

RESTAURANT OPENING IN CHENNAI

BUSINESS PROBLEM:

The Restaurant named 'Fire blaze' is most popular in north of India, they want to expand their business in south India, they have selected Chennai to test it. Previously they opened an restaurant in Bangalore which did not get that much popularity, now they want to try to open in Chennai and make it a big success, the main issue they faced last time in Bangalore is they did not done any analysis and started the restaurant now they want to analyse and start the restaurant.

The main problem is here where to start the restaurant, what the better place is and how to get the location details of Chennai location. After getting the location details how we will get the latitude and longitude details, and how we can examine the location's to find the better places.

Interested Audience:

This project is not only limited to the restaurant Fire blaze it can be used for any restaurant to get the perfect location to start their business. It is not only limited to only one city can use the same analysis for multiple cities and attain the perfect locations to start the business.

DATA DESCRIPTION:

We need all the details about the city which we are operating in this CHENNAI, we need the neighbourhood details of whole city.

There is a web application which has all postal codes and neighbourhood details.
http://www.chennaiiq.com/chennai/pincode_by_postal.asp

By using the Web Scraping technique (Beautifulsoup) all the Postal code details and Neighbourhood is obtained.

```
: data.head()
```

	Postal_code	Borough	Neighborhood
0	600001	chennai	Angappanaicken Street
1	600001	chennai	Wal Tax Road
2	600001	chennai	Seven Wells
3	600001	chennai	Sembier Street
4	600001	chennai	Monegar Choultry

By using pandas groupby function the neighbourhoods are grouped as per the postal code.

```
data.head()
```

	Postal_code	Borough	Neighborhood
0	600001	chennai	Angappanaicken Street,Wal Tax Road,Seven Wells...
1	600002	chennai	Pudupet,Madras Electricity System,Government E...
2	600003	chennai	Ripon Buildings,Park Town,Madras Medical Colle...
3	600004	chennai	Santhome,Royapettah High Road,Police Head Quar...
4	600005	chennai	Tiruvellikeni,Parthasarathy Koil,Madras Presid...

In order to obtain the longitude and latitude details of this postal codes 'pgeocode' has been used.

locations

	Postal_code	Latitude	Longitude
0	600001	13.0930	80.282817
1	600002	13.0744	80.271400
2	600003	13.0754	80.273700
3	600004	13.0754	80.273700
4	600005	13.0594	80.277800

Now merging both the data frames 'data' and 'locations' to form a final data frame.

```
finaldata = pd.merge(data,locations, on = 'Postal_code')
finaldata.head(10)
```

	Postal_code	Borough	Neighborhood	Latitude	Longitude
0	600001	chennai	Angappanaicken Street,Wal Tax Road,Seven Wells...	13.0930	80.282817
1	600002	chennai	Pudupet,Madras Electricity System,Government E...	13.0744	80.271400
2	600003	chennai	Ripon Buildings,Park Town,Madras Medical Colle...	13.0754	80.273700
3	600004	chennai	Santhome,Royapettah High Road,Police Head Quar...	13.0754	80.273700
4	600005	chennai	Tiruvellikeni,Parthasarathy Koil,Madras Presid...	13.0594	80.277800
5	600006	chennai	Teynampet West,Shastri Bhavan,Old College Buil...	13.0754	80.273700

Using Foursquare UPI to get all the venues in the neighbourhood to perform evaluations.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Angappanaicken Street,Wal Tax Road,Seven Wells...	13.0930	80.282817	Kakada Ramprasad	13.090415	80.279111	Indian Restaurant
1	Angappanaicken Street,Wal Tax Road,Seven Wells...	13.0930	80.282817	Gujarati Mandal	13.089637	80.285770	Indian Restaurant
2	Angappanaicken Street,Wal Tax Road,Seven Wells...	13.0930	80.282817	Reliance Fresh	13.094055	80.279582	Department Store
3	Angappanaicken Street,Wal Tax Road,Seven Wells...	13.0930	80.282817	Broadway	13.090351	80.285716	Bus Station
4	Pudupet,Madras Electricity System,Government E...	13.0744	80.271400	Chintatri Pet MRTS	13.073010	80.274172	General Travel

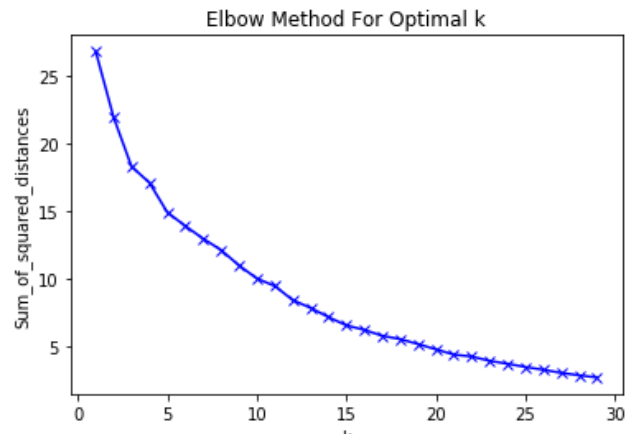
METHODOLOGY:

As we got all the data about our city CHENNAI we can proceed to perform the task to find out what are the best places to start restaurant.

We have some common venue categories in neighbourhood. In this reason I used unsupervised learning **K-means algorithm** to cluster the neighbourhoods. K-Means algorithm is one of the most common cluster method of unsupervised learning.

In order to proceed on this K-Means we should first find out the value of K to attain best results.

As in the below graph the best k value is the value at the elbow of the graph, so I have considered k as 10



After proceeding with k=10 and creating the clusters and assigning cluster number to each data and merging it with the neighbourhood details.

```
merged.head() # check the last columns!
```

	Postal_code	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Mc Comm Venue
0	600001	chennai	Angappanaicken Street,Wal Tax Road,Seven Wells...	13.0930	80.282817	1.0	Indian Restaurant	Department Store	Bus Station	Food
1	600002	chennai	Pudupet,Madras Electricity System,Government E...	13.0744	80.271400	0.0	General Travel	Zoo Exhibit	Food	Daycar
2	600003	chennai	Ripon Buildings,Park Town,Madras Medical Colle...	13.0754	80.273700	0.0	General Travel	Zoo Exhibit	Food	Daycar
3	600004	chennai	Santhome,Royapettah High Road,Police Head Quar...	13.0754	80.273700	0.0	General Travel	Zoo Exhibit	Food	Daycar
4	600005	chennai	Tiruvellikeni,Parthasarathy Koil,Madras Presid...	13.0594	80.277800	7.0	Indian Restaurant	Vegetarian / Vegan Restaurant	Music Store	Light R Station

As we can see all the venues has cluster label if we separate them as per cluster number we can get the correct cluster to select.

```
In [185]: merged.loc[merged['Cluster Labels'] == 0, merged.columns[[1] + list(range(5, merged.shape[1]))]]
Out[185]:
```

	Borough	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 Most Common Venue
1	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
2	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
3	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
5	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
8	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space

```
In [186]: merged.loc[merged['Cluster Labels'] == 1, merged.columns[[1] + list(range(5, merged.shape[1]))]]
Out[186]:
```

	Borough	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 Most Common Venue
0	chennai	1.0	Indian Restaurant	Department Store	Bus Station	Food	Daycare	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
13	chennai	1.0	Indian Restaurant	Recent Shop	Department Store	Smoke Shop	Crickit Ground	Currency Exchange	Daycare	Dessert Shop	Diner	Donut Shop
16	chennai	1.0	Indian Restaurant	Indian Movie Theater	Historic Site	Grocery Store	Clothing Store	Food	Department Store	Dessert Shop	Diner	Donut Shop
70	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Men's Store	General Travel	Farmers Market
71	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Men's Store	General Travel	Farmers Market
72	chennai	1.0	Indian Restaurant	Restaurant	Chetinal Restaurant	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store
75	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Men's Store	General Travel	Farmers Market
76	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Men's Store	General Travel	Farmers Market
77	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Men's Store	General Travel	Farmers Market
78	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Men's Store	General Travel	Farmers Market
79	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Men's Store	General Travel	Farmers Market

```
In [187]: merged.loc[merged['Cluster Labels'] == 2, merged.columns[[1] + list(range(5, merged.shape[1]))]]
Out[187]:
```

	Borough	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 Most Common Venue
94	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
108	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
109	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
110	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space

RESULTS:

After performing the K-Means clustering we got different cluster of different categories.

The (0-9) 10 clusters if we observe more closely the 1 cluster that means 2nd cluster has more restaurants.

All the other cluster are of majorly mixed with multiple type of venues.

```
In [105]: merged.loc[merged['Cluster Labels'] == 0, merged.columns[[1] + list(range(5, merged.shape[1]))]]
```

Out[105]:	Borough	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 Most Common Venue
1	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
2	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
3	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
5	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
8	chennai	0.0	General Travel	Zoo Exhibit	Food	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space

```
In [106]: merged.loc[merged['Cluster Labels'] == 1, merged.columns[[1] + list(range(5, merged.shape[1]))]]
```

Out[106]:	Borough	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 Most Common Venue
0	chennai	1.0	Indian Restaurant	Department Store	Bus Station	Food	Daycare	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
13	chennai	1.0	Indian Restaurant	Record Shop	Department Store	Smoke Shop	Crickit Ground	Currency Exchange	Daycare	Dessert Shop	Diner	Donut Shop
18	chennai	1.0	Indian Restaurant	Indie Movie Theater	Historic Site	Grocery Store	Clothing Store	Food	Department Store	Dessert Shop	Diner	Donut Shop
70	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market
71	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market
72	chennai	1.0	Indian Restaurant	Restaurant	Chettinad Restaurant	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store
73	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market
75	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market
76	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market
77	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market
78	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market
79	chennai	1.0	Indian Restaurant	Clothing Store	Big Box Store	Shopping Mall	Fast Food Restaurant	Food	Pizza Place	Merli's Store	General Travel	Farmers Market

```
In [107]: merged.loc[merged['Cluster Labels'] == 2, merged.columns[[1] + list(range(5, merged.shape[1]))]]
```

Out[107]:	Borough	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 Most Common Venue
54	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
108	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
109	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space
110	chennai	2.0	Fast Food Restaurant	Zoo Exhibit	Cupcake Shop	Daycare	Department Store	Dessert Shop	Diner	Donut Shop	Electronics Store	Event Space

As we can see in the above picture there are multiple clusters which allows us to discuss and select one.

DISCUSSIONS:

As mentioned in the Business problem the fire blade restaurant wants to start a new restaurant as we all know that the company main aim is not only profits but also customer satisfaction and popularity.

Majorly the restaurants should be in a place where more people will be or more movement of people be. In a city of Chennai majorly all the kind of people are for job or business and so on.

So we can find more people in the shopping areas, malls and so on, where people will be more on weekends or holidays, on these days they want to have best food with family or friends.

So with my analysis I recommend the restaurant to be open in 2nd cluster, because the cluster 1st most common venue is restaurant and most of the remaining venues are of shopping and malls, so people can also find a new restaurant with new style of food.

info												
	Postal_code	Borough	Neighborhood	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
0	600001	chennai	Angappanaicken Street,Wal Tax Road,Seven Wells...	13.0930	80.282817	1.0	Indian Restaurant	Department Store	Bus	Food	Daycare	Dessert Shop
13	600014	chennai	Triplicane South,Royapettah,Pudupakkam,Ligods ...	13.0506	80.264200	1.0	Indian Restaurant	Record Shop	Dep Stor	Department Store	Smoke Shop	Crickit Ground
18	600019	chennai	Wimconagar,Tiruvottiur Central,Tiruvottiur,TI...	13.1582	80.301800	1.0	Indian Restaurant	Indie Movie Theater	Histi Site	Historic Site	Grocery Store	Clothing Store
70	600071	chennai	Kamarajanagar	12.9591	80.143600	1.0	Indian Restaurant	Clothing Store	Big i Stor	Big Box Store	Shopping Mall	Fast Food Restaurant
71	600072	chennai	Thandarai,Pattabiram,Pattabiram East	12.9591	80.143600	1.0	Indian Restaurant	Clothing Store	Big i Stor	Big Box Store	Shopping Mall	Fast Food Restaurant
72	600073	chennai	Selayiur	12.9194	80.095767	1.0	Indian Restaurant	Restaurant	Che	Chettinad Restaurant	Cupcake Shop	Daycare

CONCLUSION:

As a result, people in big city needs new kind of food at the place where they spent their weekends or holidays, for this reason I am submitting the report to the Fireblade to start the new restaurant in the cluster 2 locations.

To Fire Blade Restaurant,

K. Raviraja