Opening a Chain Restaurant Report

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1. Introduction

✧ Background

Nowadays, more and more stores have chain stores across the country even across the world. When opening a new chain store in a new place, some brands got a great success, which means they have lots of customers, but some brands failed since those places maybe not suitable for them. Failure is fatal for some companies, especially those companies that are just starting out. They may invest a lot of money to establish a new store, but once the new store failed, they face quite serious cash flow problems which may make them bankrupt. Thus opening a new chain store is risk taking action for every company. If we can analyze our data to find better place to open the new store, then the risk will be decreased.

✧ Description of the problem

In this project, we will focus on a restaturant who has a great success in the New York City and wants to open a new chain restaturant in Los Angeles. We will help this restaturant to find best place in the Los Angeles so that the risk of opening a new restaturant will be lower. The reason of chosing these two places, New York City & Los Angeles, is that both of them contain various types of stores and people from all over the world. We only focus on the restaurant here, but theory is same for other stores like clothing, shoping mall, liquor store, etc.

2. Data

We will use Foursquare location data to solve the problem or execute the idea. With the Foursquare location data, we can get the neighborhoods of the restaurant that we

are focusing. Within these neighborhoods, we may find the different categories and their frequency. Then we may find a place in Los Angeles which has similar neighborhoods.

By using Foursquare location data, we can extract neighborhoods of the restaurant we are focusing on. Then after segmenting area of Los Angeles, for each location, we can use Foursquare location data again to explore the neighborhoods and find the optimal place with most similar neighborhoods.

3. Exploratory Data Analysis

3.1 Find a good chinese restaurant to focus on

In this project, we want to focus on a Chinese restaurant, so we use Foursquare to find 50 chinese restaurant arond New York City center, and then for each restaurant, we try to find its rating, but some restaurants do not have rating yet. Thus we just find some chinese restaurants with ratings, and the dataframe is shown in Table 1. We select restaurant with highest rating to focus, so from the above datafame we can see that the highest rating is 8.0, and the restaurants are "Deluxe Green Bo Restaurant" and "Bo Ky Restaurant". We try "Deluxe Green Bo Restaurant" first, and we found that there is no "Deluxe Green Bo Restaurant" in Los Angeles, so we will focus on this restaurant to do further exploration.

Table 1: Chinese Restaurants with ratings

	name	categories	address	crossStreet	lat	lng	rating
0	Canal Best Chinese Restaurant	Chinese Restaurant	266 Canal St	NaN	40.718790	-74.001055	5.5
1	Number One Chinese	Chinese Restaurant	10 S William St	NaN	40.704574	-74.010410	5.6
2	Deluxe Green Bo Restaurant	Chinese Restaurant	66 Bayard St	btwn Elizabeth & Mott St	40.715545	-73.998137	8.0
3	XO Kitchen	Chinese Restaurant	148 Hester St	btw Bowery & Elizabeth	40.717482	-73.996047	6.7
4	Bo Ky Restaurant 波記潮州小食	Chinese Restaurant	80 Bayard St	at Mott St	40.715696	-73.998667	8.0
5	Sun Sai Gai Restaurant	Chinese Restaurant	220 Canal St	at Baxter St	40.717369	-73.999415	6.6
6	218 Restaurant	Chinese Restaurant	218 Grand St	btwn Elizabeth & Mott St.	40.718833	-73.995895	7.2
7	Chinese Tuxedo	Chinese Restaurant	5 Doyers St	NaN	40.714433	-73.997987	7.3

3.2 Find an optimal place for "Deluxe Green Bo Restaurant"

In order to find an optimal location for "Deluxe Green Bo Restaurant", we explore the neighborhoods of "Deluxe Green Bo Restaurant" first. By using Foursquare location data, we found 100 nearby venues and there are 44 unique categories. Then we calculated the frequency(number) of each category, and the top ten lines are shown in the Table 2. Actually, we will just use these ten categories to find optimal location in Los Angeles since other categories have very low frequency which will not influence anything.Next we created a grid of area candidates, equaly spaced, centered around city center. Our neighborhoods will be defined as circular areas with a radius of 300 meters, so our neighborhood centers will be 600 meters apart. Resulting map is shown in Figure 1, and the addresses info are shown in Table 3.

Table 2: Categories and frequency

	index	categories	name	lat	lng
0	7	Chinese Restaurant	18	18	18
1	1	Bakery	7	7	7
2	11	Dessert Shop	5	5	5
3	12	Dim Sum Restaurant	5	5	5
4	3	Bubble Tea Shop	4	4	4
5	34	Salon / Barbershop	4	4	4
6	22	Italian Restaurant	3	3	3
7	35	Shanghai Restaurant	3	3	3
8	37	Spa	3	3	3
9	27	Noodle House	3	3	3

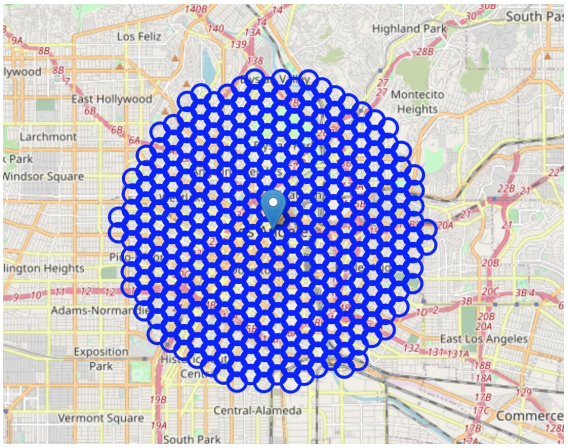

Figure 1: Map of city center location and candidate neighborhood centers

Table 3: Addresses of those locations (364 rows, just show 10 rows here)

	Address	Latitude	Longitude	X	Y	Distance from center
0	3331, Thomas Street, Lincoln Heights, Los Ange...	34.082312	-118.204106	-3.961762e+06	1.504423e+07	5992.495307
1	362, Avenue 33, Lincoln Heights, Los Angeles, ...	34.084526	-118.208553	-3.961162e+06	1.504423e+07	5840.376700
2	Metro Park and Ride, Pasadena Avenue, Highland...	34.086739	-118.213000	-3.960562e+06	1.504423e+07	5747.173218
3	453, Isabel Street, Cypress Park, Los Angeles,...	34.088952	-118.217448	-3.959962e+06	1.504423e+07	5715.767665
4	3344, Pepper Avenue, Cypress Park, Los Angeles...	34.091165	-118.221896	-3.959362e+06	1.504423e+07	5747.173218
5	2679, Loosmore Street, Cypress Park, Los Angel...	34.093378	-118.226344	-3.958762e+06	1.504423e+07	5840.376700
6	2623, Arvia Street, Cypress Park, Los Angeles,...	34.095592	-118.230793	-3.958162e+06	1.504423e+07	5992.495307
7	Abraham Lincoln High School, Lincoln Park Aven...	34.075789	-118.199741	-3.962662e+06	1.504475e+07	5855.766389
8	2755, Alta Street, Lincoln Heights, Montecito ...	34.078002	-118.204187	-3.962062e+06	1.504475e+07	5604.462508
9	472, Avenue 28, Lincoln Heights, Los Angeles, ...	34.080215	-118.208633	-3.961462e+06	1.504475e+07	5408.326913

For each location, we want to know that whether it has similar neighborhoods with our restaurant in NY, so we want to find the number of venues of each category for each location. We first explored two most important categories ("Chineses Restaurant" and "Bakery") since they have highest frequency. By using Foursquare, we can search venues around the position with specific category. Then calculate the total number of venues which is also called frequency here. After that, we filtered address with number of Chinese Restaurants nearby in the range from 13 to 23 and number of Bakery nearby in the range from 4 to 10 since in NY, our restaurant has 18 Chinese Restaurants and 7 Bakeries nearby. Then we got six locations left which are shown in Table 4. Then we look at other categories and do the above process to calculate the number of venues with each category nearby. The results are shown in

Table 5. After getting those two tables, we need to find how similar of each places with original restaurant's environment in NY. So we minus each number with original frequency and get the weight, and we will choose the optimal place according to this weight, and the final data we got with only address location and weight of the six locations is shown in Table 6. Lowest weight shows most similar neighborhoods with restaurant in NY, so "431, Leroy Street, Mission Junction LA" should be a optimal location.

Table 4: Locations after filtering

	Address	Latitude	Longitude	Chinese Restaurant	Bakery
0	Solano Avenue, Elysian Park, Chinatown, Los An...	34.074032	-118.231186	14	8
1	North Main Street, Mission Junction LA, Chinat...	34.067509	-118.226816	16	9
2	Dodger Stadium, 1000, Vin Scully Avenue, Elysi...	34.074144	-118.240160	14	5
3	1480, North Boylston Street, Elysian Park, Los...	34.076355	-118.244610	14	6
4	431, Leroy Street, Mission Junction LA, Chinat...	34.063198	-118.226893	19	9
5	Vin Scully Avenue, Elysian Park, Los Angeles, ...	34.072043	-118.244686	14	7

Table 5: Locations after filtering with all categories

	Address	Latitude	Longitude	Chinese Restaurant	Bakery	Dessert Shop	Dim Sum Restaurant	Bubble Tea Shop	Salon / Barbershop	Italian Restaurant	Shanghai Restaurant	Spa	Noodle House
0	Solano Avenue, Elysian Park, Chinatown, Los An...	34.074032	-118.231186	14	8	3	3	0	8	2	0	1	1
1	North Main Street, Mission Junction LA, Chinat...	34.067509	-118.226816	16	9	3	3	1	12	0	0	2	3
2	Dodger Stadium, 1000, Vin Scully Avenue, Elysi...	34.074144	-118.240160	14	5	2	3	0	11	2	0	1	0
3	1480, North Boylston Street, Elysian Park, Los...	34.076355	-118.244610	14	6	2	3	0	12	2	0	2	0
4	431, Leroy Street, Mission Junction LA, Chinat...	34.063198	-118.226893	19	9	4	4	1	11	0	0	4	3
5	Vin Scully Avenue, Elysian Park, Los Angeles, ...	34.072043	-118.244686	14	7	2	3	0	11	3	0	2	0

Table 6: Locations after filtering with weight

	Address	Latitude	Longitude	weight
0	Solano Avenue, Elysian Park, Chinatown, Los An...	34.074032	-118.231186	25
1	North Main Street, Mission Junction LA, Chinat...	34.067509	-118.226816	26
2	Dodger Stadium, 1000, Vin Scully Avenue, Elysi...	34.074144	-118.240160	31
3	1480, North Boylston Street, Elysian Park, Los...	34.076355	-118.244610	30
4	431, Leroy Street, Mission Junction LA, Chinat...	34.063198	-118.226893	22
5	Vin Scully Avenue, Elysian Park, Los Angeles, ...	34.072043	-118.244686	27

4. Results and Discussion

From above we can see that, we got six places that satisfy our first two categories: "Chinese Restaurant" and "Bakery", which means that these six places have similar number of venues with those categories nearby. Combining other eight categories and calculating the weight, we find that the optimal place should be "431, Leroy Street, Mission Junction LA" with latitude 34.063198 and longitude -118.226893 since it has smallest number on weight so that it has most similar neighborhoods as restaurant in New York City. Thus, if "Deluxe Green Bo Restaurant" wants to open a chian restaurant in Los Angeles, then opening arond "431, Leroy Street, Mission Junction LA" should be a optimal choice.

5. Conclusion

Purpose of this project is to find a optimal location for a successful Chinese restaurant in New York to open a chain restaurant in Los Angeles. The first process for this project is to find a good restaurant to focus on, but if you have already know which brand you want to focus (not just restaurant, but also stores or any brands), then you can skip the first process. After deciding the restaurant to focus, we explored the neighborhoods of this restaurant, and then try to find a place in Los Angeles that has similar number of categories of neighborhoods. After analysis, we find that "431, Leroy Street, Mission Junction LA" is a optimal place for "Deluxe Green Bo Restaurant" to open a chain restaurant.