

Optimizing Location for Restaurant in Vancouver British Columbia

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Introduction

In this project, I will be looking for an optimal place to open a restaurant in the city of Vancouver, British Columbia. Vancouver is located towards the west end of Canada and encompasses a population of approximately 676,000 people. Looking at coordinates this city is located 49.2827° N, 123.1207° W and covers an area that totals about 115 kilometres squared. This city is ethnically diverse and known for its local seafood like salmon, halibut, and prawns. Vancouver is also seen to be a popular tourist spot due to the astonishing mountains and it is home to The Vancouver art gallery.

We will be looking at locations in Vancouver by their postal code and cross-reference it by what is located nearby and also look at the relative population of the area.

We will weigh out the pros and cons of the potential spots in order to find an optimal place to open a restaurant.

Data Acquisition and Cleaning

We will obtain our pulled our postal code data from Wikipedia and the population data from StatsCan. The information about what is in the locals will be brought from the four-square API. All this information will help us create and analyze clusters to make an informed decision on where we should open.

After obtaining all our data that is required, we need to start by cleaning it to be able to accurately analyze on. Cleaning persisted of things like dealing with values that were not available and deleting values that were redundant or not used in our clustering algorithms. The data set we had access to have the postal code data for the all of Canada, so we had to remove all values except those from Vancouver. We also need to add our population data and match it to the its corresponding region. From here on we were able to use folium to map our key locations and regions.

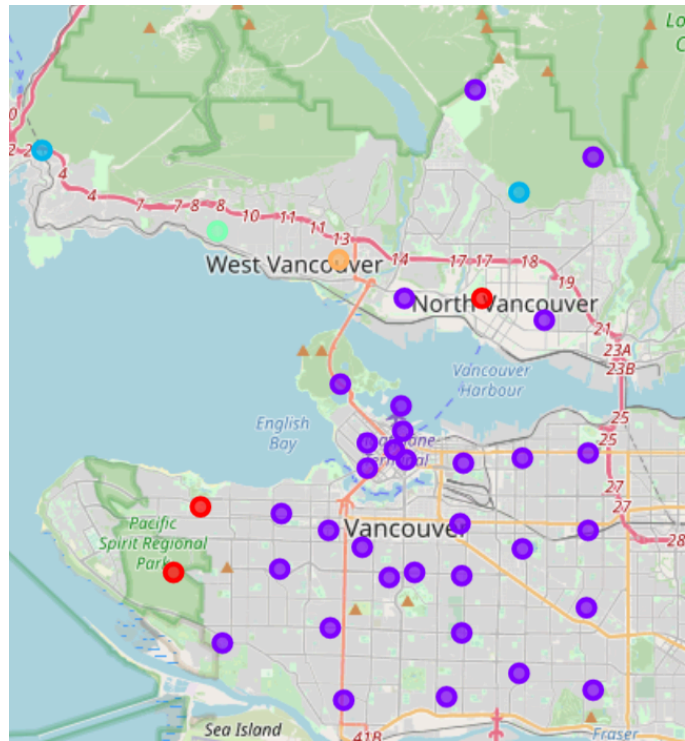
Methodology and Results

The results after using k-means clustering show that we can cluster in to five categories. The purpose of this map was to try to cluster regions with the number of restaurants and other facilities. From this we were able to create five distinct clusters that represented the city of Vancouver.

From greatest number of restaurants and facilities in a region to least:

1. Purple Cluster Points
2. Red Cluster Points
3. Turquoise Cluster Points
4. Cyan Cluster Points
5. Orange Cluster Points

This graph helps gives an idea of where most of the competition may potentially be. Ideally, we want to avoid unnecessary competition and we don't want to open the same type of restaurant in an area that may already have many of them. From this chart, we can already see that central Vancouver may already be too dense in venues to open a restaurant their we may need to do further analysis to conclude this.



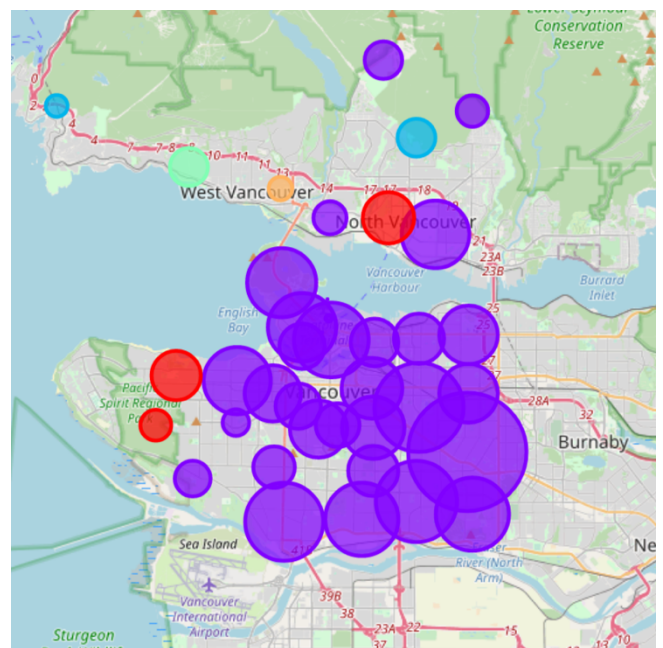
To get a better idea of what is in each region in Vancouver we then proceed to look at the top 10 in terms of most common venues:

Region	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
Vancouver (North Hastings-Sunrise)	Theme Park Ride / Attraction	Beer Garden	Theme Park	Event Space	Soccer Field	Inn	Sandwich Place	Bus Station	Portuguese Restaurant	Gas Station
Vancouver (North Grandview-Woodlands)	Café	Italian Restaurant	Asian Restaurant	Coffee Shop	Brewery	Sushi Restaurant	Theater	Chinese Restaurant	Deli / Bodega	Music Venue
Vancouver (South Hastings-Sunrise / North Renfrew-Collingwood)	Bus Stop	Furniture / Home Store	Coffee Shop	Paper / Office Supplies Store	Event Service	Metro Station	Chinese Restaurant	Sandwich Place	Liquor Store	Storage Facility
Vancouver (South Grandview-Woodlands / NE Kensington / Victoria-Fraserservice)	Café	Bakery	Beach	Bookstore	Farmers Market	Concert Hall	Lake	Church	Gym	Gym / Fitness Center
Vancouver (SE Kensington / Victoria-Fraserservice)	Pizza Place	Fish Market	Gas Station	Pet Store	Pharmacy	Noodle House	Convenience Store	Restaurant	Motorcycle Shop	Middle Eastern Restaurant
Vancouver (South Renfrew-Collingwood)	Hotel	Park	Fish & Chips Shop	Bar	Asian Restaurant	Bus Stop	Event Service	Ethiopian Restaurant	Food Truck	Food Court
Vancouver (Kilgarney)	Bus Stop	Juice Bar	Salon / Barbershop	Farmers Market	Fast Food Restaurant	Liquor Store	Coffee Shop	Bank	Bakery	Grocery Store
Vancouver (East Mount Pleasant)	Sushi Restaurant	Vietnamese Restaurant	Ethiopian Restaurant	Pizza Place	Sports Bar	Liquor Store	Café	Bar	Music Venue	Bakery
Vancouver (West Kensington / NE Riley Park-Little Mountain / SW ...)	Coffee Shop	Pizza Place	Bakery	Café	Filipino Restaurant	Chinese Restaurant	Sandwich Place	Gourmet Shop	Greek Restaurant	Grocery Store
Vancouver (SE Oakridge / East Marpole / South ...)	Chinese Restaurant	Pizza Place	Tea Room	Dessert Shop	Coffee Shop	Fast Food Restaurant	Sandwich Place	Field	Bus Stop	Fried Chicken Joint
Vancouver (SE Oakridge / East Marpole / South ...)	Indian Restaurant	Grocery Store	Park	Restaurant	Falafel Restaurant	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant	Field
Vancouver (West Mount Pleasant / West Riley Park-Little Mountain / SW ...)	Chinese Restaurant	Dessert Shop	Coffee Shop	Yoga Studio	Fast Food Restaurant	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service
Vancouver (East Fairview / South Cambie)	Coffee Shop	Bus Stop	Park	Bank	Cantonese Restaurant	Chinese Restaurant	Bubble Tea Shop	Malay Restaurant	Sushi Restaurant	Gift Shop
Vancouver (Strathcona / Chinatown / Downtown East ...)	Pub	Coffee Shop	Park	Food Truck	Cheese Shop	Seafood Restaurant	Sandwich Place	Restaurant	Café	Pie Shop
Vancouver (NE Downtown / Harbour Centre / Gastown ...)	Restaurant	Pizza Place	Hockey Arena	Breakfast Spot	Burger Joint	Sushi Restaurant	Taco Place	Clothing Store	Seafood Restaurant	Sandwich Place
Vancouver (Waterfront / Coal Harbour / Canada ...)	Hotel	Coffee Shop	Food Truck	Boat or Ferry	Restaurant	Café	New American Restaurant	Hotel Bar	Japanese Restaurant	Gym

Vancouver (West Kitsilano / Jericho)	Park	Yoga Studio	Farm	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant	Field
Vancouver (Chaldecutt / South University Endow...)	Park	Yoga Studio	Farm	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant	Field
North Vancouver Southwest Central	Park	Yoga Studio	Farm	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant	Field
North Vancouver Northwest Central	Trail	Paper / Office Supplies Store	Yoga Studio	Farm	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant
West Vancouver West	Trail	Tapas Restaurant	Yoga Studio	Farmers Market	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant
West Vancouver Southeast	Bank	Pharmacy	Yoga Studio	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant	Field
Vancouver (South West End)	Japanese Restaurant	Cosmetics Shop	Gay Bar	Hotel	Restaurant	Food Truck	Bakery	Dessert Shop	Greek Restaurant	Italian Restaurant
Vancouver (North West End / Stanley Park)	Event Space	Playground	Park	Trail	Outdoor Sculpture	Garden	Farm	Fish Market	Fish & Chips Shop	Financial or Legal Service
Vancouver (West Fairview / Granville Island / ...)	Pizza Place	Pet Store	Physical Therapist	Café	Historic Site	Breakfast Spot	Japanese Restaurant	Bakery	Farmers Market	Fish Market
Vancouver (NW Shaughnessy / East Kitsilano / Q...)	Yoga Studio	Bar	Coffee Shop	Electronics Store	Japanese Restaurant	Sushi Restaurant	Breakfast Spot	Dim Sum Restaurant	Food & Drink Shop	Furniture / Home Store
Vancouver (Central Kitsilano)	Coffee Shop	Café	Yoga Studio	Sushi Restaurant	Diner	Dessert Shop	Deli / Bodega	Pizza Place	Farmers Market	Pub
Vancouver (NW Arbutus Ridge)	Italian Restaurant	Caribbean Restaurant	Bakery	Yoga Studio	Farmers Market	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service
Vancouver (South Shaughnessy / NW Oakridge / N...)	Bus Stop	Chinese Restaurant	Electronics Store	Asian Restaurant	Sushi Restaurant	Coffee Shop	Yoga Studio	Field	Food Court	Food & Drink Shop
Vancouver (Dunbar-Southlands / Musqueam)	Vietnamese Restaurant	Construction & Landscaping	Fast Food Restaurant	Yoga Studio	Farm	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service
Vancouver (SE Kerrisdale / SW Oakridge / West ...)	Chinese Restaurant	Pizza Place	Sushi Restaurant	Bus Stop	Gas Station	Coffee Shop	Bank	Thai Restaurant	Bubble Tea Shop	Sandwich Place
Vancouver (SW Downtown)	Mexican Restaurant	Sushi Restaurant	Café	Bakery	Coffee Shop	Italian Restaurant	Middle Eastern Restaurant	Gay Bar	Hotel	Greek Restaurant
North Vancouver North Central	Scenic Lookout	Mountain	Trail	Yoga Studio	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service	Filipino Restaurant	Field
North Vancouver South Central	Sandwich Place	Butcher	Breakfast Spot	Japanese Restaurant	Yoga Studio	Food Court	Food & Drink Shop	Fish Market	Fish & Chips Shop	Financial or Legal Service
North Vancouver Southwest	Coffee Shop	Discount Store	Italian Restaurant	Greek Restaurant	Gym	Japanese Restaurant	Liquor Store	Toy / Game Store	Burger Joint	Bus Station
North Vancouver Northwest	Trail	Ski Chalet	Restaurant	Mountain	Movie Theater	Ski Chairlift	Sporting Goods Shop	Skating Rink	Scenic Lookout	Fast Food Restaurant
Vancouver (Bentall Centre)	Gym	Airport Terminal	American Restaurant	Plaza	Irish Pub	Outdoor Sculpture	Gastropub	Breakfast Spot	Farmers Market	Food & Drink Shop
Vancouver (Pacific Centre)	Hotel	Food Truck	Cosmetics Shop	Restaurant	Steakhouse	Dessert Shop	Seafood Restaurant	Clothing Store	Concert Hall	Coffee Shop

We also should look at the frequencies referenced in the code of restaurants in each region in Vancouver. This will give us a more general indication of what is the most popular venue in the region. Ideally, when we select our location, we want an area where the frequency of restaurants is not quite high.

The final chart map we will be looking at will help give us perspective in terms of population and tell us where most people reside in Vancouver. We can cross-reference this with the number of venues in the area to help find the optimal place to open a restaurant. The clusters follow the same colour pattern as before, so we have five clusters on the map. What this adds is the relative population size. The larger the circle the larger the population in that particular area. This will give us a general idea of population density in Vancouver



Conclusion

After looking at all the data presented a potential location to open a restaurant can be at V6R Vancouver (West Vancouver (West Kitsilano / Jericho). The area has a rather modest population of 19416 with 8303 occupied residents. If we look at the frequencies of venues in that particular area, we can see the most common facility is parks in this particular area by far. Looking at the top 10 venues chart we can see the following parks the next couple common venues are a yoga studio and a farm. This area has tons of potential opening restaurants here. If we do look at the already existing restaurants in this area, they are mostly fast food-based establishments. There will not be a huge amount of competition in the area that we will have to compete against. This will limit our barrier to enter the market and give us the best chance in success.