

# Capstone Project - The Battle of Neighborhoods

## Neighborhoods in Manhattan for a Hotel Chain

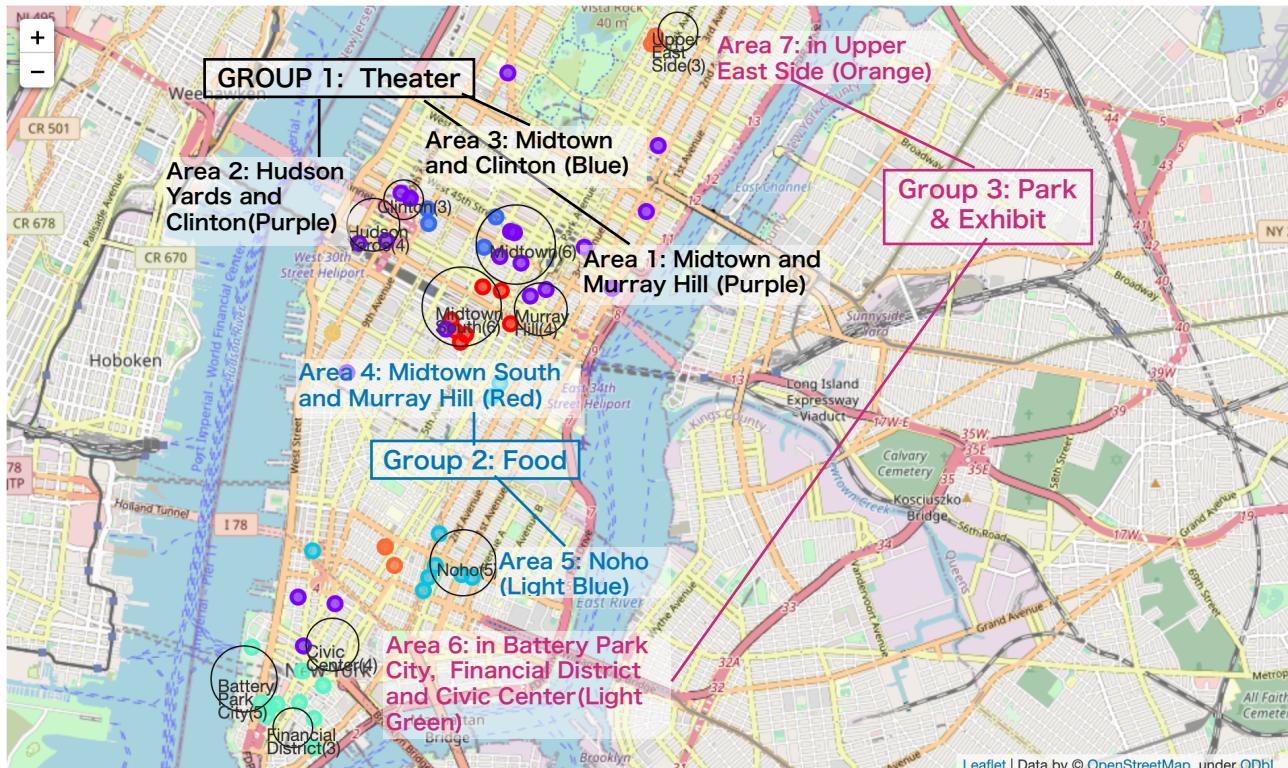
### Introduction

A hotel chain is looking to open a hotel in Manhattan and want to know which area they should open it and what kind of business concept should be implemented in each cluster.

### Executive Summary

As the result of K-mean clustering, 7 major areas where we can find many hotels were identified with categorized into 3 groups: near 1)Theater, 2)Food places and 3) Parks. Group 1(Theater)

Plot of Clusters of Hotels in Manhattan and Identified 7 Areas



Group	Area	Cluster	Most common venues	Expected Customer
1. Theater	1: Midtown and Murray Hill	1 (Purple)	Theater, clothing store and coffee shop	Enjoys theater and shopping
	2: Hudson Yards and Clinton	1 (Purple)	Theater, Gym / Fitness Center and coffee shop	Enjoys theater and prefers quieter place (places for locals)
	3: in Midtown and Clinton	2 (Blue)	Theater and Bakery	Enjoys theater and love casual place for light meals
2. Food	4: Midtown South and Murray Hill	0 (Red)	Korean restaurant and other ethnic restaurant	Korean and ethnic food lovers
	5: Noho	3 (Light Blue)	Mexican and Italian restaurant	Mexican and Italian food lovers
3. Park and exhibit	6: Battery Park City, Financial District and Civic Center	4 (Light Green)	Park and coffee shop	Loves park and casual place for light meals.
	7: Upper East Side	7 (Orange)	Exhibit, Italian and coffee shop	Loves arts and coffee.

## Data

Firstly, prepared a list of hotels in Manhattan with geolocation data by using the NY City neighborhoods data that contains boroughs and the neighborhoods that exist in each borough as well as the the latitude and longitude coordinates of each neighborhood, and Foursquare local data.

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
23 Chinatown	40.715618	-73.994279	Hotel 50 Bowery	40.715936	-73.996789	Hotel
466 Upper East Side	40.775639	-73.960508	The Mark Hotel	40.775274	-73.963383	Hotel
469 Upper East Side	40.775639	-73.960508	The Carlyle	40.774413	-73.963301	Hotel
488 Upper East Side	40.775639	-73.960508	The Surrey	40.774415	-73.963889	Hotel
866 Upper West Side	40.787658	-73.977059	The Lucerne Hotel	40.783427	-73.978495	Hotel

Neighborhood	No Hotels
12 Midtown	6
13 Midtown South	6
0 Battery Park City	5
15 Noho	5
14 Murray Hill	4
4 Civic Center	4
9 Hudson Yards	4
21 Upper East Side	3
5 Clinton	3
6 Financial District	3
20 Turtle Bay	2
18 Tribeca	2
17 Sutton Place	2
16 Soho	2
11 Little Italy	2
7 Gramercy	2
2 Chelsea	2
1 Carnegie Hill	1
10 Lincoln Square	1
8 Greenwich Village	1
19 Tudor City	1
3 Chinatown	1
22 Upper West Side	1

Then, obtained a list of venues located within 500m radius of each hotel by using Foursquare local data.

Finally, created a dataframe that contains top 10 most common venues near the each hotel for k-means clustering.

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category	
0	Hotel 50 Bowery	40.715936	-73.996789	Zu Yuan Spa	40.715469	-73.998627	Spa
1	Hotel 50 Bowery	40.715936	-73.996789	Hotel 50 Bowery	40.715936	-73.996789	Hotel
2	Hotel 50 Bowery	40.715936	-73.996789	The Original Chinatown Ice Cream Factory	40.715521	-73.998145	Ice Cream Shop
3	Hotel 50 Bowery	40.715936	-73.996789	Xi'an Famous Foods	40.715232	-73.997263	Chinese Restaurant
4	Hotel 50 Bowery	40.715936	-73.996789	Alimama	40.715854	-73.999139	Dessert Shop

## Methodology

### 1. Popular areas for a hotel location

Fist plotted neighborhoods locations on a map with number hotels in order to identify the popular areas for hotel location.

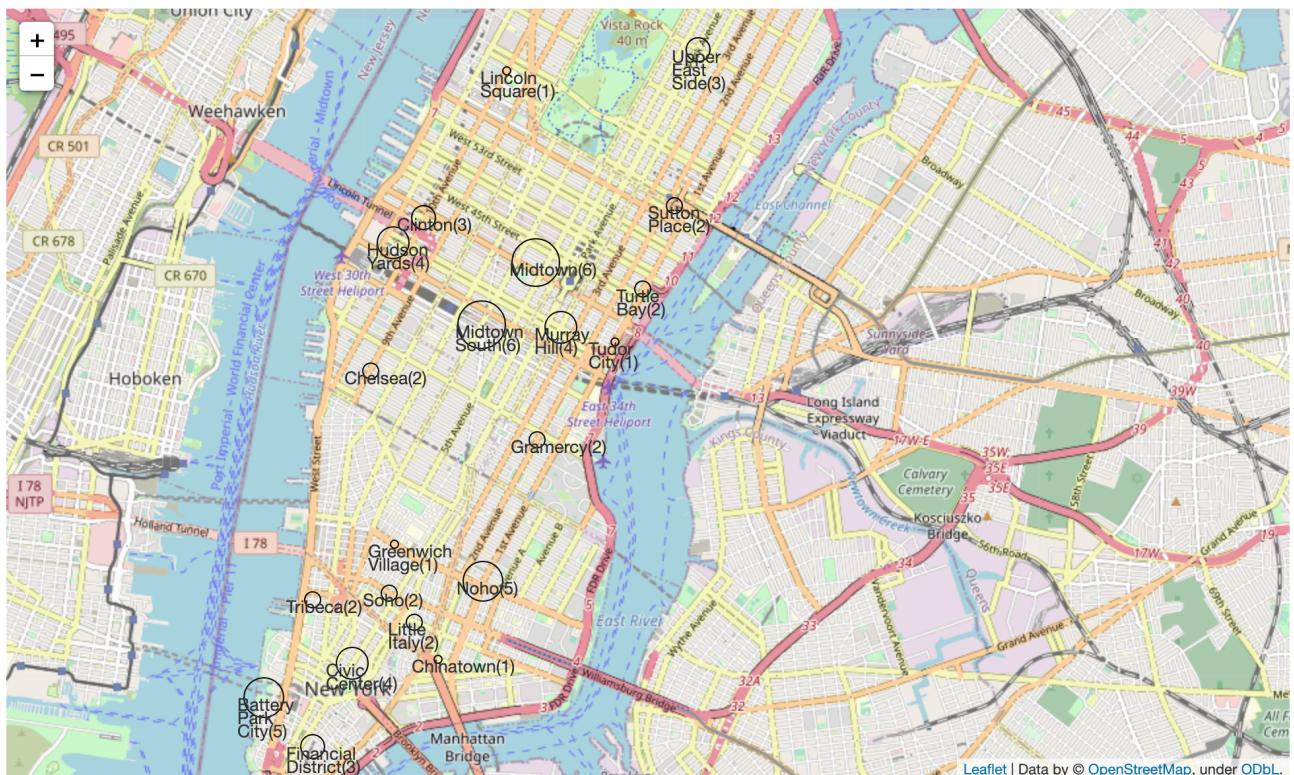
### 2. Neighborhoods analysis of each hotel in the popular areas

Then performed K-means clustering in order to analyze the most common venue categories found near each hotel. Then examined cluster and determine the discriminating venue categories that distinguish each cluster.

## Results

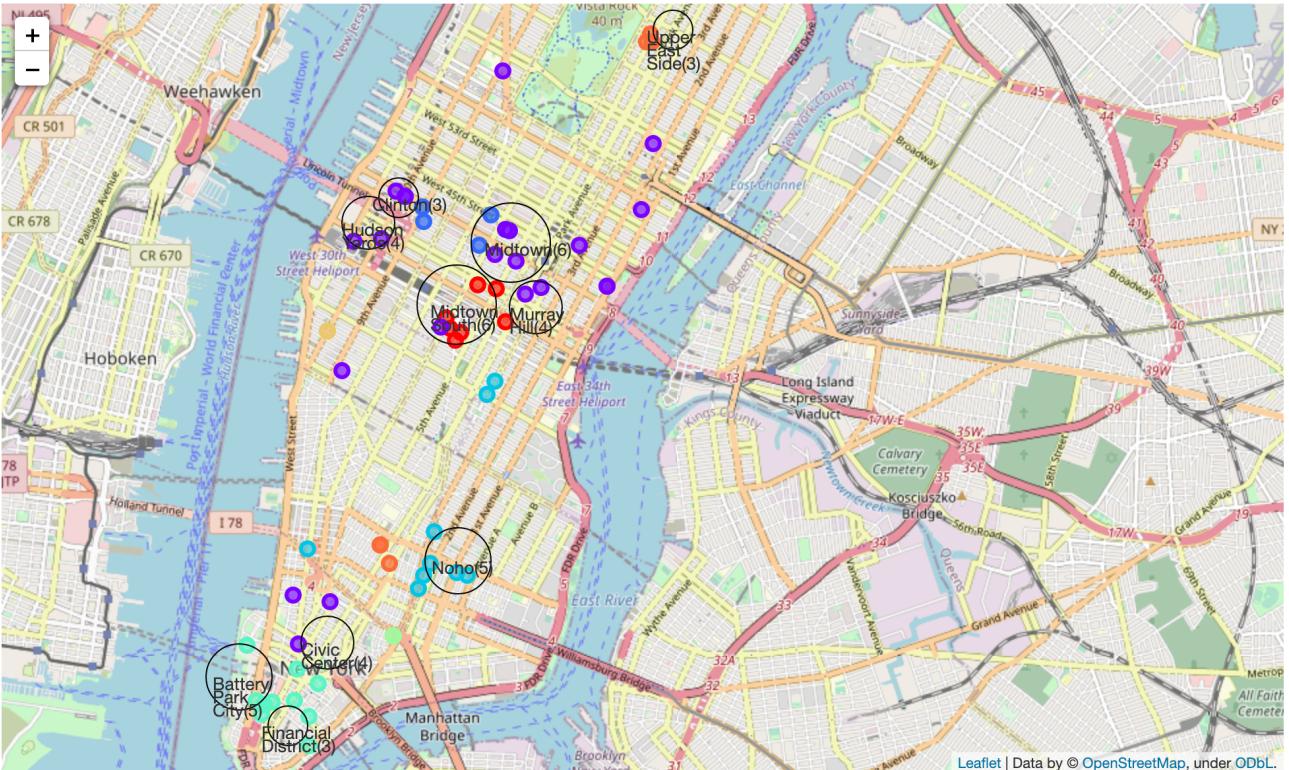
### 1. Neighborhoods analysis for hotel location

As a result, we can see I identified top 10 locations:



### 2. K-mean Clustering

By conducting k-mean clustering of each hotel, 6 areas categorized 3 groups were identified:



## Group 1: Theater area

Area 1: Cluster 1 in Midtown and Murray Hill (Purple)

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
Midtown	Theater	Clothing Store	Bakery	Steakhouse	Sushi Restaurant	Plaza	Sporting Goods Shop	Bookstore	American Restaurant	Coffee Shop
Midtown	Bakery	Coffee Shop	Clothing Store	Sporting Goods Shop	Mediterranean Restaurant	Grocery Store	Steakhouse	Bookstore	Sushi Restaurant	Café
Midtown	Theater	Clothing Store	Bakery	Sporting Goods Shop	Bookstore	Steakhouse	American Restaurant	Plaza	Coffee Shop	Sushi Restaurant
Midtown	Bakery	Clothing Store	Sandwich Place	Café	Theater	American Restaurant	Gym / Fitness Center	Coffee Shop	Steakhouse	Mediterranean Restaurant
Murray Hill	Coffee Shop	Japanese Restaurant	Bakery	American Restaurant	Sandwich Place	Gym	Gourmet Shop	Burger Joint	Café	Sushi Restaurant
Murray Hill	Bakery	Gym / Fitness Center	Sandwich Place	Coffee Shop	Japanese Restaurant	Spa	Restaurant	Gourmet Shop	Bar	American Restaurant

Area 2: Cluster 1 in Hudson Yards and Clinton (Purple)

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
Hudson Yards	Theater	Gym / Fitness Center	American Restaurant	Coffee Shop	Wine Shop	Sandwich Place	Cocktail Bar	Italian Restaurant	French Restaurant	Spa
Hudson Yards	Park	Art Gallery	American Restaurant	Coffee Shop	Theater	Cocktail Bar	Grocery Store	Lounge	Gym / Fitness Center	Café
Hudson Yards	Italian Restaurant	Gym / Fitness Center	Gym	American Restaurant	Thai Restaurant	Furniture / Home Store	Coffee Shop	Burger Joint	Art Gallery	Park
Hudson Yards	Theater	Gym / Fitness Center	Coffee Shop	American Restaurant	Gym	Italian Restaurant	Spa	Sandwich Place	Ethiopian Restaurant	Dive Bar
Clinton	Theater	Gym / Fitness Center	American Restaurant	Coffee Shop	Wine Shop	Sandwich Place	Cocktail Bar	Italian Restaurant	French Restaurant	Spa

Area 3: Cluster 2 in Midtown and Clinton (Blue)

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
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Midtown	Theater	Cosmetics Shop	Bookstore	Cuban Restaurant	Italian Restaurant	Sushi Restaurant	Plaza	Steakhouse	Bakery	Toy / Game Store
Midtown	Theater	Bakery	Steakhouse	Coffee Shop	Cuban Restaurant	Mediterranean Restaurant	Salad Place	Plaza	Cosmetics Shop	Toy / Game Store
Clinton	Theater	Italian Restaurant	Burger Joint	American Restaurant	Gym / Fitness Center	Bakery	Sandwich Place	Coffee Shop	Thai Restaurant	Park
Clinton	Theater	Dance Studio	Coffee Shop	Gym / Fitness Center	Italian Restaurant	Indie Theater	Bakery	Burger Joint	Thai Restaurant	Pizza Place

## Group 2: Food area

Area 4: Cluster 0 in Midtown South and Murray Hill (Red)

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
Midtown South	Korean Restaurant	Café	Dessert Shop	Spa	Gym / Fitness Center	New American Restaurant	Cosmetics Shop	Coffee Shop	Bakery	Japanese Restaurant
Midtown South	Korean Restaurant	Café	Coffee Shop	Hotel Bar	Dessert Shop	New American Restaurant	Lounge	Spa	Gym / Fitness Center	Italian Restaurant
Midtown South	Korean Restaurant	Coffee Shop	Gym / Fitness Center	Hotel Bar	Café	Japanese Restaurant	Dessert Shop	Italian Restaurant	Bar	Bakery
Midtown South	Korean Restaurant	Coffee Shop	Italian Restaurant	Café	Japanese Restaurant	New American Restaurant	Sandwich Place	Gym / Fitness Center	Hotel Bar	American Restaurant
Midtown South	Korean Restaurant	Bakery	Japanese Restaurant	Coffee Shop	Cosmetics Shop	Mediterranean Restaurant	Fried Chicken Joint	Café	Sandwich Place	Bookstore
Murray Hill	Korean Restaurant	Bakery	Coffee Shop	American Restaurant	Gym / Fitness Center	Japanese Restaurant	Steakhouse	Vegetarian / Vegan Restaurant	Fried Chicken Joint	Cuban Restaurant
Murray Hill	Korean Restaurant	Café	Spa	Bar	Gym / Fitness Center	Italian Restaurant	Japanese Restaurant	Bakery	Salad Place	Pizza Place

Area 5: Cluster 3 in Noho (Light Blue)

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
Noho	Mexican Restaurant	Italian Restaurant	Coffee Shop	French Restaurant	Sandwich Place	Wine Shop	Bookstore	Café	Bakery	Vietnamese Restaurant
Noho	Mexican Restaurant	Sandwich Place	Italian Restaurant	French Restaurant	Coffee Shop	Bakery	Ice Cream Shop	Pizza Place	Cocktail Bar	Yoga Studio
Noho	Italian Restaurant	Bookstore	Coffee Shop	Cocktail Bar	Japanese Restaurant	French Restaurant	Cosmetics Shop	Wine Shop	Sandwich Place	Bakery
Noho	Italian Restaurant	Bar	American Restaurant	Coffee Shop	Yoga Studio	Sushi Restaurant	Art Gallery	Japanese Restaurant	Pizza Place	Mexican Restaurant
Noho	Café	Cocktail Bar	Coffee Shop	Italian Restaurant	Pizza Place	Ice Cream Shop	Mediterranean Restaurant	Cosmetics Shop	Rock Club	Jewelry Store

## Group 3: Park and exhibit area

Area 6: Cluster 4 in Battery Park City, Financial District and Civic Center(Light Green)

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
Battery Park City	Park	Coffee Shop	Playground	Burger Joint	Deli / Bodega	Memorial Site	Gym	Food Court	Sandwich Place	Steakhouse
Battery Park City	Park	Coffee Shop	Memorial Site	Gym	Pizza Place	Gourmet Shop	Plaza	Gym / Fitness Center	Café	Shopping Mall
Battery Park City	Coffee Shop	Park	Pizza Place	Memorial Site	Gourmet Shop	Sandwich Place	Ice Cream Shop	Bar	Falafel Restaurant	Plaza
Battery Park City	Coffee Shop	Pizza Place	Memorial Site	Gym / Fitness Center	Clothing Store	Sandwich Place	Gourmet Shop	Shopping Mall	Park	Monument / Landmark
Battery Park City	Park	Coffee Shop	Pizza Place	Memorial Site	Mexican Restaurant	Clothing Store	Steakhouse	Gym	Gourmet Shop	Café
Civic Center	Coffee Shop	Sandwich Place	Café	Gym	Memorial Site	American Restaurant	Shopping Mall	Gym / Fitness Center	Falafel Restaurant	Pizza Place
Civic Center	Sandwich Place	Coffee Shop	Gym	Wine Shop	Pizza Place	Falafel Restaurant	Deli / Bodega	Plaza	Italian Restaurant	Indian Restaurant

Financial District	Coffee Shop	Pizza Place	Memorial Site	Park	Sandwich Place	Jewelry Store	Clothing Store	Café	Gym / Fitness Center	Wine Shop
Financial District	Coffee Shop	American Restaurant	Pizza Place	Falafel Restaurant	Steakhouse	Sandwich Place	Juice Bar	Café	Jewelry Store	Park
Financial District	Coffee Shop	Cocktail Bar	American Restaurant	Salad Place	Gym	Bar	Falafel Restaurant	Mexican Restaurant	Gym / Fitness Center	Steakhouse

Area 7: Cluster 7 in Upper East Side (Orange)

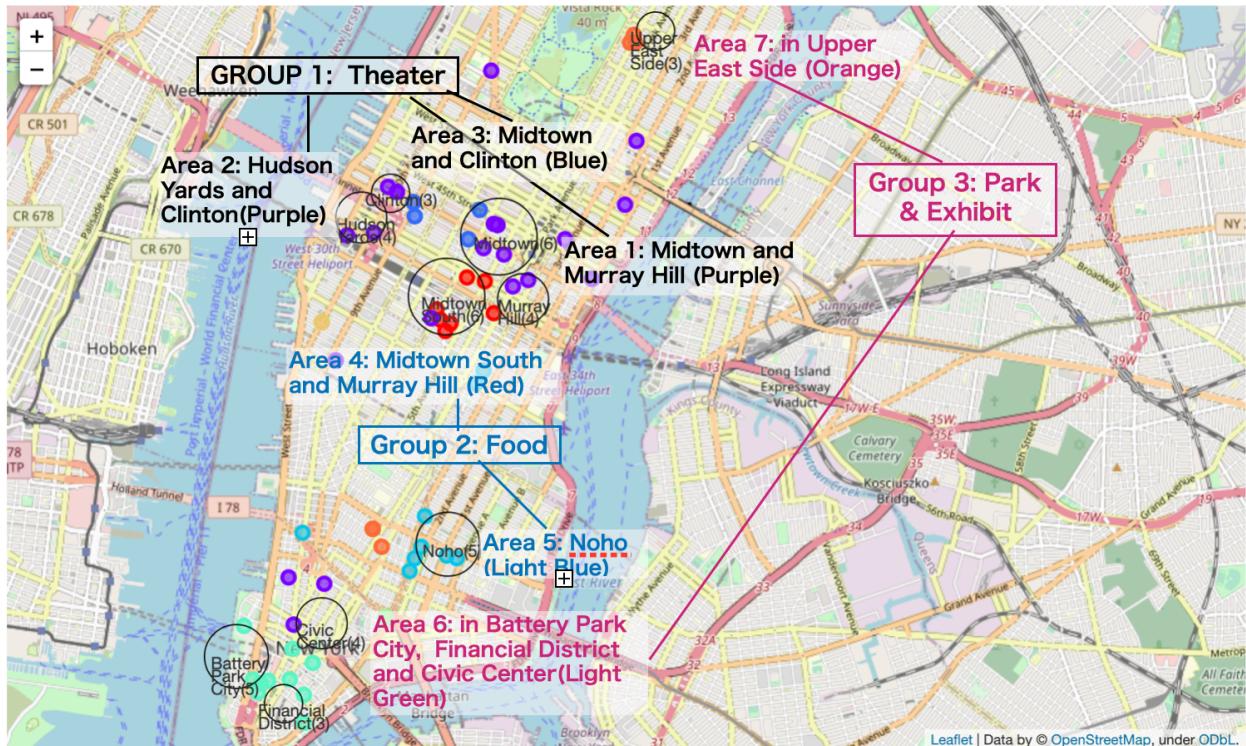
Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
Upper East Side	Exhibit	Coffee Shop	Cosmetics Shop	Outdoor Sculpture	American Restaurant	Italian Restaurant	Art Museum	Bakery	Park	Café
Upper East Side	Italian Restaurant	Coffee Shop	Cosmetics Shop	Boutique	Outdoor Sculpture	Exhibit	Park	French Restaurant	Café	Clothing Store
Upper East Side	Italian Restaurant	Coffee Shop	Exhibit	Art Museum	Cosmetics Shop	Outdoor Sculpture	Boutique	Clothing Store	Park	French Restaurant

## Discussion

By conducting k-mean clustering of each hotel, 6 most popular areas for hotel location categorized into 3 groups were identified. Based on more detailed analysis of most common venues, expected customers for targeting segmentation were identified as below:

Group	Area	Cluster	Most common venues	Expected Customer
1. Theater	1: Midtown and Murray Hill	1 (Purple)	Theater, clothing store and coffee shop	Enjoys theater and shopping
	2: Hudson Yards and Clinton	1 (Purple)	Theater, Gym / Fitness Center and coffee shop	Enjoys theater and prefers quieter place (places for locals)
2.Food	3: in Midtown and Clinton	2 (Blue)	Theater and Bakery	Enjoys theater and love casual place for light meals
	4: Midtown South and Murray Hill	0 (Red)	Korean restaurant and other ethnic restaurant	Korean and ethnic food lovers
3. Park and exhibit	5: Noho	3 (Light Blue)	Mexican and Italian restaurant	Mexican and Italian food lovers
	6: Battery Park City, Financial District and Civic Center	4 (Light Green)	Park and coffee shop	Loves park and casual place for light meals.
	7: Upper East Side	7 (Orange)	Exhibit, Italian and coffee shop	Loves arts and coffee.

**Plot of Clusters of Hotels in Manhattan and Identified 7 Areas**



## Conclusion

I recommend a hotel chain to consider a strategy to enter the areas identified based on the further analysis of competitors' concept and strategy.

If the hotel chain have a strong brand for nigh life lovers, Area 1 will be their first choice since the area seems to be located in the very busy area near theater. If they have more relaxed and artistic brand, Area 7 might be the best choice since the area seems to be far from busy area but have art and exhibit places near by.