Out of Space? Austin Has Plenty of Room for Growth

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Before my senior year of college, I interned for IBM in New York City. While I enjoyed the New York City neighborhoods I stayed in quite a lot, I did not decide to move to New York City. Instead, I had asked to work at the offices in Austin, Texas as I am originally from the area.Since starting at the Austin office nearly a year ago, I have seen the office experience significant growth. Likewise, my team/organization at IBM has continued to grow, although predominately in the NYC offices where they are quickly running out of room.

At this point, it is hard for visiting employees to find a seat, and even harder to find a quiet meeting room in the NYC office. To maintain its current levels of growth, either IBM will need to find new office space, or hire more workers in cities like Austin where there is still plenty of room to grow. The question then is, how to convince a New Yorker to move to Austin?

My Evaluation

In order to address this question, I thought about what would likely be going through a New Yorker's mind. For the most part, it would be safe to assume they want to live in a place like home. While living in New York, I spent most of my time in Gramercy Park and the Flatiron District which were close to where I was living at the time. The office where I worked itself was in-between Union Square and Washington Square Park, in Greenwich Village. It seemed that most of my fellow interns and co-workers did the same, and so I decided to set about looking for neighborhoods in Austin which were similar to these.

Using data I obtained from Wikipedia, I identified a list of neighborhoods in Austin—some 58 total. I used the Python library BeautifulSoup in order to scrape the contents of the Austin neighborhoods page to get links for each of the neighborhood's pages, and then used the scraper to get the GPS coordinates for each neighborhood. There were a few which did not have GPS coordinates attached though.

	index	wikiUrl	URL	Latitude	Longitude
0	Allandale	https://en.wikipedia.org/wiki/Allandale,_Austi...	https://en.wikipedia.org/wiki/Allandale,_Austi...	30.341944444444444	-97.74388888888889
1	Anderson Mill, Texas	https://en.wikipedia.org/wiki/Anderson_Mill,_T...	https://en.wikipedia.org/wiki/Anderson_Mill,_T...	30.455	-97.80916666666667
2	Barton Hills	https://en.wikipedia.org/wiki/Barton_Hills,_Au...	https://en.wikipedia.org/wiki/Barton_Hills,_Au...	30.258055555555554	-97.78111111111112
3	Bouldin Creek	https://en.wikipedia.org/wiki/Bouldin_Creek,_A...	https://en.wikipedia.org/wiki/Bouldin_Creek,_A...	30.249444444444446	-97.75527777777778
4	Bremond Block Historic District (Austin, Texas)	https://en.wikipedia.org/wiki/Bremond_Block_Hi...	https://en.wikipedia.org/wiki/Bremond_Block_Hi...	30.270555555555553	-97.74638888888889
5	Brentwood	https://en.wikipedia.org/wiki/Brentwood,_Austi...	https://en.wikipedia.org/wiki/Brentwood,_Austi...	30.34	-97.73083333333334
6	Bryker Woods	https://en.wikipedia.org/wiki/Bryker_Woods,_Au...	https://en.wikipedia.org/wiki/Bryker_Woods,_Au...	30.304722222222225	-97.75166666666667
7	Canyon Creek	https://en.wikipedia.org/wiki/Canyon_Creek,_Au...	https://en.wikipedia.org/wiki/Canyon_Creek,_Au...	32.39111111111111	-97.73944444444444
8	Chinatown, Austin	https://en.wikipedia.org/wiki/Chinatown,_Austin	NaN	NaN	NaN
9	Circle C Ranch	https://en.wikipedia.org/wiki/Circle_C_Ranch	https://en.wikipedia.org/wiki/Circle_C_Ranch	30.1875	-97.89083333333333
10	Clarksville Historic District (Austin, Texas)	https://en.wikipedia.org/wiki/Clarksville_Hist...	https://en.wikipedia.org/wiki/Clarksville_Hist...	30.280833333333334	-97.76222222222222
11	Congress Avenue Historic District	https://en.wikipedia.org/wiki/Congress_Avenue_...	https://en.wikipedia.org/wiki/Congress_Avenue_...	30.267777777777777	-97.7425
12	Copperfield	https://en.wikipedia.org/wiki/Copperfield,_Aus...	NaN	NaN	NaN
13	Crestview	https://en.wikipedia.org/wiki/Crestview,_Austi...	https://en.wikipedia.org/wiki/Crestview,_Austi...	30.34	-97.73083333333334
14	Dawson	https://en.wikipedia.org/wiki/Dawson,_Austin,_...	NaN	NaN	NaN
15	Dove Springs	https://en.wikipedia.org/wiki/Dove_Springs,_Au...	NaN	NaN	NaN

Figure 1: Dataframe of Neighborhoods and their Latitude and Longitude Values

They mostly appeared to be "unofficial" neighborhoods, or subsections of existing neighborhoods. For the sake of simplicity, and because the remaining sample was so large, I decided it was acceptable to drop such neighborhoods from my data.

Once I had my GPS coordinates stored in a data table, I used a function to convert the coordinates into latitude and longitude values that I could use with the FourSquare API. With the list of neighborhoods and their latitude and longitude, I was able to iterate through a series of API calls to FourSquare in which I received a list of venues for each neighborhood in Austin. A similar process was done in the capstone project for New York City, and the data collected for Austin's venues will be compared to said data. Below is an example of what some of the data that was retrieved from the FourSquare for the Allandale neighborhood in Austin looked like:

```
In [18]:  print(atx_venues.shape)
          atx_venues.head()

          (1004, 7)
```

Out[18]:

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Allandale	30.341944444444444	-97.74388888888889	Yard Bar	30.342881	-97.738871	Bar
1	Allandale	30.341944444444444	-97.74388888888889	Taqueria Arandas No. 3	30.341555	-97.739067	Mexican Restaurant
2	Allandale	30.341944444444444	-97.74388888888889	Hot Rod Coffee Trailer	30.341761	-97.738946	Food Truck
3	Allandale	30.341944444444444	-97.74388888888889	U-Haul Moving & Storage at Burnet Rd & Fm 2222	30.342257	-97.738979	Storage Facility
4	Allandale	30.341944444444444	-97.74388888888889	Marisco Grill	30.340751	-97.739250	Mexican Restaurant

Figure 3: The head of the venues in Allandale, their latitude/longitude, and each venue category

Using data such as this, it is possible to identify the defining characteristics of the NYC and Austin neighborhoods to see how they compare with one another. With this information at hand, I can then discern just how similar Austin neighborhoods are to those in New York City, and identify a specific cluster of neighborhoods which match a similar cluster in New York City.

Using the Folium library, I plotted the neihghborhoods of Austin, Texas as shown below:
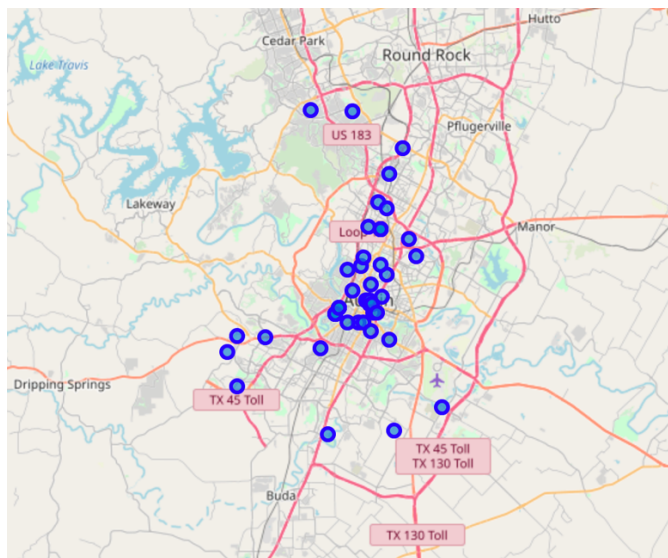

Figure 2: A Folium Map of the Neighborhoods in Austin, Texas

In total, the FourSquare API identified over 200 unique venue categories for those venues in Austin. Through a process known as one-hot encoding, I prepared the neighborhoods to be analyzed based upon these venue identifications. The table of neighborhoods was filled with "dummy" data as a placeholder for the prevalence of venues in each neighborhood. The dataframe was then populated with the actual data. I then grouped the venue classifications in order to identify the top 10 most popular venues for each location.

Through a process known as K-Means clustering, I set a range of 1-10 clusters to identify the best number of clusters to use in my analysis of Austin. The evaluation indicated five clusters was most appropriate. These clusters were then mapped using Folium, and these clusters were generated as shown below:
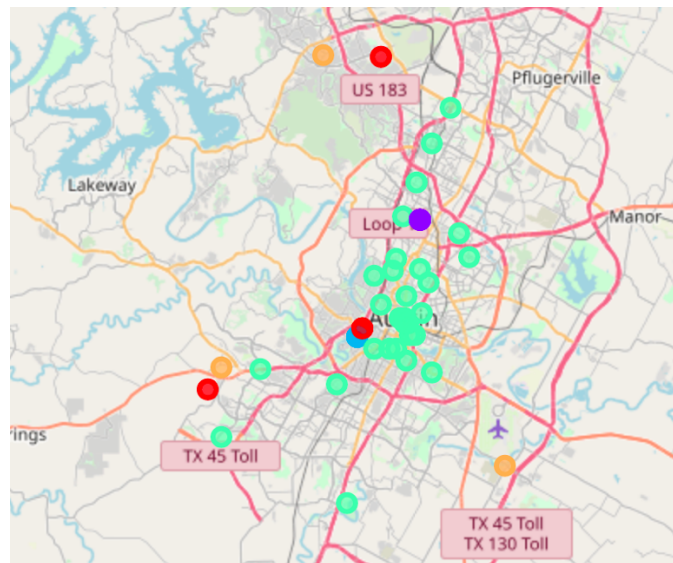

Figure 4: A Folium Map of the K-Means Clusters (n=5)

The reason why is unclear, but the Folium map does not show each point on the map based on the table data output we can find some interesting information on the clusters. I found that:

- Cluster 0 was defined by parks and trails and seems to have high access to public transport with several bus stops. (Red, mostly West Austin)
- Cluster 1 was defined by trails, pools, parks and yoga. It does not seem to have many bus or train stops. (Purple, mostly along TX state highway 343 and Lamar Blvd)
- Cluster 2 was defined by the outdoors as well and appears to be a scenic location--again though, little public transport. (Blue, along the river)
- Cluster 3 was the largest cluster, and it seemed to be clustered by its coffee shops, bars and restaurants. (Green, scattered all throughout Austin)
- Cluster 4 was defined by parks and playgrounds. (Orange, along the outskirts of Austin)

The vast majority of these clusters do not have many options for public transport. Interestingly, the data for New York City did not identify many neighborhoods with public transport, although public transport has a high investment and prevalence in New York City. This appears to be one flaw in the data.

I mentioned that the neighborhoods I most wanted to compare to were Gramercy, Flatiron and Greenwich Village. Gramercy is in cluster 1, Flatiron and Greenwich are both in 2. In addition to Gramercy, cluster 1 also contains Murray Hill, which is where my temporary home was technically-located, and the East Village where many of us would also go to hang out. And so, these two clusters are the ones I will compare to Austin's neighborhood clusters.

These are most well-defined by:

- Cluster 1: Coffee Shops, Bars, and a variety of regional cuisines.
- Cluster 2: Theatres, Gyms, and Italian Restaurants.

Comparing these to Austin, Manhattan-Cluster-1 was most similar to Austin-Cluster-3. Both have a large number of coffee shops, bars, and a variety of regional cuisines. However, a fan of New York's theatres in Manhattan-Cluster-2 might be more drawn to Austin-Cluster-0 which has a large number of theatres in it. While it may not have quite the same prevalence of gyms, it should be noted that it is well known for its outdoor spaces, which could be beneficial for New Yorkers for whom fitness is very important.

All-in-all, it can be seen that while the two cities are vastly different, they do share in some common features and functionality. Both cities are technological hubs which have made them highly attractive to employers, and the offerings of the two cities have made them highly attractive to employees alike. Should IBM need to expand its presence in Austin to account for the lack of space in New York City, a number of IBM-ers should be well-pleased to find that they will be able to enjoy in many of the same highlights of New York City, especially those of the neighborhoods I mentioned previously—Gramercy, the Flatiron District, and Greenwich Village.

A New York-to-Austin transplant would be able to find themselves surrounded by a variety of regional and cultural cuisine and would find an abundance of bars and coffee shops to keep themselves occupied. While the number of gyms is not as high in Austin, there is a beneficial tradeoff considering the number of outdoor spaces in the form of parks and trails for future Austinites to keep fit, and a number of theatres present for those who are fans of the arts. All-in-all, Austin would not be so difficult for a New Yorker to adjust to, and is a highly viable option for a company like IBM to promote to future employees to consider working in.