

Introduction

I am a huge connoisseur of coffee and have always harbored a pipe dream of opening a coffee shop focused on simple, but elevated coffee. The suggested prompt for the assignment got me thinking about where I could open a coffee shop in the city of Atlanta, where I live. Atlanta has some decent coffee, especially within the city limits. However, there are some areas which are devoid of good coffee and therefore could be a good location to open a shop.

Atlanta as a city is vast. The only public transportation runs through the heart of the city, and therefore some of the neighborhoods would only be accessible by car. Therefore, it would be beneficial to cluster neighborhoods to examine locations within the city which have a thriving coffee scene and where similar-minded neighborhoods would fill a need. Therefore, this project will allow me to conduct a city-wide search and find where a hypothetical coffee shop could be located.

Therefore, **my business problem is:** Where is the best place to open a coffee shop in metro Atlanta?

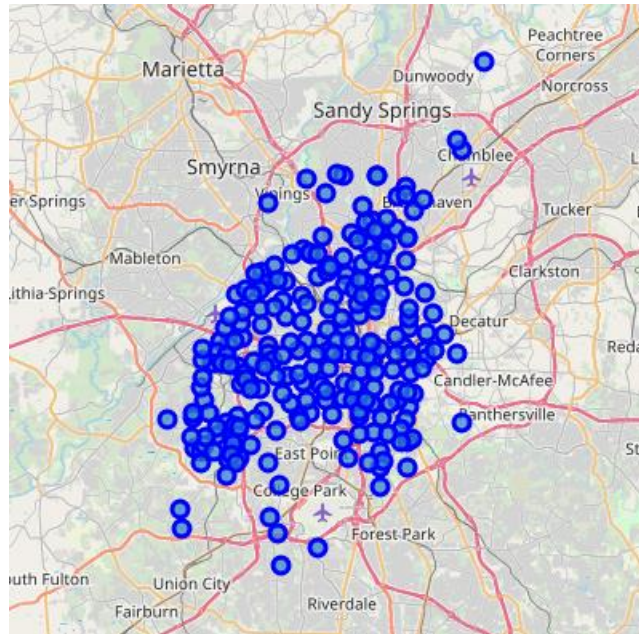
Data

Atlanta actually provides really nice documentation about all of the 244 official neighborhoods, so I am simply going to use that. This can be accessed via their website: <https://dcp-coaplangis.opendata.arcgis.com/>. Additionally, I am going to use the Foursquare API and the venue search.

Methodology

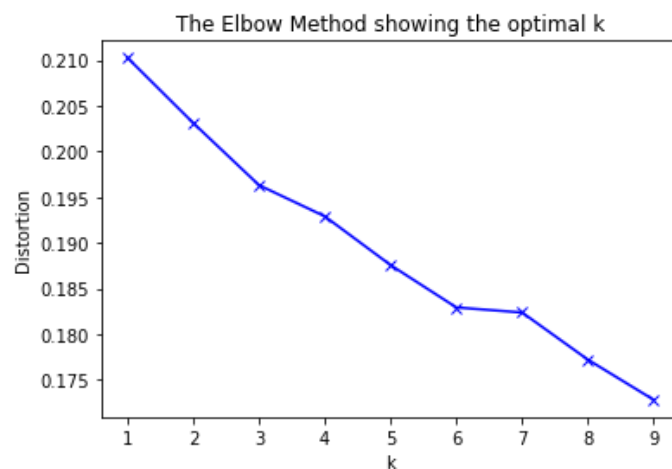
The nature of this project resulted in the main analysis followed much of the previous non-peer reviewed tutorials. After loading in the Atlanta neighborhood names, we were left with a dataframe of the name and miles² for each neighborhood. While the previous assignments feature a standard radius, I wanted to use the data provided to calculate a custom radius for each neighborhood. While I recognize this treats each neighborhood as a circle, that limitation already exists by using a standard value. Therefore, I computed the radius using: $\text{Radius} = (\text{miles}^2 / 3.14) * 1609$. Using this, we got a minimum of 128m and maximum of 1575m. Using the Arcgis library and geocoder, each neighborhood (with the added text of 'Atlanta, GA' to limit results to only names in Atlanta) was located using their respective longitude and latitude.

A map of the neighborhood centroids is below:



The Foursquare API was then used to return the top 100 locations within the custom radius for each neighborhood using a custom function. A preliminary histogram identified a number of neighborhoods which did not feature any venues. Therefore, those were removed from the analysis as they likely were residential neighborhoods without the infrastructure or space for the coffee shop. From the 244 initial neighborhoods, the following analysis was only completed on 73.

The primary method for analysis was K-means clusters. Other options, such as Agglomerative Clustering, were also examined as potential options, but did not result in heterogeneous clusters and thus were not employed. Before analysis, the categorical 'venue category' was 'one hot encoded' and the mean endorsement value was calculated for each category contained within each neighborhood. K values from one to nine were examined for use within the model using the elbow method. The plot of the elbow method is below:



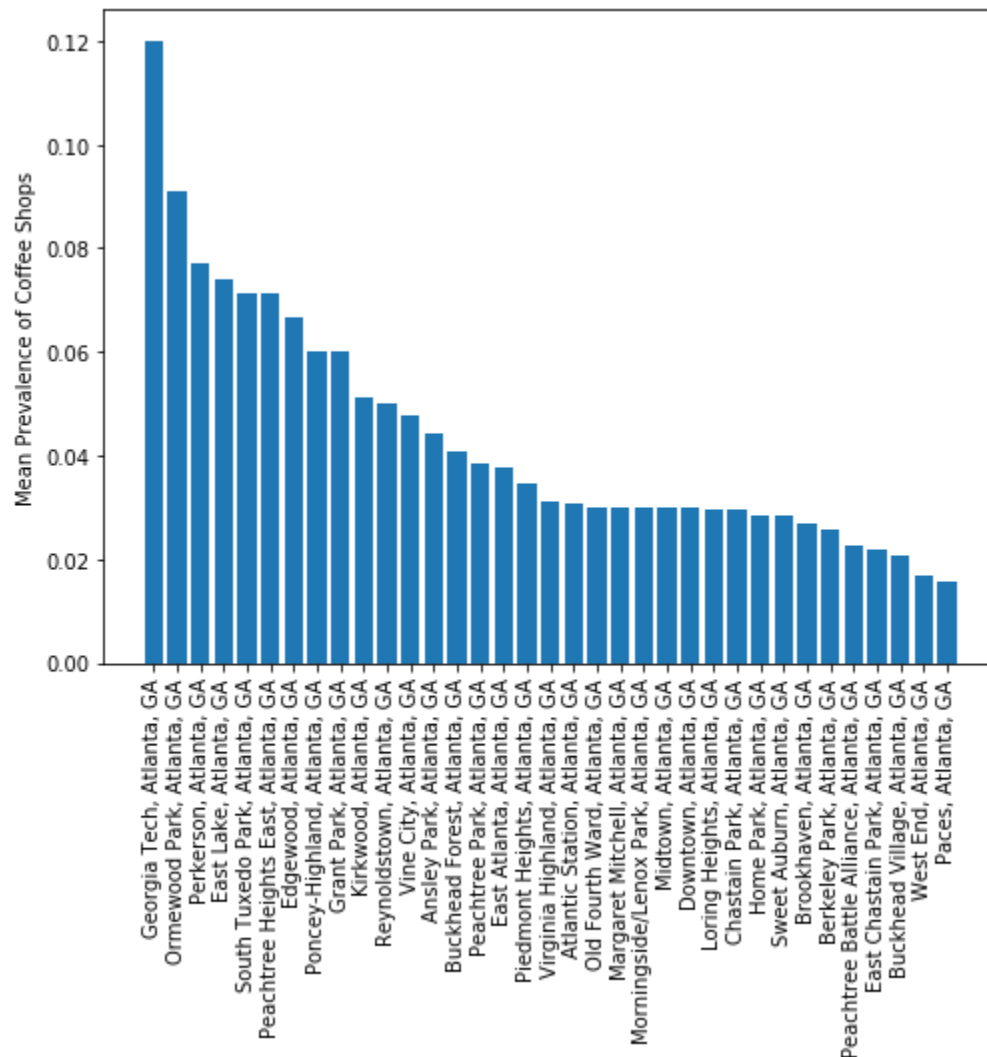
As a result, $k = 6$ was chosen as this value occurred at the largest 'elbow' in the distortion plot. To see if the distortion values plateaued with increasing k values, a similar plot using k from 1-20

was visualized but without a plateau. Therefore, the original, truncated, range was used. The k means model was therefore fit to the data.

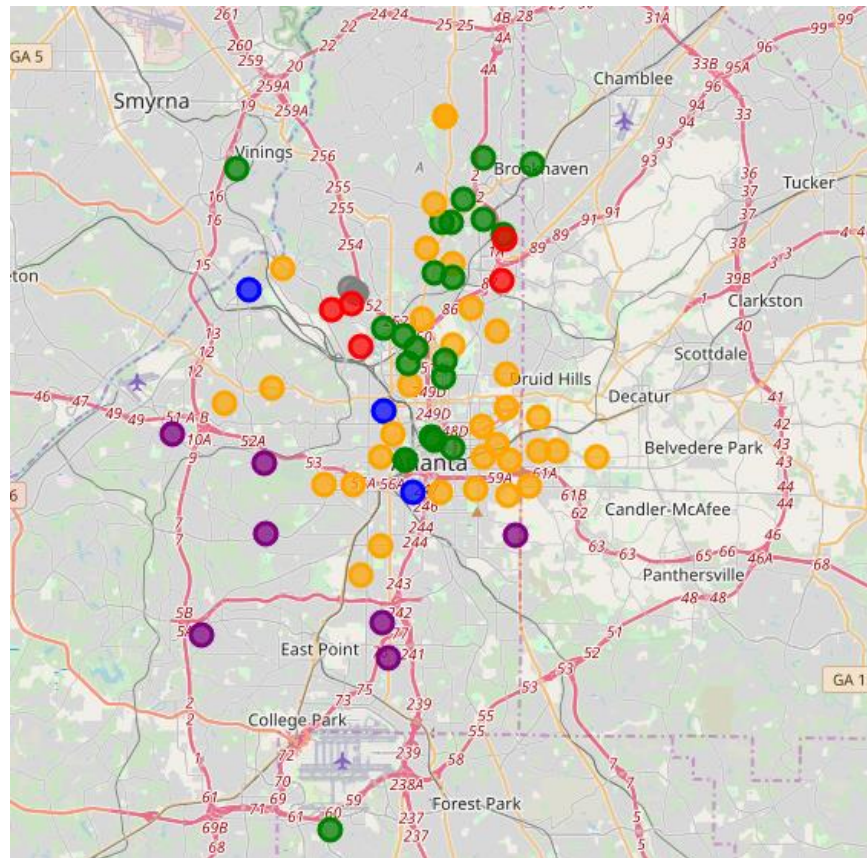
From there, the results were limited to the neighborhoods with the most coffee shops. The neighborhoods from the two clusters had the Top 20 venue category ranked. A search was applied to these ranking, returning a positive result for whether there was a coffee shop, tea shop, café, or bakery (businesses which could be direct competitors). The cluster with the greatest prevalence was then used as further refinement. From this, neighborhoods with the competing businesses were removed, leaving the final selection to the remaining neighborhoods.

Results

The prevalence of coffee shops within each neighborhood is presented below:

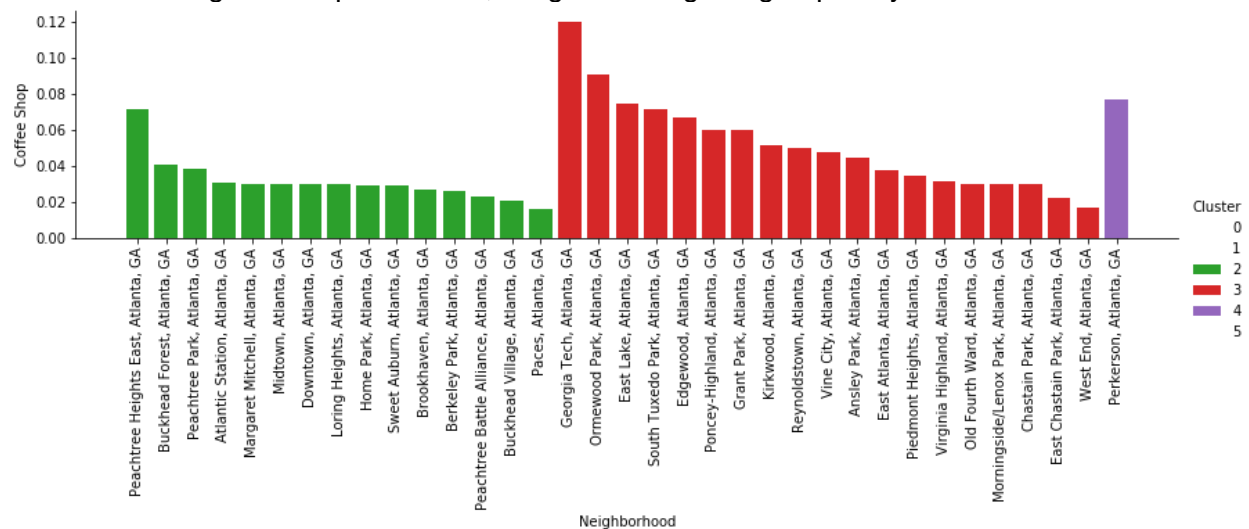


The six clusters returned are located in on the map below:



Legend: Cluster 2 = orange, Cluster 3 = green, cluster 4 = purple

When combining the two plots above, we get a histogram grouped by cluster:



What is interesting here is that only three clusters contain coffee shops. Perkerson is an interesting one, because it is the only neighborhood in cluster 4 with any coffee shops.

Perkerson:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
2829	Perkerson, Atlanta, GA	33.68924	-84.41169	Rosie's Coffee Cafe	33.692132	-84.418177	Coffee Shop
2830	Perkerson, Atlanta, GA	33.68924	-84.41169	A Town Wings	33.682283	-84.407460	Wings Joint
2831	Perkerson, Atlanta, GA	33.68924	-84.41169	Dollar Tree	33.682039	-84.409839	Discount Store
2832	Perkerson, Atlanta, GA	33.68924	-84.41169	Shell	33.687100	-84.408629	Gas Station
2833	Perkerson, Atlanta, GA	33.68924	-84.41169	Papa John's Pizza	33.682138	-84.408262	Pizza Place
2834	Perkerson, Atlanta, GA	33.68924	-84.41169	Foot Locker	33.682259	-84.409267	Shoe Store
2835	Perkerson, Atlanta, GA	33.68924	-84.41169	The Empty Stocking Fund (Santa's Village)	33.692249	-84.406544	Toy / Game Store
2836	Perkerson, Atlanta, GA	33.68924	-84.41169	American Deli	33.681929	-84.408319	Wings Joint
2837	Perkerson, Atlanta, GA	33.68924	-84.41169	Rainbow Apparel	33.682577	-84.409967	Clothing Store
2838	Perkerson, Atlanta, GA	33.68924	-84.41169	Banks Liquor Store	33.695745	-84.408543	Liquor Store
2839	Perkerson, Atlanta, GA	33.68924	-84.41169	Boston Fish Supreme	33.681757	-84.414034	Fast Food Restaurant
2840	Perkerson, Atlanta, GA	33.68924	-84.41169	Metropolitan Pkwy & GA-166	33.696495	-84.408131	Intersection
2841	Perkerson, Atlanta, GA	33.68924	-84.41169	S.O.S Deli	33.696988	-84.410154	Restaurant

Perkerson does not appear to have many locations which would drive foot traffic. Furthermore, in looking at the map it appears this place is by the highway, reinforcing the 'grab-n-go' nature of the businesses here. I think we can rule out Perkerson as a potential coffee shop location.

Aside: as someone with a local knowledge of the city, clusters 2 and 3 make sense. These generally refer to areas with a lot of commerce and are known for good food/drink. We are going to continue with just these clusters. The rationale being no other clusters even feature a coffee shop, which is likely because there is a lack of commerce or foot traffic.

If we look at the 'direct competitors' for our potential coffee shop, the rate of competitor within the Top 20 for each neighborhood is presented in the table below:

Coffee	
Cluster	
2	0.772727
3	0.515152

Therefore, Cluster 2 has a 77.2% rate and Cluster 3 has a 51.5% competitor rate. We interpret that as Cluster 2 being more representative of neighborhoods who are conducive to competitors. However, we also do not want to open a shop in a neighborhood with a competitor. Therefore, if we remove the 77.2% of neighborhoods in Cluster 2, that returns us with 5 options:

	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	...	12th Most Common Venue	13th Most Common Venue	14th Most Common Venue
8	Brookhaven, Atlanta, GA	Gym	Furniture / Home Store	Mexican Restaurant	Rental Car Location	Performing Arts Venue	Gastropub	Brewery	Gourmet Shop	Kitchen Supply Store	...	Arts & Crafts Store	New American Restaurant	Soup Place
11	Buckhead Village, Atlanta, GA	Mexican Restaurant	Breakfast Spot	Restaurant	Shopping Plaza	New American Restaurant	Gym	Gym / Fitness Center	Vegetarian / Vegan Restaurant	Arts & Crafts Store	...	Middle Eastern Restaurant	Burrito Place	Pizzeria
39	Lenox, Atlanta, GA	Nightclub	Gas Station	Art Gallery	Golf Course	History Museum	Gym / Fitness Center	Furniture / Home Store	BBQ Joint	Athletics & Sports	...	Electronics Store	Discount Store	Strip Club
50	Paces, Atlanta, GA	Hotel	Chinese Restaurant	Seafood Restaurant	Soccer Field	Discount Store	Restaurant	Thai Restaurant	Fast Food Restaurant	Weight Loss Center	...	Wings Joint	African Restaurant	Pizza Place
54	Peachtree Hills, Atlanta, GA	Gay Bar	Smoke Shop	Furniture / Home Store	Bank	Pet Store	Thrift / Vintage Store	Gym / Fitness Center	Video Store	Breakfast Spot	...	Taco Place	Storage Facility	Steakhouse

Discussion

We started this analysis by investigating all 244 neighborhoods in Atlanta for the ideal location to begin a coffee shop. Using the data supplied by the [City of Atlanta](#), we were able to compute a custom search radius for each neighborhood. Using this, a Foursquare search was completed on all venues within the radius to understand which types of businesses currently operate within those locations. Using an [article posted online](#), we were able to distill a few necessary traits for a good coffee shop.

The analysis implemented was aimed at identifying groups of neighborhoods which are conducive to starting a coffee shop. That goal was successful, as we identified two main clusters of neighborhoods which featured coffee shops. Furthermore analysis of those shops found that one cluster had a 26% greater rate of coffee shops within the top twenty locations, indicating a greater affinity compared to the other. The goal, then, was to identify neighborhoods within that cluster *but without a prominent coffee scene*. After adding an additional filter (removing like-minded businesses), we returned five possible neighborhoods.

Some of these returned neighborhoods did not fit our *a priori* criteria for an ideal location. For example, Peachtree Hills and Lenox did not feature competing businesses but also did not have venues which supported foot- or car-traffic of our target demographic, people who enjoy good coffee and a relaxing environment. Therefore, these two neighborhoods were ruled out.

The winner of our search is: **BUCKHEAD VILLAGE**. I am choosing this because, while there is a popular Breakfast Spot, there is also Shopping Plaza, Gyms, Event Space, other non-competing restaurants, and a Farmer's Market (which would potentially attract individuals who enjoy food and drink). Therefore, while there is some competition for customers, the area is rich enough with traffic *and* the target demographic to be fruitful. The second choice neighborhood (in orange above), **Brookhaven**, featured other food-based but non-competitive businesses. However, the lack of shopping centers, event spaces, etc., made it our second choice. **Paces** was the third-place finisher.

It should be noted this analysis has limitations. Namely, there are other aspects of a good coffee shop location-such as affordable rent, infrastructure, adequate parking, etc- which are *very important* components of a successful business but beyond the scope of this project. It is not recommended to open a coffee shop solely sourcing this analysis! Future directions could involve

walkability scores, cost of rent for businesses, and investigations of when customers are around the proposed coffee shop location.