Potential Locations for a Microbrewery in Portland, Oregon

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1. Introduction

1.1 Background

Portland is the largest city in Oregon and the second largest metropolitan area in the Northwest area of the United States. It is located in the Northwest section of the state at the junction of the Willamette and Columbia Rivers. The region is an attractive place with views of multiple peaks in the Cascade Mountain Range. A wide variety of outdoor recreational activities are available with both the Pacific Coast and Mount Hood within 90-minutes driving distance, as well as two rivers and a state park in the city. The region continues to attract new residents, entrepreneurs, innovators and IT professionals.

Over the last twenty years there has been a surge in property development and renovation all around the city, with much of the development concentrated in the downtown area. The regional interest in craft beer and microbreweries has been one industry fueling this growth and development. The Oregon Craft Beer Associations claims that, with 117 breweries in the greater metro area as of 2018, Portland has more breweries than any other city in the world https://oregoncraftbeer.org/facts/.

With the success of current microbreweries and a social culture in the Northwest highly conducive to the craft beer, and other distillery products, market, we are likely to see additional microbreweries started in the area. They will all be seeking the perfect spot to open their microbrewery.

1.2 Problem

Many factors contribute to determining where one might open a microbrewery, including real estate prices, zoning laws, social activities (like festivals) that bring customers to town and established competitors. This project will focus on analyzing what areas of Portland would pose the least competition for customers by other microbreweries.

1.3 Interest

Any entrepreneur interested in starting a microbrewery will find this analysis useful. Additionally, industrial/commercial real estate agencies as well as the Chamber of Commerce and other agencies tasked with attracting businesses to the area might take an interest in this information.

2. Data Acquisition and Cleaning

2.1 Data Sources

Data on microbreweries in Portland is available for free through Foursquare. Among other things, the data includes the latitude, longitude and address for each microbrewery. To map this data, we'll be using the GeoPy suite of geocoding web services.

2.2 Data Cleaning

Data from the Foursquare API required very little wrangling. I transformed it into a dataframe to enable geocoding and distance calculations, paring down the working dataframe to the name, address and coordinates of each microbrewery.

The only cleaning needed in this case was a check for missing values. Only one address was missing from the Foursquare extraction. I decide to leave that address field empty as the data needed for mapping (latitude and longitude) was available.

With the base dataframe established, I then used the GeoPy suite to calculate distances between downtown Portland and the microbreweries, as well as the distance from each microbrewery to its closest competitor. This generated the two features used in the k-means clustering analysis.

2.3 Feature Selection

Data from the Foursquare API provided 50 locations and 24 features. Most of the features, though, were not relevant to a search based on location and many of the features were empty. The most relevant features for a location analysis, address and coordinates, were selected. Those features were used for distance calculations that provided the two features for k-means cluster analysis.

3. Exploratory Data Analysis

3.1 Creating the Base Map

Using the GeoPy suite and the latitudes and longitudes of the microbreweries I generated the following base map:

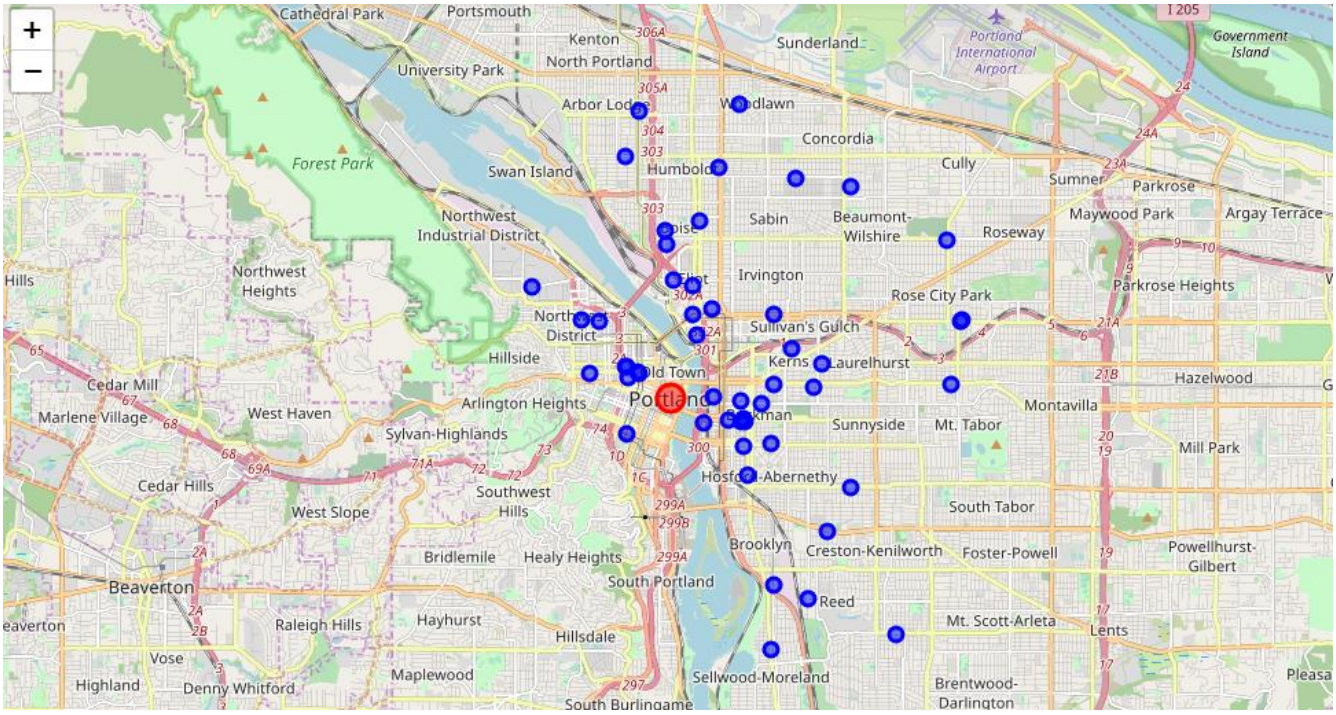

Figure 1

Each microbrewery is represented as a blue circle on the map. We can see the circles are closer together near downtown Portland, but to run our k-means cluster test we need additional features.

3.2 Calculating Distances from Downtown Portland.

Distance calculations were made using the coordinates lat. 45.5202471 and long. -122.6741949 for downtown Portland, which were generated through geolocater Nominatim. I then ran these coordinates along with the coordinates for each microbrewery through the GeoPy distance function.

3.2 Calculating Distances to Nearest Competitor

I used the GeoPy distance function to calculate distances between microbreweries. Rather than store all the distances between one microbrewery and all the others, I stored the distance of the nearest competitor.

4. K-means clustering

With the distance calculations added as features to the data, I ran the k-means clustering algorithm. I chose k-means clustering in this case because the relevant metric in this project is distance between the microbreweries and downtown. Other features, like number of reviews or ratings on Foursquare, were not considered to identify potential locations for a microbrewery. Including other types of features for analysis might warrant the use of another clustering algorithm.

4.1 Preliminary Clusters

Once the data was labeled with our k-means labels I mapped the locations again, assigning a different color for each of the clusters. These are the results:

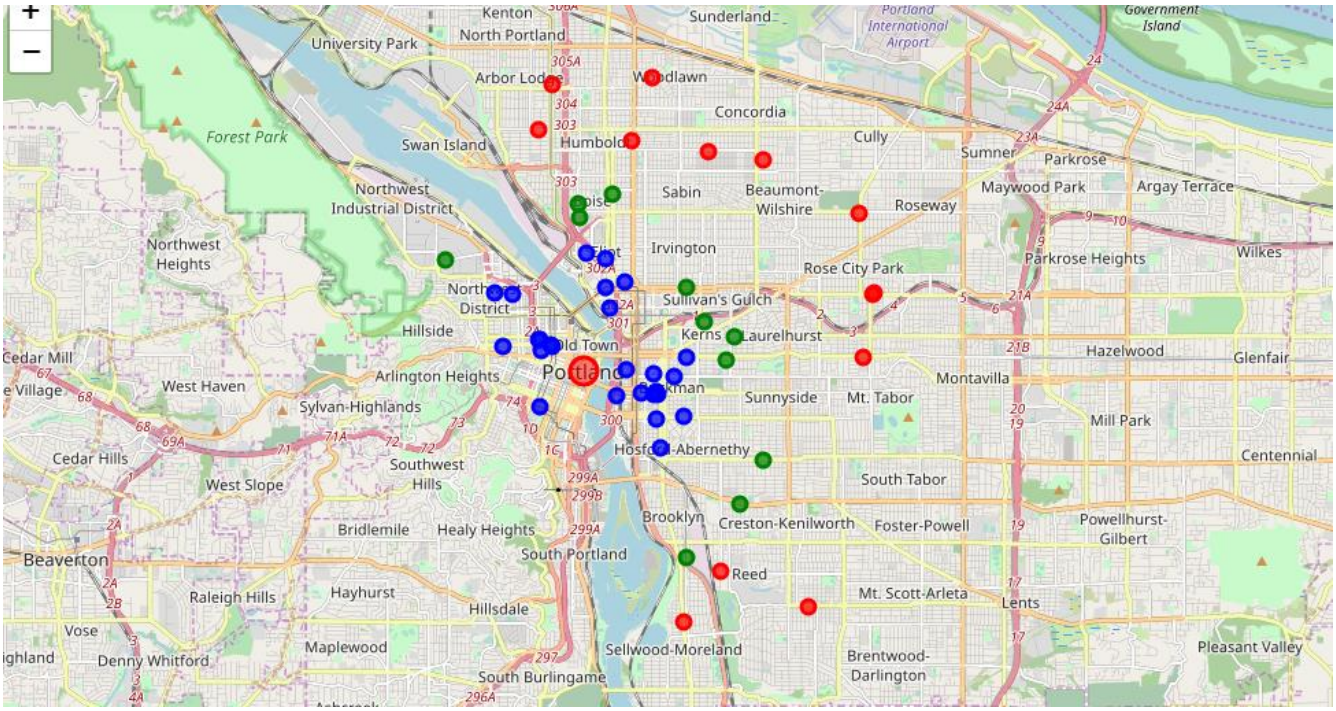

Figure 2

The k-means algorithm divided our microbreweries into the following three groups

1. A large group tightly packed around downtown.
2. A group half the size of the blue cluster a few kilometers away from downtown.
3. A third group (again, half the size of the blue cluster) near the boundary of our search about 5-6km away from downtown.

The green and red clusters look like the most promising areas to find space for new microbrewery. I focus the rest of the analysis on these areas.

4.2 Red Clusters

As we could see in figure 2, there is a collection of microbreweries approximately 5-6km from our central point. With one exception, none of these locations has a competitor within 500 meters. The exception is a microbrewery with a sister location across the street from it.

In the table that follows (figure 3) all of these locations are listed with their addresses and coordinates. The table is sorted in descending order, so the microbrewery whose nearest competitor is furthest away is listed first. The microbrewery with the sister location is thus last.

	labels	name	address	lat	lng	Dis from PDX Center	Closest Rival
0	2	Double Mountain Brewery & Taproom	4336 SE Woodstock Blvd	45.479	-122.618	6.4	1.84
1	2	Fire on the Mountain	3443 NE 57th Ave	45.5481	-122.605	6.2	1.6
2	2	Breakside Brewery	820 NE Dekum St	45.5717	-122.657	5.9	1.29
3	2	Leikam Tap Room	5812 E Burnside St	45.5226	-122.604	5.5	1.26
4	2	13 Virtues Brewing Co.	6410 SE Milwaukie Ave	45.4762	-122.649	5.3	1.22
5	2	Old Town Brewing	5201 NE M L King Blvd	45.5606	-122.662	4.6	1.1
6	2	Great Notion Brewing	2204 NE Alberta St #101	45.5589	-122.643	4.9	1.09
7	2	Lemur's Sör Ház	4635 NE 35th Ave	45.5573	-122.629	5.4	1.09
8	2	Look Long Brewing Company	nan	45.5706	-122.682	5.6	0.92
9	2	Lucky Labrador Tap Room	1700 N Killingsworth St	45.5626	-122.685	4.8	0.92
10	2	Gigantic Brewing Company	5224 SE 26th Ave	45.4851	-122.64	4.8	0.75
11	2	Baerlic Brewing Beer Hall at the Barley Pod	6035 NE Halsey St	45.5339	-122.601	5.9	0.02

Figure 3

Using this tabulated data, I plotted the locations on a new map seen below (figure 4) that includes only these locations. I consider these locations the prime candidates for further research. The distances to the closest competitor are sufficiently large to give an aspiring microbrewer plenty of areas to consider.

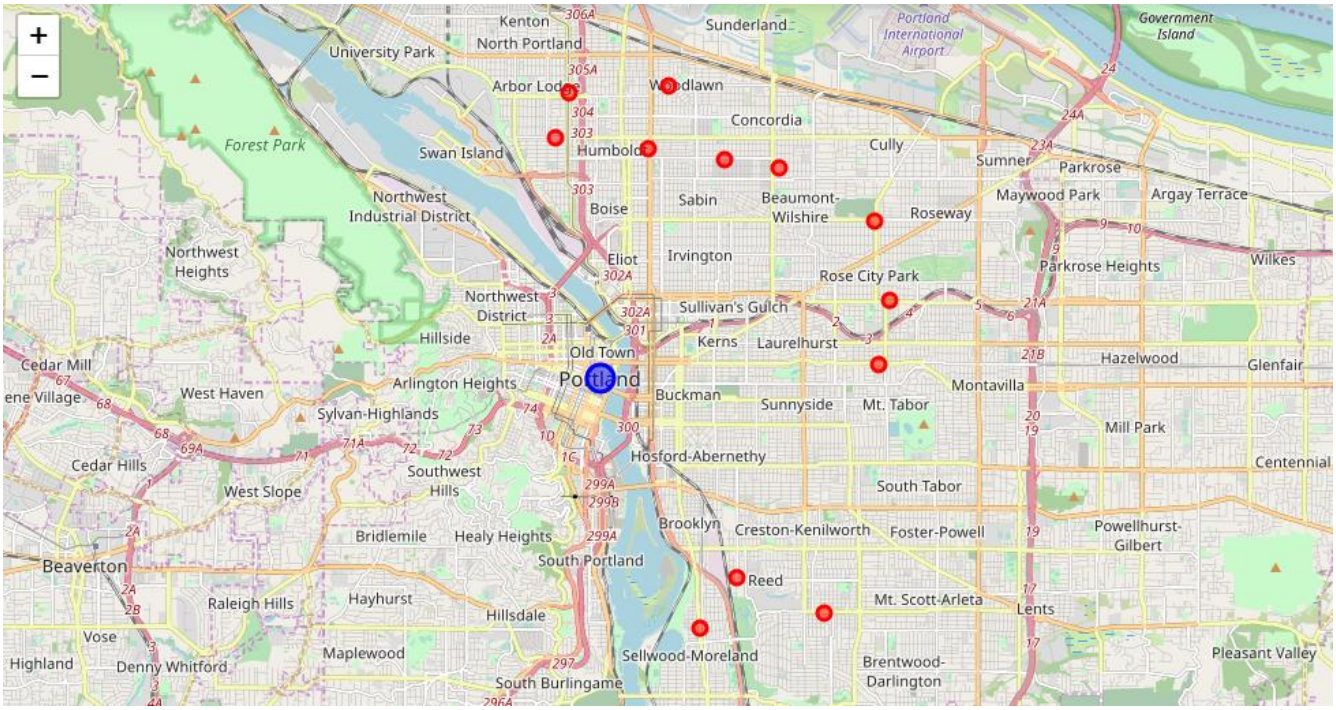

Figure 4

4.3 Green Clusters

Between the red cluster and downtown is a second group of locations represented by the green circles. These locations are approximately 2.5-4km from the central point. Several of them, however, are within 500 meters of a competitor, so I dropped them from the final table of locations recommended for further research.

The final table for the green cluster is figure 5 below:

	labels	name	address	lat	lng	Dis from PDX Center	Closest Rival
0	1	Great Notion Brewing	2444 NW 28th Ave	45.5399	-122.709	3.5	1.16
1	1	Hopworks Urban Brewery	2944 SE Powell Blvd	45.4969	-122.635	4	0.96
2	1	Little Beast Brewing Beer Garden	3412 SE Division St	45.5046	-122.629	3.9	0.96
3	1	Broadway Grill & Brewery	1700 NE Broadway St	45.5349	-122.648	2.6	0.76
4	1	Ruse Brewing	4784 SE 17th Ave	45.4877	-122.648	4.1	0.75
5	1	Hopworks BikeBar	3947 N Williams Ave	45.5513	-122.667	3.5	0.7
6	1	Culmination Brewing	2117 NE Oregon St	45.5289	-122.644	2.6	0.64

Figure 5

As with the red cluster, I plotted the locations on a new map that includes only these locations. I consider these locations good candidates for research, but not the prime candidates. Because of the proximity to downtown, and the larger cluster of microbreweries in downtown, these locations are likely to experience more area competition than our red cluster. These areas might be considered after thorough research is done on the prime candidates, the red cluster.

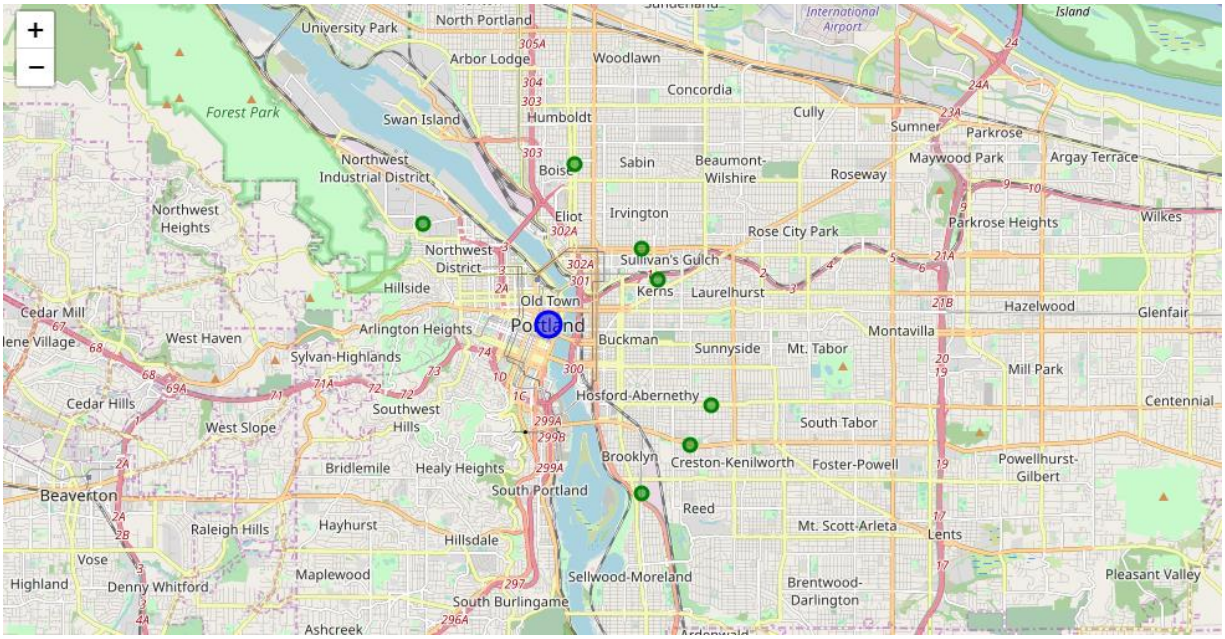

Figure 6

5. Conclusion

The analysis in this report illustrates that microbreweries in Portland are more densely distributed the closer we get to the center of downtown. The NE and SE neighborhood areas, where our red and green clusters are found, exhibit multiple areas where microbreweries are less densely distributed, thus holding the most promise for establishing a new microbrewery without a nearby competitor.

Narrowing our focus to the microbreweries in NE and SE Portland, we filtered out all microbreweries that had a competitor within 500 meters. The remaining microbreweries represent areas of lower competition for customers. These areas look particularly attractive because in the past five years the neighborhoods have seen renewed property development and renovation. Additionally, real estate in downtown Portland may be overdeveloped. Property in the surrounding neighborhoods could be obtained at a discount relative to downtown, providing a competitive advantage to a new microbrewery.

The focus of this project was to assist our client by narrowing their search for a prime location for a new microbrewery. By mapping the location of existing microbreweries provided through Foursquare data we got a general idea that microbreweries are concentrated around downtown Portland, with less density in the neighborhoods that surround downtown. K-means clustering generated promising locations in the surrounding neighborhoods in NE and SE Portland. Those clusters were further refined to create maps and a table of addresses for further exploration by the client.

While the location information we've assembled for the client provides clear direction, additional and supplemental research is recommended. Certainly, an entrepreneur would want to look at real estate prices, zoning laws, available parking, etc., to determine if any of the locations identified through our analysis would be suitable. Our client should therefore use our recommendations as a starting point for more detailed analysis that could result in a location that has both no nearby competitors and several other factors in its favor. Those additional factors are beyond the scope of this project, the purpose of which was to analyze the relative location of existing microbreweries near downtown Portland.