

The best place to host an Airbnb in Manhattan, NY

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1 Introduction

1.1 Business Problem

Airbnb is becoming a serious business in recent years. Other than individual hosts who share their own places, companies around the world also step in this new business. Reports showed that about 2 million people stay in Airbnb rentals across the world during an average night in 2018. In this project, we want to find out what is the best place to host an Airbnb in Manhattan, New York. Furthermore, we are also interested in the patterns behind those bestsellers. We can implement those patterns in other cities afterward. For example, we can find the venues similarity between popular Airbnb hosts by using the FourSquare API.

1.2 Interested Audience

Any companies or individuals who want to do serious business on the Airbnb platform. Actually, Airbnb itself has an Airbnb PLUS plan to give better service with the authorized hosts. Those professions should find this very useful as choosing a location ahead of starting a business.

2 Data Collection

2.1 Target Data:

- List of Boroughs and neighborhoods of Manhattan with latitude and longitude
- List of Airbnb houses in Manhattan with Latitude and longitude
- List of attendance of each Airbnb
- Venues for each Manhattan neighborhoods

2.2 Data source and Preprocessing:

- Use Foursquare and geopy data to map top 10 venues for all Manhattan neighborhoods and clustered in groups
- Use kaggle.com find an open dataset including details about Airbnb hosts in Manhattan.
- Use Foursquare and geopy data to map the location of rental places

I used the python folium library to visualize the geographic details of Manhattan, New York. Each circle represents an Airbnb host. I used latitude and longitude values to get the visual as below:

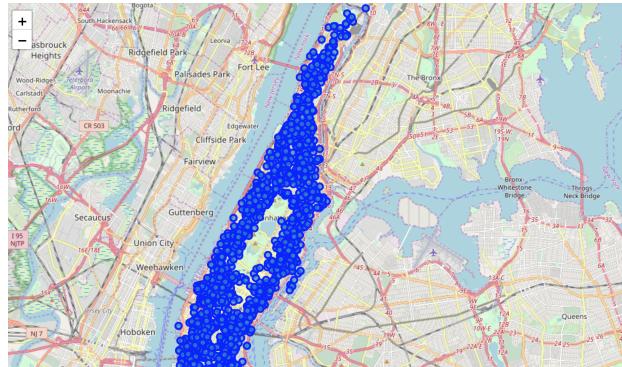


Figure 1: Visualization of airbnb locations

3 Methodology

With the help of Foursquare API, I went through every Airbnb host place to explore the neighborhood. The limit is 100 venue and the radius is 500 meters for each neighborhood from their given latitude and longitude information. The head of the list Venues name, category, latitude, and longitude information is showed below : Utilizing One-hot coding, I figured out the most

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0 Upper East Side	40.77553	-73.95343	Elio's	40.776783	-73.952736	Italian Restaurant
1 Upper East Side	40.77553	-73.95343	Y7 – Upper East Side	40.776495	-73.955594	Yoga Studio
2 Upper East Side	40.77553	-73.95343	David's Hair Stylist & Barbershop	40.776989	-73.953607	Salon / Barbershop
3 Upper East Side	40.77553	-73.95343	Caledonia Bar	40.776254	-73.952899	Bar
4 Upper East Side	40.77553	-73.95343	Luke's Lobster	40.774805	-73.954423	Seafood Restaurant

Figure 2: Venues Details

common venue of each neighborhood. Then I used unsupervised learning K-means algorithm to cluster the neighborhoods.

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 Battery Park City	Park	Plaza	Pet Store	Garden	Museum	Food Truck	Scenic Lookout	Coffee Shop	Dog Run	Dumpling Restaurant
1 Chelsea	Coffee Shop	Yoga Studio	Cuban Restaurant	Italian Restaurant	Tapas Restaurant	Donut Shop	Cycle Studio	Art Museum	Lounge	Dance Studio
2 Chinatown	Cocktail Bar	Greek Restaurant	Bakery	New American Restaurant	Pizza Place	Chinese Restaurant	Sandwich Place	Indie Movie Theater	Spanish Restaurant	Spa
3 East Harlem	Pizza Place	Café	Mexican Restaurant	Cocktail Bar	Park	Bakery	Wine Shop	Taco Place	Burger Joint	Italian Restaurant
4 East Village	Wine Bar	Bar	Japanese Restaurant	Coffee Shop	Juice Bar	Cocktail Bar	Bakery	Ice Cream Shop	Arts & Crafts Store	Vietnamese Restaurant

Figure 3: Common Venue

In the final section, I created a choropleth map to explicitly show the pattern between those clusters and Airbnb popularity:

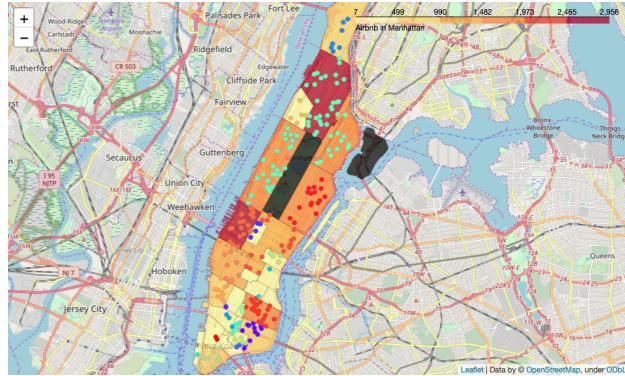


Figure 4: Choropleth map

4 Conclusion

- The Harlem and Hell's Kitchen are currently the best neighborhoods to start an Airbnb Business.
- Coffee shops and restaurants are very densely distributed near Harlem and Hell's Kitchen. We can assume those two as key factors.

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
Coffee Shop	Southern / Soul Food Restaurant	Park	Pizza Place	Mexican Restaurant	Wine Shop	Cocktail Bar	Jazz Club	Seafood Restaurant	Bakery
Bakery	Coffee Shop	Park	American Restaurant	Italian Restaurant	Yoga Studio	Grocery Store	Chinese Restaurant	Pizza Place	Wine Shop
Coffee Shop	Southern / Soul Food Restaurant	Park	Pizza Place	Mexican Restaurant	Wine Shop	Cocktail Bar	Jazz Club	Seafood Restaurant	Bakery
Bakery	Coffee Shop	Park	American Restaurant	Italian Restaurant	Yoga Studio	Grocery Store	Chinese Restaurant	Pizza Place	Wine Shop

Figure 5: Most Common Venue around Harlem

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
Theater	Coffee Shop	Dance Studio	Wine Bar	Indie Theater	Mediterranean Restaurant	Italian Restaurant	Gym / Fitness Center	Gym	Bakery
Theater	Coffee Shop	Dance Studio	Wine Bar	Indie Theater	Mediterranean Restaurant	Italian Restaurant	Gym / Fitness Center	Gym	Bakery
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Theater	Coffee Shop	Dance Studio	Wine Bar	Indie Theater	Mediterranean Restaurant	Italian Restaurant	Gym / Fitness Center	Gym	Bakery

Figure 6: Most Common Venue around Hell's Kitchen

- Some area like the Theater District has too many hotels which are poisonable towards Airbnb. Even if this neighborhood is super close to the popular Hell's Kitchen, hotels and theaters could be too competitive and noisy for Airbnb.

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
Theater	Hotel	Performing Arts Venue	Gym	French Restaurant	Exhibit	Office	Restaurant	Concert Hall	Karaoke Bar
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Figure 7: Theater District Venue