**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 out 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.

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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:

A close up of text on a white background

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A screenshot of a cell phone

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Description automatically generatedWe also should look at the frequencies 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.

North Vancouver North Central

venue freq

0 Scenic Lookout 0.33

1 Mountain 0.33

2 Trail 0.33

3 Office 0.00

4 Motorcycle Shop 0.00

North Vancouver Northwest

venue freq

0 Trail 0.26

1 Ski Chalet 0.11

2 Restaurant 0.11

3 Scenic Lookout 0.05

4 Mountain 0.05

North Vancouver Northwest Central

venue freq

0 Trail 0.67

1 Paper / Office Supplies Store 0.33

2 Accessories Store 0.00

3 Noodle House 0.00

4 Motorcycle Shop 0.00

North Vancouver South Central

venue freq

0 Butcher 0.25

1 Japanese Restaurant 0.25

2 Breakfast Spot 0.25

3 Sandwich Place 0.25

4 Office 0.00

North Vancouver Southwest

venue freq

0 Coffee Shop 0.17

1 Discount Store 0.08

2 Toy / Game Store 0.08

3 Japanese Restaurant 0.08

4 Liquor Store 0.08

North Vancouver Southwest Central

venue freq

0 Park 1.0

1 Accessories Store 0.0

2 Office 0.0

3 Motorcycle Shop 0.0

4 Mountain 0.0

Vancouver (Bentall Centre)

venue freq

0 Irish Pub 0.12

1 American Restaurant 0.12

2 Airport Terminal 0.12

3 Plaza 0.12

4 Gastropub 0.12

Vancouver (Central Kitsilano)

venue freq

0 Café 0.07

1 Coffee Shop 0.07

2 Burger Joint 0.04

3 Deli / Bodega 0.04

4 Dessert Shop 0.04

Vancouver (Chaldecutt / South University Endowment Lands)

venue freq

0 Park 1.0

1 Accessories Store 0.0

2 Office 0.0

3 Motorcycle Shop 0.0

4 Mountain 0.0

Vancouver (Dunbar-Southlands / Musqueam)

venue freq

0 Fast Food Restaurant 0.33

1 Vietnamese Restaurant 0.33

2 Construction & Landscaping 0.33

3 Optical Shop 0.00

4 Mountain 0.00

Vancouver (East Fairview / South Cambie)

venue freq

0 Coffee Shop 0.20

1 Bus Stop 0.15

2 Park 0.10

3 Gift Shop 0.05

4 Bank 0.05

Vancouver (East Mount Pleasant)

venue freq

0 Sushi Restaurant 0.14

1 Ethiopian Restaurant 0.09

2 Vietnamese Restaurant 0.09

3 Liquor Store 0.05

4 Pharmacy 0.05

Vancouver (Killarney)

venue freq

0 Bus Stop 0.11

1 Sandwich Place 0.06

2 Bank 0.06

3 Chinese Restaurant 0.06

4 Sushi Restaurant 0.06

Vancouver (NE Downtown / Harbour Centre / Gastown / Yaletown)

venue freq

0 Restaurant 0.08

1 Taco Place 0.05

2 Burger Joint 0.05

3 Pizza Place 0.05

4 Hockey Arena 0.05

Vancouver (NW Arbutus Ridge)

venue freq

0 Italian Restaurant 0.33

1 Caribbean Restaurant 0.33

2 Bakery 0.33

3 Accessories Store 0.00

4 Optical Shop 0.00

Vancouver (NW Shaughnessy / East Kitsilano / Quilchena)

venue freq

0 Yoga Studio 0.08

1 Bar 0.08

2 Electronics Store 0.08

3 Coffee Shop 0.08

4 Japanese Restaurant 0.08

Vancouver (North Grandview-Woodlands)

venue freq

0 Café 0.09

1 Deli / Bodega 0.06

2 Theater 0.06

3 Italian Restaurant 0.06

4 Sushi Restaurant 0.06

Vancouver (North Hastings-Sunrise)

venue freq

0 Theme Park Ride / Attraction 0.15

1 Beer Garden 0.07

2 Event Space 0.07

3 Theme Park 0.07

4 Portuguese Restaurant 0.04

Vancouver (North West End / Stanley Park)

venue freq

0 Garden 0.17

1 Event Space 0.17

2 Outdoor Sculpture 0.17

3 Park 0.17

4 Trail 0.17

Vancouver (Pacific Centre)

venue freq

0 Hotel 0.09

1 Food Truck 0.06

2 Cosmetics Shop 0.04

3 Restaurant 0.04

4 Concert Hall 0.03

Vancouver (SE Kensington / Victoria-Fraserview)

venue freq

0 Pizza Place 0.11

1 Middle Eastern Restaurant 0.05

2 Pharmacy 0.05

3 Pet Store 0.05

4 Restaurant 0.05

Vancouver (SE Kerrisdale / SW Oakridge / West Marpole)

venue freq

0 Chinese Restaurant 0.14

1 Sushi Restaurant 0.09

2 Bus Stop 0.09

3 Pizza Place 0.09

4 Vietnamese Restaurant 0.05

Vancouver (SE Oakridge / East Marpole / South Sunset)

venue freq

0 Indian Restaurant 0.4

1 Restaurant 0.2

2 Park 0.2

3 Grocery Store 0.2

4 Office 0.0

Vancouver (SE Riley Park-Little Mountain / SW Kensington / NE Oakridge / North Sunset)

venue freq

0 Chinese Restaurant 0.19

1 Ice Cream Shop 0.06

2 Tea Room 0.06

3 Fast Food Restaurant 0.06

4 Diner 0.06

Vancouver (SW Downtown)

venue freq

0 Mexican Restaurant 0.08

1 Sushi Restaurant 0.06

2 Bakery 0.06

3 Café 0.06

4 Greek Restaurant 0.04

Vancouver (South Grandview-Woodlands / NE Kensington)

venue freq

0 Café 0.13

1 Bakery 0.13

2 Church 0.07

3 Gym 0.07

4 Gym / Fitness Center 0.07

Vancouver (South Hastings-Sunrise / North Renfrew-Collingwood)

venue freq

0 Coffee Shop 0.09

1 Furniture / Home Store 0.09

2 Bus Stop 0.09

3 Insurance Office 0.05

4 Sandwich Place 0.05

Vancouver (South Renfrew-Collingwood)

venue freq

0 Bus Stop 0.17

1 Hotel 0.17

2 Asian Restaurant 0.17

3 Park 0.17

4 Bar 0.17

Vancouver (South Shaughnessy / NW Oakridge / NE Kerrisdale / SE Arbutus Ridge)

venue freq

0 Bus Stop 0.25

1 Chinese Restaurant 0.25

2 Asian Restaurant 0.12

3 Electronics Store 0.12

4 Sushi Restaurant 0.12

Vancouver (South West End)

venue freq

0 Japanese Restaurant 0.07

1 Dessert Shop 0.04

2 Cosmetics Shop 0.04

3 Gay Bar 0.04

4 Food Truck 0.04

Vancouver (Strathcona / Chinatown / Downtown Eastside)

venue freq

0 Pub 0.08

1 Restaurant 0.08

2 Cheese Shop 0.08

3 Food Truck 0.08

4 Coffee Shop 0.08

Vancouver (Waterfront / Coal Harbour / Canada Place)

venue freq

0 Hotel 0.08

1 Coffee Shop 0.07

2 Food Truck 0.04

3 Boat or Ferry 0.04

4 Restaurant 0.03

Vancouver (West Fairview / Granville Island / NE Shaughnessy)

venue freq

0 Pizza Place 0.12

1 Café 0.12

2 Physical Therapist 0.12

3 Japanese Restaurant 0.12

4 Pet Store 0.12

Vancouver (West Kensington / NE Riley Park-Little Mountain)

venue freq

0 Coffee Shop 0.29

1 Ice Cream Shop 0.06

2 Grocery Store 0.06

3 Filipino Restaurant 0.06

4 Sandwich Place 0.06

Vancouver (West Kitsilano / Jericho)

venue freq

0 Park 1.0

1 Accessories Store 0.0

2 Office 0.0

3 Motorcycle Shop 0.0

4 Mountain 0.0

Vancouver (West Mount Pleasant / West Riley Park-Little Mountain)

venue freq

0 Chinese Restaurant 0.50

1 Dessert Shop 0.25

2 Coffee Shop 0.25

3 Accessories Store 0.00

4 Outdoor Sculpture 0.00

West Vancouver South

venue freq

0 Art Gallery 0.5

1 Home Service 0.5

2 Accessories Store 0.0

3 Optical Shop 0.0

4 Mountain 0.0

West Vancouver Southeast

venue freq

0 Bank 0.5

1 Pharmacy 0.5

2 Optical Shop 0.0

3 Mountain 0.0

4 Movie Theater 0.0

West Vancouver West

venue freq

0 Tapas Restaurant 0.5

1 Trail 0.5

2 Accessories Store 0.0

3 Noodle House 0.0

4 Motorcycle Shop 0.0

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.

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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.