

Where to start an Indian Restaurant in Silicon Valley, California.

1. Introduction

1.1 Description and Discussion of the background

As every computer engineer dream land Silicon Valley, let's explore where to start an Indian restaurant by analyzing Indian population and Indian restaurants in the dream land. It is a region in the southern part of the San Francisco Bay Area in Northern California that serves as a global center for high technology, innovation, venture capital, and social media. Major Silicon Valley cities are multi-cultural, we are going to analyze the situation in the following cities San Jose, Sunnyvale, Santa Clara, Mountain View, Palo Alto and Cupertino^[1]. There are 4 million people in Silicon Valley out of which around 6% people are Immigrants from India^[2].

As we can see from the above, there are around 2,40,000 people are Indians. They are scattered all over the major cities in Silicon Valley. They are living far away from their native there is a high chance for them to miss their authentic native food. There is a strong belief that Indians never failed to show their love towards the food and they look for the same in their locality. Let's think of it by investor, they expect to prefer a place where the Indians are more and Indian restaurants is less.

When we consider all these problems, we can create a map and information chart where the Indian restaurants is less with respective to Indian population and each restaurant is clustered according to its type in the respective cities. We are going to analyze and report the best locality where one can start an Indian restaurant in the valley.

1.2 Target People

- Entrepreneurs who want to start a new business in Silicon Valley
- Established vendors who want to open a new chain of their Indian restaurant in Silicon Valley

2. Data Description

To solve the above problem, we retrieved data from the source as listed below:

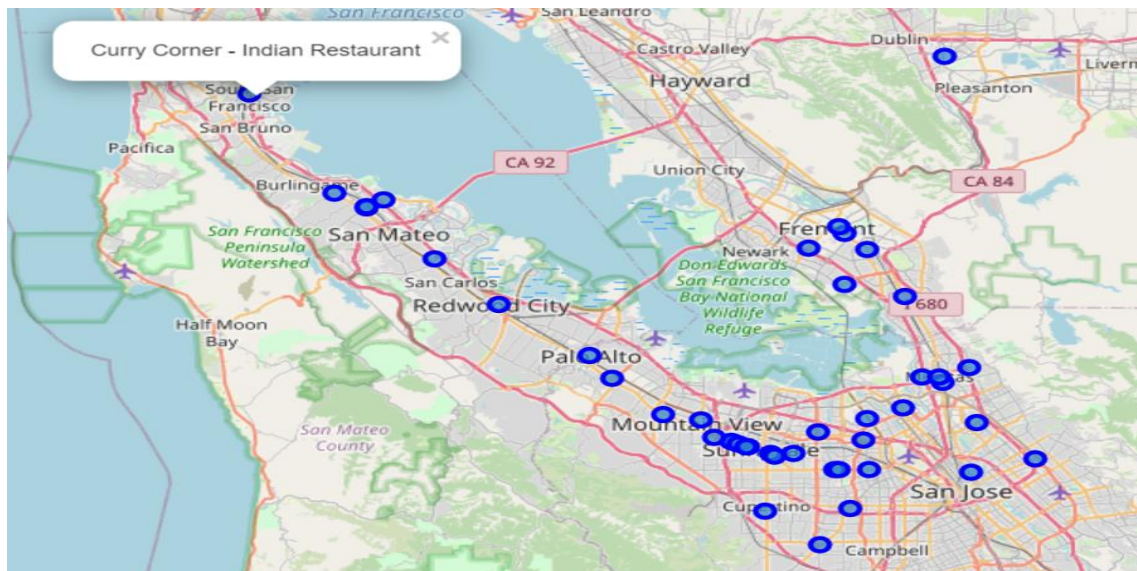
1. **geopy API** is used in this project to get the latitude and longitude coordinates of the respected cities.
2. **Forsquare API** is used to get the Indian restaurant venues around Silicon Valley.
3. **Google Map**, 'Search Nearby' option is used to get the center coordinates of each restaurants^[3].
4. California population data is retrieved from **zipatlas.com**^[4].

3. Methodology

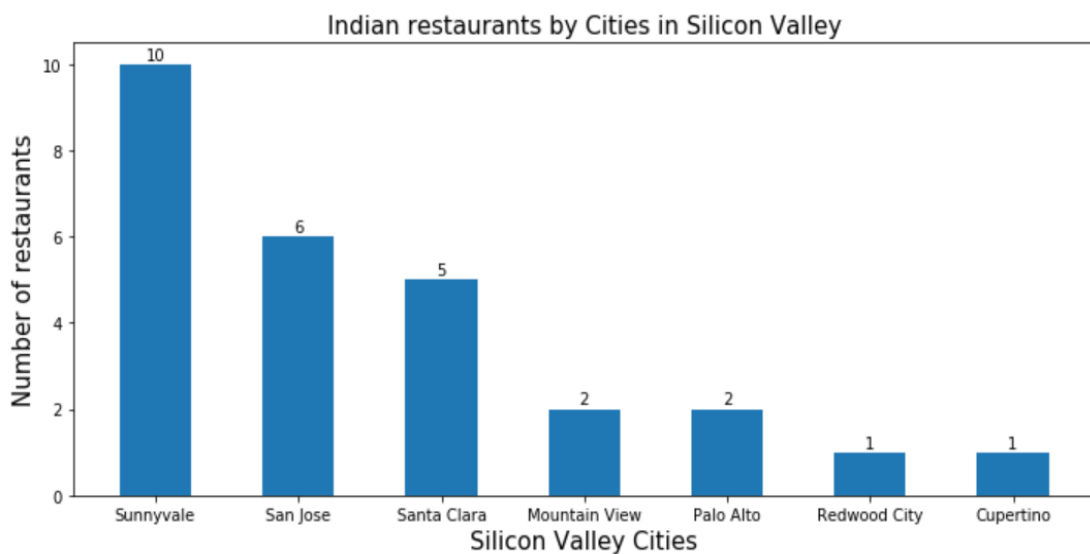
The restaurant's master data has the information about the restaurant's Name, Category, City, Latitude and Longitude.

	name	categories	city	lat	lng
0	Ettan	Indian Restaurant	Palo Alto	37.445351	-122.161423
1	Dosa Hut	Indian Restaurant	Fremont	37.544289	-121.975863
2	Puranpoli	Indian Restaurant	Santa Clara	37.376860	-121.961360
3	Avachi Biryani House	Indian Restaurant	Cupertino	37.319220	-122.033050
4	Coconut Hill Indian Foods	Indian Restaurant	Fremont	37.492994	-121.931690
5	Kasa Indian Eatery	Indian Restaurant	Redwood City	37.486640	-122.227670
6	Vishnuji Ki Rasoi	Indian Restaurant	Sunnyvale	37.365801	-122.028654
7	Palamuru Grill	South Indian Restaurant	Santa Clara	37.352790	-121.957810
8	Red Hot Chilli Pepper	Indian Chinese Restaurant	Fremont	37.503264	-121.976208
9	Urban Momos	Indian Chinese Restaurant	San Mateo	37.565662	-122.322770
10	Naan & Curry	North Indian Restaurant	San Jose	37.321388	-121.971973

Python folium library is used to visualize geographic details of Silicon Valley. The map is created with the help of latitude and longitude values by superimposing Indian restaurants on top. The visuals are as below:



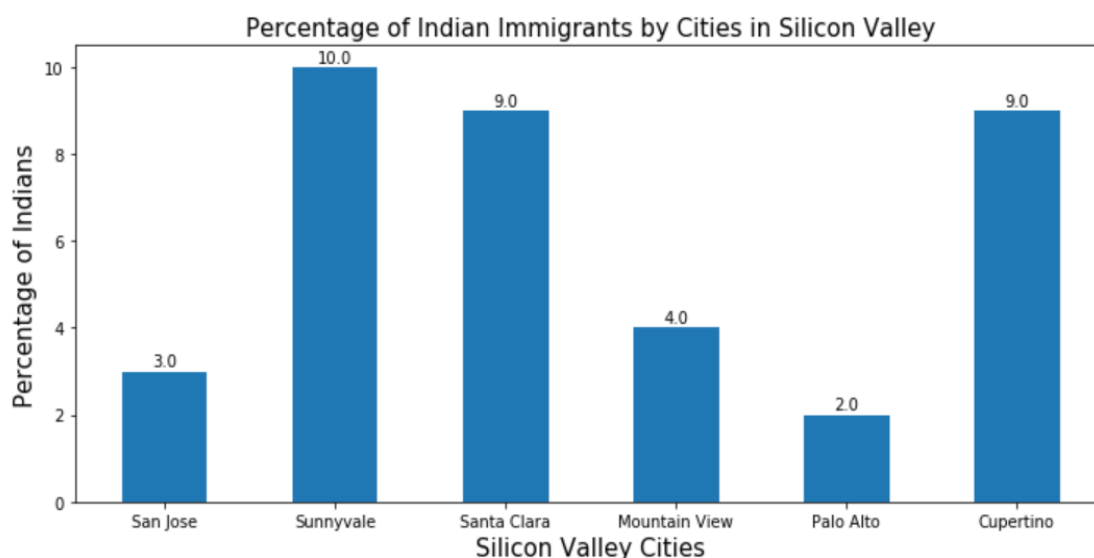
The Foursquare API is used to explore the Indian restaurants in Silicon Valley. Here is the bar chart to explore the number of restaurants with respect to the cities. By examine the below chart Sunnyvale has a greater number of Indian restaurants and Cupertino has only one Indian restaurant.



The population's master data has the information of total population, Indians percentage and Indian population with respect to each city.

	cities	total_population	indians_percentage	indians_population
0	San Jose	930193.0	3.0	27906.0
1	Sunnyvale	131018.0	10.0	13102.0
2	Santa Clara	102320.0	9.0	9209.0
3	Mountain View	73424.0	4.0	2937.0
4	Palo Alto	87857.0	2.0	1757.0

The below bar chart holds the information of Indian population with respected cities. By observing the chart Sunnyvale holds the maximum number of Indian populations, Santa Clara and Cupertino stands next to it. In Palo Alto Indian population is very less comparatively among these cities.



There are 3 different type of Indian restaurants are there in the Silicon Valley. India is diversified country there are different types of food habits are following here. Some set of people like general Indian restaurants, some set of people particularly like north Indian or south Indian restaurants respectively. To find out what types of restaurants are mostly there in the Silicon Valley. We are going to use K-means algorithm to cluster the restaurant type in each city. K-Means algorithm is one of the most common cluster methods of unsupervised learning.

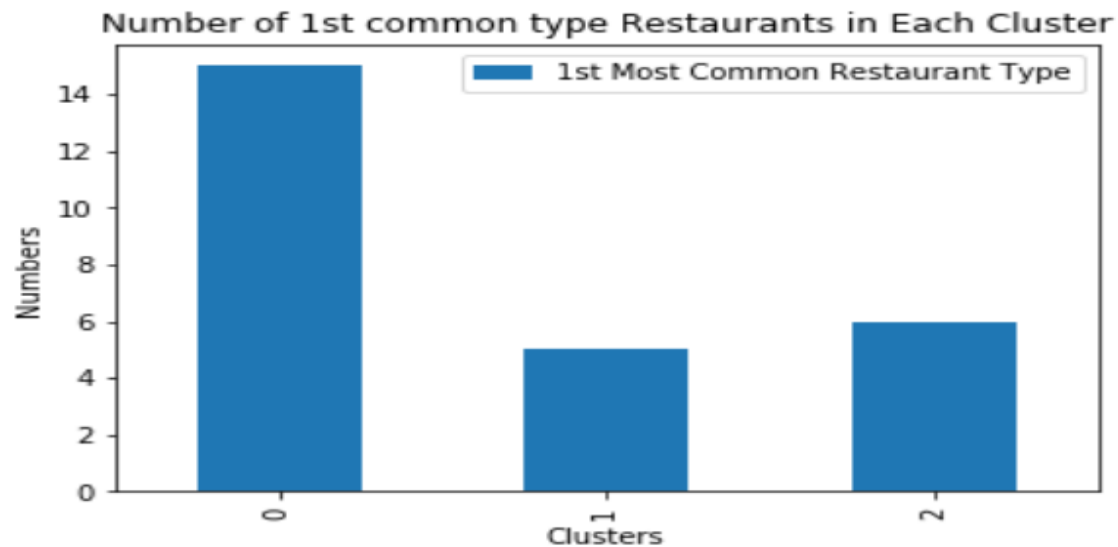
	cities	1st Most Common Restaurant Type	2nd Most Common Restaurant Type	3rd Most Common Restaurant Type
0	Cupertino	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
1	Mountain View	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
2	Palo Alto	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
3	San Jose	Indian Restaurant	North Indian Restaurant	South Indian Restaurant
4	Santa Clara	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
5	Sunnyvale	Indian Restaurant	South Indian Restaurant	North Indian Restaurant

The above table holds the head results of the combine data of both cities and common restaurant type. By the elbow method, we determined 3 is optimum. We are going to run the K-Means algorithm with 3 clusters.

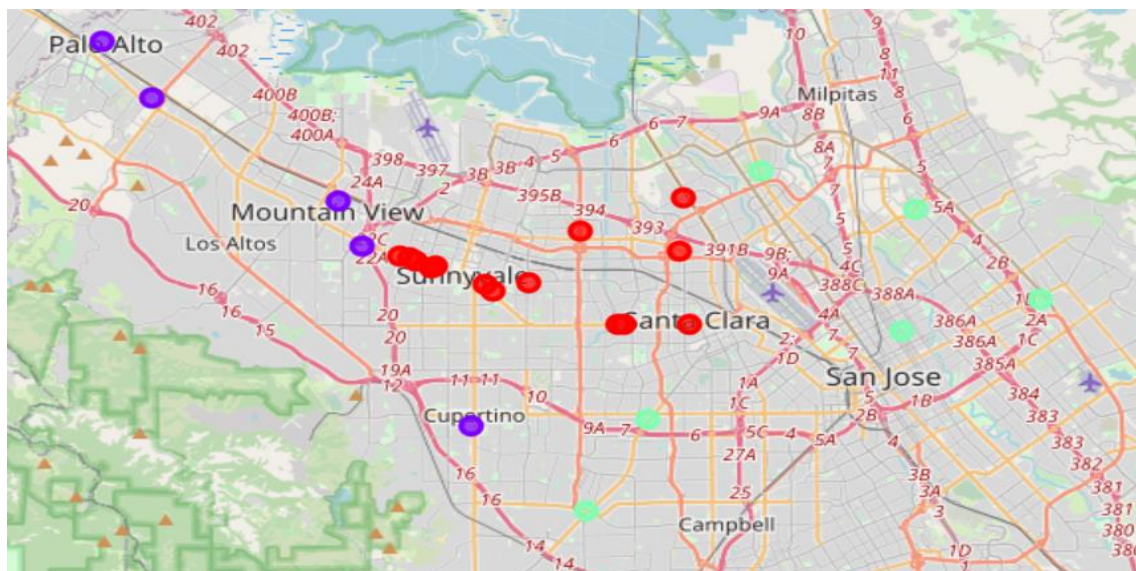
Here is the merged table with cluster labels for each city

	cities	lat	lng	Cluster Labels	1st Most Common Restaurant Type	2nd Most Common Restaurant Type	3rd Most Common Restaurant Type
	Palo Alto	37.445351	-122.161423	1.0	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
	Santa Clara	37.376860	-121.961360	0.0	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
	San Jose	37.321388	-121.971973	2.0	Indian Restaurant	North Indian Restaurant	South Indian Restaurant
	Cupertino	37.319220	-122.033050	1.0	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
	Santa Clara	37.394322	-121.959752	0.0	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
	Santa Clara	37.352790	-121.957810	0.0	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
	Sunnyvale	37.365801	-122.028654	0.0	Indian Restaurant	South Indian Restaurant	North Indian Restaurant
	San Jose	37.350743	-121.884273	2.0	Indian Restaurant	North Indian Restaurant	South Indian Restaurant
	Sunnyvale	37.366203	-122.013419	0.0	Indian Restaurant	South Indian Restaurant	North Indian Restaurant

We can also estimate the number of 1st Most Common Venue in each cluster. Thus, we can create a bar chart which may help us to find proper labels for each cluster. When we examine below graph, we can see 14 common Indian restaurants are there in cluster 1, cluster 2 has 6 and cluster 3 has 5 common Indian restaurants respectively as the 1st most common restaurant type.



Based on the cluster formation restaurants are superimposed into the Silicon Valley Map. Cluster 1 covered Sunny Vale and Santa Clara, as there are a greater number of restaurants are there. Cluster 2 covered Mountain View, Palo Alto and Cupertino. Cluster 3 covered San Jose areas.

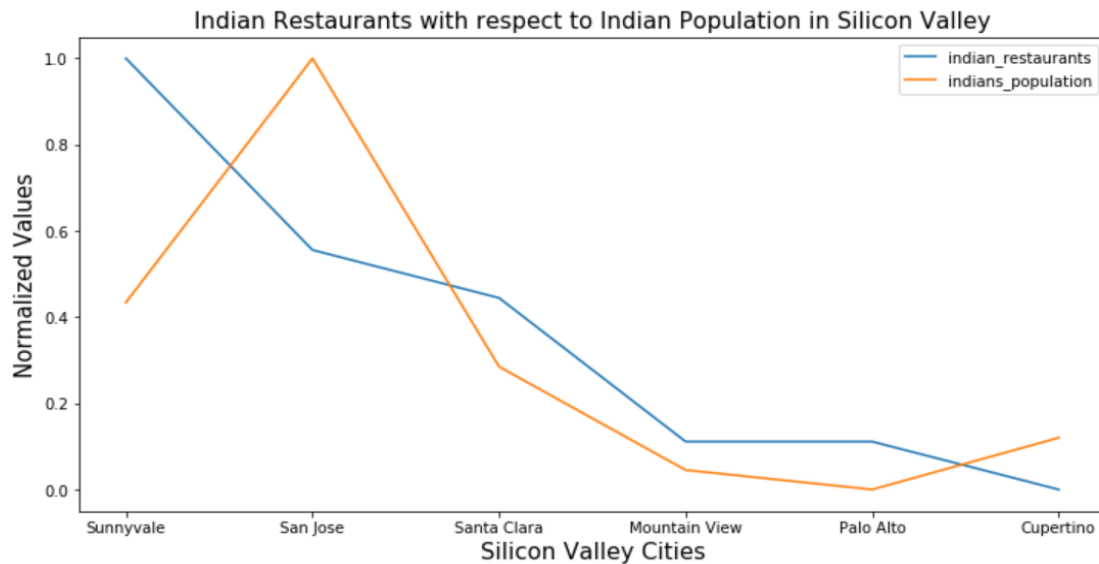


4. Results

The line graph is best way to explore the number of Indian restaurants and Indian population with respect to the cities. From the results, we observed that

Cities	#Restaurants	#Population	Ratio of Restaurant to Population
Sunnyvale	10	13102	1:1310
San Jose	6	27906	1:4651
Santa Clara	5	9209	1:1841
Mountain View	2	2937	1:1468
Palo Alto	2	1757	1:878
Cupertino	1	4897	1:4897

As the ratio suggests, In Santa Clara and Cupertino the ratio is very high. Around 4000 people there is only 1 restaurant. For rest of the cities the number looks pretty good. Palo Alto has the highest ratio, around 850 people there are 1 restaurant.



5. Discussion

As mentioned before, Silicon Valley has very high Indian population. The total number of restaurants and population densities of the 6 cities in total can vary. As there is such a complexity, very different approaches can be tried in clustering and classification studies. Moreover, it is obvious that not every classification method can yield the same high-quality results.

We have used K-Means algorithm as part of this clustering study. However, only 6 cities coordinates were used. For more detailed and accurate guidance, the data set can be expanded and the details of the cities or restaurants can also be drilled.

We also performed data analysis through this information and coming up with an Idea that opening an Indian restaurant in San Jose or Cupertino will give better results as the ratio of population with respect to restaurants is very high.

In future studies this project can be extended in two ways as follows,

- In Silicon Valley, we can analyze the data for some other restaurants (Says Asian, Italian...)
- We can pick another location (Says London, Canada) and find out the possibility of opening an Indian restaurant.

6. Conclusion

As a result, people are turning to big cities to start a business or work. For this reason, people can achieve better outcomes through their access to the platforms where such information is provided. As already discussed, people love towards food will never fade away, they are always interested in trying out new varieties. Not only for Entrepreneurs and Established Vendors but also for People who are reading this report will come to know about some idea of Indian Restaurants in Silicon Valley.

References

1. https://en.wikipedia.org/wiki/Silicon_Valley
2. <https://www.latimes.com/business/la-fi-indians-in-tech-20150812-story.html>
3. <https://www.google.com/maps/place/Silicon+Valley,+CA,+USA/@37.402473,-122.3212967,10z/data=!3m1!4b1!4m5!3m4!1s0x808fb68ad0cfc739:0x7eb356b66bd4b50e!8m2!3d37.387474!4d-122.0575434>
4. <http://zipatlas.com/us/ca/city-comparison/percentage-indian-population.htm>