

# **OPENING A FRENCH RESTAURANT IN CHICAGO, IL, USA**

Aline Campos Camargo  
December 30<sup>th</sup>, 2020

# BUSINESS OBJECTIVE

## BACKGROUND

The owner of a successful French restaurant in New York is interested in opening a similar restaurant unit in Chicago, IL. The restaurant is a medium-high price tier restaurant (\$\$\$) and offers guests a more formal sit-down dining experience.

The first step in the process of opening a restaurant is identifying the most promising location. This restaurant owner is not familiar with the city of Chicago and would like to get professional guidance on what areas to consider. Chicago is a very diverse city mapped into 77 different communities for statistical purposes.

## OBJECTIVE

Identify communities in Chicago that the French Restaurant owner should prioritize when looking for a location for his first restaurant in that city.

# DATA REQUIREMENTS AND COLLECTION

This data science project aims to group Chicago communities into 5 clusters, according to the following variables:

- Population size
- Population density (per km<sup>2</sup>)
- Number of Restaurants
- Ratio Population/Restaurant
- Frequency of Restaurant Categories

All variables above were collected or calculated using information from two main sources of information:

- Wikipedia page: [https://en.wikipedia.org/wiki/Community\\_areas\\_in\\_Chicago](https://en.wikipedia.org/wiki/Community_areas_in_Chicago)
- Foursquare Places API

# DATA CLEANING AND PREPARATION

Before moving to Cluster modelling, we have performed a few important cleaning and preparation procedures:

- Removed irrelevant columns from Wikipedia table (Area columns and Density in sq mi)
- Removed all data points from the Foursquare API call result that were unrelated to eating out
- Calculated the number of restaurants/eating venues per community
- Calculated ratio Population/Restaurant count
- Calculated the frequency of each Restaurant Category in each community
- Normalized Population, Density, Restaurant Count and ratio Population/Restaurant

A couple challenges:

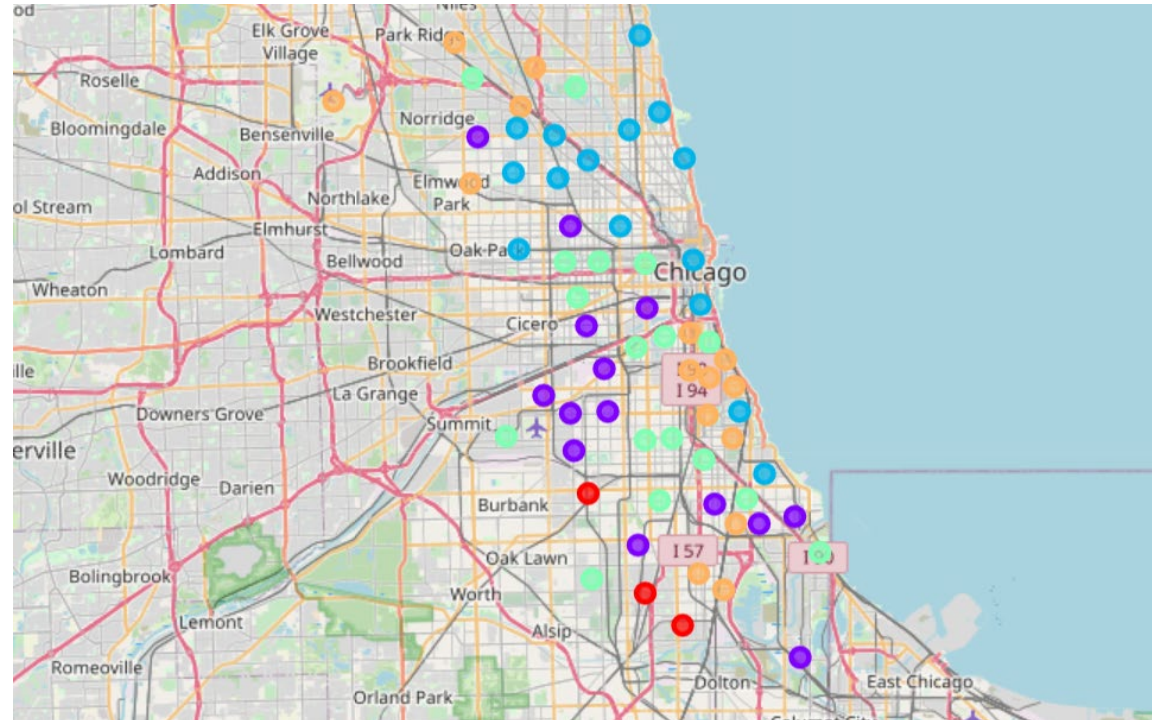
- The Foursquare API could not retrieve Restaurant information in 13 of the 77 Chicago communities
- When called against each community separately, the Foursquare API could not find the roughly 30 French Restaurants that it returns when doing a “French Restaurant” research in overall Chicago, IL using the Customer Interface of the App.

# K-MEANS CLUSTERING MODEL

After testing a K number of cluster ranging from 3 to 8, K=5 was the optimal number of clusters to model in this project. The choice of 3 clusters resulted in undefined cluster profiles, mixing communities with very different values across the 5 key features, and a choice of 6, 7 and 8 clusters resulted in more than one cluster with 1 or 2 communities only each, which was not optimal and probably an overfitting problem.

The 5 identified clusters were mapped in Chicago, IL:

- **Red dots** = Cluster 0
- **Purple dots** = Cluster 1
- **Blue dots** = Cluster 2
- **Green dots** = Cluster 3
- **Orange dots** = Cluster 4



# RESULTS ANALYSIS – Cluster 0

The first cluster (Cluster 0) has 3 communities with a high ratio of People/Restaurant compared to the entire set of 64 clustered communities (above 3<sup>rd</sup> quartile = 6,941 people/restaurant). Those communities are also located far from Chicago downtown and, based on the list of top 5 categories in those communities, there is no indication that a French restaurant would be particularly successful there.

	Community	Cluster Labels	Restaurant Count	Population	Density (/km2)	People/Restaurant	1st Category	2nd Category	3rd Category	4th Category	5th Category
1	Ashburn	0	6	43792	3479.05	7298.666667	American Restaurant	Sports Bar	Hot Dog Joint	Italian Restaurant	Yemeni Restaurant
38	Morgan Park	0	1	22394	2620.11	22394.000000	American Restaurant	Yemeni Restaurant	Food	Deli / Bodega	Dim Sum Restaurant
61	West Pullman	0	1	27742	3008.78	27742.000000	Seafood Restaurant	Yemeni Restaurant	Ethiopian Restaurant	Cuban Restaurant	Deli / Bodega

# RESULTS ANALYSIS – Cluster 1

Cluster 1, as shown below, reunites 14 communities where there seems to be high interest for Mexican food, as those are the most frequent categories of restaurants open in the region. It also seems that Caribbean, American and Fast Food are popular cuisines in those locations. I also noticed that most communities (10 out of 14) have Population values above the average of 27,284 people per community, seen across all 64 analyzed communities.

	Community	Cluster Labels	Restaurant Count	Population	Density (/km2)	People/Restaurant	1st Category	2nd Category	3rd Category	4th Category	5th Category
7	Beverly	1	1	20822	2528.12	20822.000000	Mexican Restaurant	Yemeni Restaurant	Fast Food Restaurant	Cuban Restaurant	Deli / Bodega
9	Brighton Park	1	7	44813	6361.18	6401.857143	Mexican Restaurant	Seafood Restaurant	Chinese Restaurant	Breakfast Spot	Deli / Bodega
11	Calumet Heights	1	3	13188	2909.67	4396.000000	Diner	Burger Joint	Mexican Restaurant	Yemeni Restaurant	Fast Food Restaurant
12	Chatham	1	3	31120	4073.05	10373.333333	Mexican Restaurant	Caribbean Restaurant	Yemeni Restaurant	Fast Food Restaurant	Deli / Bodega
15	Dunning	1	8	43689	4534.52	5461.125000	Mexican Restaurant	Eastern European Restaurant	Bar	American Restaurant	Seafood Restaurant
22	Gage Park	1	10	40873	7173.25	4087.300000	Mexican Restaurant	Asian Restaurant	Coffee Shop	Gay Bar	Gastropub
23	Garfield Ridge	1	6	36396	3322.12	6066.000000	Mexican Restaurant	Restaurant	Food	Ethiopian Restaurant	Cuban Restaurant
26	Hegewisch	1	1	9418	693.95	9418.000000	Mexican Restaurant	Yemeni Restaurant	Fast Food Restaurant	Cuban Restaurant	Deli / Bodega
28	Humboldt Park	1	6	56427	6051.83	9404.500000	Mexican Restaurant	Caribbean Restaurant	Taco Place	Breakfast Spot	Fast Food Restaurant
35	Lower West Side	1	21	32888	4333.83	1566.095238	Mexican Restaurant	Food	Restaurant	Taco Place	Food Court
52	South Chicago	1	7	28263	3267.19	4037.571429	Mexican Restaurant	Italian Restaurant	Caribbean Restaurant	Food	African Restaurant
53	South Lawndale	1	16	74851	6296.33	4678.187500	Mexican Restaurant	Chinese Restaurant	Diner	Restaurant	Yemeni Restaurant
57	West Elsdon	1	9	19237	6348.25	2137.444444	Mexican Restaurant	Food	American Restaurant	Chinese Restaurant	Deli / Bodega
60	West Lawn	1	14	33108	4333.24	2364.857143	Mexican Restaurant	Pizza Place	Seafood Restaurant	Food	Chinese Restaurant

# RESULTS ANALYSIS – Cluster 2

Cluster number 2 gathers 15 communities with high Population and Population Density, compared to the total averages seen across all 64 communities. It also comprises communities with diverse cuisines, indicating that restaurant guests in the area appreciate variety of food and dining experiences. This is also the cluster where European cuisine is more frequently seen in top 5 categories. This could be an indication that French cuisine – also European – could be successful in the location.

	Community	Cluster Labels	Restaurant Count	Population	Density (/km2)	People/Restaurant	1st Category	2nd Category	3rd Category	4th Category	5th Category
3	Austin	2	6	95260	5144.07	15876.666667	Southern / Soul Food Restaurant	Greek Restaurant	Breakfast Spot	Food	Taco Place
5	Avondale	2	31	37368	7286.80	1205.419355	Mexican Restaurant	Chinese Restaurant	Food	Vietnamese Restaurant	Diner
6	Belmont Cragin	2	20	79910	7890.90	3995.500000	Mexican Restaurant	Restaurant	American Restaurant	Food	Eastern European Restaurant
27	Hermosa	2	17	24144	7967.57	1420.235294	Mexican Restaurant	Restaurant	Latin American Restaurant	American Restaurant	Pizza Place
29	Hyde Park	2	14	26827	6433.52	1916.214286	Food	Japanese Restaurant	Mexican Restaurant	American Restaurant	Gastropub
30	Irving Park	2	19	54606	6568.06	2874.000000	Food	Pizza Place	Mexican Restaurant	Chinese Restaurant	Mediterranean Restaurant
33	Lincoln Park	2	15	67710	8273.10	4514.000000	Chinese Restaurant	Bagel Shop	Noodle House	Scandinavian Restaurant	Seafood Restaurant
34	Loop	2	46	35880	8395.97	780.000000	Food	Chinese Restaurant	American Restaurant	Italian Restaurant	Restaurant
40	Near South Side	2	48	23620	5123.44	492.083333	Chinese Restaurant	Food	Asian Restaurant	American Restaurant	Cantonese Restaurant
42	North Center	2	19	35789	6740.59	1883.631579	Chinese Restaurant	Thai Restaurant	Latin American Restaurant	American Restaurant	Mexican Restaurant
48	Portage Park	2	10	64307	6285.84	6430.700000	Chinese Restaurant	Restaurant	Italian Restaurant	Mexican Restaurant	Latin American Restaurant
50	Rogers Park	2	20	55062	11554.11	2753.100000	Food	Mexican Restaurant	Chinese Restaurant	American Restaurant	Wings Joint
54	South Shore	2	11	50418	6643.86	4583.454545	Food	African Restaurant	Breakfast Spot	Gay Bar	Mexican Restaurant
55	Uptown	2	47	57973	9648.06	1233.468085	Vietnamese Restaurant	Food	Chinese Restaurant	African Restaurant	American Restaurant
62	West Town	2	25	84502	7123.67	3380.080000	Latin American Restaurant	Mexican Restaurant	Caribbean Restaurant	Ukrainian Restaurant	Food



# RESULTS ANALYSIS – Cluster 3

Cluster number 3 reunites 17 communities. Population, Density and People/Restaurant values vary across communities, not showing any patterns regarding those numerical features. Cuisines in this area seem concentrated around General and American Food, Fast Food and Delis, as well as Cuban and Asian Food. Those cuisines are generally very different from French cuisine, so this is probably not a strong location for a French restaurant.

	Community	Cluster Labels	Restaurant Count	Population	Density (/km2)	People/Restaurant	1st Category	2nd Category	3rd Category	4th Category	5th Category
2	Auburn Gresham	3	8	46278	4739.53	5784.750000	Food	Southern / Soul Food Restaurant	Chinese Restaurant	Mexican Restaurant	American Restaurant
4	Avalon Park	3	5	9985	3084.18	1997.000000	Food	Fast Food Restaurant	Diner	Comfort Food Restaurant	Gay Bar
8	Bridgeport	3	10	33637	6214.03	3363.700000	Food	American Restaurant	Restaurant	Asian Restaurant	Japanese Restaurant
13	Clearing	3	4	25891	3920.22	6472.750000	Food	Pizza Place	Asian Restaurant	Latin American Restaurant	Fast Food Restaurant
14	Douglas	3	3	20781	4862.78	6927.000000	African Restaurant	Café	Food	German Restaurant	Gay Bar
16	East Garfield Park	3	4	19996	4000.26	4999.000000	Food	Diner	Fast Food Restaurant	Cuban Restaurant	Deli / Bodega
17	East Side	3	3	23737	3075.47	7912.333333	Food	Bar	Italian Restaurant	Deli / Bodega	Dim Sum Restaurant
19	Englewood	3	3	25075	3153.59	8358.333333	Food	Restaurant	Ethiopian Restaurant	Comfort Food Restaurant	Cuban Restaurant
25	Greater Grand Crossing	3	4	31766	3454.91	7941.500000	Food	Southern / Soul Food Restaurant	Yemeni Restaurant	Ethiopian Restaurant	Cuban Restaurant
36	McKinley Park	3	7	15767	4317.50	2252.428571	Food	Diner	American Restaurant	Chinese Restaurant	Fast Food Restaurant
39	Mount Greenwood	3	4	19277	2746.45	4819.250000	Food	Breakfast Spot	Italian Restaurant	Mexican Restaurant	Deli / Bodega
41	Near West Side	3	9	62872	4266.26	6985.777778	Food	Mexican Restaurant	Fast Food Restaurant	American Restaurant	Italian Restaurant
43	North Lawndale	3	2	35947	4323.74	17973.500000	Food	Fast Food Restaurant	Cuban Restaurant	Deli / Bodega	Dim Sum Restaurant
44	North Park	3	13	18842	2886.88	1449.384615	Food	Korean Restaurant	Yemeni Restaurant	American Restaurant	Chinese Restaurant
45	Norwood Park	3	7	37089	3276.92	5298.428571	Pizza Place	Diner	Latin American Restaurant	Eastern European Restaurant	Food
58	West Englewood	3	4	29929	3668.46	7482.250000	Food	American Restaurant	Fast Food Restaurant	Yemeni Restaurant	Deli / Bodega
59	West Garfield Park	3	5	17163	5177.09	3432.600000	Food	Taco Place	Coffee Shop	Ethiopian Restaurant	Cuban Restaurant

# RESULTS ANALYSIS – Cluster 4

The last Cluster, number 4, comprises 15 communities with a concentration of American, Southern and Fast Food, as well as Chinese, Middle Eastern and African Food. Population in those communities are below average. Similarly, the average number of people per restaurant seems generally below average. This may be an indication that the area is already filled with many restaurants and opening a new dining venue there could be more challenging.

	Community	Cluster Labels	Restaurant Count	Population	Density (/km2)	People/Restaurant	1st Category	2nd Category	3rd Category	4th Category	5th Category
0	Armour Square	4	6	13455	5195.00	2242.500000	Chinese Restaurant	Food	Fast Food Restaurant	American Restaurant	Deli / Bodega
10	Burnside	4	1	2254	1426.68	2254.000000	Comfort Food Restaurant	Fast Food Restaurant	Cuban Restaurant	Deli / Bodega	Dim Sum Restaurant
18	Edison Park	4	1	11605	1635.30	11605.000000	Steakhouse	Yemeni Restaurant	Ethiopian Restaurant	Cuban Restaurant	Deli / Bodega
20	Forest Glen	4	4	19019	2294.78	4754.750000	Restaurant	Indian Restaurant	Chinese Restaurant	Yemeni Restaurant	Ethiopian Restaurant
21	Fuller Park	4	4	2439	1326.34	609.750000	Fast Food Restaurant	Italian Restaurant	Diner	Southern / Soul Food Restaurant	Ethiopian Restaurant
24	Grand Boulevard	4	8	22313	4951.20	2789.125000	Southern / Soul Food Restaurant	Chinese Restaurant	BBQ Joint	Restaurant	Caribbean Restaurant
31	Jefferson Park	4	7	26808	4442.33	3829.714286	Chinese Restaurant	Restaurant	Middle Eastern Restaurant	Food	Eastern European Restaurant
32	Kenwood	4	3	17189	6381.45	5729.666667	Chinese Restaurant	Caribbean Restaurant	BBQ Joint	Yemeni Restaurant	Fast Food Restaurant
37	Montclare	4	5	13830	5393.73	2766.000000	Restaurant	Mexican Restaurant	Pizza Place	Eastern European Restaurant	Ethiopian Restaurant
46	O'Hare	4	6	12377	358.23	2062.833333	Bar	Sports Bar	Greek Restaurant	Italian Restaurant	Pub
47	Oakland	4	4	6645	4423.53	1661.250000	Restaurant	Caribbean Restaurant	BBQ Joint	Southern / Soul Food Restaurant	Ethiopian Restaurant
49	Pullman	4	4	6613	1204.38	1653.250000	Mexican Restaurant	Fast Food Restaurant	Diner	Restaurant	Cuban Restaurant
51	Roseland	4	3	42433	3399.06	14144.333333	Chinese Restaurant	Southern / Soul Food Restaurant	Fast Food Restaurant	Gay Bar	Gastropub
56	Washington Park	4	3	11502	2921.68	3834.000000	American Restaurant	Chinese Restaurant	Restaurant	Yemeni Restaurant	Ethiopian Restaurant
63	Woodlawn	4	5	23268	4340.01	4653.600000	Fast Food Restaurant	American Restaurant	Caribbean Restaurant	Diner	Restaurant

# CONCLUSION

**Cluster number 2** seems to be the most promising for opening a French Restaurant.

*Cluster 2 communities: Austin, Avondale, Belmont Cragin, Hermosa, Hyde Park, Irving Park, Lincoln Park, Loop, Near South Side, North Center, Portage Park, Rogers Park, South Shore, Uptown, West Town.*

- In this Cluster, the diversity of cuisines and a distinct higher presence of European cuisines not found in the other four clusters, seem to indicate that people living, working and/or visiting the area are interested in various food tastes and therefore more curious to try a new restaurant in the area with European origins.
- This is also a cluster of communities with large Population and high population Density, which is a promising situation for opening a new restaurant and having better chances of a higher daily occupancy, which is a crucial metric for any restaurant trying to sustain its business.

In all other clusters there was either an indication that a more formal French dining experience would not be successful, with casual and fast dining experiences being at the top 5 restaurant categories, or small Population and Population/Restaurant ratio that could present an occupancy problem for a new restaurant in their locations.

# NEXT STEPS

I recommend the French Restaurant owner to supplement this analysis with additional research:

- Understand potential in the 13 communities not covered by the Foursquare Places API
- Conduct a more focused study on French Restaurants in Chicago
- Engage a Customer Research company to collect customer data, particularly income, average value spent in dining experiences, cuisine preferences, and opinion about existing French Restaurants in Chicago.

The analysis presented in this report, combined with this recommended future customer research, would equip the French Restaurant owner with quality information to make educated decisions about what communities he could more actively start exploring to open a restaurant in Chicago, IL, USA.