Opening a Restaurant Ahmedabad City

Viren Dhanwani

Sept 2019

A. Introduction

A.1. Description & Discussion of the Background

Ahmedabad is the largest city and former capital of the Indian state of Gujarat. It is the administrative headquarters of the Ahmedabad district and the seat of the Gujarat High Court. Ahmedabad's population of 5,633,927 (as per 2011 population census) makes it the fifth-most populous city in India, and the encompassing urban agglomeration population estimated at 6,357,693 is the seventh-most populous in India. Ahmedabad is located on the banks of the Sabarmati River, 30 km from the state capital Gandhinagar, which is its twin city.

One of the most popular forms of meal in Ahmedabad is a typical Gujarati thali. It consists of roti (Chapati), dal, rice and shaak (cooked vegetables, sometimes with curry), with accompaniments of pickles and roasted papads. Sweet dishes include laddoo, mango, and vedhmi. Dhoklas, theplas and dhebras are also very popular dishes in Ahmedabad. Beverages include buttermilk and tea. Drinking alcohol is forbidden in Ahmedabad.

There are many restaurants, which serve a wide array of Indian and international cuisines. Most of the food outlets serve only vegetarian food, as a strong tradition of vegetarianism is maintained by the city's Jain and Hindu communities.The first all-vegetarian Pizza Hut in the world opened in Ahmedabad.KFC has a separate staff uniform for serving vegetarian items and prepares vegetarian food in a separate kitchen, as does McDonald's. Ahmedabad has quite a few restaurants serving typical Mughlai non-vegetarian food in older areas like Bhatiyar Gali, Kalupur and Jamalpur.

Manek Chowk is an open square near the centre of the city that functions as a vegetable market in the morning and a jewellery market in the afternoon. However, it is better known for its food stalls in the evening, which sell local street food.

As you can see from the figures, Ahmedabad is a city with a high population. Being such a crowded city and city where alcohol is forbidden, leads the owners of restaurants and cafes in the city where the population is dense. When we think of it by the investor, we expect from them to prefer the districts where there is a higher number of customers and are closer to socially famous places.

A.2 Problem

Given the location data of various types of restaurants in Ahmedabad, this project aims to predict which part of the city will be best suitable for opening a particular type of restaurant.

B. Data acquisition and cleaning

B.1 Data sources

There is no dataset available that contains the boroughs/localities of Ahmedabad city. So I searched for coordinates of 10 random boroughs of Ahmedabad and created a csv file for the same. Then I used the FourSquare API first to find restaurants in each borough. I set the limit as 50 radius of 1 km.

B.2 Data cleaning

There are several problems with the dataset. First, the names of the restaurants were not in a single case. Some restaurant names were in all capitals, some had some words of the name in capital etc. So I converted all the names into lower case, creating a uniformity throughout the dataset.

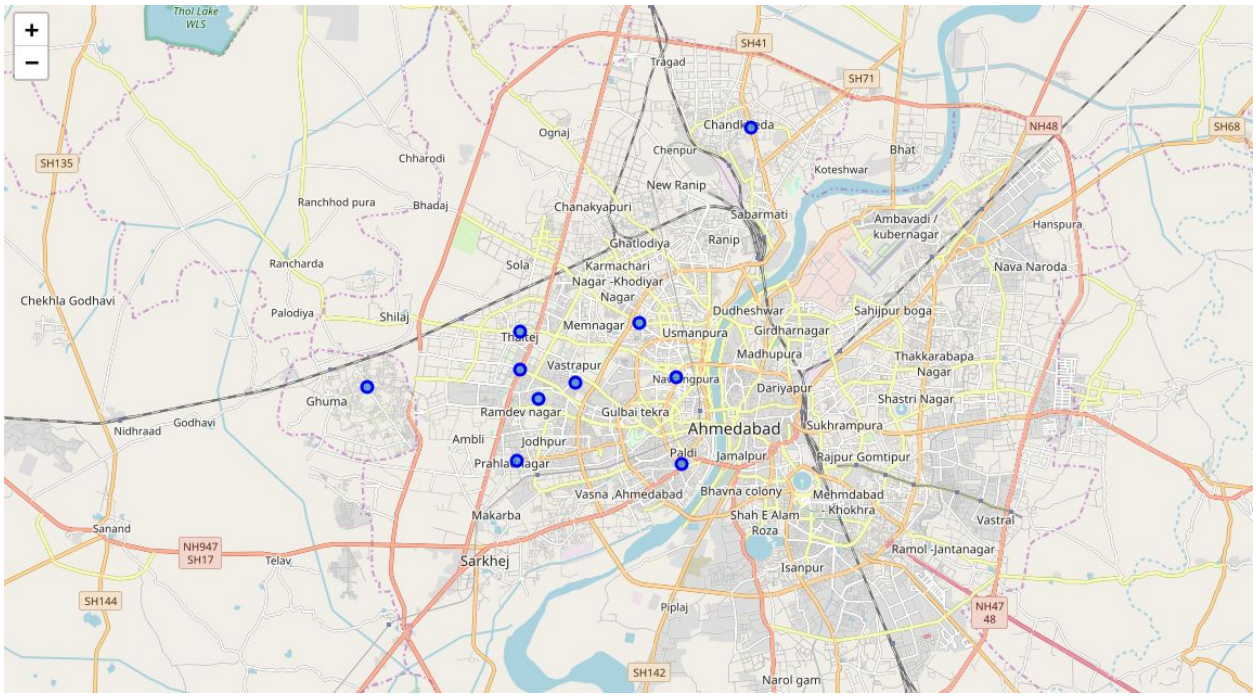
Second, many of the restaurants obtained through the FourSquare API have been permanently closed. So, I had to delete those restaurants from the dataset in order to obtain more accuracy.

Third, there were some restaurants that were in various neighbourhoods and had different name returned by the API. For example: ‘Gwalia’ restaurant was in 4 boroughs and in one of the boroughs it mentioned ‘Gwalia Sweets’. So I had to make sure that everywhere in the dataset if restaurant name repeated then it had to be the same. This ensured consistency of the dataset.

C. Methodology

For the dataset, I selected 10 random boroughs of Ahmedabad and with the help of Google Maps I was able to get their location coordinates. The data contains three columns Borough, Latitude, Longitude.

I then used the Folium library to visualize geographic details of Istanbul and its boroughs and I created a map of Ahmedabad with boroughs superimposed on top. I used latitude and longitude values to get the following visual

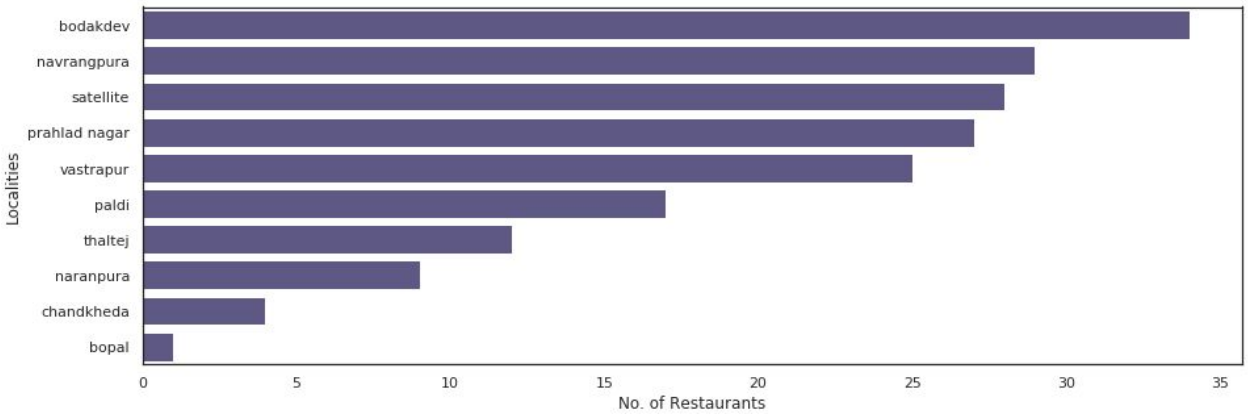


I utilized the Foursquare API to explore the boroughs and segment them. I designed the limit as 50 venues, the radius 1 km for each borough from their given latitude and longitude information and category id to that of Food (as mentioned on Foursquare's website).

The data returned from Foursquare was merged with the initial Borough data. The table now consists of Borough, Borough Latitude, Borough Longitude, Venue, Venue Latitude, Venue Longitude, Venue Category. Here's the head of the table:

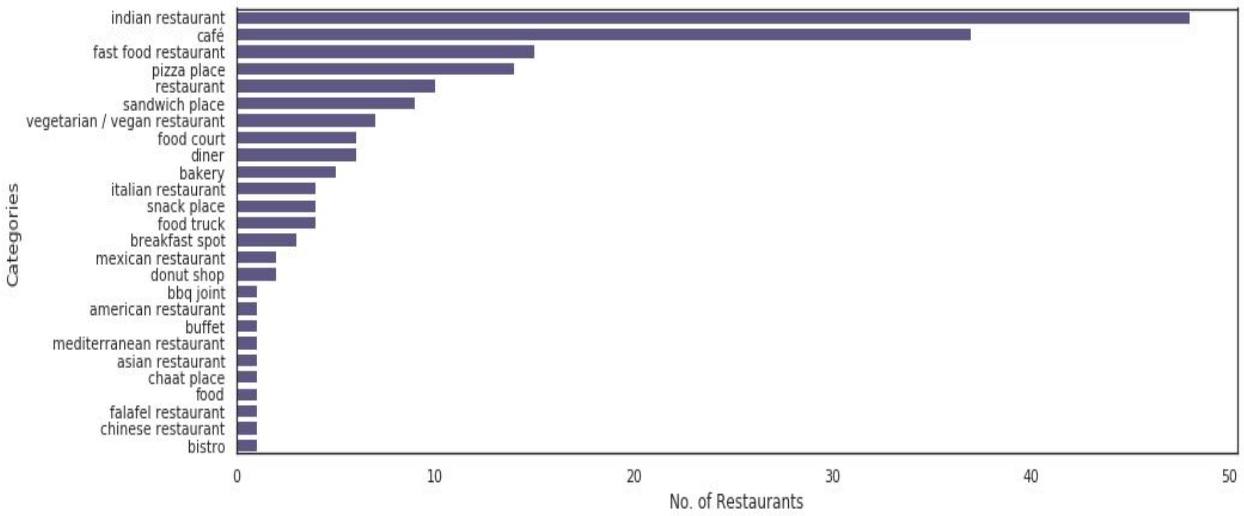
	Borough	Borough Latitude	Borough Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Bodakdev	23.0387	72.5119	mad by tomatos	23.040277	72.512255	Indian Restaurant
1	Bodakdev	23.0387	72.5119	Atithi	23.038102	72.513375	Indian Restaurant
2	Bodakdev	23.0387	72.5119	Gordhan Thal	23.035955	72.510946	Indian Restaurant
3	Bodakdev	23.0387	72.5119	Pizza Hut	23.040032	72.513010	Pizza Place
4	Bodakdev	23.0387	72.5119	Subway	23.038234	72.512828	Sandwich Place

We can see that Bodakdev has the most number of restaurants while Bopal has the least . Rest of the boroughs lie between in the range of 4- 30 restaurants.

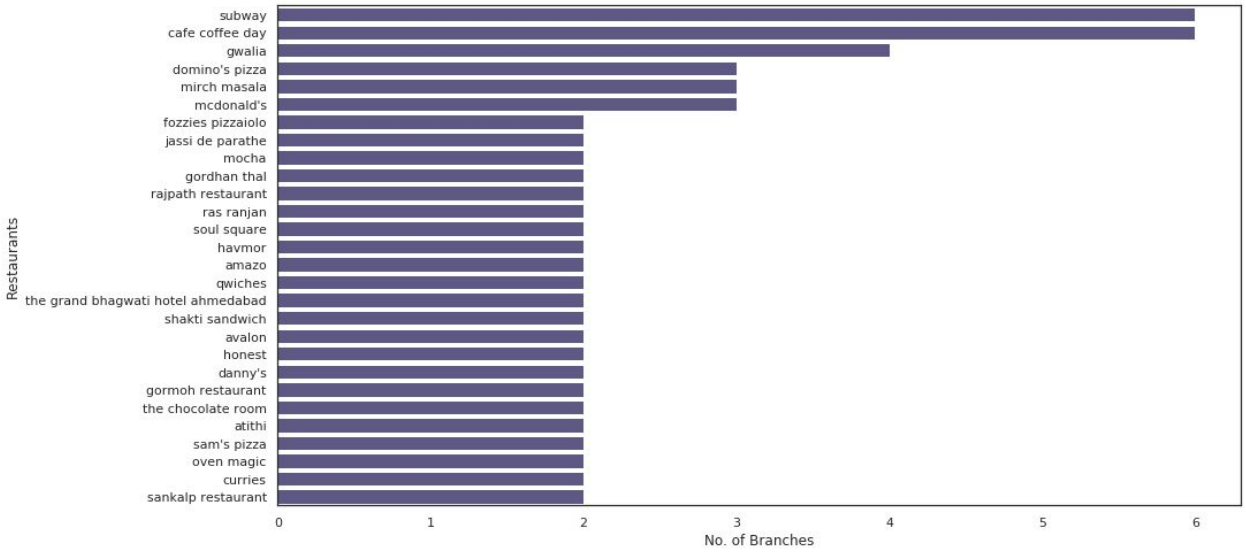


The result doesn't mean that inquiry run all the possible results in boroughs. Actually, it depends on the given Latitude and Longitude information and here is we just run single Latitude and Longitude pair for each borough. We can increase the possibilities with Neighborhood information with more Latitude and Longitude information.

Twenty six different categories of restaurants were returned by the Foursquare API, with "Indian Restaurant" category the highest. There are lots of categories of which there are only single restaurants throughout the city.



We can also see in the following graph that Cafe Coffee Day and Subway have the most number of restaurants, with McDonald's and Domino's Pizza not far behind. There are also very few local restaurants with more than 2 restaurants in the city.

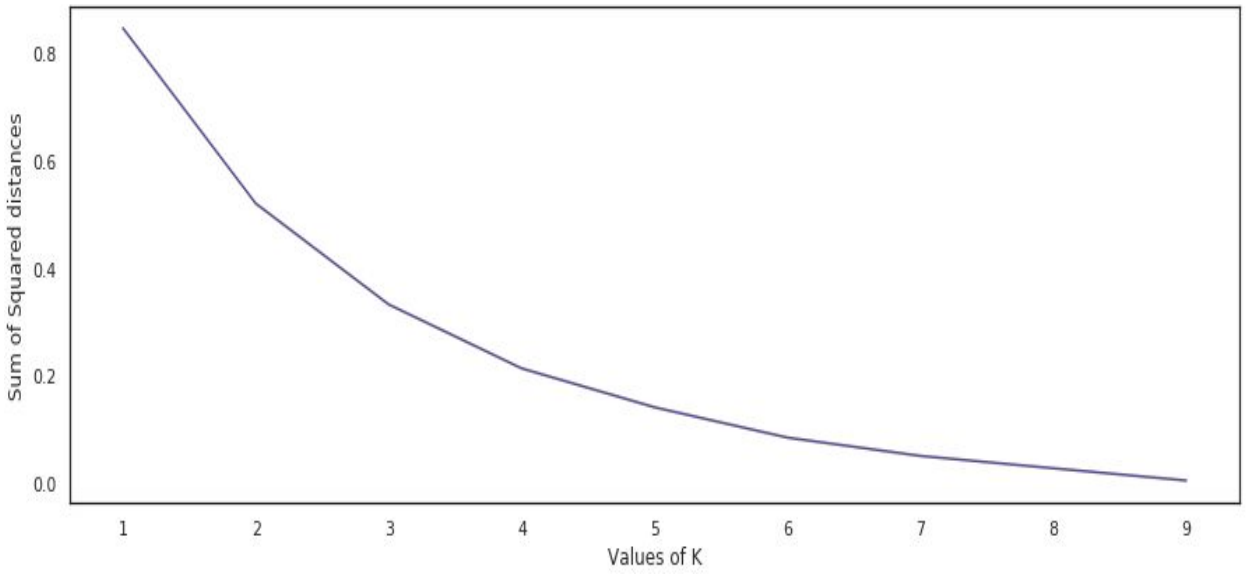


Finding out the most common venues for each borough, we get the following table

	Borough	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	bodakdev	indian restaurant	café	restaurant	pizza place	diner	italian restaurant	vegetarian / vegan restaurant	sandwich place	bakery	food court
1	bopal	indian restaurant	pizza place	gujarati restaurant	vegetarian / vegan restaurant	falafel restaurant	asian restaurant	bakery	bbq joint	bistro	breakfast spot
2	chandkheda	restaurant	indian restaurant	vegetarian / vegan restaurant	falafel restaurant	asian restaurant	bakery	bbq joint	bistro	breakfast spot	café
3	naranpura	sandwich place	vegetarian / vegan restaurant	restaurant	asian restaurant	bistro	café	food court	diner	falafel restaurant	bakery
4	navrangpura	indian restaurant	café	pizza place	fast food restaurant	bakery	food court	snack place	sandwich place	restaurant	food truck

We have some common venue categories in boroughs. This is the reason I decided to use unsupervised learning K-means algorithm to cluster the boroughs. K-Means algorithm is one of the most common cluster methods of unsupervised learning. K-means clustering aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster. The clusters created through this method don't overlap each other.

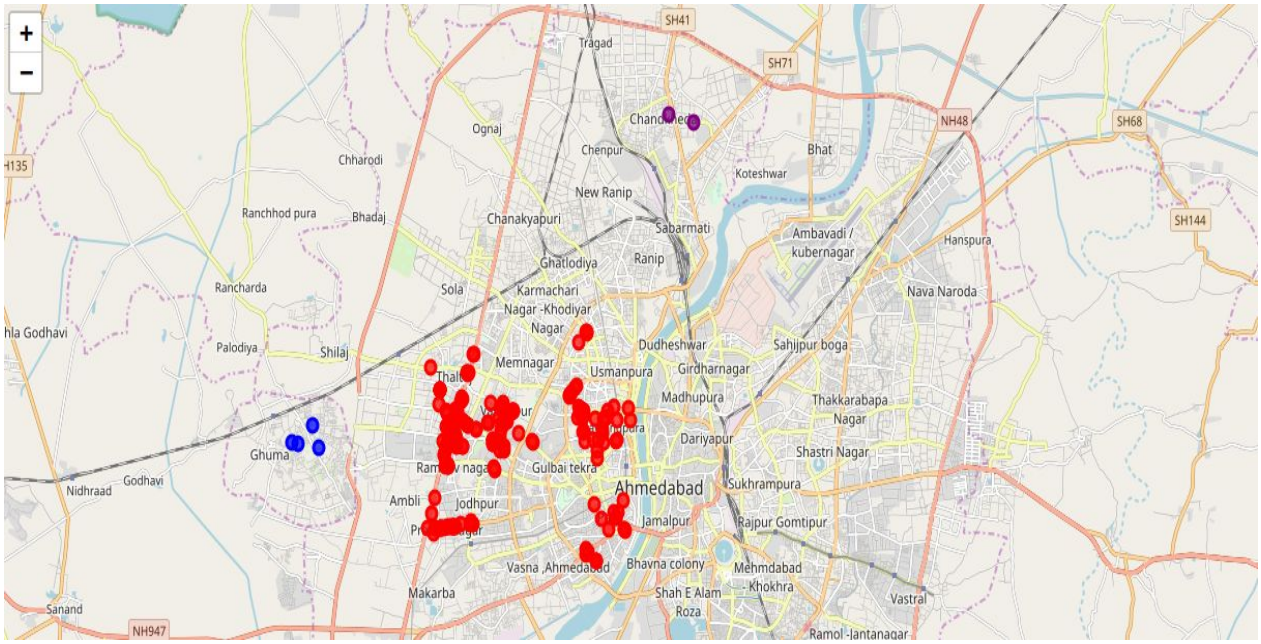
I will run K-Means to cluster the boroughs into 3 clusters because when I analyze the K-Means with elbow method it ensured me the 3rd degree for optimum k of the K-Means.



After performing K-Means clustering with k=3, here is my merged table with cluster labels for each borough.

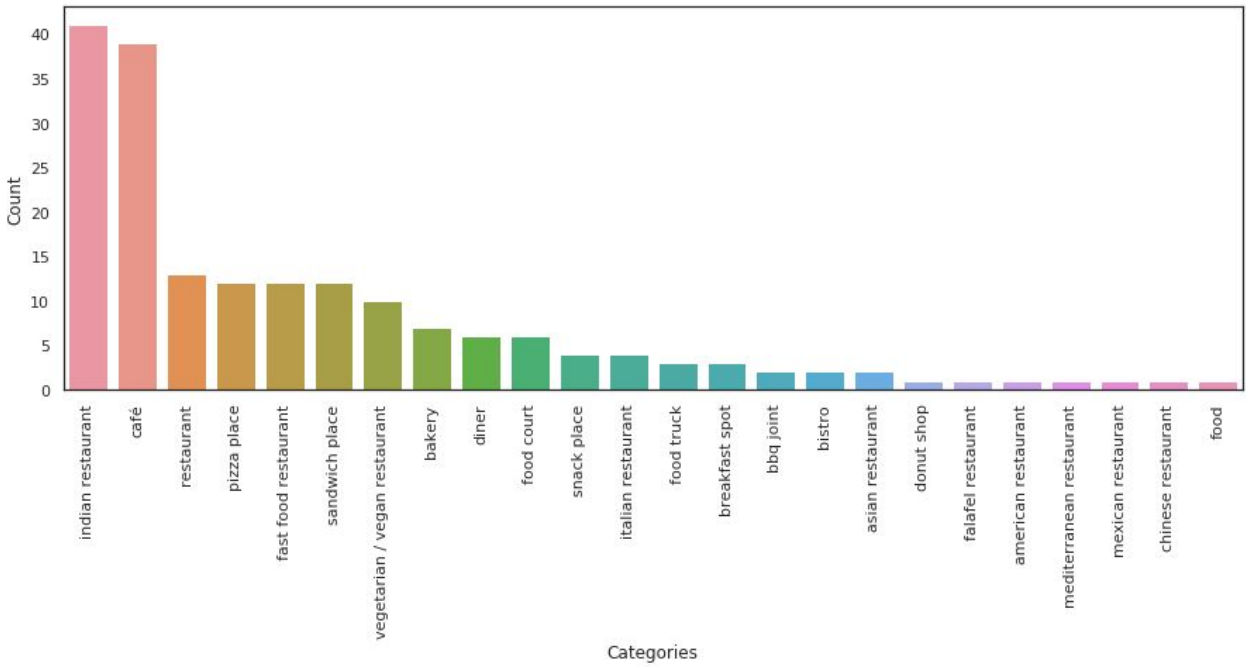
	Borough	Lat	Long	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Co V
0	bodakdev	23.0387	72.5119	0	indian restaurant	café	restaurant	pizza place	diner	italian restaurant	vegetarian / vegan restaurant	sandwich place	bakery	food
1	thaltej	23.0497	72.5117	0	indian restaurant	café	diner	sandwich place	restaurant	mediterranean restaurant	italian restaurant	bistro	breakfast spot	veget / v restau
2	vastrapur	23.0350	72.5293	0	café	restaurant	pizza place	indian restaurant	sandwich place	fast food restaurant	vegetarian / vegan restaurant	asian restaurant	bakery	brea
3	prahlad nagar	23.0120	72.5108	0	indian restaurant	vegetarian / vegan restaurant	café	fast food restaurant	sandwich place	restaurant	bakery	bbq joint	pizza place	mex restau
4	navrangpura	23.0365	72.5611	0	indian restaurant	café	pizza place	fast food restaurant	bakery	food court	snack place	sandwich place	restaurant	food

Mapping the all the restaurants as per their respective clusters.

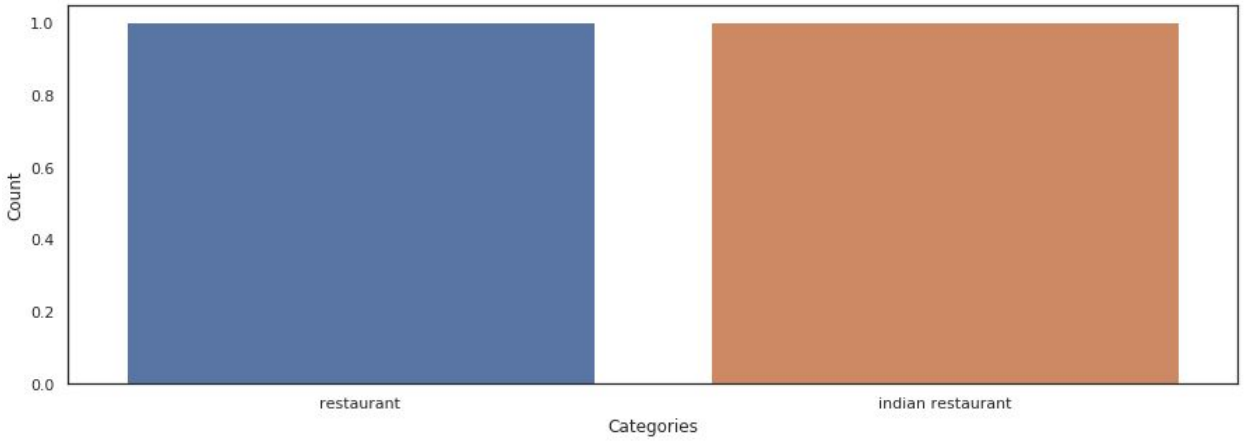


D. Results

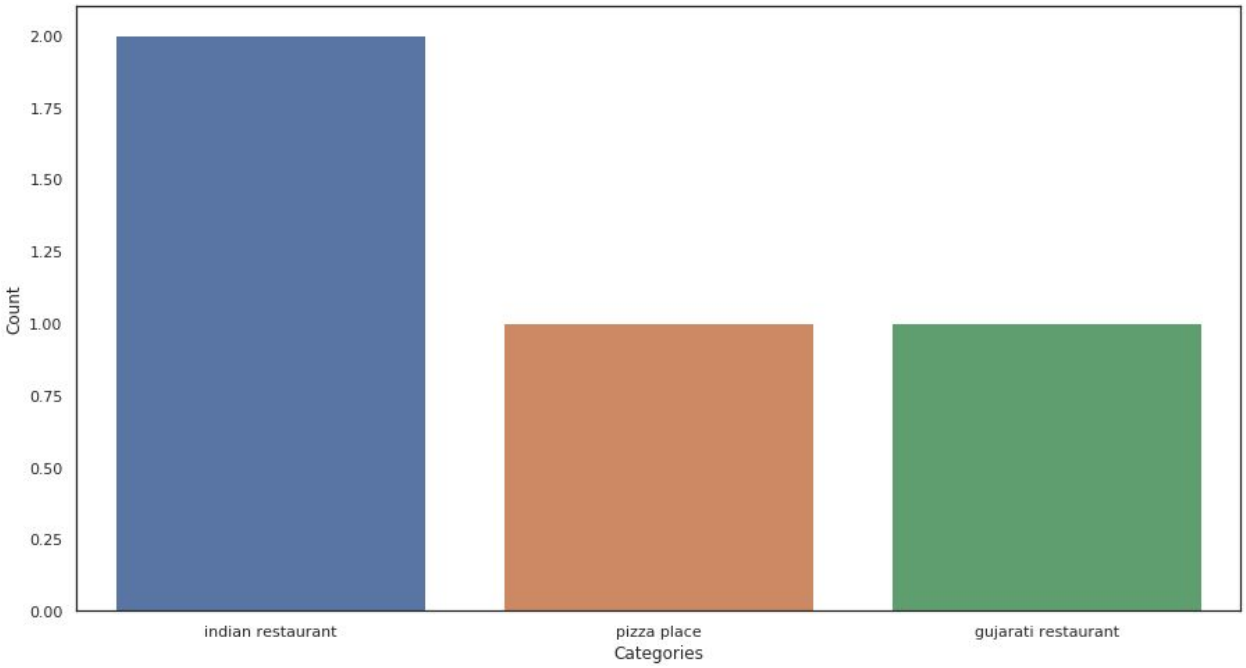
We can see from the following graph that in cluster 0, Indian restaurants and cafes are much higher than the rest of the categories.



In cluster 1, there are only indian restaurants and restaurants, with both being equal.



In cluster 2, indian restaurants are double than the other categories.



E. Discussion

As per the cluster analysis, recommending a place for opening a restaurant in Ahmedabad can be easily done.

One can open a diner, pizza place, bistro, barbeque place or even a food truck in Cluster 0 which is dominated by Indian Restaurants and Cafes. Opening a restaurant from the mentioned categories will bring in good business.

In Cluster 1, where there is only a single indian restaurant and restaurant, one can open a cafe, pizza place, sandwich place or a fast food joint. These will pull in a lot of crowds from the surrounding areas. The restaurant will be a unique one in the cluster and people will have no other option to satisfy their cravings on a given day.

Cluster 2 consists of Indian restaurant, pizza place and a gujarati restaurant. So, one can open a restaurant of either of those categories as none of them are dominating the cluster. There is also an option of opening a new kind of restaurant like a cafe, sandwich place, some specific cuisine restaurant etc. and be one of the first ones to open that kind of restaurant.

F. Conclusion

Ahmedabad has been voted as one of the best cities to live in India and is also a smart city. In such a city where alcohol is banned and people looking for new places to hangout, opening a restaurant satisfies people's needs along with one's business needs.

With analysis like this, selecting a place for opening a restaurant becomes much easier. The success of a restaurant depends how exclusive it is and how it complements already existing restaurants in a given cluster or borough.

For all the people looking to open a restaurant in Ahmedabad, this analysis helps them take major decisions easily and quickly.