Capstone Project - The Battle of Neighborhoods

Selecting the best location for a new bookstore in New York City

Introduction

A bookstore is a place where different kinds of textbooks or reference books are sold

There are many bookstores in the city of New York. Serious considerations are required to open a new bookstore than it seems

The aim of this project is to assist investor who wants to open a new bookstore in new york

Business problem

A client hired us to help him determine what is the best place for a new bookstore in new york city. We define potential neighborhood based on the number of bookstores which are operating right in each neighborhood. Brooklyn has full potential but also is a very challenging district to open a business because of high competition. New bookstore should be open in an area that inadequate neighborhood in this way the Restaurant can attract more customers/readers. Therefore, this analysis necessary to ensure that we have enough customers and that we are not so close to other bookstores.

Data Selection

To identify the characteristics of our competitors' venues in Brooklyn, we would first need to find out the number of bookstores in Brooklyn currently and their location.

We then find their geographic coordinates of new york city to create a folium map

Using Foursquare API to explore the bookstores operating in Brooklyn area

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Bay Ridge	40.625801	-74.030621	The Bookmark Shoppe	40.624577	-74.030562	Bookstore
1	Bay Ridge	40.625801	-74.030621	Book Mark Shop	40.623848	-74.031059	Bookstore
2	Bensonhurst	40.611009	-73.995180	Excalibur Comics	40.611408	-73.991451	Bookstore
3	Sunset Park	40.645103	-74.010316	Koch Comics Warehouse	40.653740	-74.011697	Bookstore
4	Sunset Park	40.645103	-74.010316	JC Christian Bookstore	40.640991	-74.014412	Bookstore

Methodology

Addresses are stored and visualized using their equivalent latitude and longitude values.

Foursquare API is used to explore neighborhoods in Brooklyn, New York. After that, explore

function to get bookstores categories in each neighborhood.

	Neighborhood	Bike Shop	Bookstore	Coffee Shop	Comic Shop	Cosmetics Shop	Furniture / Home Store	Gift Shop	Library	Miscellaneous Shop	Newsstand	Restaurant	Toy / Game Store	Used Bookstore	Video Store
0	Bay Ridge	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1	Bay Ridge	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2	Bensonhurst	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3	Sunset Park	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4	Sunset Park	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Bookstores in New York

Then using this feature to group the neighborhoods into clusters K-means clustering algorithm will be use to complete this task. And also, the Folium library to visualize the neighborhoods in Brooklyn and its emerging clusters.

	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	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
1	Bedford Stuyvesant	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
2	Bensonhurst	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
3	Boerum Hill	Bookstore	Gift Shop	Newsstand	Cosmetics Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Miscellaneous Shop	Library
4	Borough Park	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store

Results

Using K-mean to clustering data area with less number of bookstores

```
[ ] Brooklyn_merged.loc[Brooklyn_merged['Cluster Labels'] == 0, Brooklyn_merged.columns[[1] + list(range(5, Brooklyn_merged.shape[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
21	Red Hook	Bookstore	Bike Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop

```
[ ] Brooklyn_merged.loc[Brooklyn_merged['Cluster Labels'] == 2, Brooklyn_merged.columns[[1] + list(range(5, Brooklyn_merged.shape[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
37	Marine Park	Used Bookstore	Video Store	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store	Cosmetics Shop

```
Brooklyn_merged.loc[Brooklyn_merged['Cluster Labels'] == 1, Brooklyn_merged.columns[[1] + list(range(5, Brooklyn_merged.shape[1]))]]
```
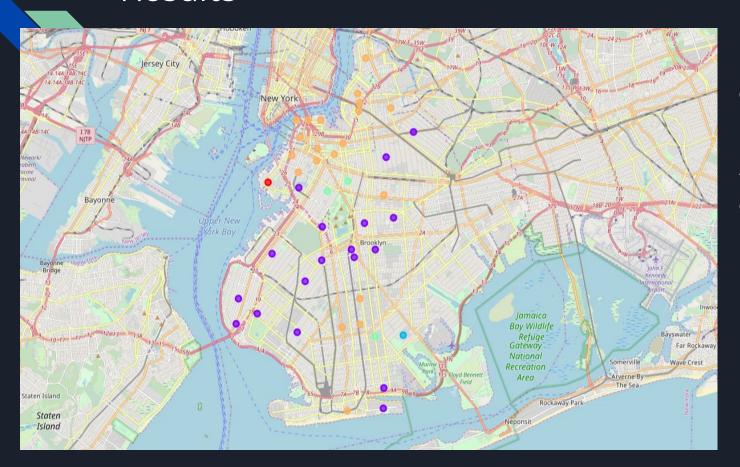
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Bay Ridge	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
1	Bensonhurst	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
2	Sunset Park	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
6	Sheepshead Bay	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
11	Kensington	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
12	Windsor Terrace	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
16	Bushwick	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
17	Bedford Stuyvesant	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
22	Gowanus	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
31	Manhattan Beach	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
34	Borough Park	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
35	Dyker Heights	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
42	Prospect Lefferts Gardens	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
47	Prospect Park South	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
53	Fort Hamilton	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
54	Ditmas Park	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
55	Wingate	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
69	Erasmus	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store

```
Brooklyn_merged.loc[Brooklyn_merged['Cluster Labels'] == 3, Brooklyn_merged.columns[[1] + list(range(5, Brooklyn_merged.shape[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
13	Prospect Heights	Bookstore	Used Bookstore	Coffee Shop	Video Store	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop
24	Park Slope	Bookstore	Used Bookstore	Gift Shop	Video Store	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Furniture / Home Store
68	Madison	Bookstore	Used Bookstore	Video Store	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store

		Venue	Venue	Venue	Venue	Venue	Venue	Venue	Venue	Venue	Venue
3	Greenpoint	Bookstore	Restaurant	Video Store	Used Bookstore	Toy / Game Store	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
5	Brighton Beach	Bookstore	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store
7	Manhattan Terrace	Bookstore	Miscellaneous Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Library	Gift Shop	Furniture / Home Store
9	Crown Heights	Bookstore	Coffee Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop
15	Williamsburg	Bookstore	Furniture / Home Store	Comic Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library
18	Brooklyn Heights	Bookstore	Newsstand	Gift Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Miscellaneous Shop	Library	Furniture / Home Store
19	Cobble Hill	Bookstore	Gift Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Furniture / Home Store
20	Carroll Gardens	Bookstore	Gift Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Furniture / Home Store
23	Fort Greene	Bookstore	Cosmetics Shop	Coffee Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library
38	Clinton Hill	Bookstore	Coffee Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop
40	Downtown	Bookstore	Newsstand	Gift Shop	Cosmetics Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Miscellaneous Shop	Library
41	Boerum Hill	Bookstore	Gift Shop	Newsstand	Cosmetics Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Miscellaneous Shop	Library
46	Midwood	Bookstore	Miscellaneous Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Library	Gift Shop	Furniture / Home Store
49	East Williamsburg	Bookstore	Library	Furniture / Home Store	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Gift Shop
50	North Side	Bookstore	Toy / Game Store	Furniture / Home Store	Comic Shop	Video Store	Used Bookstore	Restaurant	Newsstand	Miscellaneous Shop	Library
51	South Side	Bookstore	Toy / Game Store	Furniture / Home Store	Comic Shop	Video Store	Used Bookstore	Restaurant	Newsstand	Miscellaneous Shop	Library
52	Ocean Parkway	Bookstore	Miscellaneous Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Library	Gift Shop	Furniture / Home Store
61	Fulton Ferry	Bookstore	Comic Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Newsstand	Miscellaneous Shop	Library	Gift Shop
62	Vinegar Hill	Bookstore	Newsstand	Coffee Shop	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Miscellaneous Shop	Library	Gift Shop
65	Dumbo	Bookstore	Newsstand	Video Store	Used Bookstore	Toy / Game Store	Restaurant	Miscellaneous Shop	Library	Gift Shop	Furniture / Home Store

Results

Based on analysis done, Cluster 1 (Red Hook) and Cluster 3 Marine Park areas are the best places to open a new bookstore business.

Discussion

This analysis is performed on limited data

Marine Park is one of the good locations to open an bookstores that focus on new textbook than used books.

Prospect Heights, Park Slope and Madison are also good places to be considered to open the new bookstore.

further and more detailed study on full dataset of New York is needed to have more accurate and in depth analysis will be required to have a final decision that might include budget and location mortgage prices.