Applied Data Science Capstone |

The Battle of the Neighborhoods

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Contents

Introduction

- One of the most favored consumables the world over is beer, and that is no different in the United States. According to usatoday.com, the average American consumes 26.2 gallons of beer per year.
- Our fictitious brewing company "Big yEAST" has been a staple on the eastern seaboard for several decades. A recent evaluation of regional market trends has shown a decline in total consumption of beer, especially with the key demographic of (25-34-year-old individuals). Bill Barley, the President & CEO of Big yEAST, has commissioned a high-level exploratory market review of several locations in the western United States in the hope that Big yEAST can establish a position in either a developed or emerging market with the presence of a local brewery.

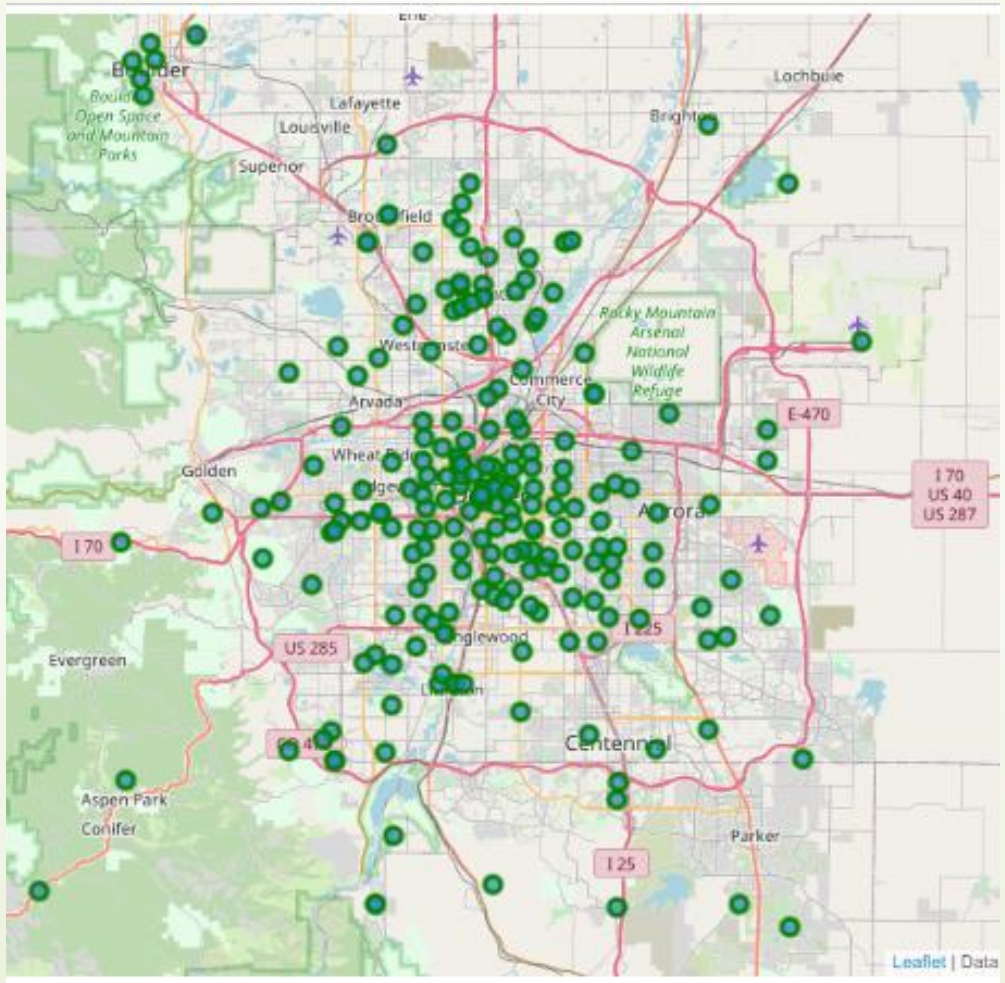
Data

- Our socioeconomic dataset, will be mined from denvermetrodata.org
- For this analysis, we will be using a projected 2017 dataset containing the following:
  - Population 25-34 years-old
  - Number of Low-Income Households (<$60k/year annual income)
  - Number of Middle-Income Households (between $60k and $125k)
  - Number of High-Income Households (>$125k/year annual income)

	Neighborhood	Population	Low Income	Medium Income	High Income	Latitude	Longitude
0	Alder-Three Sisters Park	381	544	614	452	39.740010	-104.992020
1	Allendale	1718	1672	1158	457	39.693065	-104.940542
2	Alta Vista and Memorial Park	1417	1393	1015	404	37.171692	-104.520280
3	Apel Bacher Park, Koch Sub and Coulehan Grange	467	600	359	65	39.740010	-104.992020
4	Applewood, Echo Hill, Rolling Hills and Meadows	433	456	549	531	39.740010	-104.992020

Data

- Map of Denver Neighborhoods



Data

- This analysis will be using the Places API offered by FOURSQUARE. We will submit a search query through to the Places API endpoint to produce a list of established breweries by latitude and longitude which we will then tie back into our neighborhood data.

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude
0	Alder-Three Sisters Park	39.74001	-104.99202	Iron Hill Brewery Nation	39.741615	-104.997566
1	Apel Bacher Park, Koch Sub and Coulehan Grange	39.74001	-104.99202	Iron Hill Brewery Nation	39.741615	-104.997566
2	Applewood, Echo Hill, Rolling Hills and Meadows	39.74001	-104.99202	Iron Hill Brewery Nation	39.741615	-104.997566
3	Athmar Park	39.70396	-105.01039	Chain Reaction Brewery	39.699577	-105.001335
4	Auraria	39.74575	-105.00997	Breckenridge Brewery Mountain House	39.748078	-105.006897

Methodology

- The analysis begins with an examination of brewery data mined from the FOURSQUARE Place API to determine the number of breweries or brewery density within the designated radius of the search query.

	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude
Neighborhood					
Alder-Three Sisters Park	1	1	1	1	1
Apel Bacher Park, Koch Sub and Coulehan Grange	1	1	1	1	1
Applewood, Echo Hill, Rolling Hills and Meadows	1	1	1	1	1
Athmar Park	1	1	1	1	1
Auraria	3	3	3	3	3
Baker	3	3	3	3	3
Bell Park	2	2	2	2	2

Methodology

- We start our popularity analysis by "One-Hot Coding" each of the breweries. This process simply assigns a numerical value to our categorical variable "brewery name" so that mathematical operations may be applied.

	Neighborhood	Birch Street Brewery	Black Shirt Brewery	Black Sky Brewery	Blue Moon Brewery at The Sandlot	Boggy Draw Brewery	Breckenridge Brewery Mountain House	Brewery Bar	Brewery Bar III	Briar Common	...	Strange Craft Beer Company	The Brewery	The Grateful Gnome Sandwich Shoppe & Brewery
0	Alder-Three Sisters Park	0	0	0	0	0	0	0	0	0	...	0	0	0
1	Apel Bacher Park, Koch Sub and Coulehan Grange	0	0	0	0	0	0	0	0	0	...	0	0	0
2	Applewood, Echo Hill, Rolling Hills and Meadows	0	0	0	0	0	0	0	0	0	...	0	0	0
3	Athmar Park	0	0	0	0	0	0	0	0	0	...	0	0	0
4	Auraria	0	0	0	0	0	1	0	0	0	...	0	0	0

Methodology

- Top 10 Breweries by Neighborhood

	Neighborhood	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	Alder-Three Sisters Park	Iron Hill Brewery Nation	next day brewery	Hops Grill & Brewery	Hogshead Brewery	Heavenly Daze Brewery	Grossen Bart Brewery	Great Divide Brewing Co.	Gaijin 24886 Brewery	Freshwerks Brewery	Empourium Brewing Company
1	Apel Bacher Park, Koch Sub and Coulehan Grange	Iron Hill Brewery Nation	next day brewery	Hops Grill & Brewery	Hogshead Brewery	Heavenly Daze Brewery	Grossen Bart Brewery	Great Divide Brewing Co.	Gaijin 24886 Brewery	Freshwerks Brewery	Empourium Brewing Company
2	Applewood, Echo Hill, Rolling Hills and Meadows	Iron Hill Brewery Nation	next day brewery	Hops Grill & Brewery	Hogshead Brewery	Heavenly Daze Brewery	Grossen Bart Brewery	Great Divide Brewing Co.	Gaijin 24886 Brewery	Freshwerks Brewery	Empourium Brewing Company
3	Athmar Park	Chain Reaction Brewery	next day brewery	Counter Culture Brewery + Grille	Hops Grill & Brewery	Hogshead Brewery	Heavenly Daze Brewery	Grossen Bart Brewery	Great Divide Brewing Co.	Gaijin 24886 Brewery	Freshwerks Brewery
4	Auraria	Breckenridge Brewery Mountain House	Strange Craft Beer Company	Briar Common	next day brewery	Counter Culture Brewery + Grille	Hops Grill & Brewery	Hogshead Brewery	Heavenly Daze Brewery	Grossen Bart Brewery	Great Divide Brewing Co.

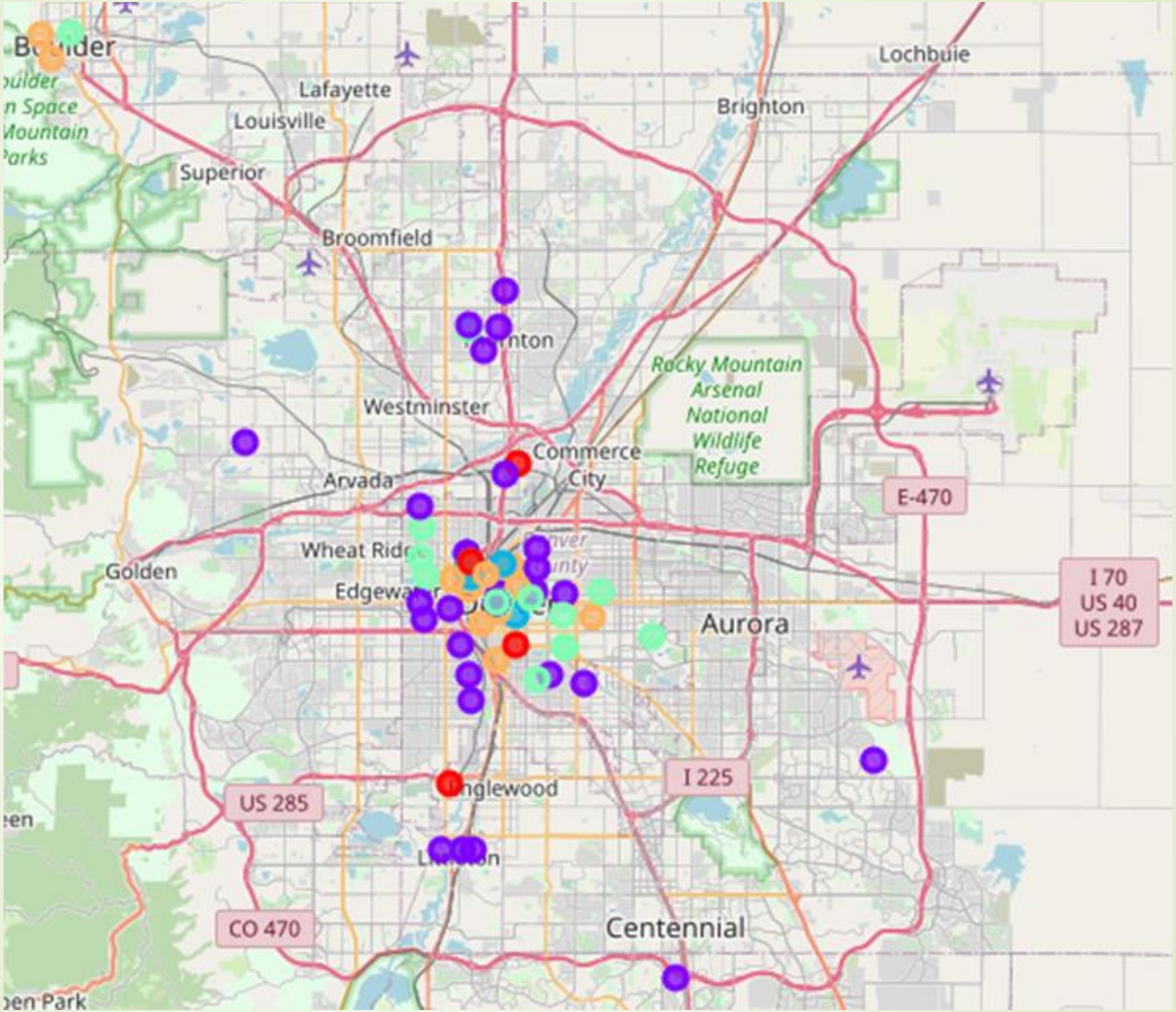
Methodology

- Data Normalization Using Min/Max Scaling
- K-Means is a popular clustering technique in data mining and machine learning that minimizes the within-cluster variance (squared Euclidian distance) (https://en.wikipedia.org/wiki/K-means_clustering).

$$z = \frac{x \text{ - } \min(x)}{\max(x) \text{ - } \min(x)}$$

	Population	Low Income	Medium Income	High Income	Venue
0	0.044101	0.066254	0.127810	0.111138	0.0
1	0.055190	0.073334	0.074729	0.015982	0.0
2	0.050806	0.055127	0.114280	0.130563	0.0
3	0.232237	0.237704	0.199001	0.066142	0.0
4	0.000000	0.000000	0.000833	0.003688	0.5

Results


Lafayette
Louisville
Superior
Broomfield
Brighton
Lochbuie
Westminster
Commerce City
Arvada
Rocky Mountain Arsenal National Wildlife Refuge
E-470
Golden
Aurora
I 70
US 40
US 287
I 225
US 285
CO 470
Centennial

Results by Cluster

1

Low to Mid Income/High Pop/Low Brewery Count

2

Normal Income Dist/Low Population/ Highest Brewery Count

3

Lowest Income/Highest Population Concentration/ Lowest Brewery Count

4

Normal Income/Median Population/2nd Highest Brewery Count

5

Normal Income/Low Population/Med Brewery Count

Discussion

- Future analytics on this specific geography should include the following:
  - Real Estate Valuation
    - This will be needed to minimize start-up cost if Denver is chosen
  - Expanded Age Demographics
    - Data is available and should be reviewed to ensure all aspects are understood
  - Evaluate Other Metro Areas in Colorado
    - Colorado Springs, CO
    - Boulder, CO (more in depth)
    - Pueblo, CO
- Based on the results of the K-Means Analysis, Cluster #1 appears to be the most ideal fit to enter a new neighborhood with an established area market and reasonable income levels and population of our desired generation.

Conclusion

- It is the analysts' recommendation that Denver, CO is a viable market to open a new brewery location. We can clearly define an established market for Big yEAST's product portfolio, and we have a cursory review of the geographic and socioeconomic data.
- Big yEAST has the option of entering an underserved market with reasonable income levels such as Cluster #1 shown in red, or pivoting into a more establish neighborhood within the metro area to attempt to steal market share from what might be categorized as weaker competition such as clusters #2 and #4 in purple and sky blue respectively.

References

- Denvermetrodata.org
- USAToday.com
- FOURSQUARE
- Thedenverchannel.com
- Wikipedia