A Math Nerd Opens a Chinese Restaurant

BAC Advanced Team Fall 2023

Source Code for map generation: https://github.com/Rahul-Jayachandran/BAC-Advanced-Question

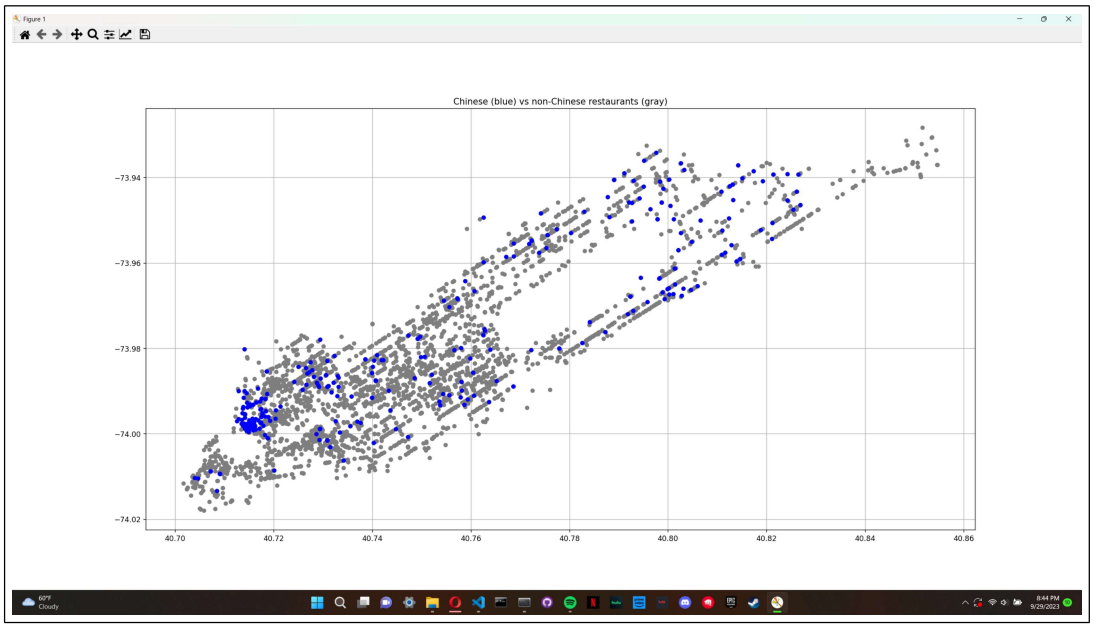
1 The Problem

We want to find an optimal location to open a new Chinese restaurant in Manhattan, given data on 3000 restaurants currently in Manhattan, their rating, their review volume, their location, their cuisine, and their health inspection information. First, we will look at maps of these restaurants based on different parameters. Then, we will discuss optimal locations for restaurants based on these maps and our values. Finally, we will combine these ideas to find an overall optimal location.

2 Visualizations

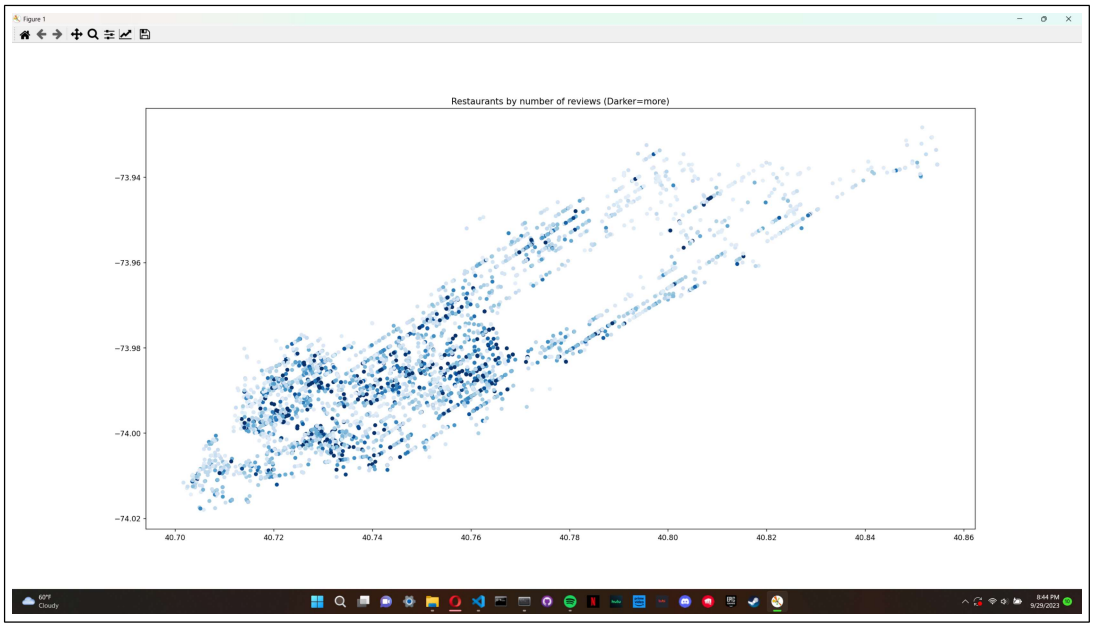
Using the latitude and longitude, I constructed maps of the restaurants with different properties. Each image below maps a subset of restaurants in Manhattan, with the color of the dots representing different complications.

2.1 Chinese vs non Chinese Restaurants



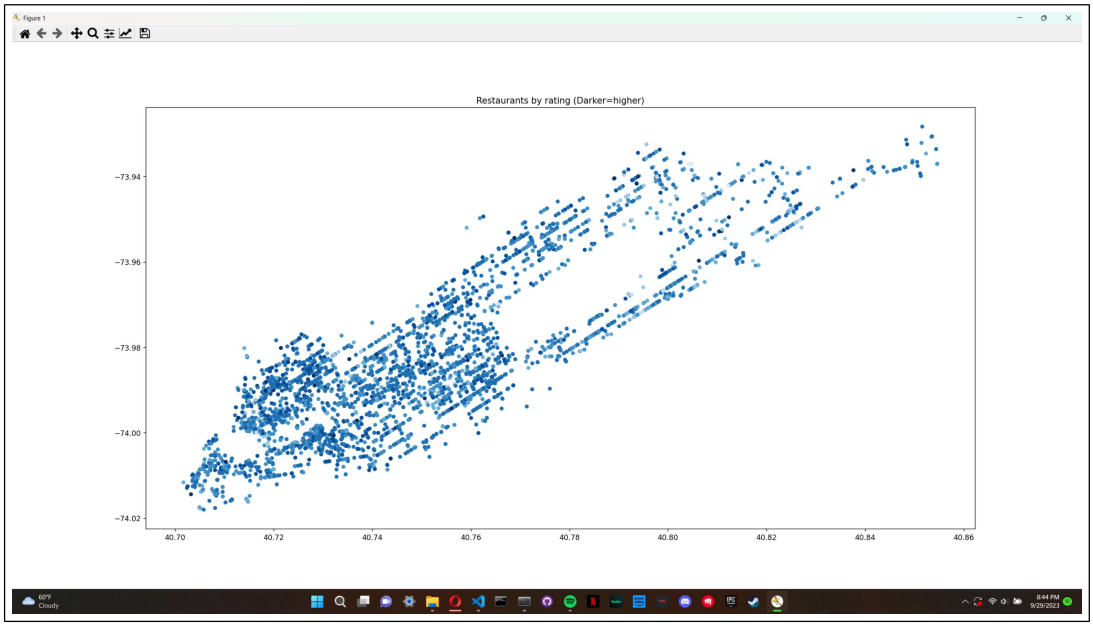
We are looking for locations that are sparse in terms of Chinese restaurants becuase we do not want an already saturated area where we have to compete

2.2 Restaurants colored by number of reviews (darker=more



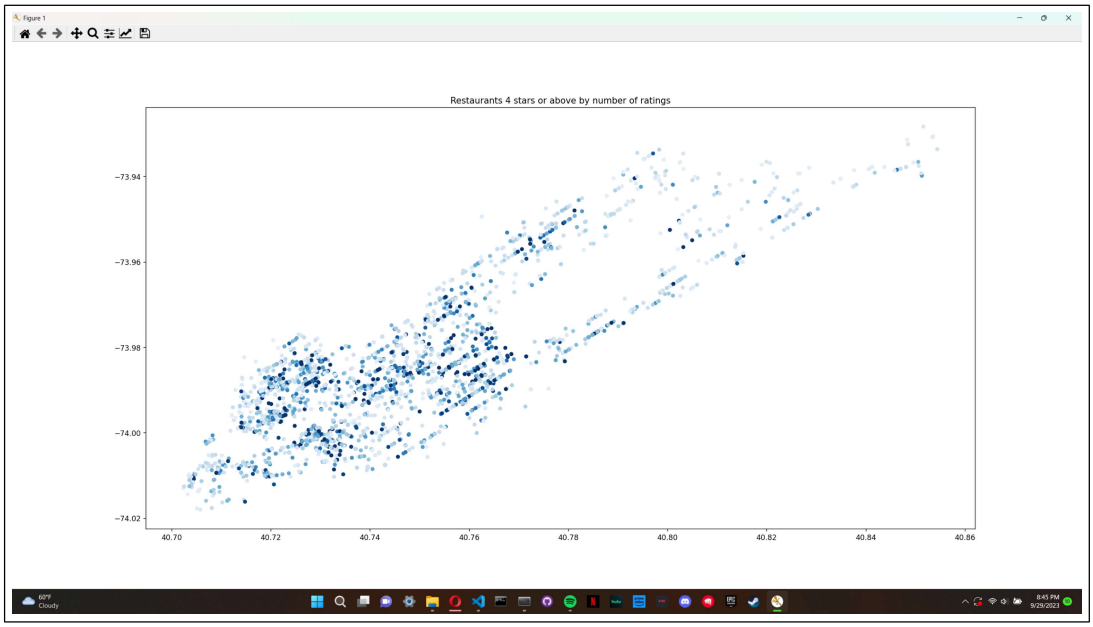
We are looking for locations with a higher volume of reviews because review volume must be linked to customer volume

2.3 Restaurants colored by rating (Darker=higher)

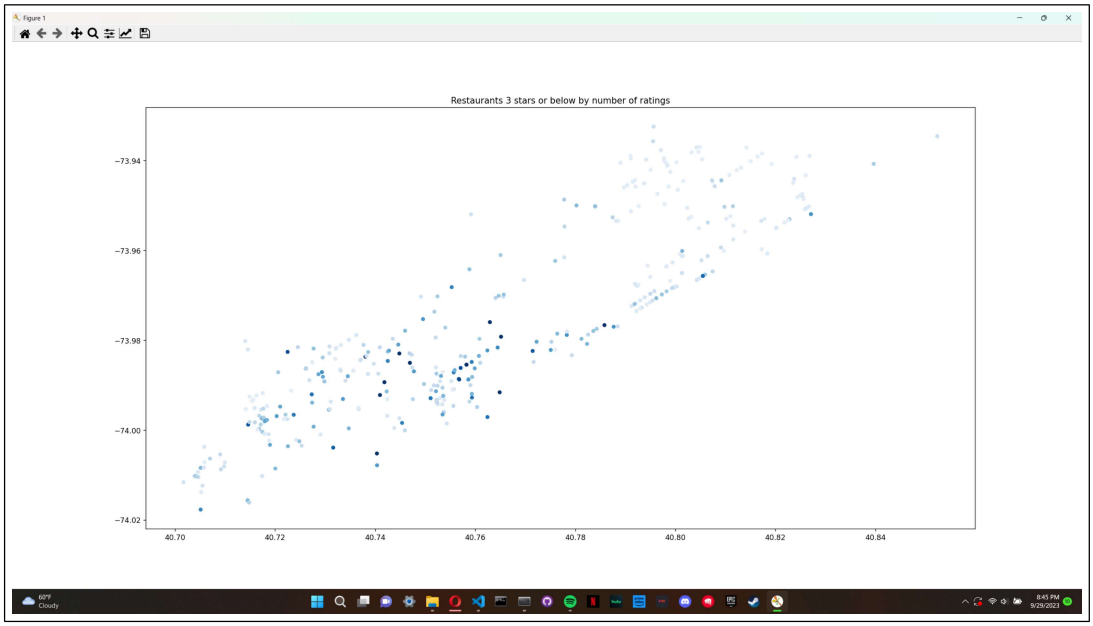


We are looking for areas with higher rated restaurants because that implies greater customer satisfaction

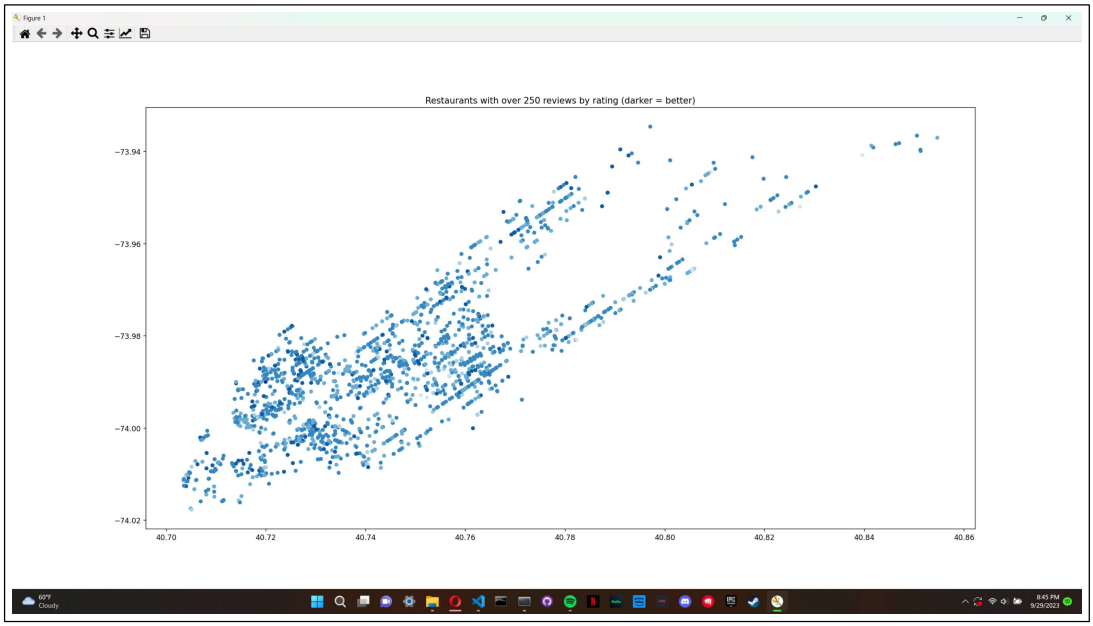
2.4 Restaurants 4 stars or above colored by number of ratings



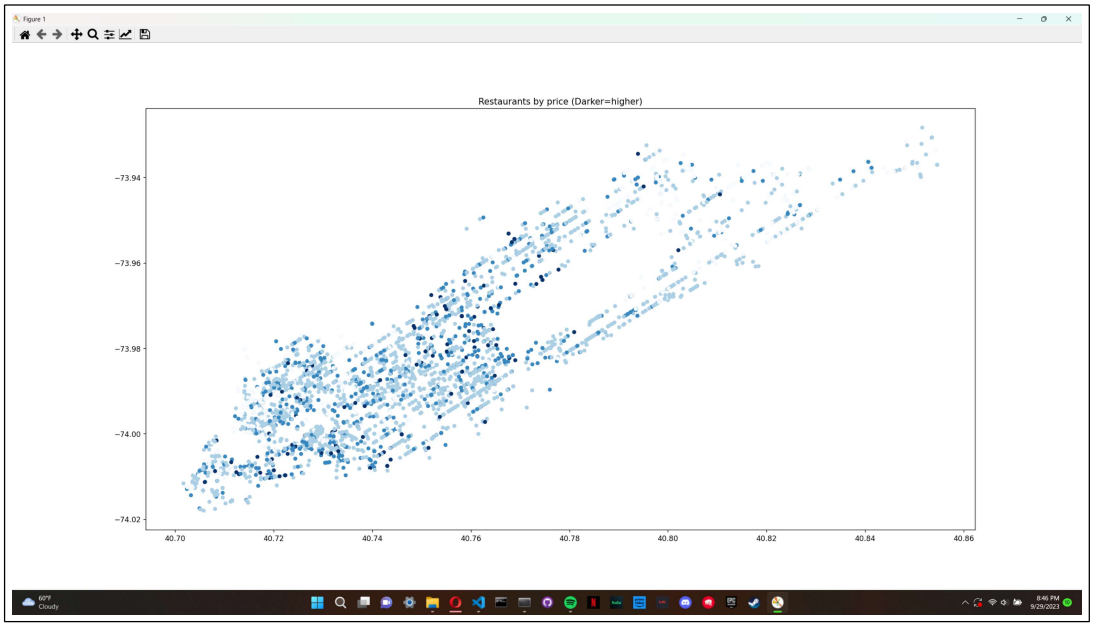
2.5 Restaurants 3 stars or below colored by number of ratings



2.6 Restaurants with over 250 reviews by rating (darker = better)

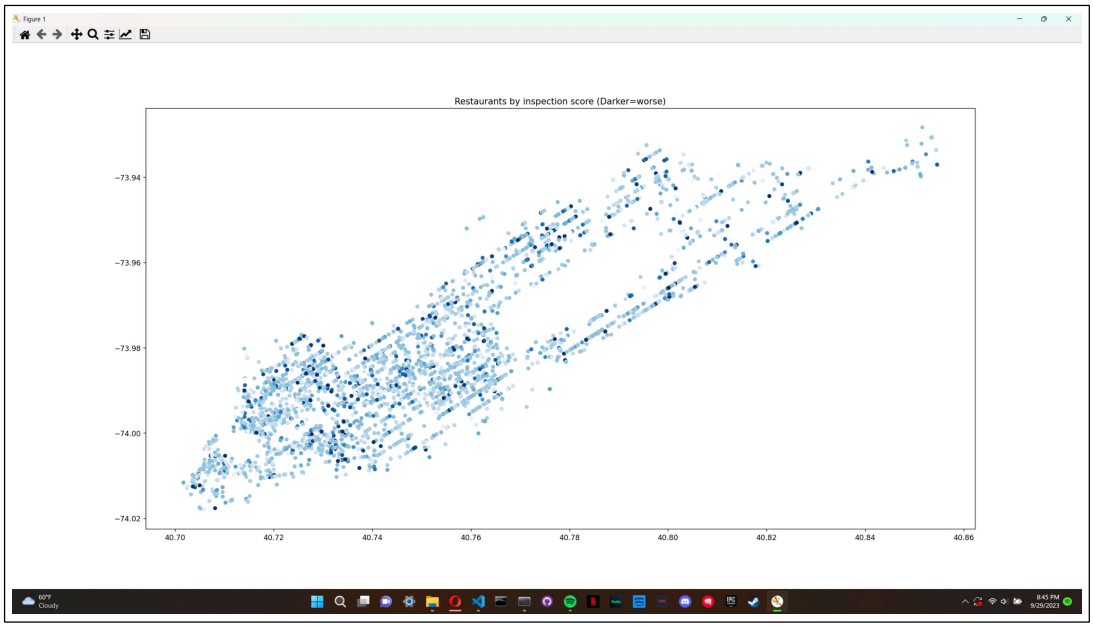


2.7 Restaurants by price (Darker=higher)



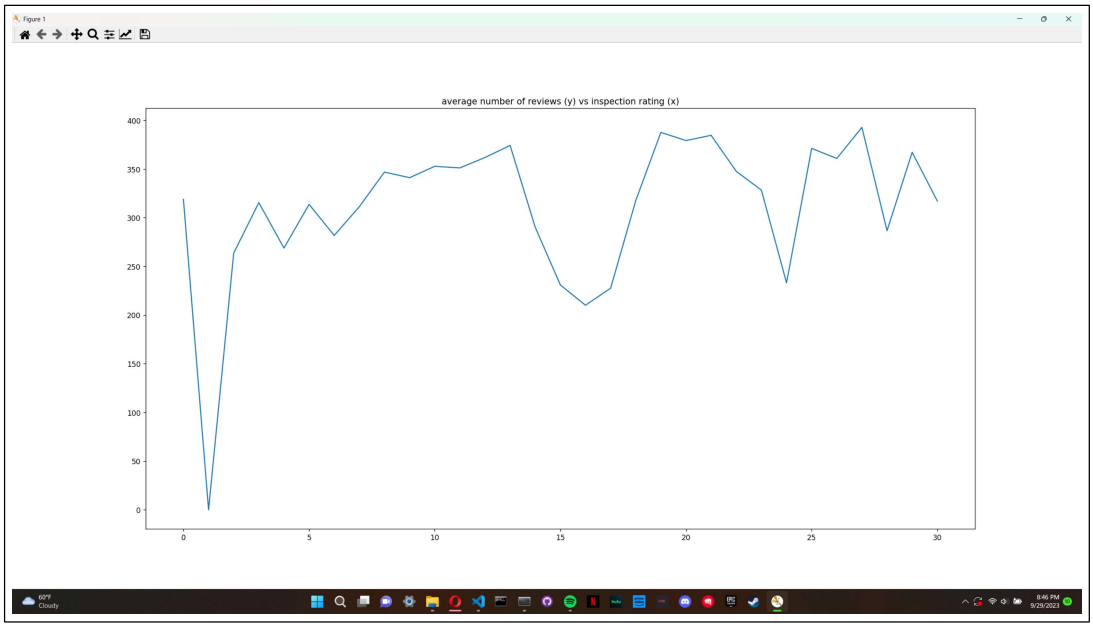
We are looking for locations with similar price points to ours so we can go into the ecosystem and take the same clientele that already eat there

2.8 Restaurants by inspection score (Darker=worse)



We are looking for locations with better inspection scores because this suggests better areas for infrastructire and operation

2.9 average number of reviews (y) vs inspection rating (x)



The data may suggest that inspection scores are not very relevant in determining customer traffic

3 Our Choice

Now, let us look at these maps one by one to find optimal locations.

First, we would likely want to set up in a location with a low density of Chinese restaurants. While there is an argument to setting up in an area with many Chinese restaurants (think: Chinatown), I believe that the saturation of these areas makes them less attractive than sparse areas, despite the increased traffic the community brings. One of these locations is 40.75,-73.99, or 7th ave and 33rd st.

There are other good locations, but this one is superior, because it also has a lot of restaurants with a high amount of reviews in the area, as per graph 2.2. More reviews generally implies more traffic. We do want to check for the contingency that these ratings are overwhelmingly negative, since ratings are usually polarized, so we look at the graphs 2.4 and 2.5 to see that the brunt of these highly rated restaurants in the area are also well rated, and there are not that many badly rated restaurants in the area with a lot of ratings.

Furthermore, a look at 2.6 shows that of the popular restaurants (restaurants with >250 reviews) in the area, there are a good amount of well rated restaurants, which implies customer satisfaction and therefore continued traffic to the areas, which benefits our Chinese restaurant.

Looking at 2.7, we see that despite the location in midtown, there are not that many very expensive restaurants in the area. This favors us, since Chinese food is usually considered a more informal meal in the US, and thus, by opening a cheaper place in the area we cater to the population already eating there, and fit into the more casual restaurant ecosystem in the area.

There is a worry about restaurants with bad inspection scores leading to customer dissatisfaction and a lower likelihood of them revisiting the area, but as we see from 2.9, there is really no correlation between the average number of reviews and the inspection rating (as the rating goes up (which implies a worse standard), the review volume does not decrease) which seems to suggest that customers are either unaware or ambivalent to lower inspection ratings on restaurants.

Thus, we have found a location which is optimal on all relevant maps and with respect to all relevant provided factors. As a plus, this location is next to the Empire State and Penn Station, which is bound to drive more traffic.

I look forward to hot noodle soup and pork dumplings on the corner of 33rd St. and 7th Ave.