

# The Battle of Neighborhoods: Exploring Boston and Find the Best Place to Open a Chinese Restaurant

Jerry CHENG

June 20<sup>th</sup>, 2021

## 1. Business Problem

This project is aimed to explore Boston and find the best place for opening a restaurant. To be more specific, the project is targeted at audience with an interest of opening a Chinese restaurant in Boston, MA, USA.

Considering the competition environment, it is optimal to find a region where not so many restaurants exist, especially Chinese-style restaurants. Moreover, the closer to the city center, the more likely the restaurant can gain enough customers and profits, which is also an important consideration in this project.

A few candidate neighborhoods in Boston will be recommended. Analysis of advantages and disadvantages of these neighborhoods will be discussed in detail.

## 2. Data

According to the definition of the business problem, there are several factors that are related to our analysis:

- a. number of existing restaurants in the neighborhood*
- b. number of and distance to Chinese restaurants in the neighborhood*
- c. distance of neighborhood from city center*

Following data sources will be needed to extract/generate the required information:

- a. geographical coordinates of all the neighborhoods are obtained from the Internet*
- b. number of restaurants, the type and location in every neighborhood will be obtained using Foursquare API*
- c. coordinate of Boston center will be obtained using geopy, using the location of Faneuil Hall Marketplace in Downtown, Boston.*

## 3. Methodology

Firstly, we find the ten nearest neighborhoods in Boston from the city center. This is because we assume only when the neighborhood is near the city center, the restaurant can gain enough customers and earn profits.

Secondly, among the Top10 neighborhoods, we explore them by finding the top 100 venues that are within a radius of 500 meters. The number of venues are an important indicator of the neighborhood's living conditions.

Thirdly, among all the venues, we try to find the number of restaurants to see how competitive

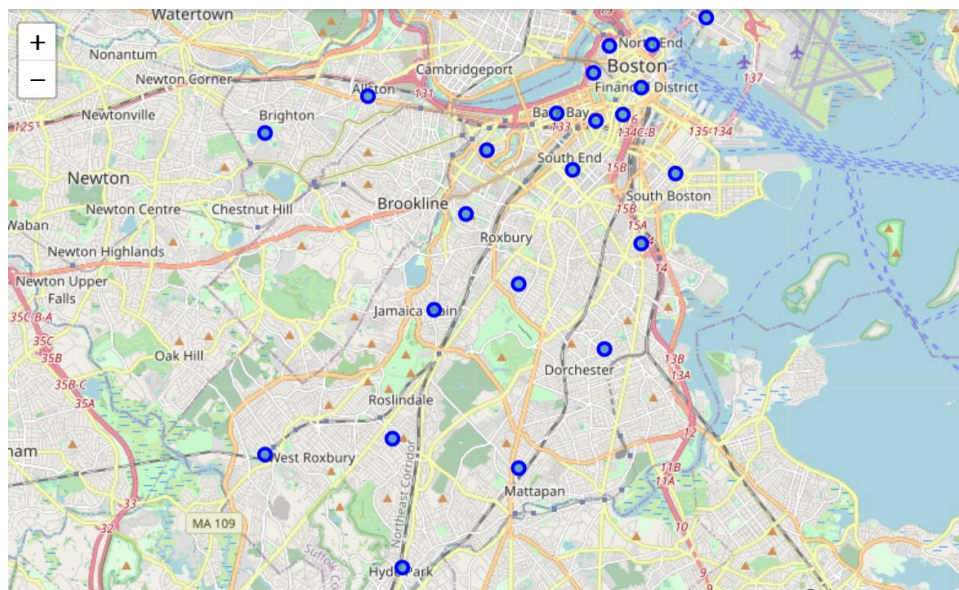
the catering industry is in the neighborhood. If the restaurants are intensely distributed in this area, then it might be hard to enter the market and earn decent profits.

Fourthly, among all the restaurants, we try to find how many of them are Chinese restaurants. If the neighborhood is already crowded with Chinese restaurants, then it is not ideal to open an alike restaurant there to make profits.

Lastly, based on these information, we develop a evaluation score which are related to the relevant variables we get previously. According to the score, we can rank the candidate neighborhood and propose several good choices for opening a Chinese restaurant.

## 4. Analysis

We first create a map of Boston with neighborhoods superimposed on top:



Then we calculate the distance between each neighborhood to the city center:

	Neighborhood	Latitude	Longitude	Distance from the City Center (KM)
0	Downtown	42.3557	-71.0572	0.478647
1	North End	42.3647	-71.0542	0.559871
2	West End	42.3644	-71.0661	1.045930
3	Chinatown	42.3501	-71.0624	1.226325
4	Beacon Hill	42.3588	-71.0707	1.288336
5	Bay Village	42.3490	-71.0698	1.697815
6	East Boston	42.3702	-71.0389	1.768092
7	Charlestown	42.3782	-71.0602	2.099208
8	Back Bay	42.3503	-71.0810	2.373688
9	South Boston	42.3381	-71.0476	2.479632

Next, we get the top 100 venues that are in the district within a radius of 500 meters. After that, find the number of restaurants and specifically, Chinese restaurants. Below are the results:

## 1. Downtown

```
[21] get_info(0)
```

```
Latitude and longitude values of Downtown are 42.3557, -71.0572.  
In Downtown 96 venues were returned by Foursquare.  
In Downtown 25 restaurants were returned by Foursquare.  
In Downtown 1 Chinese restaurants were returned by Foursquare.
```

## 2. North End

```
[22] get_info(1)
```

```
Latitude and longitude values of North End are 42.3647, -71.0542.  
In North End 84 venues were returned by Foursquare.  
In North End 30 restaurants were returned by Foursquare.  
In North End 0 Chinese restaurants were returned by Foursquare.
```

## 3. West End

```
[23] get_info(2)
```

```
Latitude and longitude values of West End are 42.3644, -71.0661.  
In West End 83 venues were returned by Foursquare.  
In West End 16 restaurants were returned by Foursquare.  
In West End 0 Chinese restaurants were returned by Foursquare.
```

## 4. Chinatown

```
[24] get_info(3)
```

```
Latitude and longitude values of Chinatown are 42.3501, -71.0624.  
In Chinatown 78 venues were returned by Foursquare.  
In Chinatown 40 restaurants were returned by Foursquare.  
In Chinatown 15 Chinese restaurants were returned by Foursquare.
```

## 5. Beacon Hill

```
[25] get_info(4)
```

```
Latitude and longitude values of Beacon Hill are 42.3588, -71.0707.  
In Beacon Hill 28 venues were returned by Foursquare.  
In Beacon Hill 5 restaurants were returned by Foursquare.  
In Beacon Hill 0 Chinese restaurants were returned by Foursquare.
```

## 6. Bay Village

```
[26] get_info(5)
```

```
Latitude and longitude values of Bay Village are 42.349, -71.0698.  
In Bay Village 66 venues were returned by Foursquare.  
In Bay Village 5 restaurants were returned by Foursquare.  
In Bay Village 0 Chinese restaurants were returned by Foursquare.
```

## 7. East Boston

```
[27] get_info(6)
```

```
Latitude and longitude values of East Boston are 42.3702, -71.0389.  
In East Boston 43 venues were returned by Foursquare.  
In East Boston 14 restaurants were returned by Foursquare.  
In East Boston 1 Chinese restaurants were returned by Foursquare.
```

## 8. Charlestown

```
[28] get_info(7)
```

```
Latitude and longitude values of Charlestown are 42.3782, -71.0602.  
In Charlestown 20 venues were returned by Foursquare.  
In Charlestown 1 restaurants were returned by Foursquare.  
In Charlestown 0 Chinese restaurants were returned by Foursquare.
```

## 9. Back Bay

```
[29] get_info(8)
```

```
Latitude and longitude values of Back Bay are 42.3503, -71.081.  
In Back Bay 93 venues were returned by Foursquare.  
In Back Bay 21 restaurants were returned by Foursquare.  
In Back Bay 0 Chinese restaurants were returned by Foursquare.
```

## 10. South Boston

```
[30] get_info(9)
```

```
Latitude and longitude values of South Boston are 42.3381, -71.0476.  
In South Boston 27 venues were returned by Foursquare.  
In South Boston 4 restaurants were returned by Foursquare.  
In South Boston 0 Chinese restaurants were returned by Foursquare.
```

Next, we calculate the Restaurants/Venues Ratio and Chinese Restaurants/Restaurants Ratio:

	Neighborhood	Restaurants/Venues Ratio	Chinese Restaurants/Restaurants Ratio
1	Downtown	0.260417	0.040000
2	West End	0.192771	0.000000
3	North End	0.357143	0.000000
4	Bay Village	0.075758	0.000000
5	Back Bay	0.225806	0.000000
6	Beacon Hill	0.178571	0.000000
7	Charlestown	0.050000	0.000000
8	South Boston	0.148148	0.000000
9	East Boston	0.325581	0.071429
10	Chinatown	0.512821	0.375000

After obtaining all the necessary variables, we try to normalize them:

	Neighborhood	Norm_Distance	Norm_#Venues	Norm_Restaurants/Venues Ratio	Norm_Chinese Restaurants/Restaurants Ratio
1	Downtown	0.000000	1.000000	0.454640	0.106667
2	West End	0.283502	0.828947	0.308480	0.000000
3	North End	0.040592	0.842105	0.663633	0.000000
4	Bay Village	0.609284	0.605263	0.055653	0.000000
5	Back Bay	0.947054	0.960526	0.379859	0.000000
6	Beacon Hill	0.404645	0.105263	0.277800	0.000000
7	Charlestown	0.809882	0.000000	0.000000	0.000000
8	South Boston	1.000000	0.092105	0.212065	0.000000
9	East Boston	0.644405	0.302632	0.595439	0.190476
10	Chinatown	0.373655	0.763158	1.000000	1.000000

Then, we define an evaluation score as negatively related to the distance from the city center, Restaurants/Venues Ratio and Chinese Restaurants/Restaurants Ratio, but positively related to the number of venues. We obtain the scores and normalize them. Below is the result:

	Neighborhood	Score
1	Downtown	1.000000
2	West End	0.901557
3	North End	0.853204
4	Bay Village	0.756798
5	Back Bay	0.607123
6	Beacon Hill	0.504255
7	Charlestown	0.390698
8	South Boston	0.239381
9	East Boston	0.235609
10	Chinatown	0.000000

## 5. Results and Discussion

According to the ranking, the Top 3 neighborhoods with score over 0.8 are Downtown, West End, and North End. These 3 neighborhoods all have a large number of venues existing, which indicates good living conditions and good for opening a high-end Chinese restaurant.

Among the venues, the number of restaurants, especially Chinese restaurant, is not so significant, which means there can be space to get profits from these 3 neighborhoods' catering industry.

For the other neighborhoods, Back Bay is good in terms of the number of venues and less competitive market, but it is too far away from the city center. Therefore, it is not ideal to open a Chinese restaurant; Chinatown is relatively close to the city center, but it already have a very competitive catering market, especially Chinese restaurants. A new Chinese restaurant may find it hard to compete against the incumbents.

## 6. Conclusion

This project is targeted at the stakeholders who want to open a Chinese restaurant in one of the neighborhoods in Boston. By first finding the ten candidate neighborhoods that are closest to the city center, we then explore these neighborhoods one by one in terms of the number of venues, restaurants and specifically Chinese restaurants.

After the analysis, we propose the Top 3 neighborhoods, i.e., Downtown, West End, North End, which are the most suitable for opening a Chinese restaurant based on the several criteria we consider. Hopefully, these recommendations can be of practical value to the people who are interested.