

Selecting the location for a brand new Fashion Boutiques in high traffic areas in Seattle, Washington, USA

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1.0. Introduction

The location of a Fashion Boutique is very important. This could potentially mean the difference between steady profits or a steady loss in revenue. A good understanding of the target market is key to finding the best retail location. Once the environment where the targeted audience shops, lives and works are determined, the best location that will attract these potential customers can then be selected. This makes it easy for customers to find the boutique by choosing a location that is close-by and convenient to stop in.

Established in 1970 as one of the first multi-brand boutiques in the UK, **Browns Fashion** – headquartered in Mayfair London, has a reputation as a fashion talent scout that is second to none. The company's founder, Joan Burstein, employed Manolo Blahnik and Osman Yousefzada, and discovered Alexander McQueen and John Galliano –some of the top names in the fashion industry. Now owned by online giant Farfetch, the original South Molton Street store has powerful backing and a big digital engine, as well as a second store, **Browns East**. With a substantial e-commerce footprint, the company has begun the implementation of fashion boutique stores in major big cities as part of their omnichannel retail strategy. After rolling out stores in a few selected cities by guessing where the best locations to open, as part of their

store expansion for Seattle, the company has decided to be more informed and selective, and take the time to do some research before opening a store in Seattle.

As a data scientist, I have been tasked to assist Browns in making data-driven decisions on the new location –more suitable for a new store in Seattle. This exploratory work constitutes a major part of their decision-making process. Then the company will internally conduct ground qualitative analyses of Seattle’s neighbourhoods once the results of my analysis and report are reviewed.

1.1. Business Understanding

In general, most fashion boutiques are not necessarily located in the premium upmarket strips like, but rather, in high traffic areas where consumers go for shopping, restaurants and entertainment. **Foursquare** data are deemed very useful in making data-driven decisions about the best of those areas that will reproduce the similar success **Browns Fashion** has experienced in their London Fashion Boutique. To achieve this, **Brown's** neighbourhood's latitude and longitude values in their London Boutique has been used to compile and analyse top 100 venues within a radius of 500 meters of their boutique to guide the decision of the new location in Seattle, WA.

Figure 1 shows, in red circle marker, the location of Browns Fashion Boutique in Mayfair, London UK and **surrounding most common venues** in blue dotted circle markers. The script used to produce the figure below are provided in Jupiter Notebook [5].

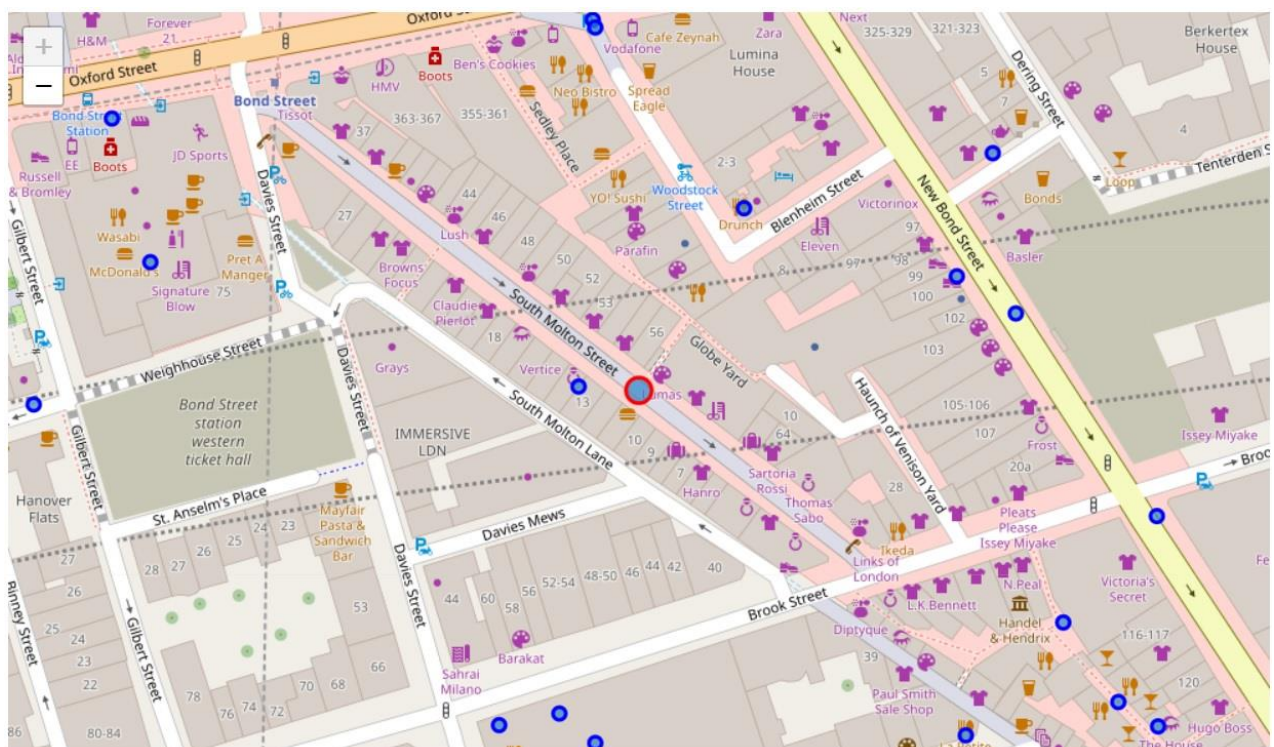


Figure 1: Browns Fashion Boutique in Mayfair London and surrounding venues using Folium

The analysis of Brown's current surrounding of their London's store (see **Figure 1**), shows that the best location to open new fashion retail store may not only be where other clothing stores are located, but in fact areas that are near all the following venues:

1. Art Gallery
2. Clothing Store
3. French Restaurant
4. Coffee Shop
5. Boutique
6. Juice Bar
7. Italian Restaurant
8. Hotel
9. Café
10. Cosmetics Shop

Thus, opening a new store where these above enumerated venues are located might attract people that often frequent these places and bring similar success experienced in London.

The analysis and recommendations for a new store location in Seattle will focus on general districts with these venues, not on specific store addresses. Narrowing down the best district options derived from analysis allows for either further research to be conducted, advising agents of the chosen district, or on the ground searching for specific sites by the company's personnel.

1.2. Summary

In this section, we leverage Foursquare data of Brown Fashion store in Mayfair London, to produce the 10 best venues surrounding their London's Fashion Boutique. These top venues will help in the analysis in the next stage where Seattle's geospatial data –through Foursquare, will be leveraged in order to determine the best locations possible for Browns' new fashion boutique in one of Seattle neighbourhoods.

2.0. Description of the Data acquisition and Wrangling

In the absence of leveraging data to aid decisions about a Fashion boutique location in Seattle, Browns Fashion's decision makers could spend extensive amount of time and resources to come up with the ideal location. Decision makers could proceed through dispatching a team to ask around Seattle's Neighbourhoods, consulting many real estate agents with their own district/Neighbourhood's biases. The company could then end up opening in a location that is not ideal. Thus, leveraging data to explore different neighbourhoods around Seattle that might replicate the kind of success experienced in Mayfair, London will provide unbiased and better answers, and better solutions to a potential new store location.

The aim is to identify the best neighbourhood to open a new store as part of Browns' plan. The results will be translated to management in a simple form that will convey the data-driven analysis for the best location to open the store.

2.1. Data collection

Seattle's Neighbourhoods and districts data were scrapped from Wikipedia [1, 2]. These data have been wrangled and cleaned. Geospatial data –including latitudinal and longitudinal data,

for each Neighbourhood were added using the *Geopy Library* in python. The resulting Pandas **DataFrame** was also converted into a **.csv file** format suitable for analysis [4]. Based on the obtained dataset, the city of Seattle and surroundings is subdivided into 90 Neighbourhoods --assembled in 19 neighbourhood groups (Districts).

Table 1: Seattle neighbourhoods and geospatial data

| | District | Neighbourhood | Latitude | Longitude |
|----|--------------|-------------------|-----------|-------------|
| 0 | Ballard | Adams | 47.565271 | -122.279546 |
| 1 | Ballard | Loyal Heights | 47.688709 | -122.392907 |
| 2 | Ballard | Sunset Hill | 47.675217 | -122.398448 |
| 3 | Ballard | West Woodland | 47.675973 | -122.347499 |
| 4 | Ballard | Whittier Heights | 47.683297 | -122.371449 |
| 5 | Beacon Hill | Holly Park | 47.541650 | -122.291929 |
| 6 | Beacon Hill | North Beacon Hill | 47.577586 | -122.309960 |
| 7 | Beacon Hill | South Beacon Hill | 47.577586 | -122.309960 |
| 8 | Capitol Hill | Broadway | 47.606293 | -122.320794 |
| 9 | Capitol Hill | Madison Park | 47.635930 | -122.280196 |
| 10 | Capitol Hill | Montlake | 47.641408 | -122.303044 |

2.2. Summary

In this section, the list of Seattle's Neighbourhoods and Districts were researched and pulled from the internet and converted into pandas DataFrame. Geospatial coordinates for each neighbourhood were added using **Geopy Library** in Python. In the Next section, Foursquare location data will be leveraged to explore or compare neighbourhoods in Seattle, identifying the high traffic areas where consumers go for shopping, dining and entertainment – potential areas where Brown Fashion is would be most interested in opening a new store capable of replicating the success the company experienced in the Mayfair London Fashion Boutique, as illustrated in section 1.1.

3.0. Methodology and Exploratory Data Analysis

The principal theme throughout this section will be to use Foursquare location data to carry out the exploratory analysis and compare Neighbourhoods around Seattle, WA. The step will encompass:

1. data manipulation and analysis to derive subsets of the initial data
2. Identification of the high traffic areas using statistical analysis and data visualisation - using various mapping libraries including geospatial library in Python (folium) and Violin plot (seaborn)
3. Results and discussions

3.1. Seattle Neighbourhoods

Figure 2 shows a map of Seattle with added markers illustrating the geo-localisation of its neighbourhoods. The script used to draw this map is provided in the Jupiter notebook.

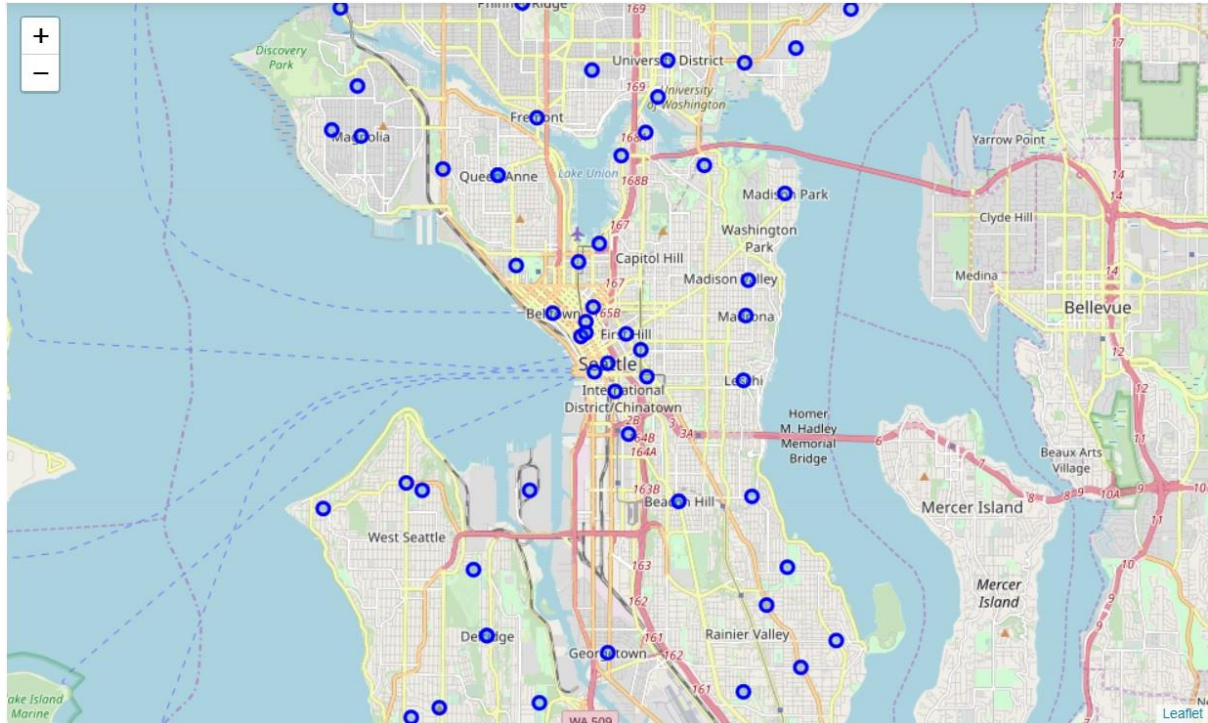


Figure 2: Showing a map of Seattle and neighbourhoods in dotted blue circle markers.

The geographical coordinates of Seattle were obtained through **geopy.geocoder** and are given by (Latitude: 47.6038321, Longitude: -122.3300624). A function **getNearbyVenues ()** was then defined in order to retrieve all the neighbourhoods in Seattle, WA. A DataFrame (**seattle_venues**) that contains all the venues in all considered Seattle neighbourhoods

Table 2: Showing the 10 first lines of venues around Seattle neighbourhoods.

| | Neighbourhood | Latitude | Longitude | Venue | Venue Latitude | Venue Longitude | Venue Category |
|----|---------------|-----------|-------------|-------------------------------|----------------|-----------------|---------------------------|
| 0 | Adams | 47.565271 | -122.279546 | Genesee Park & Playground | 47.564485 | -122.279274 | Park |
| 1 | Adams | 47.565271 | -122.279546 | Genesee Dog Park | 47.563495 | -122.276687 | Dog Run |
| 2 | Adams | 47.565271 | -122.279546 | Genesee Park - Soccer Fields | 47.562986 | -122.278359 | Soccer Field |
| 3 | Loyal Heights | 47.688709 | -122.392907 | Cafe Munir | 47.686908 | -122.387996 | Middle Eastern Restaurant |
| 4 | Loyal Heights | 47.688709 | -122.392907 | Larsen's Bakery | 47.686804 | -122.387524 | Bakery |
| 5 | Loyal Heights | 47.688709 | -122.392907 | Fresh Fish Company | 47.686888 | -122.387236 | Fish Market |
| 6 | Loyal Heights | 47.688709 | -122.392907 | Saleh's Delicatessen | 47.686702 | -122.387918 | Convenience Store |
| 7 | Loyal Heights | 47.688709 | -122.392907 | Cocina Esperanza | 47.690447 | -122.397992 | Mexican Restaurant |
| 8 | Loyal Heights | 47.688709 | -122.392907 | Soprano's Pizza & Pasta | 47.685948 | -122.387791 | Pizza Place |
| 9 | Loyal Heights | 47.688709 | -122.392907 | Ballard Food Bank Turkey Trot | 47.690144 | -122.398158 | Athletics & Sports |
| 10 | Loyal Heights | 47.688709 | -122.392907 | Fiore | 47.690414 | -122.398022 | Coffee Shop |

Table 2 shows neighbourhoods and associated venues. The number of venues for each neighbourhood were then Computed, with 286 unique venue categories being identified. In this work, only a maximum of 100 venues per neighbourhood is used as there is a 100 venue limit imposed by the free Sandbox Foursquare account.

3.2. Analysis of each of the neighbourhoods in Seattle

In order to carry out the analysis categorical venue data were transformed to binaries using one-hot encoding approach. Venues rows were grouped by neighbourhoods and the mean of the frequency of occurrence of each category was taken.

Table 3: showing a snip of data for Venues grouped by rows

| | Neighbourhood | ATM | Accessories Store | African Restaurant | American Restaurant | Amphitheater | Antique Shop | Arcade | Art Gallery | Art Museum | Arts & Crafts Store | Asian Restaurant | Athletics & Sports |
|---|---------------|----------|-------------------|--------------------|---------------------|--------------|--------------|----------|-------------|------------|---------------------|------------------|--------------------|
| 0 | Adams | 0.000000 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 1 | Alki | 0.000000 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.047619 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | Arbor Heights | 0.000000 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 3 | Atlantic | 0.000000 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 4 | Belltown | 0.000000 | 0.00 | 0.000000 | 0.010000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 5 | Bitter Lake | 0.035714 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.035714 |
| 6 | Briarcliff | 0.000000 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.250000 |
| 7 | Brighton | 0.000000 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 8 | Broadview | 0.000000 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.111111 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 9 | Broadway | 0.019608 | 0.00 | 0.000000 | 0.000000 | 0.0000 | 0.000000 | 0.000000 | 0.000000 | 0.019608 | 0.000000 | 0.039216 | 0.000000 |

From the results shown in table 3, the best 10 top most common venues for each neighbourhood was then retrieved for comparison purposes as shown in table 4.

Table 4: Showing a snip dataset of the best top 10 most common venues for each neighbourhood

| | Neighbourhood | 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 | Adams | Park | Soccer Field | Dog Run | Electronics Store | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market |
| 1 | Alki | Ice Cream Shop | Coffee Shop | Mexican Restaurant | Park | Art Gallery | Italian Restaurant | Restaurant | Thai Restaurant | Scenic Lookout | Sandwich Place |
| 2 | Arbor Heights | Spa | Zoo Exhibit | Farmers Market | Ethiopian Restaurant | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Fast Food Restaurant |
| 3 | Atlantic | Thrift / Vintage Store | Marijuana Dispensary | Sporting Goods Shop | Food Truck | Rental Car Location | Cheese Shop | Light Rail Station | Electronics Store | Grocery Store | Ethiopian Restaurant |
| 4 | Belltown | Bar | Bakery | New American Restaurant | Sushi Restaurant | Cocktail Bar | Coffee Shop | Hotel | Seafood Restaurant | Pizza Place | Italian Restaurant |
| 5 | Bitter Lake | Fast Food Restaurant | Gym / Fitness Center | Grocery Store | ATM | Donut Shop | Noodle House | Sandwich Place | Chinese Restaurant | Seafood Restaurant | Thai Restaurant |
| 6 | Briarcliff | Bus Stop | Athletics & Sports | Trail | Park | Floating Market | Fish Market | Fish & Chips Shop | Field | Fast Food Restaurant | Farmers Market |
| 7 | Brighton | Convenience Store | Greek Restaurant | Café | Zoo Exhibit | Farmers Market | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant |
| 8 | Broadview | Convenience Store | Pizza Place | Thai Restaurant | Beer Bar | Sushi Restaurant | Video Store | Furniture / Home Store | Antique Shop | Food Truck | Fish & Chips Shop |
| 9 | Broadway | Sandwich Place | Coffee Shop | Pharmacy | Pizza Place | Korean Restaurant | Bar | Asian Restaurant | Bus Stop | Supplement Shop | Bike Shop |
| 10 | Bryant | Organic Grocery | Zoo Exhibit | Farmers Market | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Fast Food Restaurant | Electronics Store |
| 11 | Cedar Park | Vietnamese Restaurant | Park | Ethiopian Restaurant | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market | Zoo Exhibit |
| 12 | Central Business District | Coffee Shop | Hotel | American Restaurant | Seafood Restaurant | Clothing Store | Cocktail Bar | Spa | Concert Hall | Theater | Mexican Restaurant |
| 13 | Columbia City | Pizza Place | Bar | African Restaurant | Park | Coffee Shop | Vietnamese Restaurant | Ice Cream | Brewery | Gastropub | Live Bar |

3.3. Cluster Neighbourhoods Using K-Means Clustering

In this step, we run **k-means** to cluster the neighbourhoods into 6 different clusters. This is aimed at grouping similar clusters of neighbourhoods together then selecting the cluster that represents the criteria best set in section 1.1 the best. Then a thorough analysis of the chosen cluster was carried out to select the best neighbourhood for the new Browns Fashion Boutique.

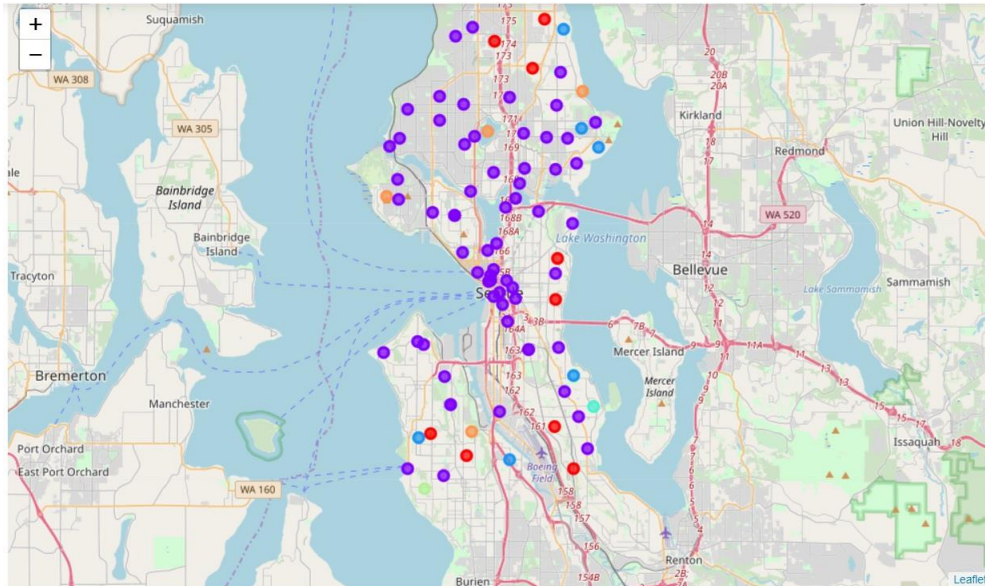


Figure 3: Showing *K-Means* clustering of Seattle neighbourhoods

3.4. Clusters analysis

Data for the respective clusters are shown in tables 5, 6, 7, 8, 9, 10. These respective clusters are then examined so that a determination of the discriminating venue categories that distinguish each cluster can be established.

Table 5: Cluster 1

| | Neighbourhood | 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 |
|----|-----------------------|-----------------------|-----------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 5 | Holly Park | Food & Drink Shop | Playground | Brewery | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market | Fast Food Restaurant |
| 17 | Harrison/Denny-Blaine | Park | Playground | Zoo Exhibit | Ethiopian Restaurant | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market |
| 18 | Leschi | Park | Playground | Pet Store | Grocery Store | Pizza Place | Field | Fast Food Restaurant | Farmers Market | Falafel Restaurant | Fish & Chips Shop |
| 22 | Highland Park | Playground | Bus Stop | Gym | Baseball Field | Home Service | Floating Market | Fish Market | Fish & Chips Shop | Field | Fast Food Restaurant |
| 23 | High Point | Playground | Coffee Shop | Eye Doctor | Field | Park | Bus Station | Ethiopian Restaurant | Event Space | Fabric Shop | Fair |
| 39 | Olympic Hills | Martial Arts Dojo | Playground | Middle Eastern Restaurant | Farmers Market | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Fast Food Restaurant |
| 40 | Victory Heights | Playground | Garden | Zoo Exhibit | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market | Fast Food Restaurant |
| 44 | Haller Lake | Coffee Shop | Playground | Lake | Park | Dance Studio | Floating Market | Fish Market | Fish & Chips Shop | Field | Fast Food Restaurant |
| 75 | Rainier Beach | Light Rail Station | Mexican Restaurant | Deli / Bodega | Tennis Court | Playground | Zoo Exhibit | Farmers Market | Eye Doctor | Fabric Shop | Fair |

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Table 6: Cluster 2

| | Neighbourhood | District | Neighbourhood | 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 |
|---|-------------------|-------------|-------------------|-----------|-------------|----------------|---------------------------|-----------------------|------------------------|-----------------------|-----------------------|------------------------|
| 1 | Loyal Heights | Ballard | Loyal Heights | 47.688709 | -122.392907 | 1.0 | Middle Eastern Restaurant | Convenience Store | Mexican Restaurant | Bakery | Fish Market | Pizza Place |
| 2 | Sunset Hill | Ballard | Sunset Hill | 47.675217 | -122.398448 | 1.0 | Bakery | Italian Restaurant | Wine Shop | Ice Cream Shop | Grocery Store | Cocktail Bar |
| 3 | West Woodland | Ballard | West Woodland | 47.675973 | -122.347499 | 1.0 | Zoo Exhibit | Asian Restaurant | Food Truck | Lake | Electronics Store | Caribbean Restaurant |
| 4 | Whittier Heights | Ballard | Whittier Heights | 47.683297 | -122.371449 | 1.0 | Bar | Vietnamese Restaurant | Furniture / Home Store | Park | Bakery | Caribbean Restaurant |
| 6 | North Beacon Hill | Beacon Hill | North Beacon Hill | 47.577586 | -122.309960 | 1.0 | Mexican Restaurant | Food Truck | Café | Pub | Coffee Shop | Peking Duck Restaurant |
| 7 | South Beacon Hill | Beacon Hill | South Beacon Hill | 47.577586 | -122.309960 | 1.0 | Mexican Restaurant | Food Truck | Café | Pub | Coffee Shop | Peking Duck Restaurant |

Table 7: Cluster 3

| | Neighbourhood | 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 | Adams | Park | Soccer Field | Dog Run | Electronics Store | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market |
| 36 | Cedar Park | Vietnamese Restaurant | Park | Ethiopian Restaurant | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market | Zoo Exhibit |
| 62 | South Park | Park | Brewery | Dog Run | Zoo Exhibit | Farmers Market | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant |
| 63 | View Ridge | Park | Farmers Market | Ethiopian Restaurant | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Zoo Exhibit | Electronics Store |
| 66 | Windermere | Park | Pizza Place | Zoo Exhibit | Ethiopian Restaurant | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market |
| 83 | Gatewood | Park | Coffee Shop | Print Shop | Pet Store | Gym | Fair | Electronics Store | Ethiopian Restaurant | Event Space | Eye Doctor |

Table 8: Cluster 4

| | Neighbourhood | 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 |
|----|---------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 77 | Seward Park | Beach | Zoo Exhibit | Food Stand | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Farmers Market | Fast Food Restaurant |

Table 9: Cluster 5

| | Neighbourhood | 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 |
|----|---------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|
| 80 | Arbor Heights | Spa | Zoo Exhibit | Farmers Market | Ethiopian Restaurant | Event Space | Eye Doctor | Fabric Shop | Fair | Falafel Restaurant | Fast Food Restaurant |

Table 10: Cluster 6

| | Neighbourhood | District | Neighbourhood | 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 |
|----|----------------|---------------|----------------|-----------|-------------|----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 25 | Riverview | Delridge | Riverview | 47.539383 | -122.349189 | 5.0 | Trail | Park | Baseball Field | Smoke Shop | Fair | Ethiopian Restaurant | Event Space | |
| 37 | Matthews Beach | Lake City | Matthews Beach | 47.696927 | -122.272724 | 5.0 | Playground | Trail | Park | Falafel Restaurant | Electronics Store | Ethiopian Restaurant | Event Space | |
| 41 | Briarcliff | Magnolia | Briarcliff | 47.648151 | -122.407612 | 5.0 | Bus Stop | Athletics & Sports | Trail | Park | Floating Market | Fish Market | Fish & Chips Shop | |
| 54 | Green Lake | North Seattle | Green Lake | 47.678284 | -122.338549 | 5.0 | Park | Lake | Theater | Trail | Tennis Court | Beach | Ethiopian Restaurant | |

After close analysis, it's shown that cluster 2 represents the best the criteria set in section 1.1. Hence, a detailed analysis of cluster 2 (Table 6) is then carried out in the next section.

3.5. Meeting Browns Fashion's selection criteria for new location.

Based on the results from different clusters, It appears that cluster 2 seems to be closely related to Browns neighbourhood in Mayfair London. The choice of cluster 2 was made as it includes all the type of businesses that were specified in section 1.1 after a pre-analysis of the surrounding of the location of their successful operation in Mayfair, London UK. Recall, Brown Fashion has experienced tremendous success in London and they would like to replicate the experience in their new location. After an initial exploratory analysis of their boutique in Mayfair, London, the following top businesses in that area were identified:

1. Art Gallery
2. Clothing Store
3. French Restaurant
4. Coffee Shop
5. Boutique
6. Juice Bar
7. Italian Restaurant
8. Hotel
9. Café
10. Cosmetics Shop

Next, we leverage data to look at the frequency of occurrence of the above businesses for all Cluster 2's neighbourhoods, isolating the categorical venues. Recall, in order to replicate the success in London as much as possible, the above venue types needs to be in abundance density of any ideal store locations. In order to reduce the complexity in this task and for better visualization, only 3 top business types chosen will be explored out of the 10 enumerated above. These are:

1. Art Gallery
2. Italian Restaurant
3. Coffee Shop

We will also limit the analysis to only the **Central area district** and **Downtown** Seattle for Cluster 2.

3.6. Analysis of Cluster 2 using Violin Plot

Violin plot is a Categorical plot used mostly for density estimation of an underlying distribution. The top 3 venue types as specified in section 1.1 for each neighbourhood are used for the plotting.



Figure 4: Frequency distribution for the top 3 venue categories for each neighbourhood

4.0. Results and Discussions

As can be seen in Figure 4 table, there is one neighbourhood –**International District**, that has all the 3 best top venues specified. This means that **International District** meets the criteria for a new location for opening new Fashion boutiques according to the criteria that 3 specified venues are present in a great frequency (Art Galleries, Italian Restaurant, and coffee shop).

Taking the analysis deeper, we can also see if the location is ideal as there is no single competition around the **International District** neighbourhood as shown in the violin plot in Figure 5.

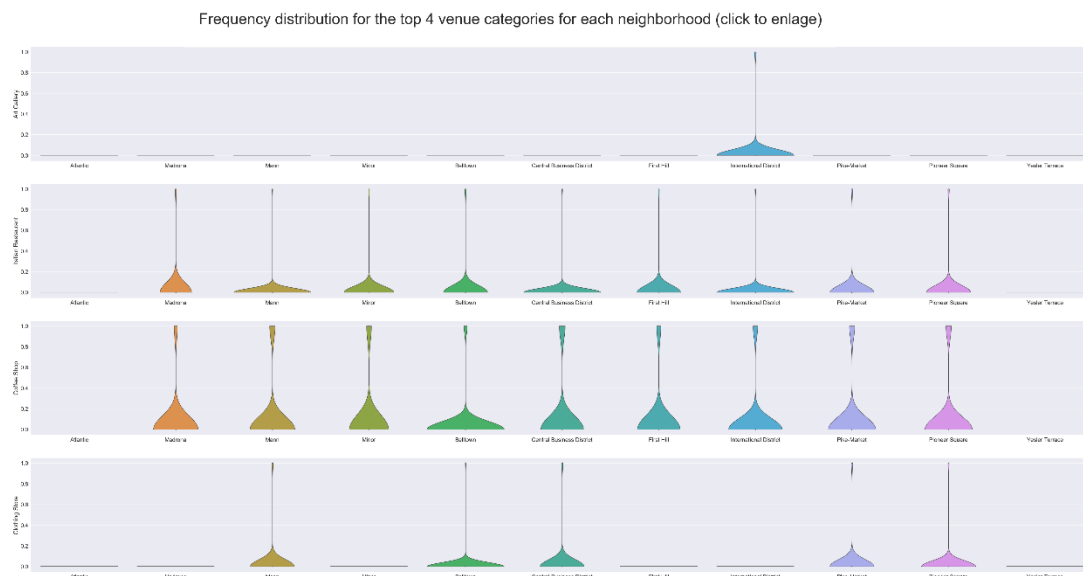


Figure 5: Frequency distribution for the top 4 venue categories for each neighbourhood including the presence of competitions (clothing stores)

4. Conclusions

In this work, inferences have been made in making a new location recommendation and we steered a course for Browns Fashion Boutique's Decision Makers to select the best possible location for their new store in Seattle, WA. This recommendation was based on the criteria of being in neighbourhoods that has at least an Art Gallery, an Italian restaurant and a Coffee Shop. This problem could be reinforced by expanding the number of venues in.

To help arrive at this solution, K-means clustering was used to first group neighbourhoods from the entire Seattle, WA and then select a cluster that met most of the criteria for details analysis. The visualisation library was also used to visualise the best location of the store. The final choice was then plotted using Foursquare location data. This process helped narrow down the scale of the analysis. The international District neighbourhood in Seattle was selected as the best location as it met all the criteria and no competition was in proximity. Figure 6 Below shows a map of Seattle and the International District Marked with a circle red. Similar neighbourhood that shares few venues in common with the international District are marked in blue circles.

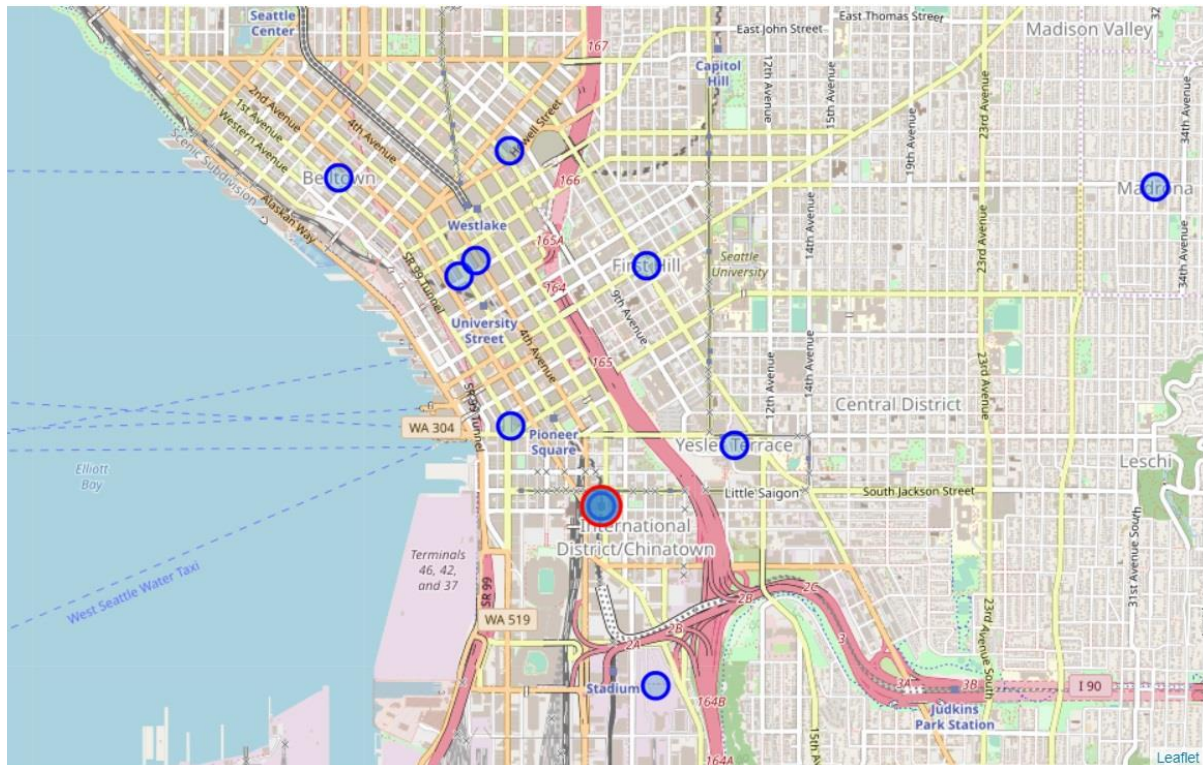


Figure 6: Map of Seattle WA with the International District marked in circle red.

References

1. https://en.wikipedia.org/wiki/List_of_neighborhoods_in_Seattle
2. <http://clerk.seattle.gov/~public/nmaps/neiglist.htm>
3. <http://data-seattlecitygis.opendata.arcgis.com/datasets/city-clerk-neighborhoods/data>
4. <http://insideairbnb.com/get-the-data.html>

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5. http://localhost:8888/notebooks/Desktop/Data_Science_IBM/Capstone_Project/Final_assignment_capstone/Capstone_BattleOfNeighborhoods/Capstone_Project_Battle_Of_Neighbourhoods_Week2.ipynb#