

Problem Description

The customer of the battle of neighborhoods was not satisfied with the first results. He claimed that that the similarity in the quantity of venues is meaningless because he care about the quality of the venues. He said that he went to the theoretically similar neighborhoods and they truly have somewhat close similar quantities of venues around them, but one turned to be out more like a ghetto and the other is more modern and nicer place. Thus, the client rejected our previous work and asked for a new way to solve this problem.

Needed Data

This project will require information about the neighborhood of Manhattan and the likes of the customers for each venue and the number of likes. This information is available freely from Venue's likes. The neighborhood will be clustered based on the likes that is given to each venue. This will emphasize the quality of the venue to be considered when clustering the neighborhoods. The screenshot below show the main data that are going to be used mainly the count of likes for each venue.

This endpoint supports **userless** or **user** authentication.

Supported	Description
Userless	required unless OAuth token is provided. A valid Client ID and Secret in the query string of each request. Eg. <code>&client_id=XXXX&client_secret=XXXX</code>
User	required unless Client ID and Secret are provided. A valid OAuth access token in the query string of each request. Eg. <code>&oauth_token=XXXX</code>

For more information about these authentication methods and how to obtain an access token, see the [Authentication](#) docs.

Parameters

Name	Type	Description
VENUE_ID	XXX123YYYY	required The ID of the venue to get likes for.

Response Fields

Field	Description
likes	A <code>count</code> and <code>groups</code> of users who like this venue. Groups generally include <code>friends</code> and <code>others</code> (indicating the relationship to the acting user), but are subject to change.

The venue id will be fetched using Foursquare API for Venue explore as shown in the screen shot

Venue Recommendations

Description

Returns a list of recommended venues near the current location. For more robust information about the venues themselves (photos/tips/etc.), please see our [venue details](#) endpoint.

User authenticated calls will personalize the ranking based on you and your friends.

Request

```
GET https://api.foursquare.com/v2/venues/explore
```

Authentication

This endpoint supports **userless** or **user** authentication.

Supported	Description
Userless	required unless OAuth token is provided. A valid Client ID and Secret in the query string of each request. Eg. <code>&client_id=XXXX&client_secret=XXXX</code>
User	required unless Client ID and Secret are provided. A valid OAuth access token in the query string of each request. Eg. <code>&oauth_token=XXXX</code>

For more information about these authentication methods and how to obtain an access token, see the [Authentication](#) docs.

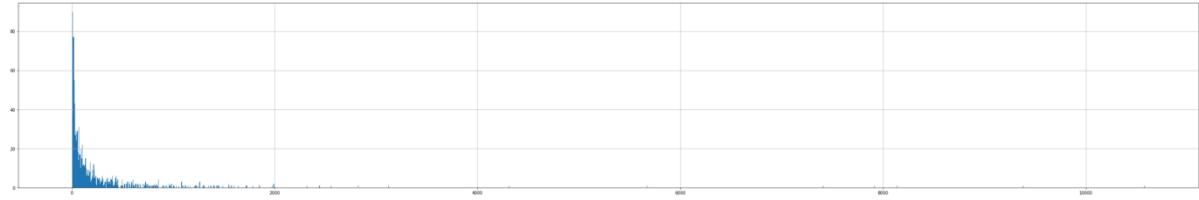
Parameters

Name	Example	Description
<code>ll</code>	40.74224,-73.99386	required unless <code>near</code> is provided. Latitude and longitude of the user's location.
<code>near</code>	Chicago, IL	required unless <code>ll</code> is provided. A string naming a place in the world. If the <code>near</code> string is not geocodable, returns a <code>failed_geocode</code> error. Otherwise, searches within the bounds of the geocode and adds a geocode object to the response.
<code>llAcc</code>	10000.0	Accuracy of latitude and longitude, in meters.
<code>alt</code>	0	Altitude of the user's location, in meters.

Methodology

In order to emphasize the quality of the venue some rules has to be made to distinguish the venues from each other. After fetching the surrounding venue for each neighborhood the number of likes for each venues are fetched.

The distribution of likes are examined using histogram as shown in the plot:

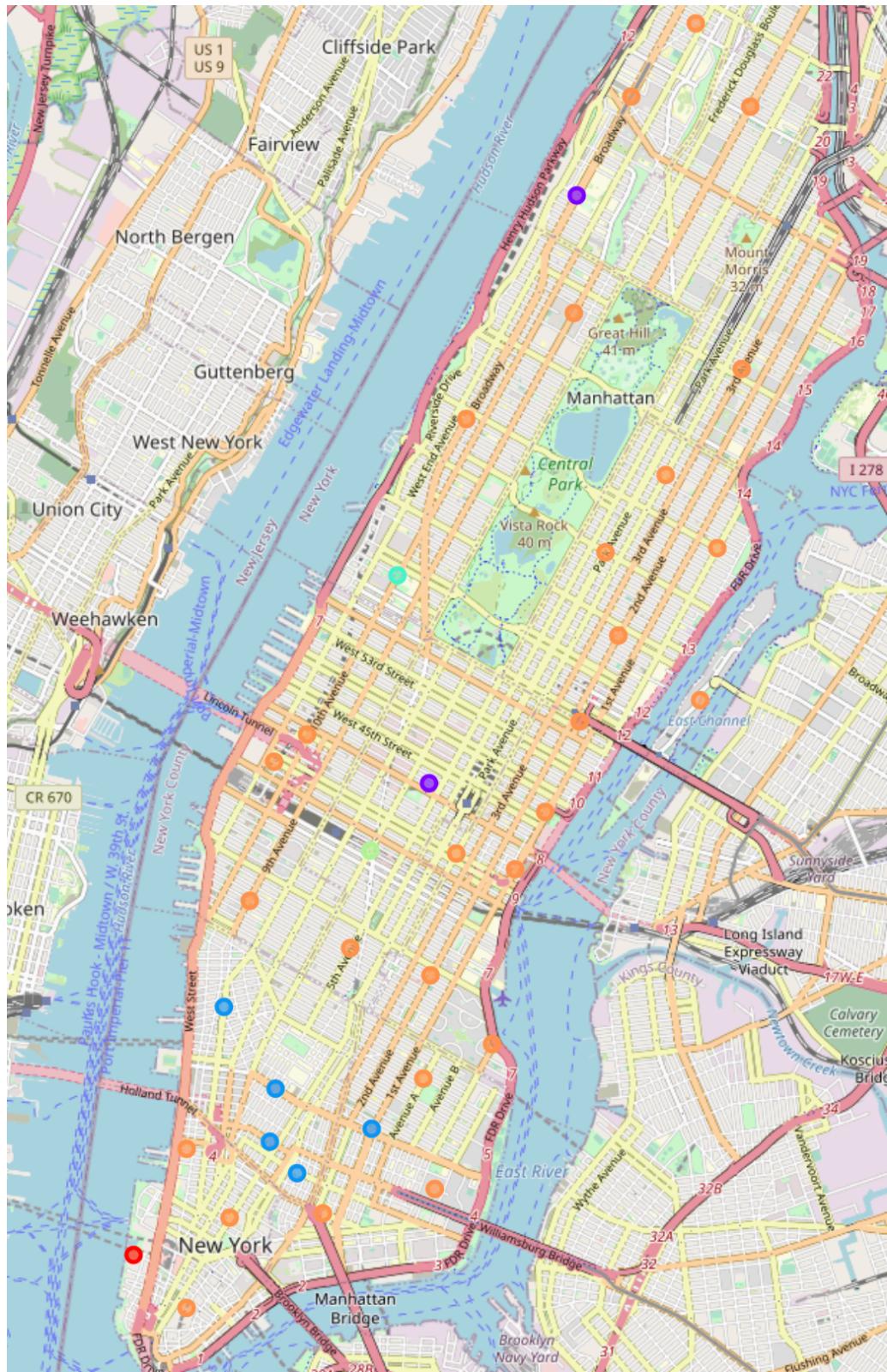


The plot support our assumption that Foursquare explore is returning so many venues that have no likes. The plot shows that most of the venus have zero likes. To fix the complaint of our customer we apply the following rule:

1. If the venue has less than 25 or equal to likes then this venue is equivelant to one venue
2. If the venue has more than 25 like less than or equal to 50 then this venue is equivelant to two venue of same category
3. If the venue has more than 50 like less than or equalt to 100 then this venue is equivelant to three venue of same category
4. If the venue has more than 100 likes less than or equalt to 200 then this venue is equivelant to five venue of same category
5. If the venue has more than 200 likes less than or equalt to 300 then this venue is equivelant to 7 venue of same category
6. If the venue has more than 300 likes less than or equalt to 500 then this venue is equivelant to ten venue of same category

Results

After applying the rule above we got new results , hopefully, more convincing for our client. The clustering took into account the number of likes for each venues and emphasized the similarity based on quality in addition to the quantity.



The screen shoot show that the clustering is different than the one that we have submitted first time. And further explanation will be analyzed in the next section .

Discussion

The results seems to reflect the quality of venue (evaluated by the number of likes) by dividing the neighborhoods into five clusters. The ordinary common ones are neighborhoods with variety of common venues (cafes, restaurants, pizzas, pub, bars ...etc). It is hard to conclude very specific character for these neighborhoods. But this time we gave the customer better list to choose the location as the top venues are sorted based on the quality also.

The number of clusters are increased to make more sense of the data.

The Battle of Nighborhoods V1 lack interpretation of the results and advice for customer on how to act on the basis of these results thus in V3 we add the following analysis :

- For ordinary customers who would like to have regular neighborhoods with sufficient varieties of restaurants and activities we recommend the following neighborhoods

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Marble Hill	Donut Shop	Sandwich Place	Gym	Seafood Restaurant	Coffee Shop
1	Chinatown	Chinese Restaurant	Sandwich Place	New American Restaurant	American Restaurant	Greek Restaurant
2	Washington Heights	Café	Tapas Restaurant	Caribbean Restaurant	Italian Restaurant	Park
3	Inwood	Park	Mexican Restaurant	Wine Bar	Restaurant	Café
4	Hamilton Heights	Cocktail Bar	Coffee Shop	Italian Restaurant	Wine Bar	Café
5	Manhattanville	BBQ Joint	Ramen Restaurant	Italian Restaurant	Supermarket	Coffee Shop
6	Central Harlem	Music Venue	African Restaurant	American Restaurant	French Restaurant	Park
7	East Harlem	Mexican Restaurant	Steakhouse	Cuban Restaurant	Bakery	French Restaurant
8	Upper East Side	Seafood Restaurant	Bakery	Italian Restaurant	Hotel Bar	Hotel
9	Yorkville	Park	Italian Restaurant	Pub	Monument / Landmark	Sandwich Place
10	Lenox Hill	Thai Restaurant	Burger Joint	Gym	Salad Place	Health Food Store
11	Roosevelt Island	Park	Outdoors & Recreation	Coffee Shop	Waterfront	Japanese Restaurant
12	Upper West Side	American Restaurant	Seafood Restaurant	Café	Southern / Soul Food Restaurant	Food & Drink Shop
14	Clinton	Theater	Peruvian Restaurant	Hotel	Gym / Fitness Center	Sandwich Place
16	Murray Hill	Burger Joint	Museum	Pub	Sandwich Place	Coffee Shop
17	Chelsea	American Restaurant	Speakeasy	Italian Restaurant	Coffee Shop	Fish Market
19	East Village	Bar	Vietnamese Restaurant	Caribbean Restaurant	Park	Speakeasy
20	Lower East Side	Cocktail Bar	Bakery	Filipino Restaurant	Coffee Shop	Italian Restaurant
21	Tribeca	American Restaurant	Park	Indian Restaurant	Italian Restaurant	Greek Restaurant
25	Manhattan Valley	Grocery Store	Latin American Restaurant	Thai Restaurant	Vietnamese Restaurant	Coffee Shop
27	Gramercy	Italian Restaurant	Bar	Bagel Shop	Pizza Place	Cocktail Bar
29	Financial District	Coffee Shop	Seafood Restaurant	Steakhouse	Gym	Event Space
30	Carnegie Hill	Community Center	Pizza Place	Ramen Restaurant	Wine Bar	Bar
32	Civic Center	Park	French Restaurant	Cocktail Bar	Spa	Bakery
34	Sutton Place	Beer Garden	Grocery Store	Italian Restaurant	Bakery	Furniture / Home Store
35	Turtle Bay	American Restaurant	Seafood Restaurant	Turkish Restaurant	Karaoke Bar	Wine Bar
36	Tudor City	Burger Joint	Mexican Restaurant	Hawaiian Restaurant	Park	Pizza Place
37	Stuyvesant Town	Bar	Cocktail Bar	Coffee Shop	Park	Boat or Ferry
38	Flatiron	New American Restaurant	Salad Place	Donut Shop	Gourmet Shop	Sandwich Place
39	Hudson Yards	Camera Store	Public Art	Italian Restaurant	American Restaurant	Park

Comparing V3 with V1 in appendix we see that the recommended venues have been changed mostly in all the neighborhoods. For example Marble Hill most common quality venue become donut shop whereas it was sandwich place considering the quantity alone. However, in China Town the Chinese restaurant stay the most common venue in both cases which is reasonable outcome.

- For those who care the most about the atmosphere of the neighborhood with beautiful sceneries ,memorial sites and park there are not much options. Battery Park City is the best fit. The most quality venues has changed from gym, coffe shop , hotel and blaza to the venues the people appreciate the most in this neighborhood .

```
In [96]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 0, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	
28	Battery Park City	Memorial Site	Food Court	Park	Scenic Lookout	Movie Theater

```
Out[96]:
```

```
In [97]: print (cluster)
```

- Our customer care the most about parks, books and coffee shops? Midtown and Morningsight Height are the best candidates for such customers

```
In [98]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 1, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	
15	Midtown	Coffee Shop	Grocery Store	Park	Bookstore	Hotel
26	Morningside Heights	Coffee Shop	Park	American Restaurant	Burger Joint	Bookstore

```
Out[98]:
```

```
In [99]: manhattan_merged.loc[manhattan_merged['Cluster Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_merged.shape[1]))]]
```

- The Mediterranean touches are visible strongly in particular neighborhoods where every neighborhood of these has Italy/Italian as its best venue

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	
18	Greenwich Village	Italian Restaurant	Sushi Restaurant	French Restaurant	Bagel Shop	Café
22	Little Italy	Sandwich Place	Pizza Place	Coffee Shop	Bakery	Ice Cream Shop
23	Soho	Italian Restaurant	Bakery	Mediterranean Restaurant	Mexican Restaurant	Pizza Place
24	West Village	Cocktail Bar	American Restaurant	Italian Restaurant	Bakery	Wine Bar
31	Noho	Italian Restaurant	Grocery Store	Southern / Soul Food Restaurant	Rock Club	Sandwich Place

- The hippies, indies artists and designers have their fit neighborhoods as well. For those people we recommend Lincoln Square

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	
13	Lincoln Square	Theater	Concert Hall	Performing Arts Venue	Indie Movie Theater	Movie Theater

Conclusion

An updated version of the battle of the neighborhoods was made to consider the quality of the venues in clustering the neighborhoods in addition to the quantity. The results show really promising and sound logic. The logic can be updated further based on our customers input. The rules that made the foundation for this analysis can be tailored in addition to the methodology.

Note: This study is conducted after failing to get the data for the other project idea to cluster neighborhood based on genders and ages preferences. The reason was that accessing this data from stats require to be the owner of the venue thus the idea was altered to this project.

Appendix A Results of V1

Now, you can examine each cluster and determine the discriminating venue categories that distinguish each cluster. Based on the defining categories, you can then assign a name to each cluster. I will leave this exercise to you.

Cluster 1

manhattan_merged.loc[manhattan_merged['Cluster_Labels'] == 0, manhattan_merged.columns[[1] + list(range(5, manhattan_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		
1 Chinatown	Chinese Restaurant	Bakery	Dessert Shop	Bubble Tea Shop	Ice Cream Shop	Spa	Bar	Cocktail Bar	Hotspot Restaurant	Optical Shop		
19 East Village	Bar	Cocktail Bar	Pizza Place	Mexican Restaurant	Coffee Shop	Korean Restaurant	Wine Bar	Dessert Shop	Ice Cream Shop	Filipino Restaurant		
25 Manhattan Valley	Coffee Shop	Bar	Mexican Restaurant	Yoga Studio	Pizza Place	Bubble Tea Shop	Café	Peruvian Restaurant	Park	Arts & Crafts Store		
27 Gramercy	Bar	Coffee Shop	Italian Restaurant	Bagel Shop	Playground	Mexican Restaurant	Cocktail Bar	American Restaurant	Ice Cream Shop	Pizza Place		
33 Midtown South	Korean Restaurant	Hotel	Dessert Shop	Japanese Restaurant	Café	Burger Joint	Gym / Fitness Center	Cocktail Bar	Coffee Shop	Scenic Lookout		

Cluster 2

manhattan_merged.loc[manhattan_merged['Cluster_Labels'] == 1, manhattan_merged.columns[[1] + list(range(5, manhattan_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		
14 Clinton	Theater	Gym / Fitness Center	Italian Restaurant	Wine Shop	Gym	American Restaurant	Coffee Shop	Sandwich Place	Cocktail Bar	Tailor Shop	Hotel	
15 Midtown	Coffee Shop	Hotel	Theater	Bakery	Clothing Store	Sandwich Place	Pizza Place	Cuban Restaurant	Juice Bar	Mediterranean Restaurant		
16 Murray Hill	Sandwich Place	Coffee Shop	Japanese Restaurant	Hotel	American Restaurant	Gym / Fitness Center	Pizza Place	Gourmet Shop	Burger Joint	Food Court	Shopping Mall	
28 Battery Park City	Park	Hotel	Coffee Shop	Gym	Memorial Site	Plaza	Hotel	Juice Bar	Steakhouse	Event Space		
29 Financial District	Coffee Shop	American Restaurant	Bar	Pizza Place	Italian Restaurant	Cocktail Bar	Yoga Studio	Spa	American Restaurant	Café		
32 Civic Center	Coffee Shop	Gym / Fitness Center	French Restaurant	Park	Hotel	Cocktail Bar	Park	Gym	Bar	Dog Run	Café	
39 Hudson Yards	Hotel	Gym / Fitness Center	American Restaurant	Italian Restaurant	Coffee Shop	Park						

Cluster 3

manhattan_merged.loc[manhattan_merged['Cluster_Labels'] == 2, manhattan_merged.columns[[1] + list(range(5, manhattan_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 Marble Hill	Sandwich Place	Coffee Shop	Gym	Yoga Studio	Diner	Miscellaneous Shop	Pizza Place	Steakhouse	Supplement Shop	Seafood Restaurant		
2 Washington Heights	Café	Bakery	Mobile Phone Shop	Coffee Shop	New American Restaurant	Tapas Restaurant	Latin American Restaurant	Park	Italian Restaurant	Supermarket		
3 Inwood	Mexican Restaurant	Café	Restaurant	Lounge	Chinese Restaurant	Park	Frozen Yogurt Shop	Pizza Place	Spanish Restaurant	Bakery		
4 Hamilton Heights	Pizza Place	Coffee Shop	Café	Deli / Bodega	Mexican Restaurant	Yoga Studio	Sushi Restaurant	Bakery	Caribbean Restaurant	Chinese Restaurant		
5 Manhattanville	Coffee Shop	Deli / Bodega	Mexican Restaurant	Italian Restaurant	Seafood Restaurant	Indian Restaurant	Café	Liquor Store	Lounge	Sushi Restaurant		
6 Central Harlem	African Restaurant	Chinese Restaurant	Gym / Fitness Center	American Restaurant	Fried Chicken Joint	Bar	French Restaurant	Seafood Restaurant	Bookstore	Boutique		
7 East Harlem	Mexican Restaurant	Thai Restaurant	Bakery	Spa	Latin American Restaurant	Deli / Bodega	Sandwich Place	Taco Place	Cocktail Bar	Café		
11 Roosevelt Island	Park	Farmers Market	Dog Run	Outdoors & Recreation	Supermarket	Coffee Shop	Sandwich Place	Food & Drink Shop	Greek Restaurant	Gym		
20 Lower East Side	Café	Coffee Shop	Chinese Restaurant	Cocktail Bar	Bakery	Park	Ramen Restaurant	Art Gallery	Sandwich Place	French Restaurant		
26 Morningside Heights	Bookstore	American Restaurant	Park	Coffee Shop	Deli / Bodega	Burger Joint	Sandwich Place	Indian Restaurant	New American Restaurant	Supermarket		
35 Turtle Bay	Italian Restaurant	Coffee Shop	Sushi Restaurant	Café	Park	Deli / Bodega	French Restaurant	Seafood Restaurant	Pharmacy	Karaoke Bar		
36 Tudor City	Café	Park	Deli / Bodega	Sushi Restaurant	Mexican Restaurant	Garden	Seafood Restaurant	Coffee Shop	Thai Restaurant	Diner		

Cluster 4

manhattan_merged.loc[manhattan_merged['Cluster_Labels'] == 3, manhattan_merged.columns[[1] + list(range(5, manhattan_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		
8 Upper East Side	Italian Restaurant	Coffee Shop	Bakery	Juice Bar	Gym / Fitness Center	Yoga Studio	Wine Shop	Spa	French Restaurant	Sushi Restaurant		
9 Yorkville	Italian Restaurant	Gym	Coffee Shop	Bar	Deli / Bodega	Sushi Restaurant	Pizza Place	Diner	Japanese Restaurant	Wine Shop		
10 Lenox Hill	Italian Restaurant	Coffee Shop	Pizza Place	Sushi Restaurant	Cocktail Bar	Café	Gym	Gym / Fitness Center	Burger Joint	Thai Restaurant		
12 Upper West Side	Italian Restaurant	Bar	Indian Restaurant	Wine Bar	Bakery	Coffee Shop	Ice Cream Shop	Seafood Restaurant	Sports Bar	Pub		
13 Lincoln Square	Plaza	Café	Concert Hall	Performing Arts Venue	Italian Restaurant	Theater	Gym / Fitness Center	Gym	American Restaurant	Indie Movie Theater		
17 Chelsea	Coffee Shop	Art Gallery	Ice Cream Shop	American Restaurant	Café	Italian Restaurant	Bakery	French Restaurant	Market	Cocktail Bar		
18 Greenwich Village	Italian Restaurant	Sushi Restaurant	Café	Indian Restaurant	Chinese Restaurant	Ice Cream Shop	Coffee Shop	Clothing Store	Sandwich Place	Pilates Studio		
21 Tribeca	Italian Restaurant	Park	American Restaurant	Wine Bar	Spa	Greek Restaurant	Coffee Shop	Café	Skate Park	Burger Joint		
22 Little Italy	Bakery	Chinese Restaurant	Spa	Bubble Tea Shop	Italian Restaurant	Café	Sandwich Place	Thai Restaurant	Ice Cream Shop	Pizza Place		
23 Soho	Italian Restaurant	Clothing Store	Boutique	Coffee Shop	Sandwich Place	Mediterranean Restaurant	French Restaurant	Bakery	Ice Cream Shop	Café		
24 West Village	Italian Restaurant	American Restaurant	New American Restaurant	Wine Bar	Cocktail Bar	Park	Coffee Shop	Bakery	Jazz Club	Pizza Place		
30 Carnegie Hill	Coffee Shop	Wine Shop	Café	Italian Restaurant	Yoga Studio	Gym	Gym / Fitness Center	Bookstore	Japanese Restaurant	Cocktail Bar		
31 NoHo	Italian Restaurant	Pizza Place	Coffee Shop	Grocery Store	Mexican Restaurant	Hotel	Cocktail Bar	Japanese Restaurant	Wine Bar	American Restaurant		
34 Sutton Place	Italian Restaurant	Gym	Park	Coffee Shop	Gym / Fitness Center	Furniture / Home Store	Bagel Shop	Lingerie Store	Latin American Restaurant	Ice Cream Shop		
38 Flatiron	Gym / Fitness Center	Mediterranean Restaurant	Café	Gym	New American Restaurant	Vegetarian / Vegan Restaurant	Italian Restaurant	Park	Wine Shop	Toy / Game Store		

Cluster 5

manhattan_merged.loc[manhattan_merged['Cluster_Labels'] == 5, manhattan_merged.columns[[1] + list(range(5, manhattan_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		
11 Greenwich Village	Italian Restaurant	Art Gallery	Ice Cream Shop	Spa	Yoga Studio	Wine Shop	Spa	French Restaurant	Sushi Restaurant			
26 Morningside Heights	Bookstore	American Restaurant	Park	Coffee Shop	Gym / Fitness Center	Furniture / Home Store	Bagel Shop	Lingerie Store	Latin American Restaurant	Ice Cream Shop		
30 Carnegie Hill	Coffee Shop	Wine Shop	Café	Gym	New American Restaurant	Vegetarian / Vegan Restaurant	Italian Restaurant	Park	Wine Shop	Toy / Game Store		