



# RESTAURANTS IN HYDERABAD

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APPLIED DATA  
SCIENCE CAPSTONE

# INTRODUCTION/BUSINESS PROBLEM

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According to the website <https://worldpopulationreview.com/world-cities/hyderabad-population/>, Hyderabad has a population of about 10 million people which creates a high demand for places like restaurants and cafes where people can enjoy food with family or friends.

Among the foreigners in the city, Hadhrami Arabs represent the majority, with sizeable populations of African Arabs, Armenians, Abyssinians, Iranians, Pathans, and Turkish people. At the 2011 census, 24% of Hyderabadis were migrants from elsewhere in the country.

According to a report on <https://www.euromonitor.com>, Hyderabad is known for its food across the country, due to its royal history and general love for food. One of the most successful strategies for restaurants in the city is to have more than one type of foodservice channel under the same roof; for example, a full-service restaurant with a café or a bakery is a common sight in the city. This strategy has been successful, as it allows players to reach out to a more varied consumer base, covering all age groups.

## TARGET AUDIENCE

Entrepreneurs interested in the opening restaurant in Hyderabad, who may require external advice concerning what type of restaurants are in trend and where exactly it should be inaugurated which could create a high chance of being successful.

# DATA DESCRIPTION

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I used the following data to analyze the city of Hyderabad.

## NEIGHBORHOOD DATA

Using pandas converted the table on

<https://www.mapsofindia.com/pincode/india/telangana/hyderabad/> website consisting the name of the neighborhood with respect to its Pincode.

## GEOPY.GEOCODERS

Using geopy.geocoders library to get the latitude and longitude of each neighborhood in Hyderabad.

## FOURSQUARE API

Using Foursquare API to explore venue information for each neighborhood in the Hyderabad city. Some features extracted include 'Venue', 'Venue Category', 'Venue Latitude', 'Venue Longitude', etc.

# METHODOLOGY

## EXTRACTING DATA

After extracting the data of Hyderabad neighborhoods and grouping them by their pin codes I got the following data frame containing 67 neighborhoods.

	Pincode	Location
0	500001	Gandhi Bhawan, Hindi Bhawan, Hyderabad., Moazz...
1	500002	Hyderabad Jubilee, Moghalpura, Tagarikanaka
2	500003	Begumpet Policelines, Kingsway, Mg Road, Picke...
3	500004	A.Gs office, Anandnagar, Bazarghat, Khairataba...
4	500005	Balapur, Crp Camp, Keshogiri, Mamidipalli, Pah...

## GEOPY FOR LONGITUDE AND LATITUDE

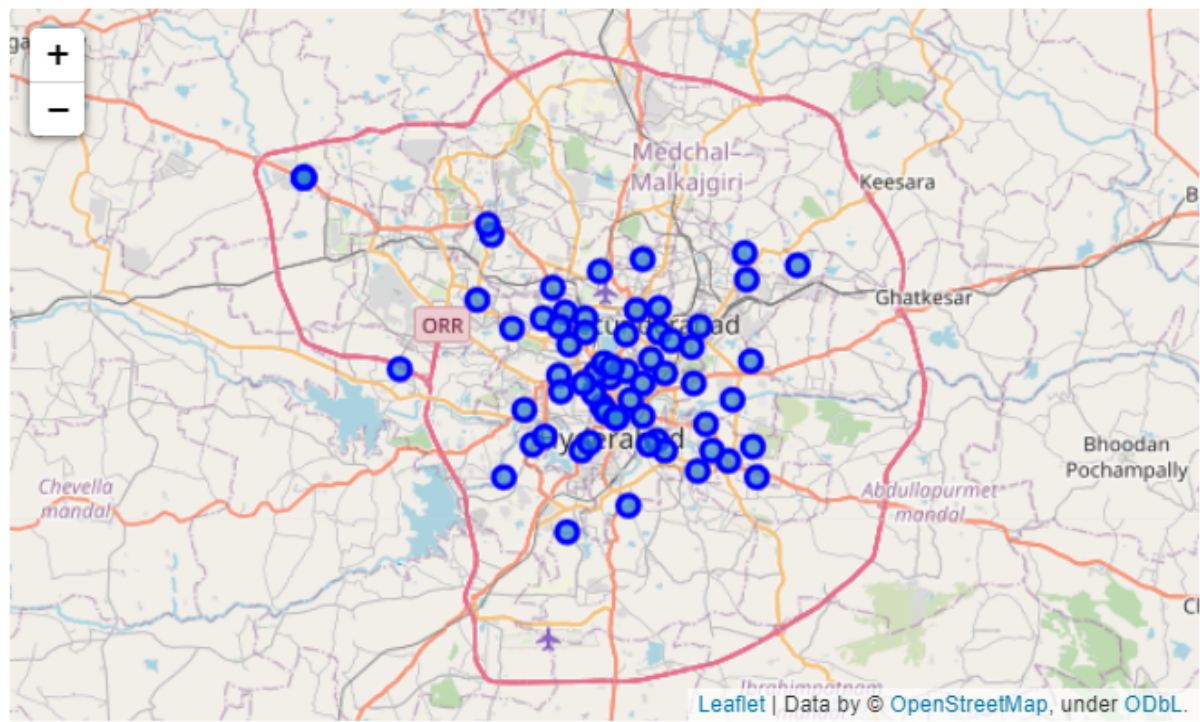
I used Geopy library to get the latitudes and longitudes by passing the Pincodes, and generated the following data frame:

	Pincode	Location	Latitude	Longitude
0	500001	Gandhi Bhawan, Hindi Bhawan, Hyderabad., Moazz...	17.398710	78.472147
1	500002	Hyderabad Jubilee, Moghalpura, Tagarikanaka	17.380252	78.466783
2	500003	Begumpet Policelines, Kingsway, Mg Road, Picke...	17.441898	78.490840
3	500004	A.Gs office, Anandnagar, Bazarghat, Khairataba...	17.401951	78.463264
4	500005	Balapur, Crp Camp, Keshogiri, Mamidipalli, Pah...	17.316797	78.484326

## USING FOLIUM TO VISUALIZE

The folium library was used to visualize the geographic details of Hyderabad and superimposed the markers on the map indicating the neighborhoods with a popup text.

# METHODOLOGY



## USING FOURSQUARE API

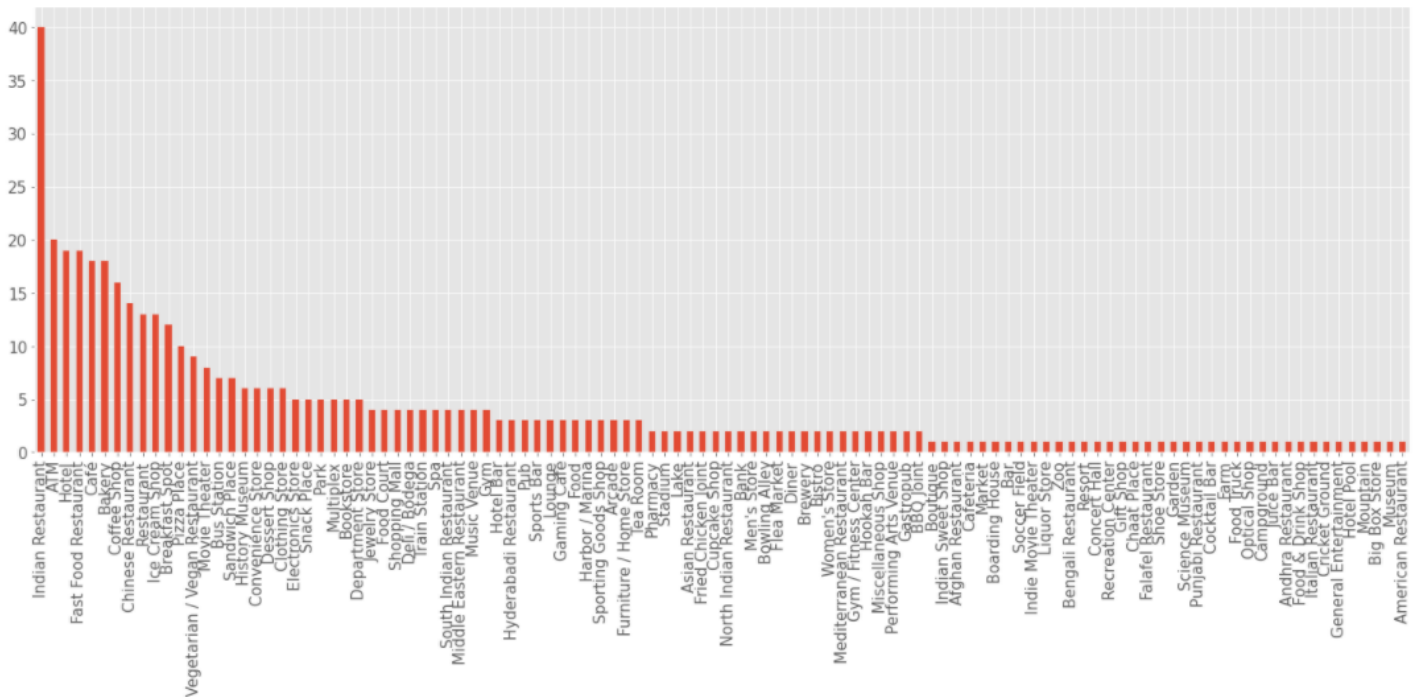
I utilized the Foursquare API to explore the boroughs and segment them. It fetches the venues located nearest to location passed through the URL. I assigned the limit as 200 and the radius as 500 meters for each neighborhood from their given latitude and longitude information. From the data gathered I created the following data frame consisting of 455 venues categorized by the venue type.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Gandhi Bhawan, Hindi Bhawan, Hyderabad., Moazz...	17.398710	78.472147	Lal Bahadur Shastri Stadium	17.399140	78.472666	Stadium
1	Gandhi Bhawan, Hindi Bhawan, Hyderabad., Moazz...	17.398710	78.472147	Blue Diamond	17.399272	78.474750	Chinese Restaurant

# METHODOLOGY

## DATA EXPLORATION

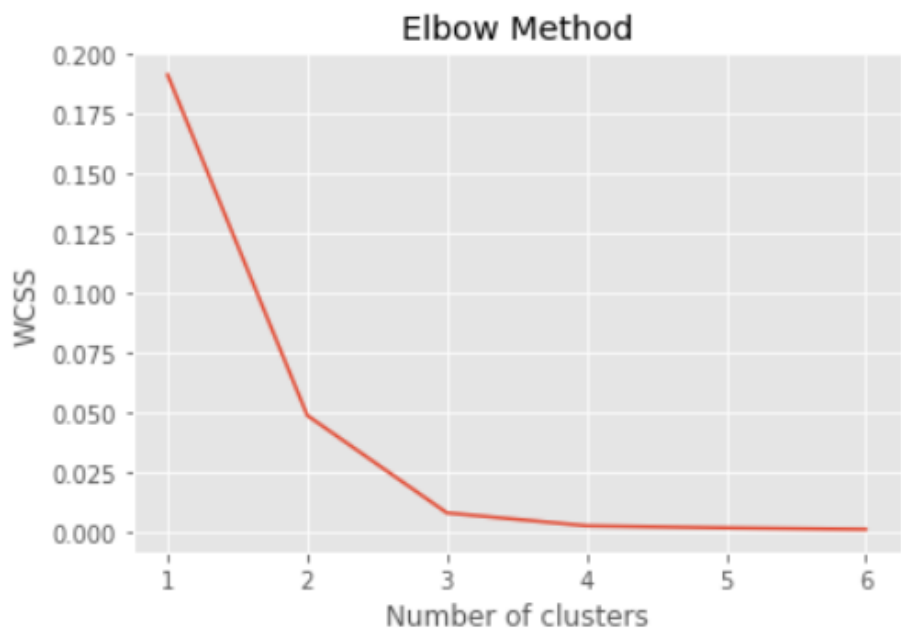
Exploring the dataset is important because it gives you initial insights and may help you to get a partial idea of the answer that you are looking to find out from the data. By exploring the above dataset I found out that "Indian Restaurant" was the most reoccurring venue category with a count of 40 and the "Fast Food Restaurant" category has 19 unique venue locations in the dataset.



For this study, I used one-hot encoding and standardization to process our categorical variable (venue category) into a form that machine learning algorithms can further classify the data. Since we have some common venue category that is why I decided to choose K - means algorithm for clustering the dataset as it is one of the simplest and popular unsupervised machine learning algorithms. To decide the optimal number of clusters I used the Elbow method.



# METHODOLOGY



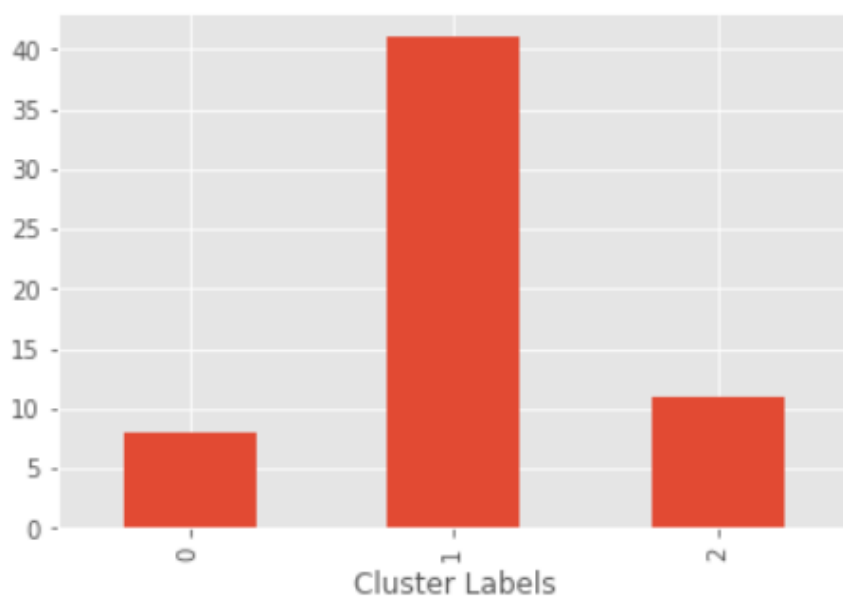
HERE IS MY MERGED TABLE WITH CLUSTER LABELS FOR EACH LOCATION.

	Pincode	Location	Latitude	Longitude	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
0	500001	Gandhi Bhawan, Hindi Bhawan, Hyderabad., Moazz...	17.398710	78.472147	1	Clothing Store	Chinese Restaurant	Stadium	Hotel Bar	Fast Food Restaurant	Convenience Store	Cricket Ground	Cupcake Shop
1	500002	Hyderabad Jubilee, Moghalpura, Tagarikanaka	17.380252	78.466783	1	Vegetarian / Vegan Restaurant	Middle Eastern Restaurant	Gaming Cafe	Park	South Indian Restaurant	Breakfast Spot	Zoo	Electronics Store
2	500003	Begumpet Policelines, Kingsway, Mg Road, Picke...	17.441898	78.490840	1	Vegetarian / Vegan Restaurant	Arcade	Bakery	Indian Restaurant	Hotel	Fast Food Restaurant	Chinese Restaurant	Hyderabadi Restaurant
3	500004	A.Gs office, Anandnagar, Bazarghat, Khairataba...	17.401951	78.463264	1	Hotel	Hyderabadi Restaurant	Coffee Shop	Performing Arts Venue	Indian Restaurant	Ice Cream Shop	Café	Shoe Store
4	500005	Balapur, Crp Camp, Keshogiri, Mamidipalli, Pah...	17.316797	78.484326	1	Middle Eastern Restaurant	Falafel Restaurant	Zoo	Farm	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop

## METHODOLOGY

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EXPLORING THE DATASET TO SEE THE DISTRIBUTION OF VENUES AMONG THE CLUSTERS.





# RESULT

## CLUSTER 1: NEIGHBORHOODS WHERE FAST FOOD RESTAURANTS AREN'T A COMMON VENUE

	Location	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
32	Raj Bhawan	ATM	Music Venue	Afghan Restaurant	American Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
36	Hindustan Cables Ltd	ATM	Music Venue	Afghan Restaurant	American Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
38	Falaknuma, Uppuguda	ATM	Music Venue	Afghan Restaurant	American Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
41	Saidabad, Saidabad Colony, Santoshnagar Colony	ATM	Indian Restaurant	Breakfast Spot	Coffee Shop	Farm	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
47	Fatehgarwaza, Quazipura, Shahalibanda, Sultans...	ATM	Bakery	Flea Market	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store	Dessert Shop	Diner
50	Gsi(sr) Bandlaguda, Mansoorabad	ATM	Ice Cream Shop	Fast Food Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store	Dessert Shop
58	Jillelaguda, Karmanghat, Vaishalinagar	ATM	Farm	Jewelry Store	Gastropub	Garden	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega
64	Vikarabad	ATM	Music Venue	Afghan Restaurant	American Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store

## CLUSTER 2: NEIGHBORHOODS WHERE FAST FOOD RESTAURANT ARE THE MOST COMMON VENUE

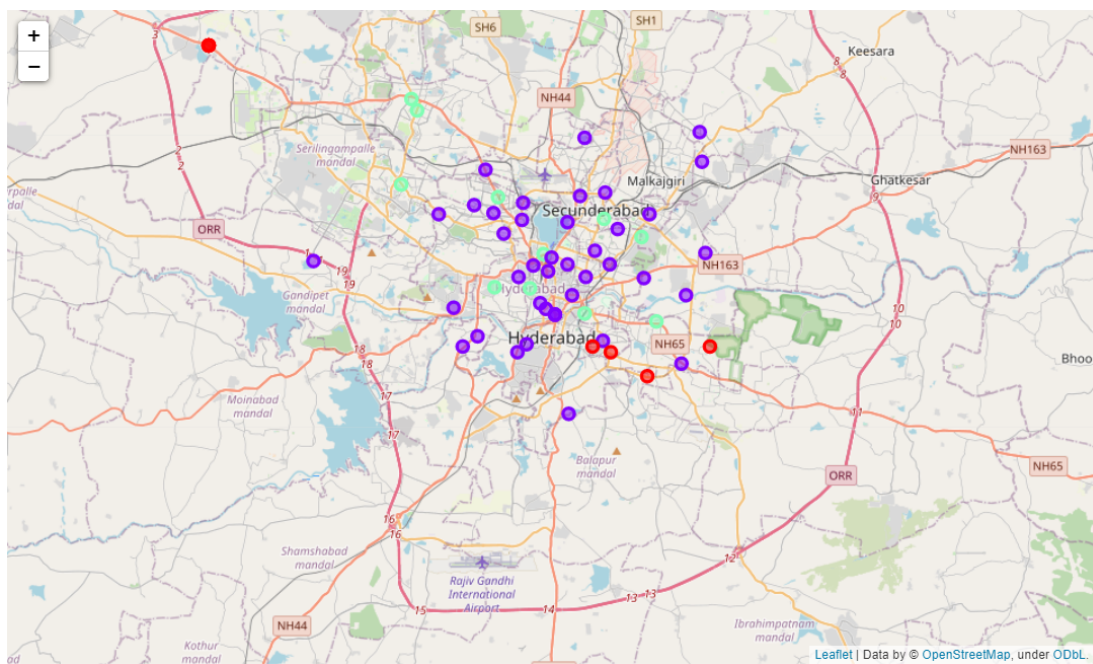
	Location	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Gandhi Bhawan, Hindi Bhawan, Hyderabad,, Moazz...	Clothing Store	Chinese Restaurant	Stadium	Hotel Bar	Fast Food Restaurant	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
1	Hyderabad Jubilee, Moghalpura, Tagarikanaka	Vegetarian / Vegan Restaurant	Middle Eastern Restaurant	Gaming Cafe	Park	South Indian Restaurant	Breakfast Spot	Zoo	Electronics Store	Concert Hall	Convenience Store
2	Begumpet Policelines, Kingsway, Mg Road, Picke...	Vegetarian / Vegan Restaurant	Arcade	Bakery	Indian Restaurant	Hotel	Fast Food Restaurant	Chinese Restaurant	Hyderabadi Restaurant	Department Store	Campground
3	A Gs office, Anandnagar, Bazarghat, Khairataba...	Hotel	Hyderabadi Restaurant	Coffee Shop	Performing Arts Venue	Indian Restaurant	Ice Cream Shop	Café	Shoe Store	Bank	Bakery
4	Balapur, Crp Camp, Keshogiri, Mamidipalli, Pah...	Middle Eastern Restaurant	Falafel Restaurant	Zoo	Farm	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
5	Dhoolpet, Karwan Sahu, Mangalhat	Zoo	Café	Bakery	Fast Food Restaurant	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store	Dessert Shop

# RESULT

## CLUSTER 3: NEIGHBORHOODS WHERE FAST FOOD RESTAURANT ARE A COMMON VENUE

	Location	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
6	Administrative Buildings, Iict, Jama I osmania...	Indian Restaurant	Zoo	Fast Food Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store	Dessert Shop
15	Central Secretariat	Indian Restaurant	Science Museum	Park	Hotel	Farm	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega
17	Chanchalguda, Darushifa, Sahifa	Indian Restaurant	Train Station	Convenience Store	Hotel	Zoo	Farm	Concert Hall	Cricket Ground	Cupcake Shop	Deli / Bodega
18	Himmatnagar, Padmaraoanagar	Park	Bakery	Vegetarian / Vegan Restaurant	Train Station	Indian Restaurant	Electronics Store	Diner	Dessert Shop	Department Store	Zoo
21	Dattatreya Colony, Humayunnagar, Murad Nagar, ...	Indian Restaurant	Chinese Restaurant	Spa	Zoo	Fast Food Restaurant	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
24	Ibrahim Bagh lines	Indian Restaurant	Snack Place	Zoo	Fast Food Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega	Department Store
27	Huda Residential complex, Ramakrishanapuram, S...	Movie Theater	Indian Restaurant	Bowling Alley	Restaurant	Falafel Restaurant	Concert Hall	Convenience Store	Cricket Ground	Cupcake Shop	Deli / Bodega
29	Sanjeev Reddy nagar, Vengal Rao nagar	Indian Restaurant	Breakfast Spot	Clothing Store	Café	Sporting Goods Shop	Department Store	Pizza Place	Zoo	Falafel Restaurant	Convenience Store

## CLUSTERS ON MAP



# RESULT

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In the final section, I created a map to visualize all clusters on the map of Hyderabad. The results are visualized in the above map with Cluster 0 in red color, Cluster 1 in purple color, and Cluster 2 in light green color.

## DISCUSSION

The fast-food restaurants' being the most common venue is observed in cluster 1, followed by moderate density in cluster 2 and cluster 0.

Therefore, when choosing a neighborhood to open a fast-food restaurant, it is advisable to consider locations in Cluster 0 and 2 because of the lack of competition and the ability to conquer the market. It is also important to be centrally located in the city to cover the maximum radius of potential customers.

## LIMITATION

This project can be further improved by adding constraints like population density, property costs, and the proximity of farmers market. This analysis allows the developer to provide information on a more profitable place to set up shop for their services. Reducing competition and differentiating your business from those around you allows businesses to develop strategies to grow and thrive. However, to put all these data into this project is not possible to do within a short time frame for this capstone project. Also, the Foursquare API used had a limit of 200 calls in a radius of 500m, therefore, all the predictions are based on the data gathered by the Foursquare data platform.

# RESULT

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## CONCLUSION

This project was concerned with the data science methodology where one identified a business problem, collected the data required, processed the data, used relevant methods to prepare data for analysis by the appropriate machine learning techniques, and lastly used the results to recommend solutions to relevant entrepreneurs.

Based on the Clusters formed it would be a good idea to open a restaurant in Clusters 0 & 2 since the other clusters already have fast-food restaurants in their vicinities. Also, clusters 0 & 2 have many restaurants in the vicinity (Pizza restaurants, cafe, coffee shop, Indian restaurants) so one will be able to attract a good crowd.