

Pardes India Inc.

Optimal Location for opening an Indian Restaurant

in

Vicinity of Schaumburg, IL

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Introduction

"Pardes India Inc." is a large Indian restaurant chain operating out of Mid-West USA. They already have few restaurants in Chicago metropolitan area and are looking to open Indian restaurants in many Chicago Suburbs. One of the key area they want to explore is Northwest suburb of Chicago and they have identified few suburbs in vicinity of Schaumburg IL. This area has sizeable Indian population and they believe opening an Indian restaurant there is a great business opportunity.

Schaumburg IL, is a suburb in the Northwest of Chicago. It is a multi-cultural suburb, famous for Woodfield Mall and has offices of many multi-national corporations. "Pardes India Inc." wants to identify a right location which is not crowded with Indian restaurants and has reasonable Indian population and the household income of the area is on higher side. Hence we will find locations that are good candidates for opening a new Indian restaurant.

Data

For this project, we used different sources of data. Some of this data was obtained by scraping various websites and some of it was fetched by using Foursquare API.

First, we identified the suburbs in the vicinity of Schaumburg. Next we got all the unique zip codes in these suburbs. Then, we got some demographic details about these zip codes and finally we got the restaurant details in the identified zip codes. While collecting this information, we also got location coordinates of suburbs, zip codes as well as of the restaurants.

We used following sources to get the needed data.

- Scrape Zipmat.net to get the zip codes for areas in vicinity of Schaumburg, IL.
- Scrape zipdatamaps.com to get the Asian Population percentage, Total Population and Median Household income of each Zip Code.
- Geopy "geocode.Geolake" to get the location coordinates for suburb and each zip code.
- Geopy "geocode.Nominatim" to get the addresses from the location coordinates.
- Use Foursquare API's to get the list of all restaurants and identify whether a restaurant is India or not.

Methodology

In this project, we identified the zip codes in vicinity of Schaumburg that have low density of Indian restaurants. We also got the demographic details of each zip code to ensure we have enough Indian/Asian population in the zip code. Given that Indian cuisine is typically little costlier than other cuisines, we will also check the median Household Income in each zip code. and and the community.

In the first step, we will get the location details of all the suburbs we wanted to explore. And, with each suburb we got the details of all zip codes in the suburb. In case, zip code was part of more than one suburb, we assigned it to the suburb which was nearest to it. We also scraped the population of the zip code, percentage of Asian population as well as the Median Household income.

In the second step, we did analysis to find the density of all restaurants as well as density of Indian restaurants in each zip code. We also used maps (including Heat maps) to identify few promising areas.

In the third step, we identified zip codes that have less density of Indian restaurants (less than 5%), where household Income is greater than 70K and Asian Population is at least 5% of the total population.

Finally, we clustered these locations to identified the center of addresses that can be used to do further analysis to pinpoint exact location for Indian Restaurant in discussion with the stakeholders.

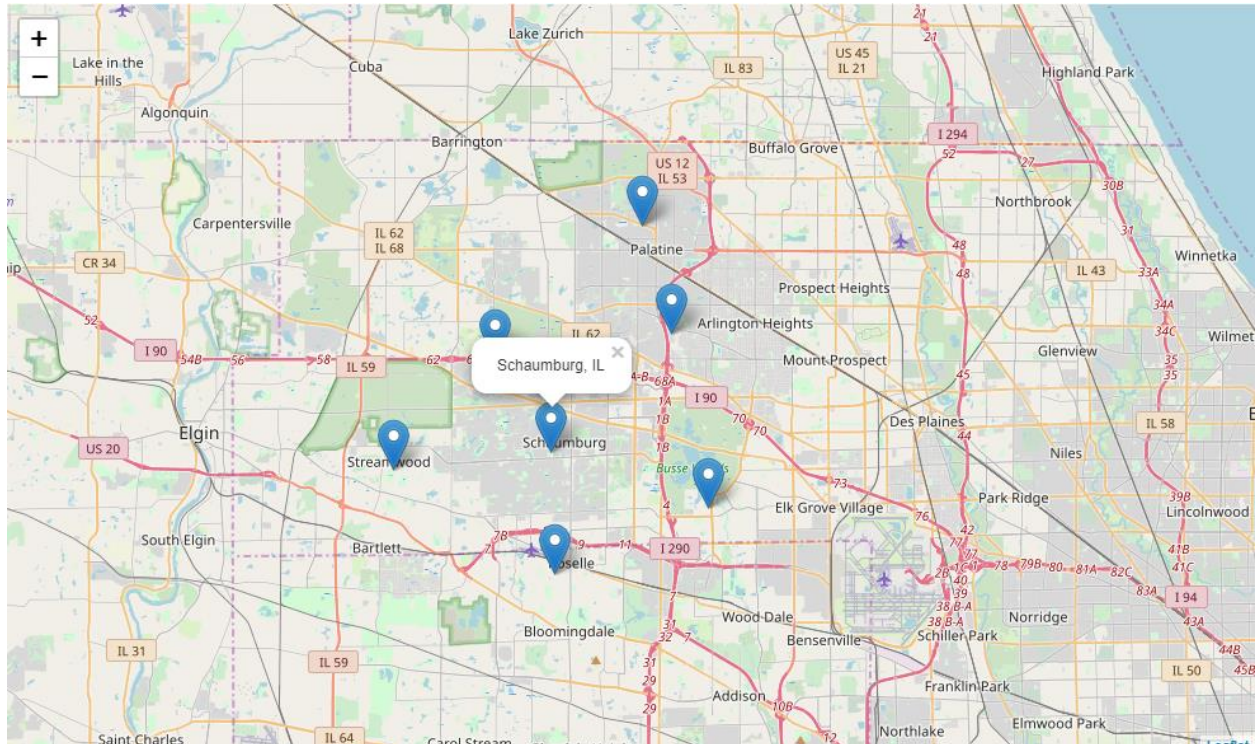
Data Analysis

Data Collection - Areas to Explore

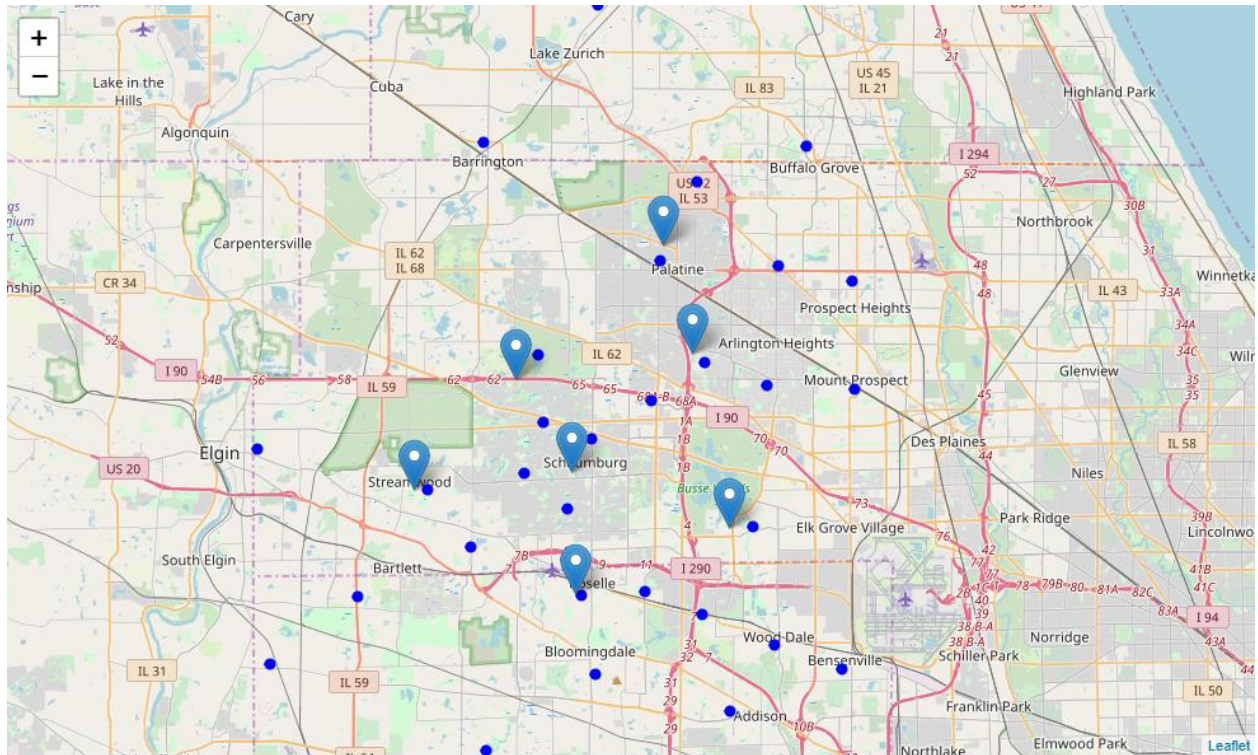
First we found which suburbs are in the vicinity of Schaumburg, IL. Quick Wikipedia search showed following 7 suburbs in the vicinity.

Schaumburg, Hoffman Estates, Streamwood, Roselle, Elk Grove Village, Rolling Meadows and Palatine

For these suburbs, we got the latitude and longitude details and plotted them on a map.



Next, we got the unique zip codes in these suburbs. We got 30 unique zip codes and average zip codes per suburb was 4.29. We also plotted these zip codes on map to see how they align with suburbs.

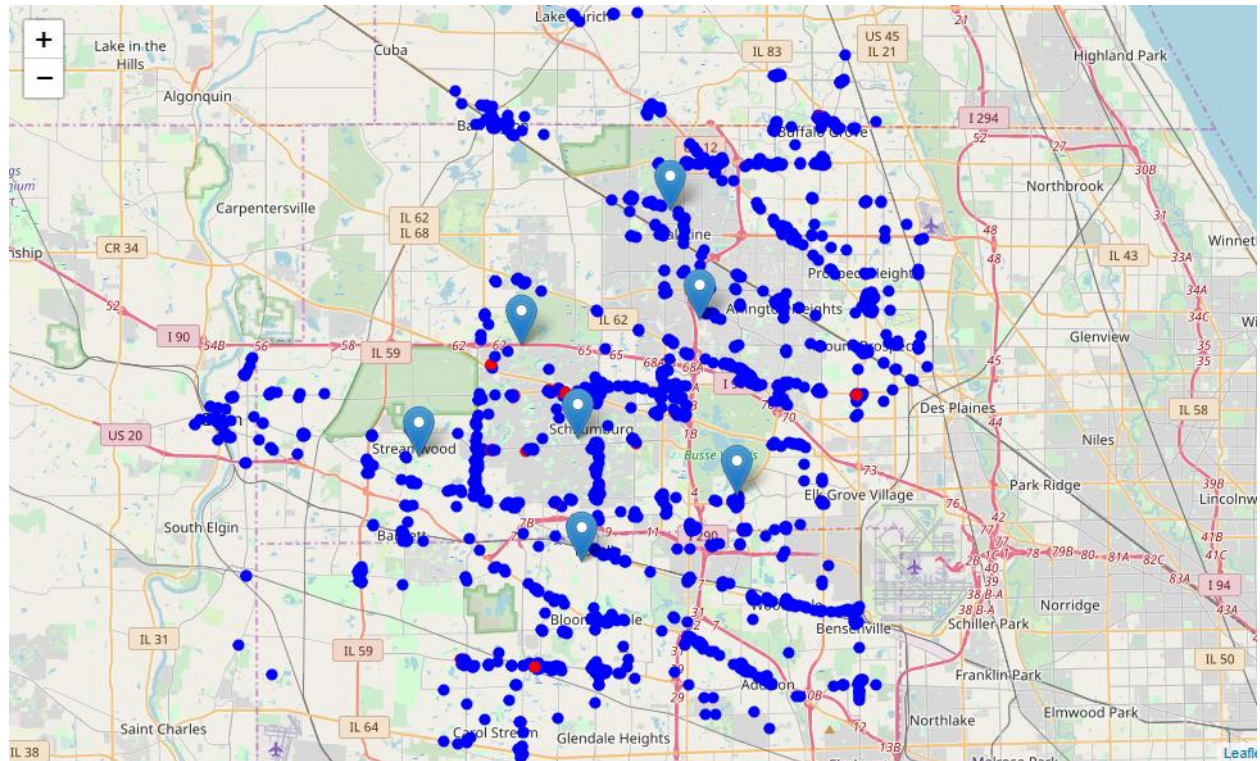


We also got some demographic information (Total Population, Asian Population and Median Household income for these zip codes.

Suburb	Suburb Latitude	Suburb Longitude	Zip Code	Latitude	Longitude	Address	Distance from Suburb Center	Distance from Center	Asian Population	Total Population	Household Median Income
Elk Grove Village, IL	42.006304	-88.005855	60191	41.9602	-87.9810	Wood Dale, US	5519.642413	12216.170165	4.41	14310	71567
Hoffman Estates, IL	42.065890	-88.121643	60169	42.0493	-88.1065	Hoffman Estates, US	2228.640339	4924.124896	23.59	33847	63780
Hoffman Estates, IL	42.065890	-88.121643	60192	42.0428	-88.0798	Hoffman Estates, US	4309.923768	3119.554152	28.29	16343	108651
Hoffman Estates, IL	42.065890	-88.121643	60195	42.0764	-88.1093	Schaumburg, US	1551.207998	5450.085925	38.03	4769	83358
Palatine, IL	42.119485	-88.041359	60004	42.1120	-87.9792	Arlington Heights, US	5207.375760	8272.669875	8.35	50582	83431
Palatine, IL	42.119485	-88.041359	60010	42.1614	-88.1383	Barrington, US	9268.193450	13681.636887	10.34	44095	133572
Palatine, IL	42.119485	-88.041359	60047	42.2165	-88.0769	Lake Zurich, US	11169.116825	17753.694608	8.55	41669	125778
Palatine, IL	42.119485	-88.041359	60067	42.1139	-88.0429	Palatine, US	633.311587	6213.475959	14.38	38585	90474
Palatine, IL	42.119485	-88.041359	60074	42.1458	-88.0230	Palatine, US	3293.585446	9961.831594	12.97	38985	72946
Palatine, IL	42.119485	-88.041359	60089	42.1598	-87.9644	Buffalo Grove, US	7780.084556	13253.194850	17.81	41533	101576

Finally, we got list of restaurants in those zip codes within 3KM radius of and also identified the Indian restaurants among them.

We plotted on map “all restaurants” and “Indian restaurants” to see where they are located. Indian restaurants were marked in “red” while all others were marked in “blue”.



We found there are large number of restaurants in these zip codes and Indian restaurants constitute only 2.26%.

Total number of restaurants: 1413

Total number of Indian restaurants: 32

Percentage of Indian restaurants: 2.26%

Average number of restaurants in Zip Code: 47.10

Analyze the Data

Following data analysis was performed to

- Find how many restaurants are in each zip code and their minimum and average distance from center of zip code.
- Find how many Indian restaurants are in each zip code and their minimum and average distance from center of zip code.
- Calculate the percentage of Indian restaurants in each Zip Code
- Plot the heat map of all restaurants and Indian restaurants only.

We found that most of the zip codes had more than 50 restaurants and the average distance of all restaurants was 571m from the center of zip code.

Zip Code	Num of All Restaurants	Min Distance from Zip	Avg Distance from Zip
60047	11	2099	2366.0
60056	73	75	1781.0
60067	49	299	1362.0
60070	40	658	2081.0
60074	68	413	1638.0
60089	77	286	1810.0
60101	53	520	1634.0
60103	32	105	1340.0
60106	42	587	1671.0
60107	55	1098	2130.0
60108	85	615	1674.0
60120	59	286	1812.0
60133	45	615	1608.0
60143	31	568	1754.0
60157	41	560	2196.0

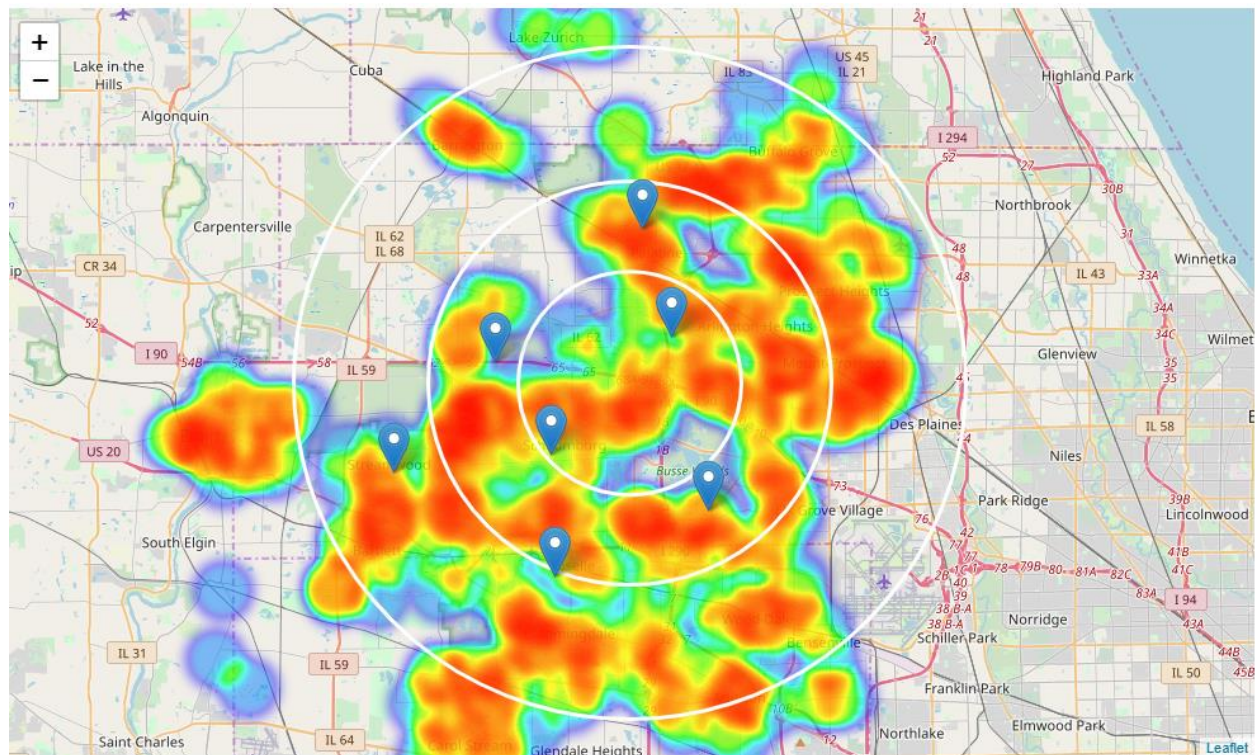
We also found that Indian restaurants were located only in 11 of 30 zip codes and zip code 60169 has 12 Indian restaurants (40%) of all Indian restaurants in all zip codes. We also found average distance of Indian restaurants was 1368m from the center of zip codes.

Zip Code	Num of Indian Restaurants	Min Distance from Zip-Indian	Avg Distance from Zip-Indian
60056	1	1749	1749.0
60074	2	744	904.0
60089	2	362	1047.0
60107	1	2023	2023.0
60157	1	2178	2178.0
60169	12	91	1045.0
60173	2	1262	1742.0
60188	2	2989	2990.0
60192	3	708	1548.0
60193	3	1228	1649.0
60194	3	1719	1993.0

We calculated the percentage of Indian restaurants in zip codes where they exist. Zip code 60169 has 24% Indian restaurants. Overall there were 4 zip codes where percentage of Indian restaurants is more than 5%.

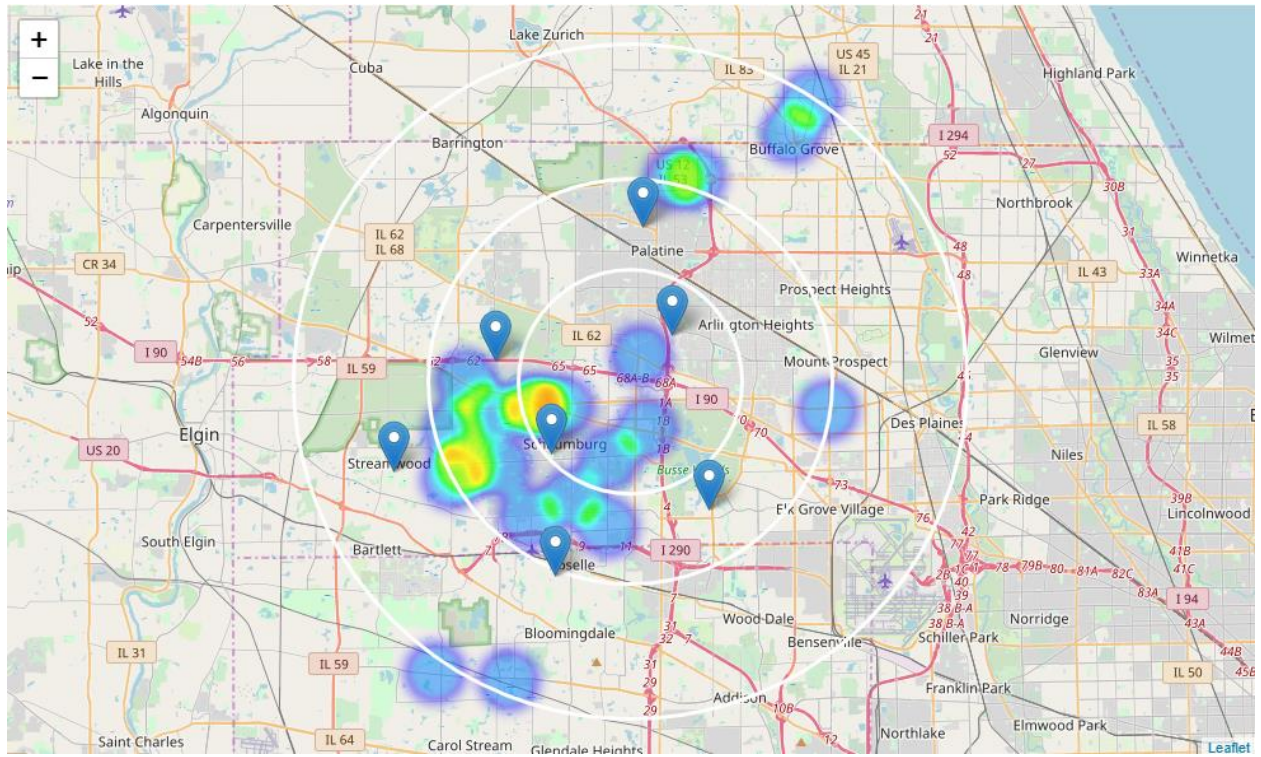
Zip Code	Num of All Restaurants	Min Distance from Zip	Avg Distance from Zip	Num of Indian Restaurants	Min Distance from Zip-Indian	Avg Distance from Zip-Indian	Percent of Indian Restaurants
60056	73	75	1781.0	1.0	1749.0	1749.0	1.37
60074	68	413	1638.0	2.0	744.0	904.0	2.94
60089	77	286	1810.0	2.0	362.0	1047.0	2.60
60107	55	1098	2130.0	1.0	2023.0	2023.0	1.82
60157	41	560	2196.0	1.0	2178.0	2178.0	2.44
60169	49	88	1269.0	12.0	91.0	1045.0	24.49
60173	79	294	1396.0	2.0	1262.0	1742.0	2.53
60188	56	298	2235.0	2.0	2989.0	2990.0	3.57
60192	46	109	1107.0	3.0	708.0	1548.0	6.52
60193	51	1003	1496.0	3.0	1228.0	1649.0	5.88
60194	19	394	2073.0	3.0	1719.0	1993.0	15.79

We plotted heat maps of all restaurants to see the density of restaurants.



We noticed there aren't many restaurants in north east of Schaumburg.

We also plotted heat map of Indian restaurants and noticed that most of the restaurants are located in the triangle of Schaumburg, Hoffman Estates and Streamwood.



Identify the candidate locations

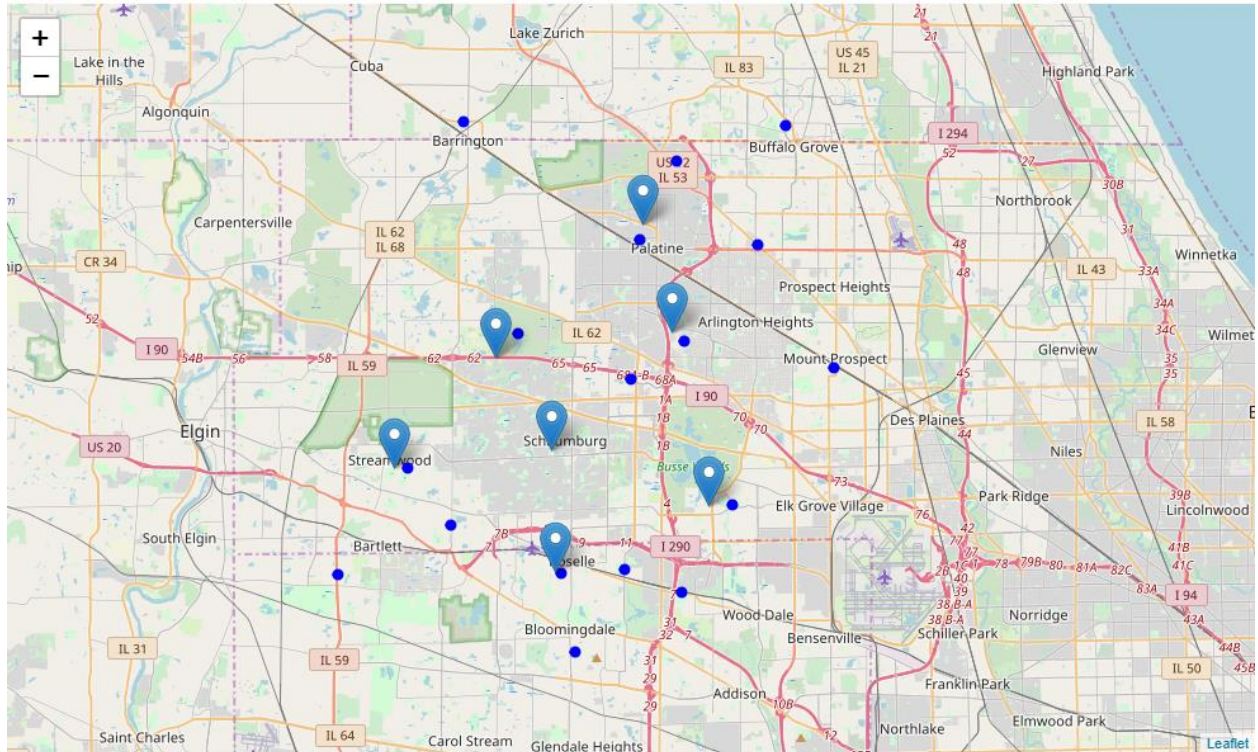
Next we narrowed zip codes on following criteria.

- Percentage of Indian restaurants is less than 3%
- Asian population is more than 5% of total population
- Household Median Income is above 70K

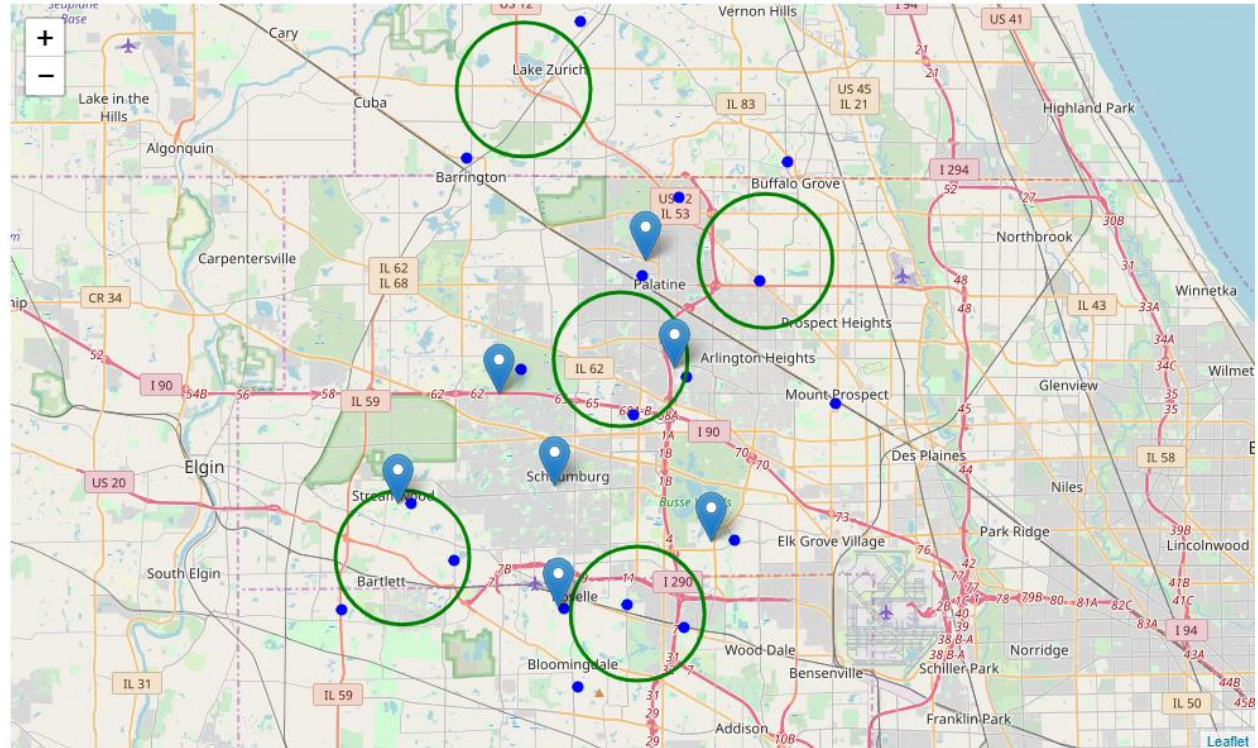
We got 18 zip codes that match the above criteria.

Zip Code	Asian Population	Household Median Income	Percent of Indian Restaurants
60007	10.59	75743	0.00
60143	7.44	88031	0.00
60157	5.05	77536	2.44
60195	38.03	83358	0.00
60004	8.35	83431	0.00
60010	10.34	133572	0.00
60047	8.55	125778	0.00
60067	14.38	90474	0.00
60074	12.97	72946	2.94
60089	17.81	101576	2.60
60008	7.32	70132	0.00
60056	12.03	70205	1.37
60173	31.31	73178	2.53
60108	13.77	84403	0.00
60172	8.22	78867	0.00
60103	15.40	101001	0.00
60107	15.22	80741	1.82
60133	15.09	76945	0.00

We plotted these zip codes on the map to get sense of how far they from each suburb.



We applied clustering on the location coordinates of these 18 zip codes to get 5 zones that can be candidates for opening a new location and plotted them on a map.



Finally, we got address of center of these 5 zones. This will be the starting point for stakeholders to make final decision after considering other criteria's as well.

Address of locations around which Indian restaurants can be opened

2684, Mill Creek Lane, Rolling Meadows, Cook County, Illinois, 60008
448, East Lake Street, Streamwood, Cook County, Illinois, 60107
MB Financial Bank, Rand Road, Lake Zurich, Lake County, Illinois, 60047
2460, North Douglas Avenue, Arlington Heights, Cook County, Illinois, 60004
Terrace Drive, Medinah, DuPage County, Illinois, 60157

Results and Discussion

Our Analysis shows there are 30 unique zip codes in suburbs in the vicinity of Schaumburg. These zip codes have close to 1400 restaurants. Of these there are only 32 Indian restaurants, which constitute 2.26% of all restaurants. Average number of restaurants in each zip code is around 47. Average distance of restaurants from center of zip code is 571m.

Of the 30 zip codes only 11 zip codes have Indian restaurants and average distance of these restaurants from center of zip code is 1368m.

Highest number of restaurants were detected in all directions from Schaumburg center except in North West. Indian restaurants are mostly concentrated in a triangle of Schaumburg, Hoffman Estates and Streamwood. We also looked the demographics of the zip codes to get the total population, percentage of Asian Population and Median Household Income.

We then narrowed down the number of zip codes to where percentage of Indian restaurants is less than 3%, Asian population is at least 5% and Median Household income is greater than 70K. This identified 18 target zip codes. We then clustered these zip codes to identify centers of points of interest. We also get the address of these centers by reverse geocoding.

Result of all this analysis is 5 zones which can be used as a starting point for finding the best location for opening an Indian restaurant. However, this is only an initial analysis and should be further analyzed by looking at other data e.g., crime rate, age grouping, education, commercial activity, real estate, fun areas etc. of the zip codes. Additional analysis might lead to different conclusions.

Conclusion

Purpose of this project was to identify areas in vicinity of Schaumburg with low number of Indian restaurants to help "Pardes India Inc." in narrowing down the search for optimal location for a new Indian restaurant. By calculating restaurant density distribution from Foursquare data we have first identified zip codes that warrant further analysis. Clustering of these zip codes was performed to create major zones of interest and addresses of those zone centers were created to be used as starting points for final exploration.

Final decision on optimal restaurant location will be made by stakeholders based on specific characteristics of neighborhoods and locations in every recommended zone, taking into consideration additional factors listed above.