

## **Problem Solving: Where to open a Chinese restaurant in New York City.**

### **1. Introduction**

#### **1.1. Background**

Client A decides to open a Chinese restaurant in New York city. She would like to get some advice on how to choose a proper location for her restaurant. Referring to some tips, there are four important factors that one should notice when he/she choose a location of the restaurant <sup>[1]</sup>:

- 1) Visibility and accessibility. The spot should be convenient to be accessed either by driving or walking.
- 2) The demographics. The target group of the restaurant should match the demographics, such as income level, age, the ethnicity composition, etc., of the interested neighborhood.
- 3) Labor costs and minimum wage. The restaurant runner should evaluate whether the restaurant can afford labor's wage.
- 4) The competition with other restaurants. More nearby competitors sometimes mean more potential customers. However, it also means that customers may be easily drawn by competitors. The restaurant owner should make a balance.

#### **1.2. Defining the Problem**

Since the client decide to open the restaurant in New York, the minimum wage will not be considered in my analysis. In this sense, in order to find optimal sites for opening a restaurant, I only need to consider the rest factors.

In short, the question will be defined as 'how to find an optimal site for client A to open a restaurant?'

### **2. Methodology**

#### **2.1. Data**

For the first and the last factors, analyzing Foursquare <sup>[2]</sup> location data will give us the answer. For the second factors, I need incorporate demographic data from New York University Furman Center <sup>[3]</sup> into my analysis.

I will retrieve venue information of each neighborhood in New York by using Foursquare location data. I will also retrieve the demographic data of each neighborhood in New York.

The data from NYU Furman Center contains various demographic data of each sub-Borough area (similar to the neighborhood), such as median of household income,

ethnic composition, etc. I only extract two variables, i.e. the median of household income and percentage of Asian of each sub-borough area.

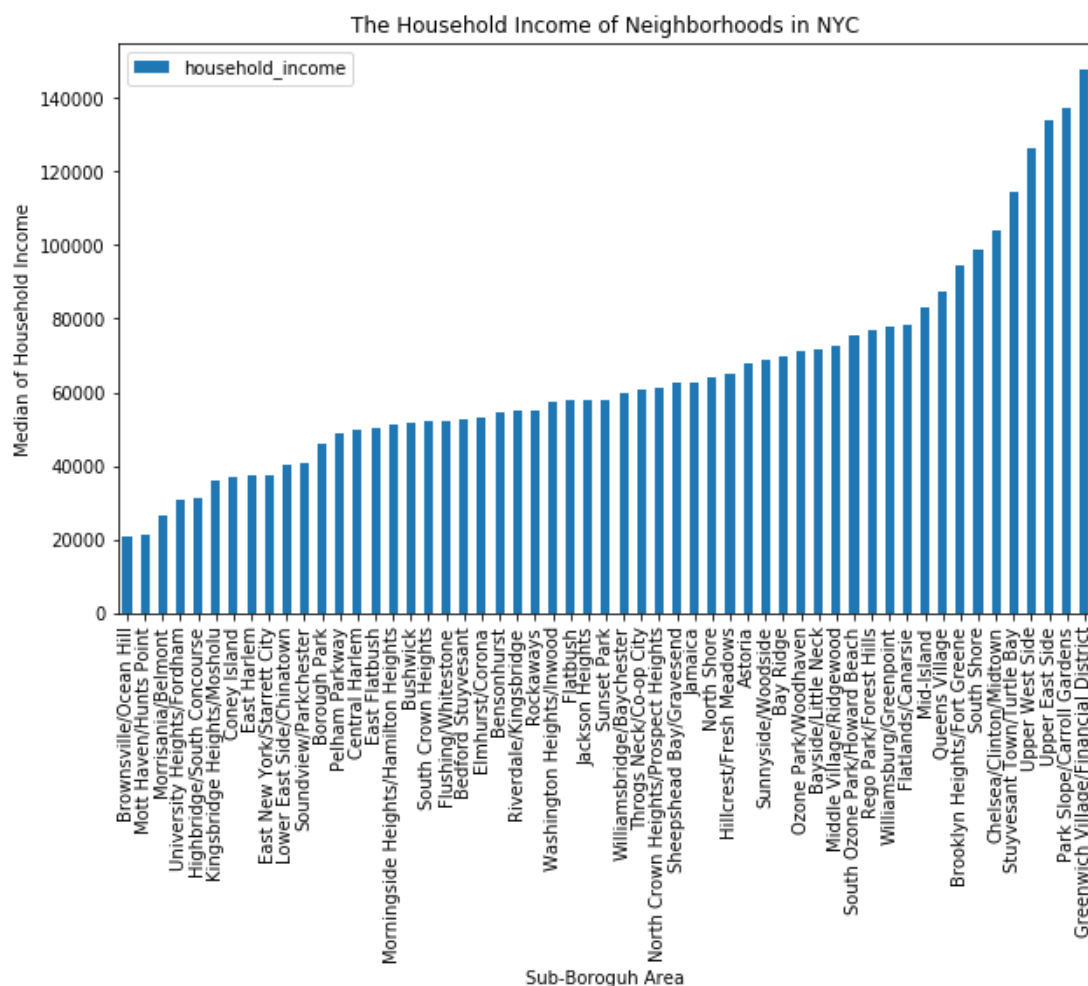
Foursquare data contains the information of venues near the interested location.

## 2.2. Analytical Approach

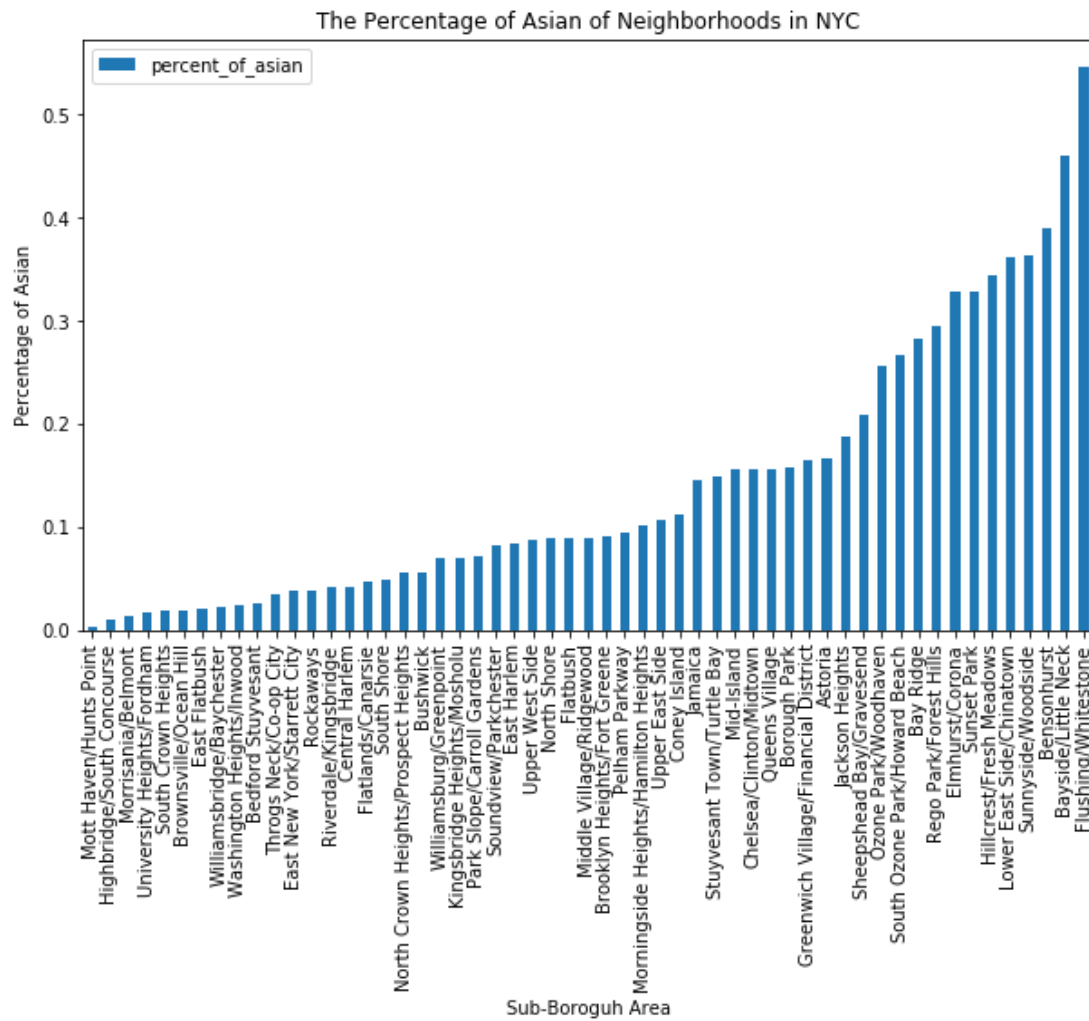
Firstly, I adopted 'geopy' to obtain the location information of each neighborhood in NYC. Secondly, I merge the demographic data of neighborhoods into the location data. Thirdly, I fetched the information of venues near neighborhoods in New York from Foursquare. Then, after merge two datasets, I adopted the algorithm-clustering to cluster neighborhoods in New York. Finally, I will give suggestions on choosing location to the client.

## 3. Results

### 3.1. The demographics of New York neighborhoods



(Figure 1. The household income of neighborhoods in NYC)



(Figure 2. The percentage of Asian in neighborhoods of NYC)

According to the bar chart, the gap of household income of New York city is quite huge. The descriptive statistics of household income of New York is shown in Table 1.

Table 1. The descriptive statistics of household income

household_income	
count	55.00
mean	64664.96
std	28139.91
min	20640.27
25%	50142.38
50%	57870.00
75%	73946.35
max	147641.00

The average percentage of Asia in New York neighborhoods is 14%. Table 2 shows the neighborhoods whose percentage of Asians is larger than 30%.

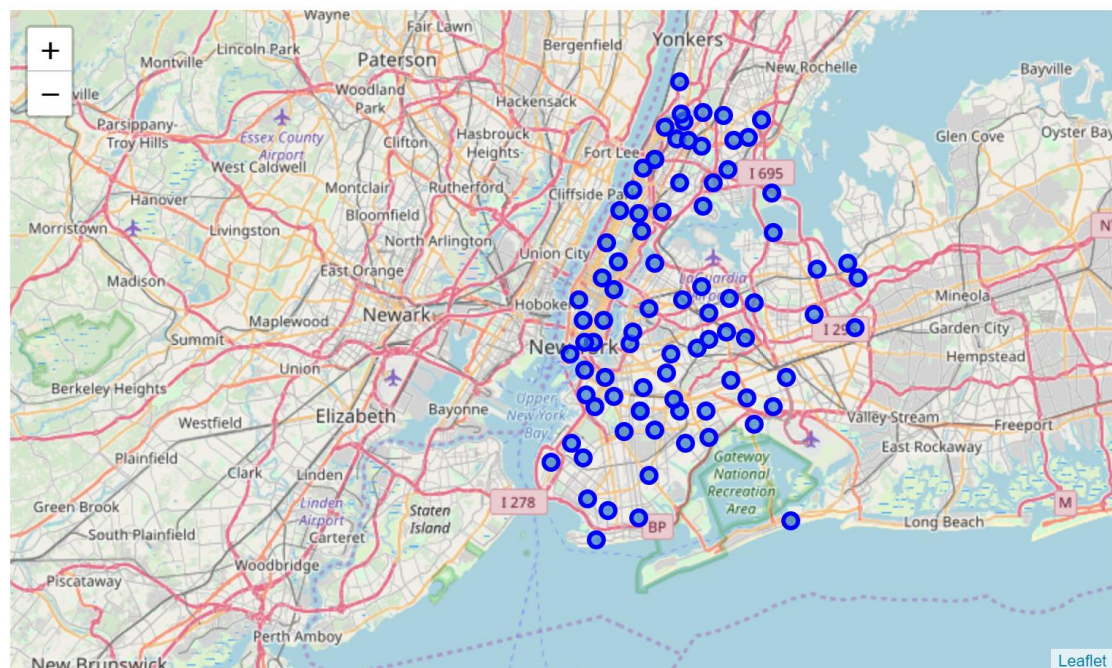
**Table 2. Neighborhoods whose percentage of Asians are larger than 30%**

Sub-Borough Area	household_income	percent_of_asian
Elmhurst/Corona	52983.550097	0.327161
Sunset Park	57869.996525	0.327252
Hillcrest/Fresh Meadows	65225.652484	0.344237
Lower East Side/Chinatown	40338.914584	0.360945
Sunnyside/Woodside	68643.617306	0.363453
Bensonhurst	54513.175976	0.388749
Bayside/Little Neck	71492.940396	0.459847
Flushing/Whitestone	52262.047684	0.545416

Based on table 1 and table 2, we can easily observe that the household income of neighborhoods whose percentage of Asians are larger than 30% always lie between the first quartile to the third quartile. The range of household income among those neighborhoods is around 20k dollars. These middle-class neighborhoods can be treated as ideal sites for the Chinese restaurant.

### 3.2. Location information of the neighborhoods

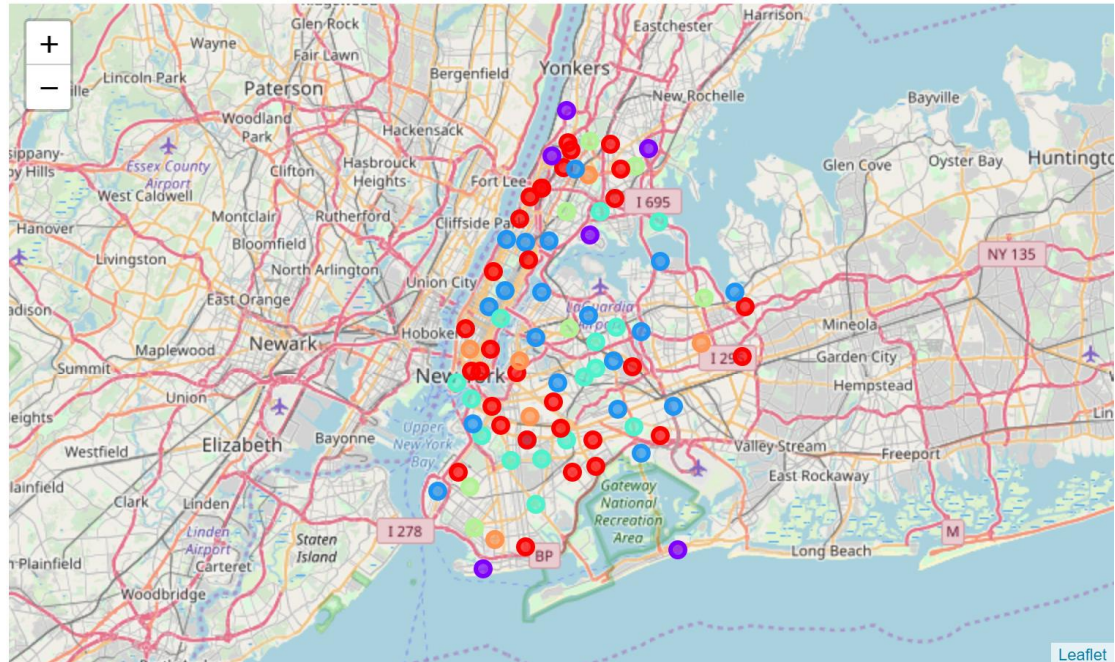
The figure 3 shows the distribution of the neighborhoods on the New York map.



(Figure 3. The neighborhoods on NY map)

### 3.3. Results of clustering analysis

In this part, after visualizing the clusters on NY map (shown in Figure 4), I further evaluate whether above neighborhoods are suitable for opening the Chinese restaurant by taking its potential competitors into account. Specifically, table 3 to table 8 illustrate the distribution of potential competitors (if any) in our interested neighborhoods.



Note:

Cluster 1: red; Cluster 2: purple; Cluster 3: blue; Cluster 4: light blue; Cluster 5: light green;  
Cluster 6: orange.

(Figure 4. The clusters of neighborhoods on NY map)

Table 3. Interested neighborhoods in the first cluster

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
Little Neck	Yoga Studio	Sandwich Place	Hotel	Chinese Restaurant	Fountain
Lower East Side	Coffee Shop	Bar	Cocktail Bar	Mexican Restaurant	Café
Chinatown	Chinese Restaurant	Bakery	Italian Restaurant	Salon / Barbershop	Vietnamese Restaurant
Sunset Park	Pizza Place	Bank	Latin American Restaurant	Tea Room	Pharmacy



**Table 4. Neighborhoods in the second cluster\***

Neighborhood	Cluster Labels	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
Hunts Point	1	Restaurant	BBQ Joint	Spanish Restaurant	Paper / Office Supplies Store	Farmers Market	Bank	Bakery	Pizza Place	Juice Bar	Waste Facility
Riverdale	1	River	Wine Shop	Shopping Mall	Park	Lawyer	Yoga Studio	Flea Market	Falafel Restaurant	Farmers Market	Fast Food Restaurant
Co-op City	1	Bus Station	Pizza Place	Liquor Store	Gift Shop	Baseball Field	Grocery Store	Park	Fast Food Restaurant	Basketball Court	Salon / Barbershop
Inwood	1	Café	Mexican Restaurant	Restaurant	Bakery	Chinese Restaurant	Deli / Bodega	Park	Frozen Yogurt Shop	Spanish Restaurant	American Restaurant
Coney Island	1	Theme Park Ride / Attraction	Pizza Place	Dessert Shop	Bar	Hot Dog Joint	Baseball Stadium	Caribbean Restaurant	Fast Food Restaurant	Scenic Lookout	Candy Store

\*There are no interested neighborhoods in the second cluster.

**Table 5. Interested neighborhoods in the third cluster**

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
Flushing	Flower Shop	Bar	Historic Site	Intersection	Bus Station
Whitestone	Dessert Shop	Food Truck	Cafe	Moving Target	Food
Hillcrest	Deli / Bodega	Italian Restaurant	Chinese Restaurant	Wine Bar	Farmers Market
Sunnyside	Deli / Bodega	Donut Shop	Sporting Goods Shop	Hotel	Clothing Store

**Table 6. Interested neighborhoods in the fourth cluster**

Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
Elmhurst	Bakery	Bubble Tea Shop	Pizza Place	Chinese Restaurant	Taiwanese Restaurant
Corona	Food Truck	Pizza Place	Latin American Restaurant	Mexican Restaurant	Grocery Store

**Table 7. Interested neighborhoods in the fifth cluster**

<b>Neighborhood</b>	<b>1st Most Common Venue</b>	<b>2nd Most Common Venue</b>	<b>3rd Most Common Venue</b>	<b>4th Most Common Venue</b>	<b>5th Most Common Venue</b>
Bayside	Pizza Place	Italian Restaurant	Asian Restaurant	Sushi Restaurant	Gas Station
Woodside	Grocery Store	Bakery	Thai Restaurant	American Restaurant	Pub
Bensonhurst	Chinese Restaurant	Pizza Place	Bank	Bakery	Cantonese Restaurant

**Table 8. Interested neighborhoods in the sixth cluster**

<b>Neighborhood</b>	<b>1st Most Common Venue</b>	<b>2nd Most Common Venue</b>	<b>3rd Most Common Venue</b>	<b>4th Most Common Venue</b>	<b>5th Most Common Venue</b>
Fresh Meadows	Bus Station	Grocery Store	Chinese Restaurant	Pharmacy	Vegetarian / Vegan Restaurant

#### 4. Suggestions

After taking the income level, ethnicity composition, and potential competitors into account, I will give following suggestions to the client.

##### 4.1 If open the restaurant in interested neighborhoods in the first cluster:

Chinatown has more Chinese restaurants than any other interested neighborhoods in the first cluster. Considering such fierce competition, I will suggest client not choose Chinatown as the site for opening Chinese restaurant.

Moreover, since the income level of Little Neck is higher than any other interested neighborhoods, which may suggest the high labor costs and leasing price.

Neighborhoods recommended: Lower East Side (\*\*\*), Sunset Park (\*\*)

##### 4.2 If open the restaurant in interested neighborhoods in the second cluster:

Neighborhoods in the second cluster is not ideal place to open the Chinese restaurant.

##### 4.3 If open the restaurant in interested neighborhoods in the third cluster:

Flushing and Whitestone possess the largest Asian population in New York City. Moreover, after analyzing the potential competitors in these areas, I found there are fewer Chinese restaurant than any other neighborhoods. These two areas are the most ideal place for opening the Chinese Restaurant.

The income level of Sunnyside is the second highest one of interested neighborhoods, which may suggest higher labor costs and leasing price.

Neighborhoods recommended: Flushing (\*\*\*\*\*), Whitestone (\*\*\*\*\*), Hillcrest (\*\*\*)

#### **4.4 If open the restaurant in interested neighborhoods in the fourth cluster:**

Elmhurst and Corona both can be the candidate site for opening the restaurant. However, the Asian population of these two places is lower than any other interested neighborhoods.

Neighborhoods recommended: Elmhurst (\*\*\*), Corona (\*\*\*)

#### **4.5 If open the restaurant in interested neighborhoods in the fifth cluster:**

Bayside and Woodside have fewer potential competitors for one to open Chinese restaurant. However, the income level of Bayside and Woodside is higher than any other interested neighborhoods, which means the labor costs and leasing price will be much higher too.

Bensonhurst is not an ideal neighborhood since there are lots of competitors.

#### **4.6 If open the restaurant in interested neighborhoods in the sixth cluster:**

Fresh Meadows can be seen as the candidate site for opening restaurant.

Neighborhoods recommended: Fresh Meadows (\*\*\*)

## **5. Limitation**

Due to the lack of data on leasing price of recommended neighborhoods, the client has to consult the leasing price of neighborhoods he/she interested to before making decision.



**References:**

[1] <https://www.webstaurantstore.com/article/40/how-to-start-a-restaurant.html>

[2] <https://www.foursquare.com>

[3] <http://app.coredata.nyc>