New York City Restaurant Analysis: Finding Outdoor Dining in a Pandemic

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Abstract

The objective of this analysis to use a modern-day venue application to study what data is returned when a user queries the application for a venue search. This study in particular narrows the scope to New York City with an emphasis on Manhattan neighborhoods. NYC was chosen because it is the epicenter of the current Covid 19 pandemic and the primary financial center for the United States.

With current Covid 19 restrictions in place, dining out can be anywhere from non-existent to scarce based on several factors but primarily the restrictions placed on restaurants during the pandemic. As of June 20th, 2020, NYC is currently under a phase 2 reopening plan where restaurants are allowed to reopen with a stipulation attached: they can only serve customers by way of takeout or customers that choose to dine in where the restaurant has outdoor dining which can make it particularly challenging to find the right venue for potential customers that may be reluctant to dine out.

This certainly can affect the dining experience but more so the search to find a venue in a congested city such as NYC. This research explores the Foursquare application to search for restaurants where we can find a venue that has outdoor dining with the objective of creating a map of locations in neighborhoods of a few selected and providing a list of all outdoor dining establishments in Manhattan.

1. Introduction

In today's pandemic environment many of us still need to operate in a modern fashion meaning we travel for our career which leads most of us to rely on technology. The issue that many encounter is where can we go and where cannot go under certain state guidelines. This research attempts to answer that question with respect to dining in several NYC neighborhoods. Using NYC data this research will plot all restaurants onto a map that are currently open and provide outdoor dining services. The primary objective is to provide an accurate list of outdoor restaurants while addressing the safety issue of patrons from state guidelines.

1.1 Problem

Locating restaurants that provide outdoor dining in NYC that are legally open in accordance with NYC approval application process under phase 2 of the city reopening guidelines.

2. Data Acquisition

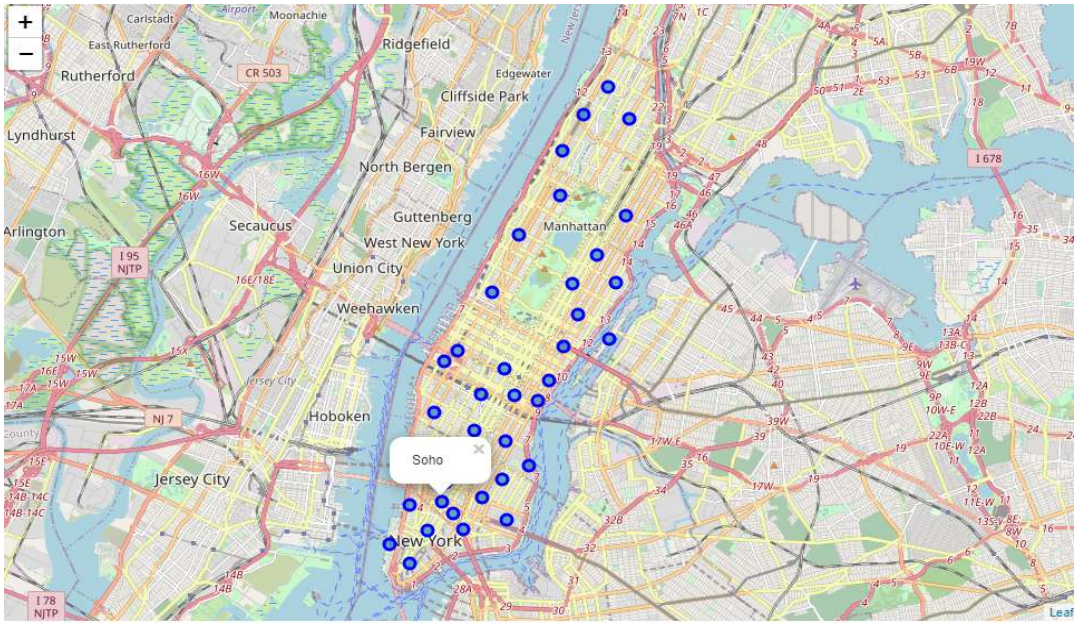
The data used for this study is from taken from the Foursquare API and by researching the NYC Data Repository for open restaurant applications filed as of mid-June 2020 for phase 2 of the reopening. https://data.cityofnewyork.us/Transportation/Open-Restaurant-Applications/pitm-atqc . Also, a NYC JSON file was used from New York University located at https://geo.nyu.edu/catalog/nyu_2451_34572

2.1 Data Cleaning

Of the 2 data sets used, only the NYC open restaurant application data contained missing values for longitude and latitude. This is problematic as the coordinates are used for plotting on a map and could not be done with missing values and therefore those values were removed. Typically, the rule is to not exceed 5% of your total values for removing those found to be null but this is applied to models in general and given this is demonstrative and considered a method to find a solution rather than a prediction, the 12.5% removed have no negative impact overall. The total open restaurants are 7,939 with 996 missing coordinates and therefore left out of the plotting.

3. Methodology

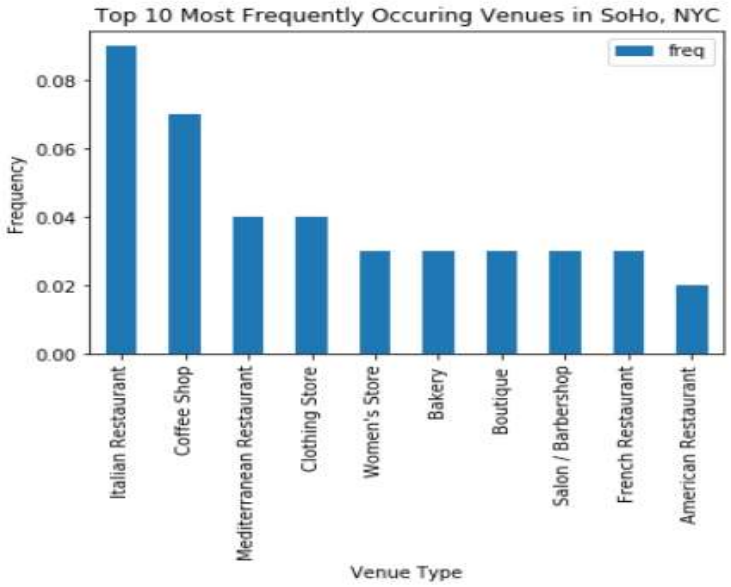
This analysis focuses solely on raw data and a descriptive analysis which breaks down NYC from boroughs to the neighborhood of Soho due to the sheer size and density of NYC. This example only provides a method for sub setting the neighborhoods and finding open restaurants with outdoor seating. First, to get an idea of the size of NYC, Manhattan is plotted on a map using the geojson NYU file which shows us the various neighborhoods in the form of the blue dots as seen below:



Soho is seen within Manhattan and that is where the focus for this analysis will take place, as the map shows us, NYC is a large place and I have highlighted Soho to provide just this perspective. After using the Foursquare API results to break down the categories, there are over 300 unique categories of venues within NYC. This can range from parks to stores to restaurants as they are grouped by neighborhood. Manhattan as a whole is overwhelming favoring Italian Restaurants and coffee shops but given our location is Soho, lets look at how it breaks down.

3.1 Exploratory Analysis

To get an idea of what venues are popular within Soho, let's look at the top 10 venues using the Foursquare API data. The categories were labeled using a logistic regression technique where we can classify frequencies using a binary indicator, for example, when we see an Italian Restaurant, that event is classified as 1. The total is summed and the frequency is counted which results in proportional occurrence that is quantified as seen below in the bar chart.

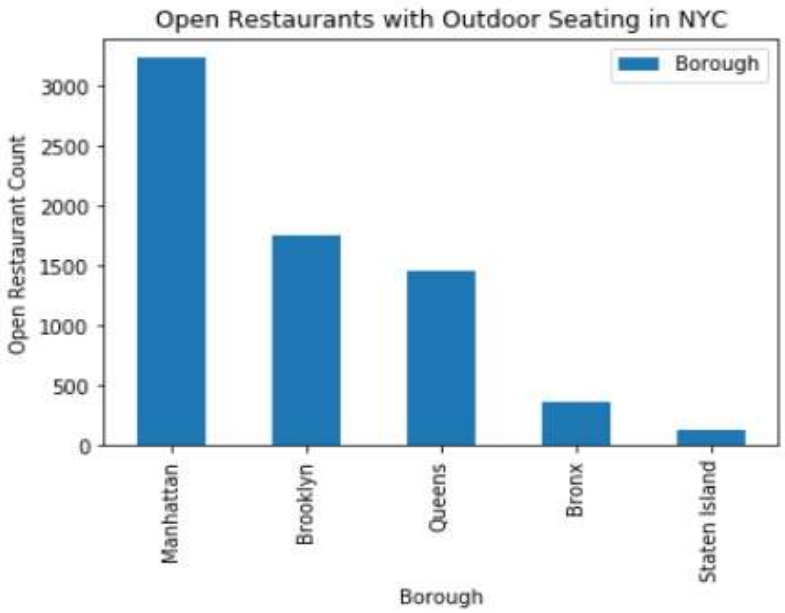


	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Soho	Italian Restaurant	Coffee Shop	Clothing Store	Boutique	Mediterranean Restaurant	Salon / Barbershop	Bakery	Cosmetics Shop	Falafel Restaurant	French Restaurant

Clearly, we can see that restaurants are 40% of the top 10 and there will be plenty of selections here for our analysis.

3.2 Exploring the open restaurant data

After importing the open restaurant data and removing the missing values, the data frame shows the exact same results for boroughs: 5 with 6,943 unique restaurant names. First, we look at the boroughs to see just how many restaurants in each borough have outdoor seating and are legally open:



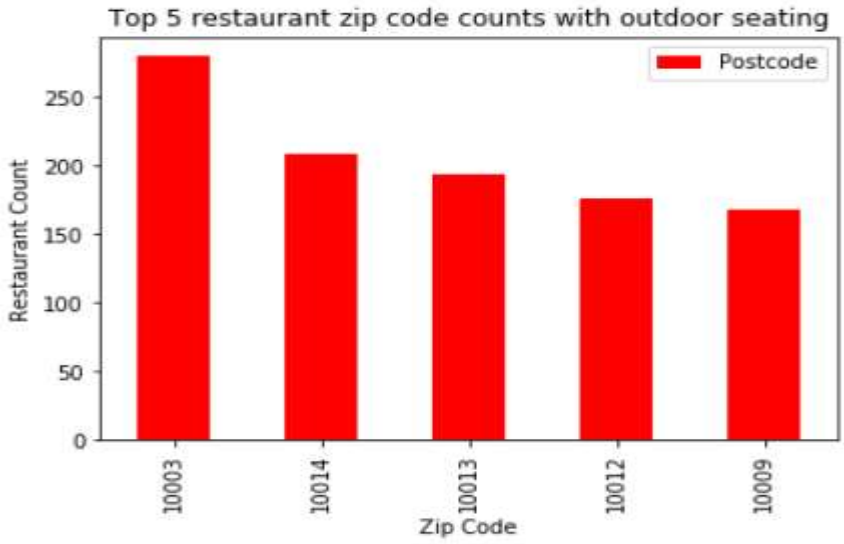
The bar chart shows us that Manhattan is the dominant borough with over 3000 open restaurants that provide outdoor seating and of course, the neighborhood used in this analysis is located in the Manhattan borough and will have to filtered. This is achieved by using the postal code in the csv file. However, by looking at the postal codes we get a better idea of what postal code is the dominant code to use for this analysis since it is focused on a neighborhood.

	Postcode
10003	280
10014	208
10013	193
10012	176
10009	168

Soho is located within the 10012 and 10013 zip code with approximately 176 and 193 open and outdoor seating restaurants. The primary challenge here is combining the foursquare data with the open restaurant data. There is no unique key to join on and by using the name of the

restaurant, the results get somewhat diminished as Foursquare doesn't show all the venues due to the search radius used and limits on the search itself.

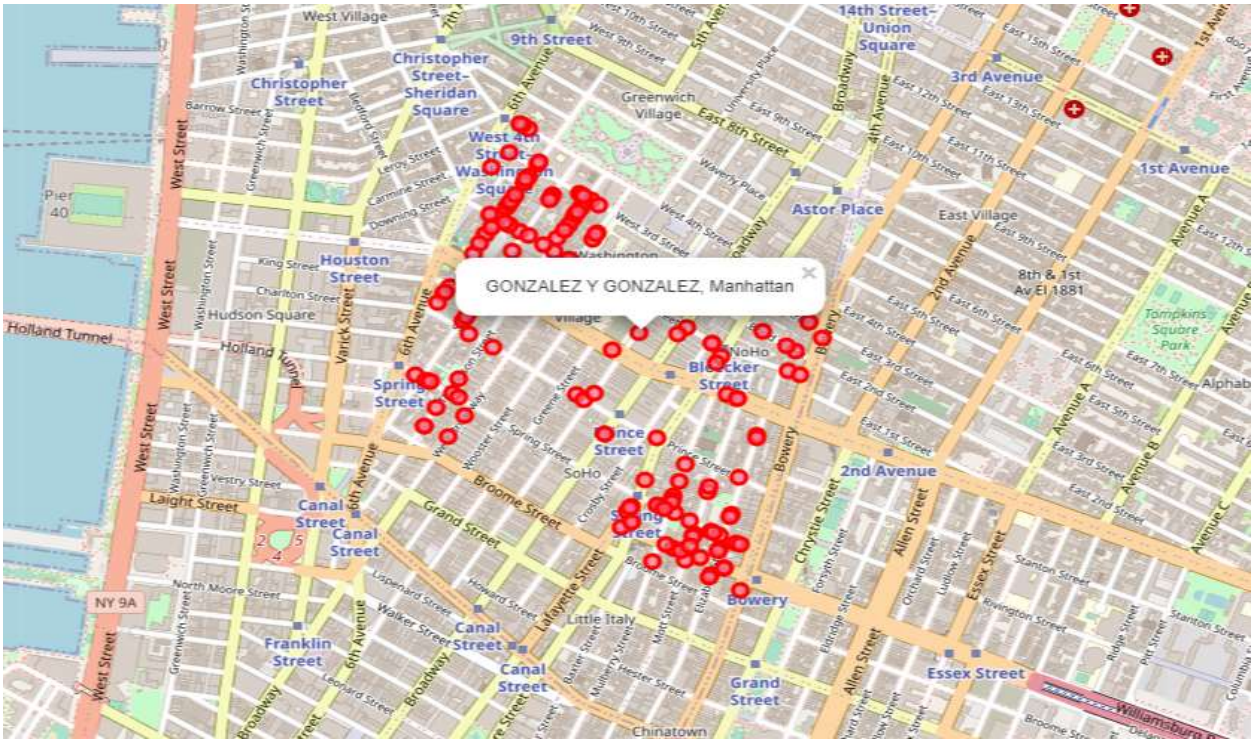
By taking the top 5 postal codes and using a count of open restaurants with outdoor seating, the postal code for SoHo is among these zips with its postal code falling under 10012 and 10013. Plotting each separately shows the restaurants on the map and provides a succinct location within Manhattan.



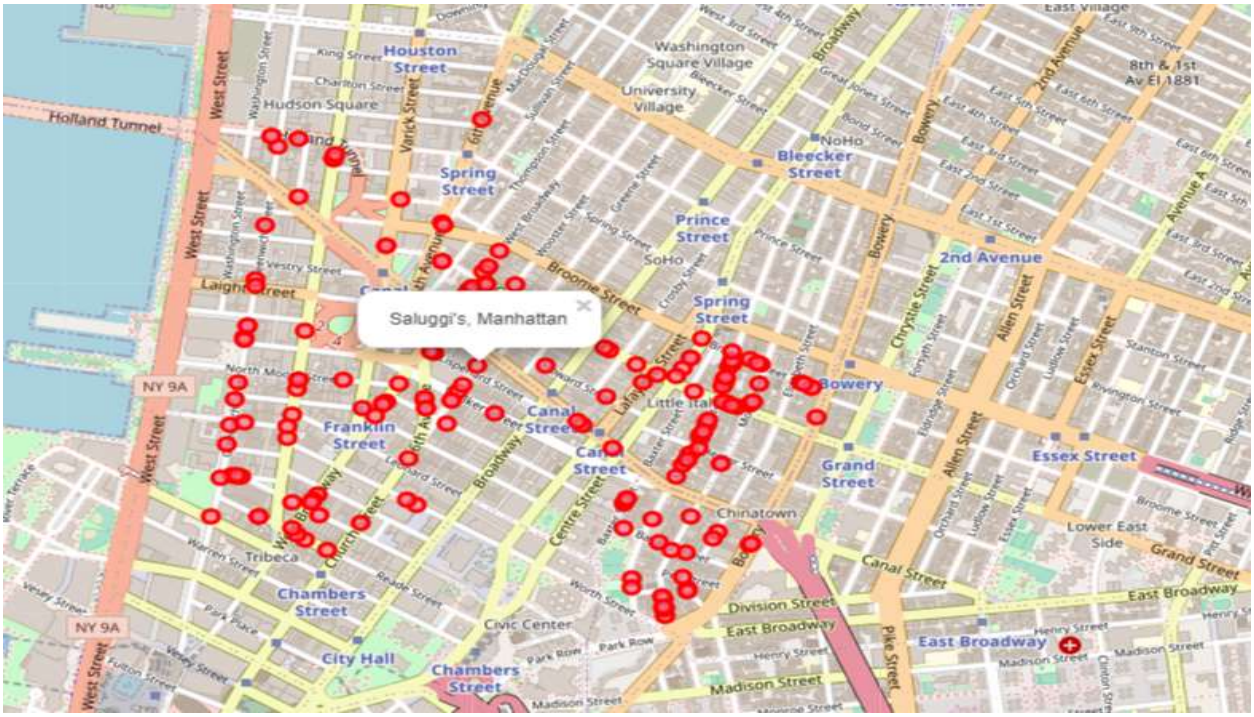
Results

After combining the data sets and filtering for the SoHo zip code, we can create a venue map that not only incudes the Foursquare restaurant data but also all of the open restaurants in the NYC application data that have outdoor seating. This analysis can be constructed on any NYC neighborhood but this was example of what we can do with technology and how it can help us during a pandemic. Given the density of NYC, it was nearly impossible to do all the neighborhoods without providing an unusually lengthy document with over 300 maps plotted out. I have however included the list of all open restaurants with outdoor seating.

Here is the plot for zip code 10012:



And zip code 10013:



Both total nearly 400 outdoor seating and open restaurants within the SoHo neighborhood.

Discussion

The Covid 19 pandemic has led many of us to adapt quickly and given the technology we enjoy today; it has made us responsive as well. However, there is a lot of room for improvement on this front in my opinion. Finding a restaurant with outdoor seating was particularly challenging and I could not imagine if I had to travel for my career what I might do under these circumstances. It may be helpful to have this information available as an option for any location/venue service applications not only as a great additional feature but as a safety measure given our current experiences.

Conclusion

In conclusion, this analysis shows there are plenty of outdoor dining options in Soho and all of Manhattan and NYC for that matter. The idea was to explore outdoor options due to a safer dining environment and while Foursquare doesn't offer this information, we can discover what venues do offer this while plotting them on a map and incorporating additional data from the NYC data repository.