Best Place to Open an Indian Restaurant in Chicago? - A Data Science Solution

- Sushanth Sreenivasa Babu

1. Introduction

Chicago is one of the most popular metropolises in the USA, and the city's demographics show that it is ethnically diverse. The city has seen several advancements in terms of culture and tradition because of the growth in fields like performing arts, improvisational comedy, music and most importantly **food!**

The famous deep-dish pizza is one of Chicago's finest dishes. The city is additionally known for various popular culinary dishes, including the Chicago-style hot dog and the Italian beef sandwich. With its diverse culture, comes diverse food taste [1]. There are many restaurants in Chicago, each belonging to different categories such as Chinese, Indian, and Italian etc.

Chicago is a highly developed city as a result, the cost of doing business is also equally high. Any new business venture or expansion needs to be analyzed carefully. The insights derived from this analysis should give sufficient high-level understanding of the business environment in the city. This would help an investor strategically target the market to reduce risk and invest in areas where the Return on Investment would be reasonable.

1.a Business Problem

Chicago is famous for its diverse cuisine. Its food culture includes an array of international cuisines influenced by the city's immigrant history.

Indian restaurants have become so popular in the United States now that you can find one in every corner, not only in major cities but also in smaller cities. Starting an Indian restaurant can be a great business opportunity, but you need to distinguish yourself from others to enjoy long-term success.

If you plan to open a restaurant that can demand higher prices for fresh spices, delivered daily from India, focus on neighborhoods and outlets that already attract a sophisticated Indian client. If you plan a cheap buffet restaurant, point to the masses looking for affordable high-traffic locations with large shopping centers which do not have many Indian restaurants nearby.

We define the potential neighborhoods based on the number of Indian restaurants which are operating in each neighborhood. Chicago has full potential but is also an extremely challenging city to open a business because of the high competition. New Indian restaurants should ideally open in areas where they are not in plenty so that they can attract more customers. Hence, this analysis must ensure that we find places that are not close to other Indian restaurants so that we can attract a good amount of customers.

Best Place to Open an Indian Restaurant in Chicago? - A Data Science Solution

- Sushanth Sreenivasa Babu

1.b Data Description

The following data sources have been used for this analysis:

- We found the data that contains a list of districts, zip codes and neighborhoods in Chicago [2]
- We used Foursquare API to get the most common venues of a given district in Chicago [3]
- The Geopy Python library was used to map the co-ordinates with each zip code [4]

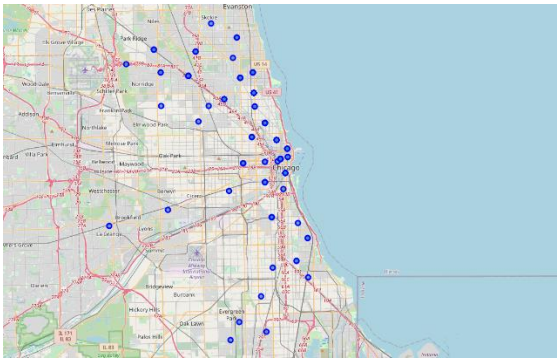
2. Methodology

Let us scrape the data from the web page [1] that contains information about the districts, zip codes and neighborhoods in Chicago. Now that we have our details in place, let us add the latitude and longitude co-ordinates to our data. A sample of the final data set is shown below.

	Zip Code	District	Neighborhood	Latitude	Longitude
0	60611	Downtown	Cathedral District	41.895350	-87.622775
1	60605	Downtown	Central Station	41.869490	-87.625855
2	60605	Downtown	Dearborn Park	41.869490	-87.625855
3	60610	Downtown	Gold Coast	41.904230	-87.638225
4	60601	Downtown	Loop	41.886255	-87.622310

The **geocoder** has successfully assigned co-ordinates to each of our zip codes. The geographical coordinate of Chicago are 41.8755616, -87.6244212. The data now can be visualized to be represented on a map of Chicago.

We shall use Python's **folium** library to visualize geographic details of Chicago and its popular neighborhoods. A map of Chicago is created with its districts superimposed on top using latitude and longitude values to get the visual below.

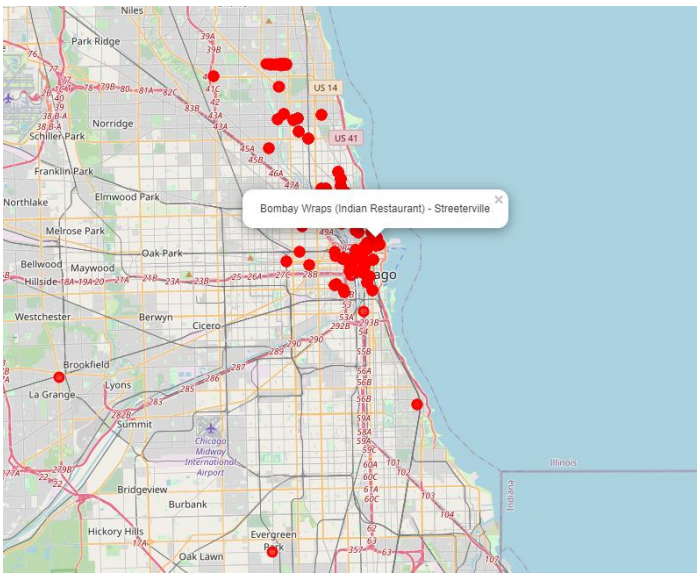


Best Place to Open an Indian Restaurant in Chicago? - A Data Science Solution

Now, let us use **Foursquare API** to explore the districts in Chicago which already have Indian restaurants. The API returns all the Indian restaurants in Chicago and the Neighborhood that they belong to. Our analysis shows us that there are **2103** Indian cuisine restaurants in the city. The sample of the data set is as below.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
1514	Burr Ridge	41.884250	-87.632450	Masala	41.881260	-87.629799	Indian Restaurant
2077	Chinatown	41.859805	-87.654565	Chapati	41.864732	-87.645936	Indian Restaurant
1560	Downers Grove	41.884250	-87.632450	Karma kitchen	41.889451	-87.637105	Indian Restaurant
514	Highwood	41.884250	-87.632450	Village Restaurant	41.878339	-87.639298	Indian Restaurant
377	Deerfield	41.884250	-87.632450	Naansense	41.885663	-87.634073	Indian Restaurant
1652	Hinsdale	41.884250	-87.632450	Baba's Village	41.885122	-87.631552	Indian Restaurant
1778	Oak Brook	41.884250	-87.632450	Curried Mobile Food Truck	41.885562	-87.633820	Food Truck

This data set helps us to look at all the Indian restaurants in Chicago. We can use this to visualize the map below that displays the most popular Indian restaurants and their neighborhood.



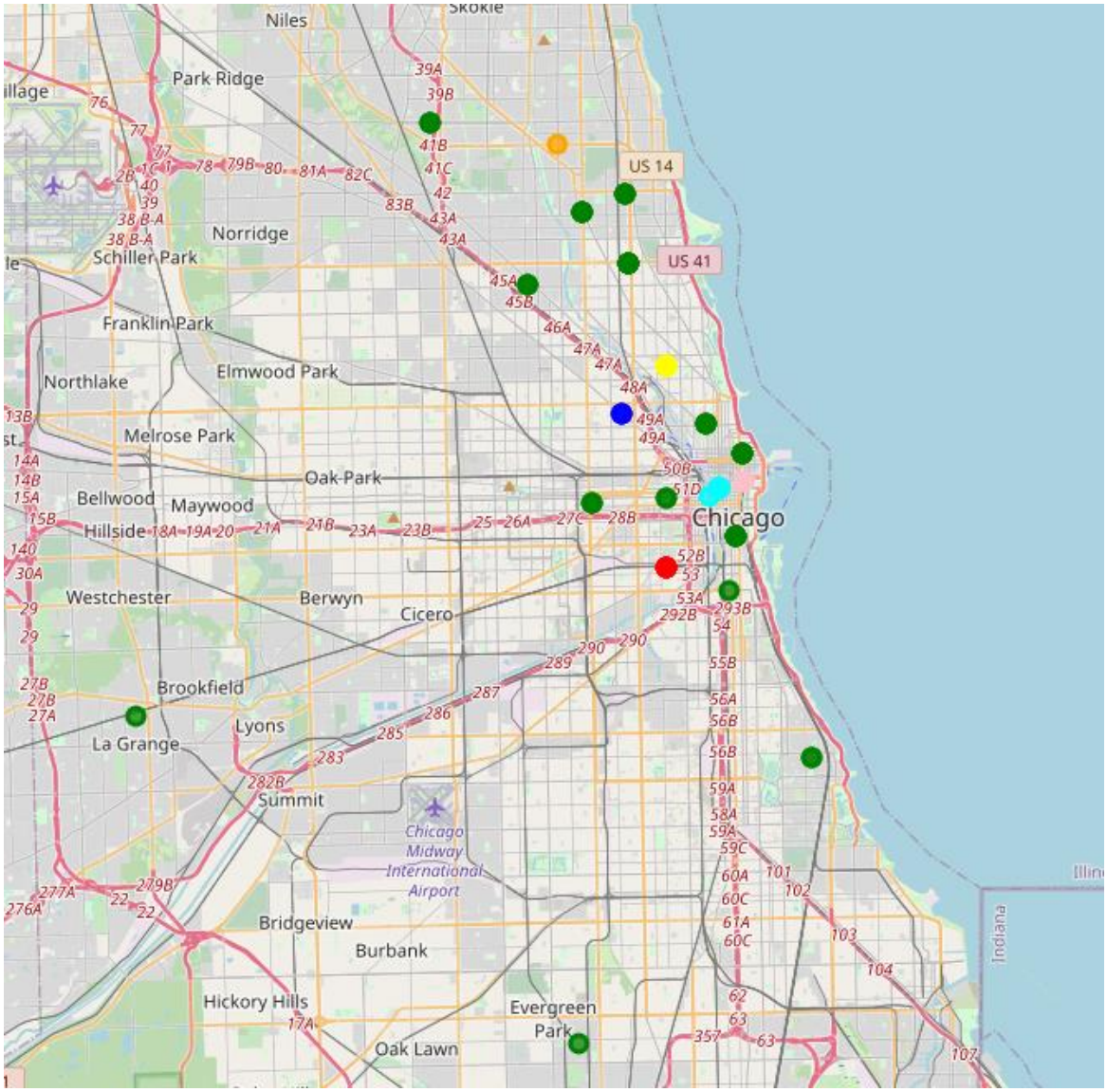
On further analysis, we found out that the Indian restaurants in Chicago are divided in **8** sub-categories in the Foursquare App. The 8 sub-categories are:

1. Indian Restaurant
2. South Indian Restaurant
3. North Indian Restaurant
4. Indian Pubs
5. Indian Chinese Restaurant
6. Food Truck
7. Halal Restaurant
8. Pakistani Restaurant

Best Place to Open an Indian Restaurant in Chicago? - A Data Science Solution

- Sushanth Sreenivasa Babu

We will now use one-hot encoding to cluster the neighborhoods in our web scraped data set, based on the similarity of the Indian restaurants and their sub-categories present in them. The Machine Learning algorithm K-means clustering comes in handy now. The neighborhoods are clustered into different colors based on the similarity of the Indian restaurants in each of them. Let us visualize this on the map of Chicago.



3. Discussion

The algorithm has now clustered the neighborhoods based on the similarity and number of restaurants in each of them. Due to Chicago's diverse nature and the limitations of the Foursquare API, different approaches can be tried for clustering and classification studies. Moreover, it is obvious that other classification methods can yield higher quality results for this city.

Best Place to Open an Indian Restaurant in Chicago? - A Data Science Solution

- Sushanth Sreenivasa Babu

With my current budding knowledge about Data Science, I used K-means algorithm to get these results. This can be used to get a high-level understanding of the areas in where an Indian restaurant can be opened.

4. Results

The clusters in **green** represent similar neighborhoods with a good amount of Indian restaurants. The ones in **cyan** are neighborhoods having an adequate number of these Indian Restaurants. The **red**, **blue**, **yellow** and **orange** clusters have limited Indian restaurants.

5. Conclusion

Our analysis set out to get the most ideal locations to open up an Indian Restaurant. The goal of our analysis was to find places that are not close to other Indian restaurants so that we can attract a good amount of customers.

As evident from the above analysis, the **green** and **cyan** clusters have the highest amount of competition. Opening up a restaurant in these neighborhoods will be a risky job.

The **red**, **blue**, **yellow** and **orange** clusters is where investors should look at for setting up an Indian restaurant as there is less competition when compared to the other neighborhoods.

Zip Code	District	Neighborhood	Color
60659	Far North Side	Peterson Park	Orange
60622	Downtown	Noble Square	Blue
60622	Downtown	River West	Blue
60622	Downtown	Wicker Park	Blue
60608	South Side	Bridgeport	Red
60608	South Side	Chinatown	Red
60608	South Side	Lawndale	Red
60608	South Side	Little Village	Red
60608	South Side	McKinley Park	Red
60608	South Side	Pilsen	Red
60614	North Side	Bucktown	Yellow
60614	North Side	DePaul	Yellow
60614	North Side	Old Town Triangle	Yellow
60614	North Side	ParkÂ West	Yellow
60614	North Side	Ranch Triangle	Yellow
60614	North Side	Sheffield	Yellow
60614	North Side	West DePaul	Yellow
60614	North Side	Wrightwood Neighbors	Yellow

The image on the above shows the neighborhoods where our analysis has predicted that Indian restaurants would be successful. The **orange** area would be the most ideal neighborhood according to our analysis. This analysis can be further studied by

Best Place to Open an Indian Restaurant in Chicago? - A Data Science Solution

- Sushanth Sreenivasa Babu

incorporating crime data, population density, ethnicity and other factors to determine the ideal neighborhood for opening up an Indian restaurant.

We have made this analysis just based on the number of Indian restaurants in the neighborhood.

6. References

- [1] Chicago - Wikipedia: https://en.wikipedia.org/wiki/Chicago
- [2] Chicago - Dreamtown: https://www.dreamtown.com/maps/chicago-zipcode-map
- [3] Foursquare API: https://foursquare.com/developers/apps
- [4] Geopy Library: https://pypi.org/project/geopy/