



Opening Indian Restaurant In Boston, Massachusetts

APOORVA ARBOOJ

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Background

- According to the information in the public domain like the one found on Wikipedia; the US government estimates over more than 2,00,000 F visa Indian students in the United States. Massachusetts has consistently been positioned in the top 10 US states for international students.
- Reason: There are over 120 quality institutions of higher learning in Massachusetts, with over 50 in the Boston metropolitan area alone! And Indians make the most count among the total international students in and around Boston.
- Good business Idea: To open an Indian restaurant in a neighborhood in Boston city which caters to and address to a large Indian student population.



Business Problem & Target Audience

- Objective:
 - To find a best location to open an Indian Restaurant in Boston, MA
- Business Question:
 - What would be the best location for an entrepreneur to open an Indian Restaurant in Boston?
- Target Audience:
 - Any individual who would want to open an Indian Restaurant in Boston.

Data & Data extraction

■ Data Needed

- Neighborhood data of Boston MA
- Latitude and Longitude of the neighborhoods in Boston
- Venue data related to restaurants in Boston city

■ Data Extraction

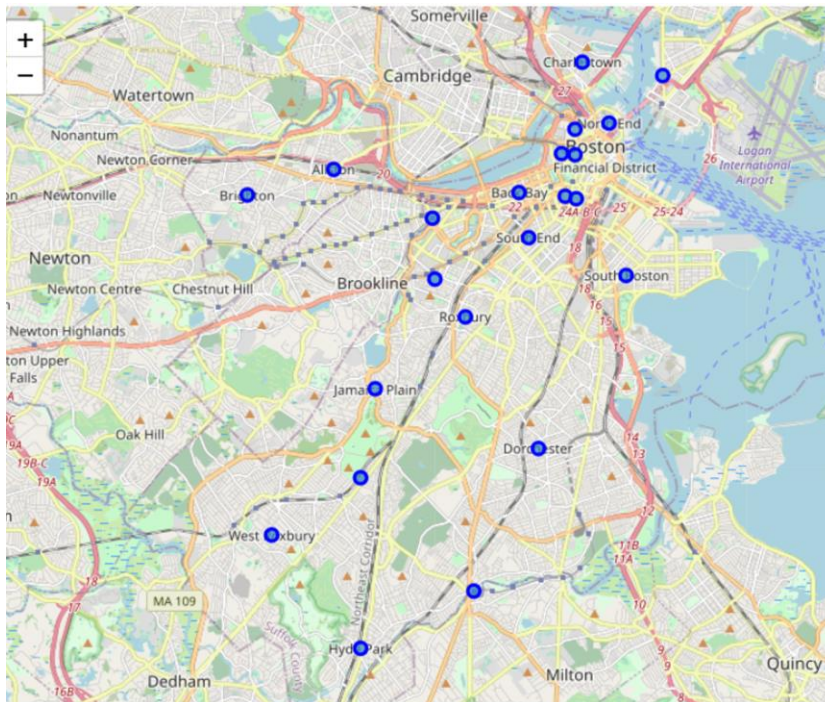
- Scraping wikipedia page to obtain Boston neighborhood data
- Use Geocoder package to obtain latitude and longitude data of these neighborhoods
- Using Foursquare API to get venue data related to these neighborhoods

Methodology

- Scrape the Wikipedia page 'Neighborhoods_in_Boston' and obtain the data for Boston neighborhoods.
- Use Geopy library to get the geo-spatial co-ordinates for all the neighborhoods.
- Use Folium library to visualize it on a map.
- Using Foursquare API, collect top 50 restaurants in every neighborhood along with their venue categories within 1000 meters range.
- Group collected data by neighborhood and find the mean of the frequency of occurrence of each unique category, preparing data for clustering.
- Cluster restaurants using K-Means algorithm from the sklearn machine learning library.
- Analyze the top 10 most common restaurant categories in each cluster.
- Visualize the clusters on the map.

Boston Neighborhood Data

	Neighborhood	Latitude	Longitude
0	Allston	42.355434	-71.132127
1	Back Bay	42.350707	-71.079730
2	Bay Village	42.350011	-71.066948
3	Beacon Hill	42.358708	-71.067829
4	Brighton	42.350097	-71.156442
5	Charlestown	42.377875	-71.061996
6	Chinatown	42.349405	-71.063582
7	Dorchester	42.297320	-71.074495
8	Downtown	42.358602	-71.063875
9	East Boston	42.375097	-71.039217
10	Fenway	42.345365	-71.104282
11	Hyde Park	42.255654	-71.124496
12	Jamaica Plain	42.309820	-71.120330
13	Mattapan	42.267566	-71.092427
14	Mission Hill	42.332560	-71.103608
15	North End	42.365097	-71.054495
16	Roslindale	42.291209	-71.124497
17	Roxbury	42.324843	-71.095016
18	South Boston	42.333431	-71.049495
19	South End	42.341310	-71.077230
20	West End	42.363919	-71.063899
21	West Roxbury	42.279265	-71.149497



Visualizing Boston Neighborhood

- Used Geopy library to obtain the geo-spatial co-ordinates of Boston:
 - Latitude: 42.3602534
 - Longitude: -71.0582912
- Used Folium library to create a map of Boston, with the neighborhoods superimposed on it.

	Neighborhood	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	Allston	Chinese Restaurant	American Restaurant	Tapas Restaurant	Brazilian Restaurant	Mexican Restaurant	Seafood Restaurant	Korean Restaurant	Asian Restaurant	Bar	Burmese Restaurant
1	Back Bay	American Restaurant	Chinese Restaurant	Italian Restaurant	Thai Restaurant	Mexican Restaurant	Seafood Restaurant	Brazilian Restaurant	Latin American Restaurant	Korean Restaurant	Vietnamese Restaurant
2	Bay Village	Chinese Restaurant	American Restaurant	Seafood Restaurant	Italian Restaurant	Asian Restaurant	Thai Restaurant	Vietnamese Restaurant	Hotpot Restaurant	Gastropub	Latin American Restaurant
3	Beacon Hill	American Restaurant	Chinese Restaurant	Italian Restaurant	Seafood Restaurant	Thai Restaurant	Greek Restaurant	Portuguese Restaurant	Vietnamese Restaurant	Brazilian Restaurant	Breakfast Spot
4	Brighton	American Restaurant	Seafood Restaurant	Mexican Restaurant	Tapas Restaurant	Asian Restaurant	Bar	Caribbean Restaurant	Pizza Place	Vietnamese Restaurant	Ice Cream Shop
5	Charlestown	American Restaurant	Mexican Restaurant	Chinese Restaurant	Italian Restaurant	Sushi Restaurant	Brazilian Restaurant	Seafood Restaurant	Peruvian Restaurant	Ice Cream Shop	Korean Restaurant
6	Chinatown	Chinese Restaurant	American Restaurant	Asian Restaurant	Seafood Restaurant	Italian Restaurant	Thai Restaurant	Vietnamese Restaurant	Hotpot Restaurant	Gastropub	Latin American Restaurant
7	Dorchester	American Restaurant	Caribbean Restaurant	Seafood Restaurant	Vietnamese Restaurant	Italian Restaurant	Latin American Restaurant	Mexican Restaurant	Portuguese Restaurant	Hotpot Restaurant	Ice Cream Shop
8	Downtown	American Restaurant	Italian Restaurant	Chinese Restaurant	Seafood Restaurant	Thai Restaurant	Greek Restaurant	Asian Restaurant	Peruvian Restaurant	Middle Eastern Restaurant	Hotpot Restaurant
9	East Boston	American Restaurant	Mexican Restaurant	Chinese Restaurant	Italian Restaurant	Latin American Restaurant	Vietnamese Restaurant	Seafood Restaurant	Pizza Place	Hotpot Restaurant	Deli / Bodega
10	Fenway	American Restaurant	Mexican Restaurant	Tapas Restaurant	Seafood Restaurant	Sports Bar	Chinese Restaurant	Latin American Restaurant	Bakery	Bar	Brazilian Restaurant
11	Hyde Park	American Restaurant	Italian Restaurant	Mexican Restaurant	Seafood Restaurant	Ice Cream Shop	Sports Bar	Portuguese Restaurant	Gastropub	Chinese Restaurant	Caribbean Restaurant
12	Jamaica Plain	American Restaurant	Chinese Restaurant	Seafood Restaurant	Mexican Restaurant	Ice Cream Shop	Tapas Restaurant	Sports Bar	Caribbean Restaurant	Vietnamese Restaurant	Gastropub
13	Mattapan	American Restaurant	Mexican Restaurant	Seafood Restaurant	Ice Cream Shop	Italian Restaurant	Chinese Restaurant	Caribbean Restaurant	Vietnamese Restaurant	Portuguese Restaurant	Brazilian Restaurant

Find the top 10 most common restaurant categories

Latitude	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
42.350097	Seafood Restaurant	Mexican Restaurant	Tapas Restaurant	Asian Restaurant	Bar	Caribbean Restaurant	Pizza Place	Vietnamese Restaurant	Ice Cream Shop
42.297320	Caribbean Restaurant	Seafood Restaurant	Vietnamese Restaurant	Italian Restaurant	Latin American Restaurant	Mexican Restaurant	Portuguese Restaurant	Hotpot Restaurant	Ice Cream Shop
42.309820	Chinese Restaurant	Seafood Restaurant	Mexican Restaurant	Ice Cream Shop	Tapas Restaurant	Sports Bar	Caribbean Restaurant	Vietnamese Restaurant	Gastropub
42.332560	Seafood Restaurant	Mexican Restaurant	Tapas Restaurant	Latin American Restaurant	Chinese Restaurant	Gastropub	Turkish Restaurant	Italian Restaurant	Ice Cream Shop
42.324843	Caribbean Restaurant	Seafood Restaurant	Tapas Restaurant	Italian Restaurant	Chinese Restaurant	Latin American Restaurant	Mexican Restaurant	Vietnamese Restaurant	Brazilian Restaurant
42.333431	Chinese Restaurant	Seafood Restaurant	Italian Restaurant	Pizza Place	Caribbean Restaurant	Mexican Restaurant	Vietnamese Restaurant	Greek Restaurant	Hotpot Restaurant

K-Means Cluster 0
Cuisine that dominates: Chinese Restaurants

	Latitude	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	42.355434	American Restaurant	Tapas Restaurant	Brazilian Restaurant	Mexican Restaurant	Seafood Restaurant	Korean Restaurant	Asian Restaurant	Bar	Burmese Restaurant
1	42.350707	Chinese Restaurant	Italian Restaurant	Thai Restaurant	Mexican Restaurant	Seafood Restaurant	Brazilian Restaurant	Latin American Restaurant	Korean Restaurant	Vietnamese Restaurant
3	42.358708	Chinese Restaurant	Italian Restaurant	Seafood Restaurant	Thai Restaurant	Greek Restaurant	Portuguese Restaurant	Vietnamese Restaurant	Brazilian Restaurant	Breakfast Spot
5	42.377875	Mexican Restaurant	Chinese Restaurant	Italian Restaurant	Sushi Restaurant	Brazilian Restaurant	Seafood Restaurant	Peruvian Restaurant	Ice Cream Shop	Korean Restaurant
9	42.375097	Mexican Restaurant	Chinese Restaurant	Italian Restaurant	Latin American Restaurant	Vietnamese Restaurant	Seafood Restaurant	Pizza Place	Hotpot Restaurant	Deli / Bodega
10	42.345365	Mexican Restaurant	Tapas Restaurant	Seafood Restaurant	Sports Bar	Chinese Restaurant	Latin American Restaurant	Bakery	Bar	Brazilian Restaurant
19	42.341310	Chinese Restaurant	Thai Restaurant	Latin American Restaurant	Seafood Restaurant	Italian Restaurant	Turkish Restaurant	Mexican Restaurant	Brazilian Restaurant	Korean Restaurant

K-Means Cluster 1

Cuisine that dominates: Chinese Restaurants followed by Tapas Restaurants

	Latitude	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
11	42.255654	Italian Restaurant	Mexican Restaurant	Seafood Restaurant	Ice Cream Shop	Sports Bar	Portuguese Restaurant	Gastropub	Chinese Restaurant	Caribbean Restaurant
13	42.267566	Mexican Restaurant	Seafood Restaurant	Ice Cream Shop	Italian Restaurant	Chinese Restaurant	Caribbean Restaurant	Vietnamese Restaurant	Portuguese Restaurant	Brazilian Restaurant
16	42.291209	Mexican Restaurant	Seafood Restaurant	Ice Cream Shop	Sports Bar	Chinese Restaurant	Caribbean Restaurant	Vietnamese Restaurant	Pizza Place	Irish Pub
21	42.279265	Italian Restaurant	Mexican Restaurant	Seafood Restaurant	Ice Cream Shop	Sports Bar	Vietnamese Restaurant	Greek Restaurant	Irish Pub	Chinese Restaurant

K-Means Cluster 2

Cuisine that dominates: Italian Restaurants followed by Seafood Restaurants

	Latitude	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
2	42.350011	American Restaurant	Seafood Restaurant	Italian Restaurant	Asian Restaurant	Thai Restaurant	Vietnamese Restaurant	Hotpot Restaurant	Gastropub	Latin American Restaurant
6	42.349405	American Restaurant	Asian Restaurant	Seafood Restaurant	Italian Restaurant	Thai Restaurant	Vietnamese Restaurant	Hotpot Restaurant	Gastropub	Latin American Restaurant

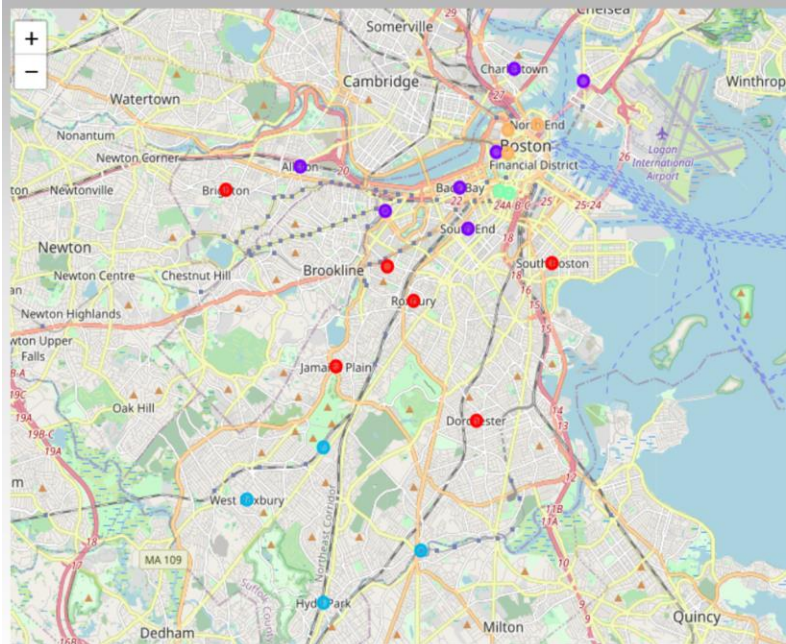
K-Means Cluster 3

Cuisine that dominates: American Restaurants

	Latitude	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
8	42.358602	Italian Restaurant	Chinese Restaurant	Seafood Restaurant	Thai Restaurant	Greek Restaurant	Asian Restaurant	Peruvian Restaurant	Middle Eastern Restaurant	Hotpot Restaurant
15	42.365097	American Restaurant	Chinese Restaurant	Seafood Restaurant	Pizza Place	Mexican Restaurant	Vietnamese Restaurant	Deli / Bodega	Hotpot Restaurant	Ice Cream Shop
20	42.363919	Italian Restaurant	Chinese Restaurant	Seafood Restaurant	Asian Restaurant	Pizza Place	Portuguese Restaurant	Korean Restaurant	Brazilian Restaurant	Latin American Restaurant

K-Means Cluster 4

Cuisine that dominates: Italian Restaurant followed by Chinese Restaurant



Visualizing the Clusters

Map Legend

- Cluster 0: Red : Chinese Restaurants
- Cluster 1: Purple : Chinese & Tapas Restaurants
- Cluster 2: Blue : Italian & Seafood Restaurants
- Cluster 3: Green : American Restaurants
- Cluster 4: Yellow : Italian & Chinese Restaurants



Observation

- From the clusters, it is evident that there are no Indian Restaurants in the top 10 most common venue.
- We cannot infer whether there are Indian Restaurants in Boston but are not popular or there are only few Indian Restaurants in Boston neighborhoods.
- One thing is clear that if a person wants to successfully set up an Indian Restaurant business in Boston, he/she they can open up in any of the neighborhoods provided if they cater quality/tasty food to people.
- Additionally, if we look at the clusters, we can see that there are many asian restaurants that are pretty popular in many of the neighborhoods. Therefore, the person can open an Indian restaurants which can also appease asian population by providing chinese, thai and japanese food options.

So based on observations and analysis, my recommendations are as follows:

- Cluster 0 locations- Indian Restaurants/Indo-chinese Restaurants
- Cluster 1 locations- Indian Restaurants/Indo-chinese Restaurants
- Cluster 2 locations- Indian Restaurants
- Cluster 3 locations- Indian Restaurants
- Cluster 4 locations- Indian Restaurants/Indo-chinese Restaurants

Conclusion

This type of analysis can be applied to any city of your choice that has available geospatial information. This type of analysis can be applied to any type of venue (shopping, clubs, etc.) that is available in Foursquare database.