The Battle of Neighbourhoods

A New Restaurant in Vancouver, BC

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Business Problem

- There is a businessperson (stakeholder), who is looking forward to opening a french cuisine restaurant in the city of Vancouver, British Columbia, Canada.
- The current project aims to find the most suitable location for a french cuisine restaurant in Vancouver.

Data

- Local Areas IDs and Names from Open Data Catalogue - "Neighbourhoods": https://data.vancouver.ca/datacatalogue/localAreaBoundary.htm
- Dataset downloaded in CSV format. It has 22 rows and 2 features
- Geographic coordinates of each Local Area obtained by using: *from geopy.geocoders import Nominatim*.
- Final dataset has: ID, Local Area name, latitude, and longitude.
- Foursquare API used to retrieve information about venues (Name, Latitude, Longitude, and Category) for each Local Area.

Methodology

- k-means algorithm used because the goal is to segment local areas in Vancouver and by which aspects they are similar.
- Steps:
  - Data Cleaning
  - Add coordinates to each local area
  - Visualise local areas in Vancouver
  - Use Foursquare API
  - Analyse each local area
  - Cluster local areas
  - Examine Clusters
  - Find French Restaurants in Vancouver

Methodology - Step 1: Data Cleaning

- Download data as CSV file and convert it to pandas dataframe.
- Complete the name of each local are with the string " , Vancouver, BC" to get geographic coordinates more precisely.
- Dataframe:

	MAPID	LocalArea
0	SUN	Sunset, Vancouver, BC
1	MP	Mount Pleasant, Vancouver, BC
2	RP	Riley Park, Vancouver, BC
3	CBD	Downtown, Vancouver, BC
4	KITS	Kitsilano, Vancouver, BC

22 rows and 2 columns
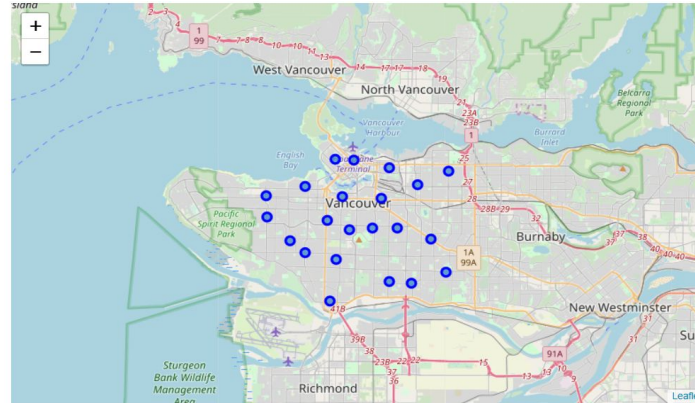
Methodology - Step 2: Add coordinates

- Obtain geographic coordinates (latitude and longitude) of each Local Area, by using: *from geopy.geocoders import Nominatim*.
- Merge it with the first dataframe
- Dataframe:

	MAPID	LocalArea	Latitude	Longitude
0	SUN	Sunset, Vancouver, BC	49.219593	-123.090239
1	MP	Mount Pleasant, Vancouver, BC	49.263330	-123.096588
2	RP	Riley Park, Vancouver, BC	49.247438	-123.102966
3	CBD	Downtown, Vancouver, BC	49.283393	-123.117456
4	KITS	Kitsilano, Vancouver, BC	49.269410	-123.155267

22 rows and 4 columns

Methodology - Step 3: Visualise local areas

- A map of Vancouver with its local areas

Methodology - Step 4: Use Foursquare API

- Foursquare API gets the top 100 venues within 500 metres for each Local Area in Vancouver.
- Venue features: name, latitude, longitude and category.
- Filter dataframe to focus only on *Restaurants*
- Dataframe after filtering:

	LocalArea	LocalArea Latitude	LocalArea Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Sunset, Vancouver, BC	49.219593	-123.090239	Kalai's Dosa Hut	49.218998	-123.091160	South Indian Restaurant
1	Sunset, Vancouver, BC	49.219593	-123.090239	Sartaj Sweets & Restaurant	49.224046	-123.090841	Indian Restaurant
2	Mount Pleasant, Vancouver, BC	49.263330	-123.096588	Sushiyama	49.262897	-123.097169	Sushi Restaurant
3	Mount Pleasant, Vancouver, BC	49.263330	-123.096588	Carp	49.262393	-123.096070	Sushi Restaurant
4	Mount Pleasant, Vancouver, BC	49.263330	-123.096588	Congee Noodle House 粥麵館 (Congee Noodle House)	49.263029	-123.102105	Chinese Restaurant

227 rows and 7 columns

Methodology - Step 5: Analyse each local area

- Applying One Hot Encoding, then grouping by Local Area to calculate the mean of the frequency of occurrence of each category.
- Calculate top 5 common venues in each local area.
- Dataframe:
  - *Note*: Only 21 rows because 'Arbutus-Ridge, Vancouver, BC' has no restaurants, hence no venues were selected.

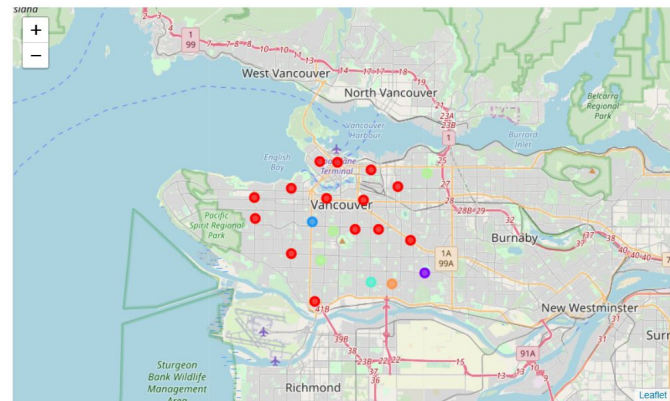|	LocalArea	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Downtown, Vancouver, BC	Vietnamese Restaurant	Seafood Restaurant	Restaurant	American Restaurant	Hawaiian Restaurant	Mexican Restaurant	Japanese Curry Restaurant	Australian Restaurant	French Restaurant	Chinese Restaurant
1	Dunbar-Southlands, Vancouver, BC	Sushi Restaurant	Italian Restaurant	Indian Restaurant	Fast Food Restaurant	Vietnamese Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant
2	Fairview, Vancouver, BC	Asian Restaurant	Vietnamese Restaurant	Chinese Restaurant	Korean Restaurant	Indian Restaurant	Malay Restaurant	Fast Food Restaurant	Falafel Restaurant	Restaurant	Sushi Restaurant
3	Grandview-Woodland, Vancouver, BC	Sushi Restaurant	Italian Restaurant	Indian Restaurant	Japanese Restaurant	French Restaurant	Seafood Restaurant	Greek Restaurant	Vegetarian / Vegan Restaurant	Mexican Restaurant	Middle Eastern Restaurant
4	Hastings-Sunrise, Vancouver, BC	Vietnamese Restaurant	Sushi Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant	Filipino Restaurant

21 rows and 11 columns

Methodology - Step 6: Cluster local areas

- By running k-means, the local areas grouped into 6 clusters.
- Result saved in dataframe, also include top 10 venues for each local area.
- Dataframe: (It has 21 rows and 15 columns)

	MAPID	LocalArea	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	9th Most Common Venue	10th Most Common Venue
0	SUN	Sunset, Vancouver, BC	49.219593	-123.090239	3	Indian Restaurant	South Indian Restaurant	Vietnamese Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Italian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant	Filipino Restaurant
1	MP	Mount Pleasant, Vancouver, BC	49.263330	-123.096588	0	Sushi Restaurant	Vietnamese Restaurant	Indian Restaurant	Chinese Restaurant	Mexican Restaurant	New American Restaurant	Peruvian Restaurant	Ethiopian Restaurant	Restaurant	Asian Restaurant
2	RP	Riley Park, Vancouver, BC	49.247438	-123.102966	0	Restaurant	Thai Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Sushi Restaurant	Chinese Restaurant	Vietnamese Restaurant	Middle Eastern Restaurant	Caribbean Restaurant	Seafood Restaurant
3	CBD	Downtown, Vancouver, BC	49.283393	-123.117456	0	Vietnamese Restaurant	Seafood Restaurant	Restaurant	American Restaurant	Hawaiian Restaurant	Mexican Restaurant	Japanese Curry Restaurant	Australian Restaurant	French Restaurant	Chinese Restaurant
4	KITS	Kitsilano, Vancouver, BC	49.269410	-123.155267	0	Sushi Restaurant	American Restaurant	French Restaurant	Japanese Restaurant	Thai Restaurant	Restaurant	Asian Restaurant	Indian Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant

21 rows and 15 columns

Map showing clusters

Methodology - Step 7: Examine Clusters

- ***Cluster 1***
  - Consists of 14 local areas.
  - The most popular restaurant venues are: Sushi Restaurant and Vietnamese Restaurant

	LocalArea	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	Mount Pleasant, Vancouver, BC	0	Sushi Restaurant	Vietnamese Restaurant	Indian Restaurant	Chinese Restaurant	Mexican Restaurant	New American Restaurant	Peruvian Restaurant	Ethiopian Restaurant	Restaurant	Asian Restaurant
2	Riley Park, Vancouver, BC	0	Restaurant	Thai Restaurant	Japanese Restaurant	Vegetarian / Vegan Restaurant	Sushi Restaurant	Chinese Restaurant	Vietnamese Restaurant	Middle Eastern Restaurant	Caribbean Restaurant	Seafood Restaurant
3	Downtown, Vancouver, BC	0	Vietnamese Restaurant	Seafood Restaurant	Restaurant	American Restaurant	Hawaiian Restaurant	Mexican Restaurant	Japanese Curry Restaurant	Australian Restaurant	French Restaurant	Chinese Restaurant
4	Kitsilano, Vancouver, BC	0	Sushi Restaurant	American Restaurant	French Restaurant	Japanese Restaurant	Thai Restaurant	Restaurant	Asian Restaurant	Indian Restaurant	Vegetarian / Vegan Restaurant	Seafood Restaurant
5	Dunbar-Southlands, Vancouver, BC	0	Sushi Restaurant	Italian Restaurant	Indian Restaurant	Fast Food Restaurant	Vietnamese Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant
6	Kerrisdale, Vancouver, BC	0	Chinese Restaurant	Vietnamese Restaurant	Fast Food Restaurant	Sushi Restaurant	Thai Restaurant	Asian Restaurant	Italian Restaurant	Mediterranean Restaurant	Japanese Restaurant	Portuguese Restaurant
8	West Point Grey, Vancouver, BC	0	Japanese Restaurant	Vegetarian / Vegan Restaurant	Asian Restaurant	Sushi Restaurant	Fast Food Restaurant	Italian Restaurant	South American Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Indian Restaurant
9	Marpole, Vancouver, BC	0	Sushi Restaurant	Chinese Restaurant	Japanese Restaurant	Vietnamese Restaurant	Thai Restaurant	Taiwanese Restaurant	Shanghai Restaurant	Dim Sum Restaurant	Falafel Restaurant	Fast Food Restaurant
12	Fairview, Vancouver, BC	0	Asian Restaurant	Vietnamese Restaurant	Chinese Restaurant	Korean Restaurant	Indian Restaurant	Malay Restaurant	Fast Food Restaurant	Falafel Restaurant	Restaurant	Sushi Restaurant
14	West End, Vancouver, BC	0	Japanese Restaurant	Greek Restaurant	Indian Restaurant	American Restaurant	Ramen Restaurant	Sushi Restaurant	Italian Restaurant	Restaurant	Chinese Restaurant	Falafel Restaurant
16	Renfrew-Collingwood, Vancouver, BC	0	Vietnamese Restaurant	Japanese Restaurant	Chinese Restaurant	Cantonese Restaurant	Shanghai Restaurant	Vegetarian / Vegan Restaurant	Asian Restaurant	Caribbean Restaurant	French Restaurant	Japanese Curry Restaurant
19	Kensington-Cedar Cottage, Vancouver, BC	0	Chinese Restaurant	Vietnamese Restaurant	Malay Restaurant	Greek Restaurant	Filipino Restaurant	Fast Food Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant
20	Strathcona, Vancouver, BC	0	Vietnamese Restaurant	Restaurant	Japanese Restaurant	Asian Restaurant	Fast Food Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant
21	Grandview-Woodland, Vancouver, BC	0	Sushi Restaurant	Italian Restaurant	Indian Restaurant	Japanese Restaurant	French Restaurant	Seafood Restaurant	Greek Restaurant	Vegetarian / Vegan Restaurant	Mexican Restaurant	Middle Eastern Restaurant

Methodology - Step 7: Examine Clusters

- ***Cluster 2***
  - The most common restaurant venue is Italian Restaurant in Killarney.

	LocalArea	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
15	Killarney, Vancouver, BC	1	Italian Restaurant	Vietnamese Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Japanese Curry Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant	Filipino Restaurant

- ***Cluster 3***
  - French Restaurant is the most common venue in Shaughnessy.

	LocalArea	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
11	Shaughnessy, Vancouver, BC	2	French Restaurant	Vietnamese Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant	Filipino Restaurant

- ***Cluster 4***
  - Indian Restaurant is the most common venue in Sunset.

	LocalArea	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	Sunset, Vancouver, BC	3	Indian Restaurant	South Indian Restaurant	Vietnamese Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Italian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant	Filipino Restaurant

Methodology - Step 7: Examine Clusters

- **Cluster 5**
  - Consists of 3 local areas: Oakridge, South Cambie, and Hastings-Sunrise
  - The most common venue is Vietnamese Restaurant.

- **Cluster 6**
  - Fast Food Restaurant is the most common venue in Victoria-Fraserview.

	LocalArea	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
10	Oakridge, Vancouver, BC	4	Vietnamese Restaurant	Sushi Restaurant	Fast Food Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant
13	South Cambie, Vancouver, BC	4	Vietnamese Restaurant	Malay Restaurant	Sushi Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant
17	Hastings-Sunrise, Vancouver, BC	4	Vietnamese Restaurant	Sushi Restaurant	Falafel Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant	Filipino Restaurant

	LocalArea	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
18	Victoria-Fraserview, Vancouver, BC	5	Fast Food Restaurant	Vietnamese Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Japanese Curry Restaurant	Italian Restaurant	Indian Restaurant	Hawaiian Restaurant	Greek Restaurant	French Restaurant

Methodology - Step 8: Find French Restaurants

- Explore French Restaurants in Vancouver using Foursquare API.
- Dataframe:

	LocalArea	LocalArea Latitude	LocalArea Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Riley Park, Vancouver, BC	49.247438	-123.102966	Coco et Olive	49.251760	-123.101089	French Restaurant
1	Riley Park, Vancouver, BC	49.247438	-123.102966	The French Table	49.250073	-123.100949	French Restaurant
2	Riley Park, Vancouver, BC	49.247438	-123.102966	Yugo Restaurant	49.247488	-123.101384	French Restaurant
3	Downtown, Vancouver, BC	49.283393	-123.117456	L'Hermitage	49.280139	-123.117480	French Restaurant
4	Downtown, Vancouver, BC	49.283393	-123.117456	Bacchus Lounge	49.282187	-123.122333	French Restaurant

18 rows and 7 columns

LocalArea	Venue
Downtown, Vancouver, BC	4
Grandview-Woodland, Vancouver, BC	4
Kitsilano, Vancouver, BC	4
Riley Park, Vancouver, BC	3
Kerrisdale, Vancouver, BC	1
Shaughnessy, Vancouver, BC	1
West End, Vancouver, BC	1

Group, count, and sort values

Results

- The local areas of West End, and Grandview-Woodland have the largest number of restaurants, with a total of 28 each. Whereas, local areas of Killarney, Shaughnessy, and Victoria-Fraserview have the smallest number of restaurants, with 1 each.
- Throughout Vancouver, there are 18 French Restaurant, which are distributed across 7 local areas: Downtown, Grandview-Woodland, Kitsilano, Riley Park, Kerrisdale, Shaughnessy, and West End.
- Downtown, Grandview-Woodland, and Kitsilano have 4 French Restaurants each, whereas Riley Park has 3, and Kerrisdale, Shaughnessy, and West End have 1 each.

Conclusion

- The local areas to be considered to open a French Restaurant are: Shaughnessy, Downtown, and Grandview-Woodland
- Shaughnessy only has one restaurant, so the number of competitors is small.
- Grandview-Woodland is more optimal to open a French Restaurant due to French Restaurants are in the top 5 most common venue. Additionally, this local area is recognised for its multiculturalism.

Thank you!