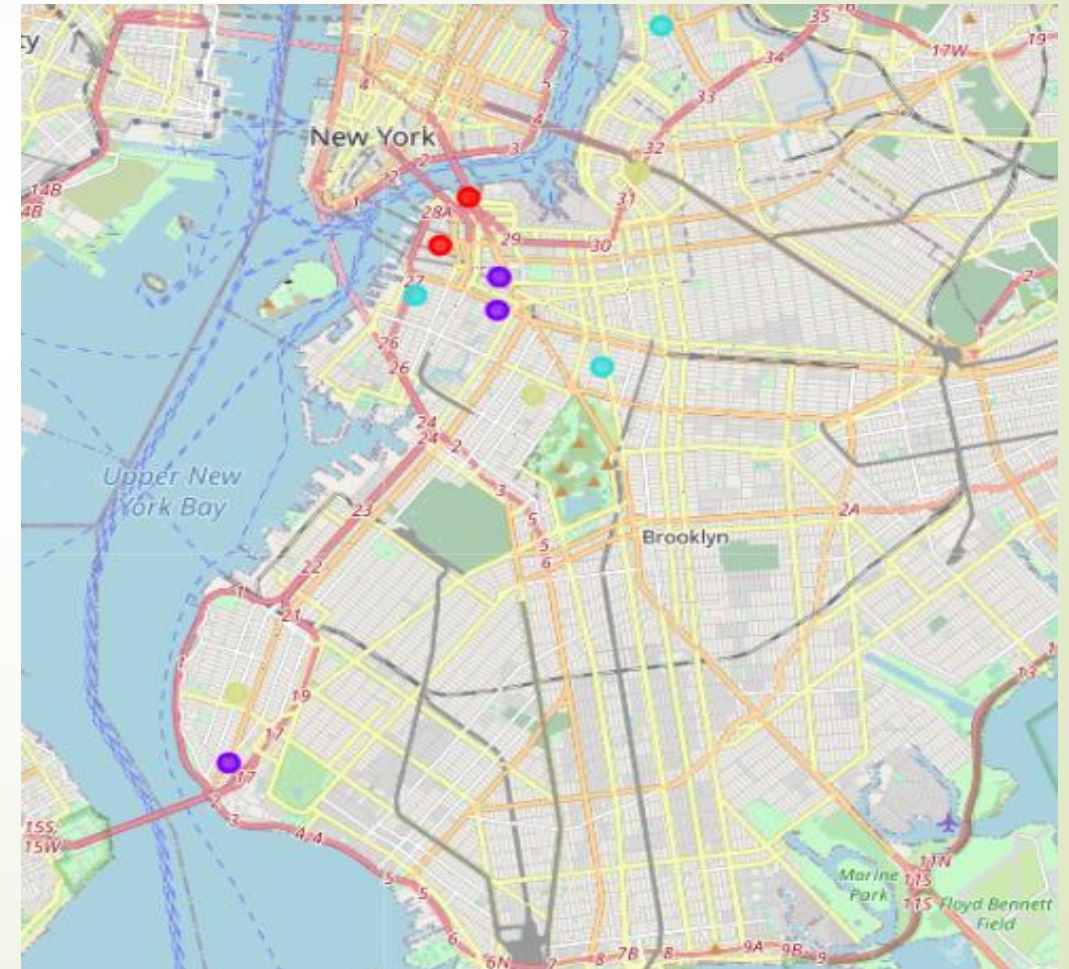
- From the above data it can be seen that Coffee Shops and food joints are among the most visited venues in almost every cluster



# Most Visited Venues using Foursquare API (Contd.) - Clusters

It can be seen that coffee shops are among top 2 most visited venues in the neighborhoods **DUMBO**, **Downtown Brooklyn**, **Boerum Hill**, **Greenpoint**, **Williamsburg** and **Park Slope**

Map showing the Clusters (Red: Cluster 1, Purple: Cluster 2, Blue: Cluster 3, Yellow: Cluster 4)



# Results and Discussion

- From the above analysis, we have obtained the following results:
  1. The neighborhoods **Bay Ridge-Fort Hamilton, Park Slope, DUMBO-Downtown Brooklyn-Boerum Hill and Greenpoint** have the **maximum population**. This will ensure a good frequency of customer visits
  2. The neighborhoods **DUMBO-Downtown Brooklyn-Boerum Hill, Brooklyn Heights-Cobble Hill, Park Slope and Prospect Heights** have a **good Average Household Income**. So, the pricing of products will not have too much of restrictions
  3. The neighborhoods **Greenpoint, Park Slope, Brooklyn Heights-Cobble Hill and Bay Ridge-Fort Hamilton** have a **low Average Asking Rent PSF**. Hence, shop rent, which is a major part of expenses, will be lower
  4. Coffee Shops and food joints are among the most visited venues in almost every cluster. Also, **coffee shops are among top 2 most visited venues** in the neighborhoods **DUMBO, Downtown Brooklyn, Boerum Hill, Greenpoint, Williamsburg and Park Slope**. So there are good chances for the Café to be popular
- The neighborhood which satisfies all the above requirements will be chosen as the optimum location for the new Café





# Conclusion

- From the above discussion, we can see that Park Slope fits in all the parameters. Therefore, the **best location** for opening a new Café as per the above analysis would be **Park Slope**. Also, Park Slope is close to DUMBO-Downtown Brooklyn-Boerum Hill where coffee shops and food joints are among the most visited venues
- If Shop Rent is not an issue, the **second best location** for the Café would be **DUMBO-Downtown Brooklyn-Boerum Hill**
- Also, it has to be kept in mind that these results are based on the 4 parameters as listed earlier. More parameters can be considered according to individual's preferences and local requirements, and more filtered results can be obtained which may vary from the result obtained above



**Thank You!**