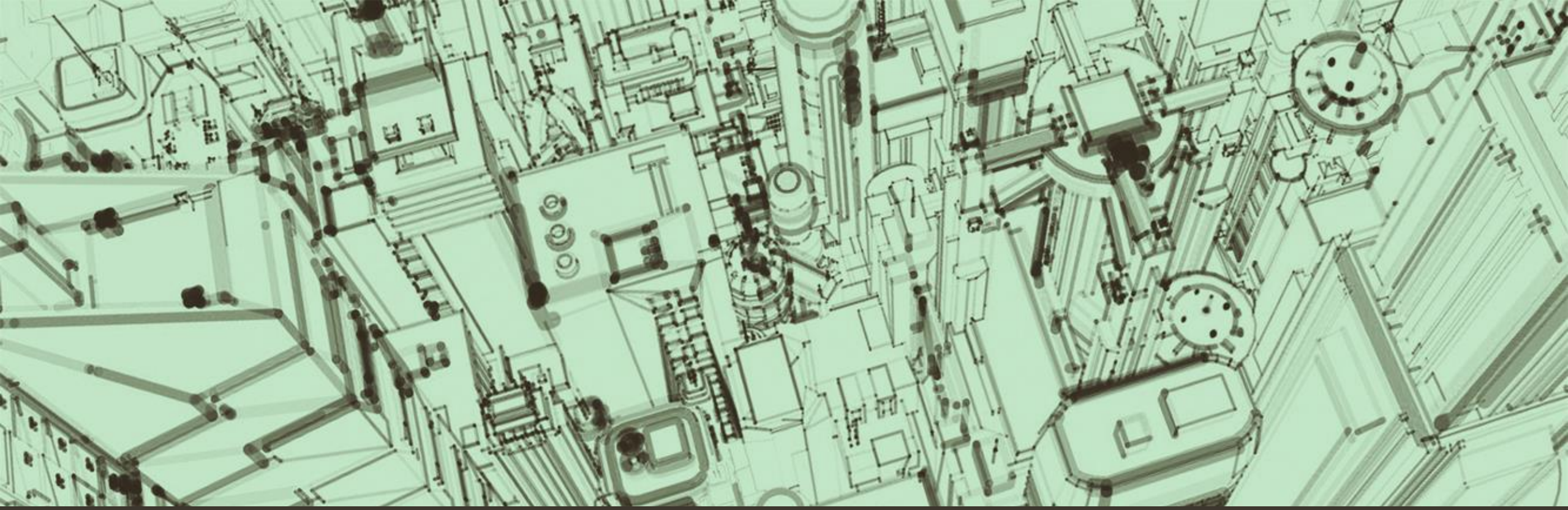


REIT Portfolio in Austin, Texas

Capstone Project for IBM Applied Data Science
by Miguel Villanueva

Introduction: What is an REIT? Why Austin, TX?

- An REIT or a Real Estate Investment Trust is a company that manages capital from investors and invests it in real estate.
- By law, 90% of its net earnings are returned to investors.
- Austin, TX is a booming city with interest in it becoming the next Silicon Valley
- Big Tech has already situated there, which is a good source of employment


image credit: Mitchell Kmetz @unsplash.com

image credit: forbes.com

Introduction: Goals and Interested Parties

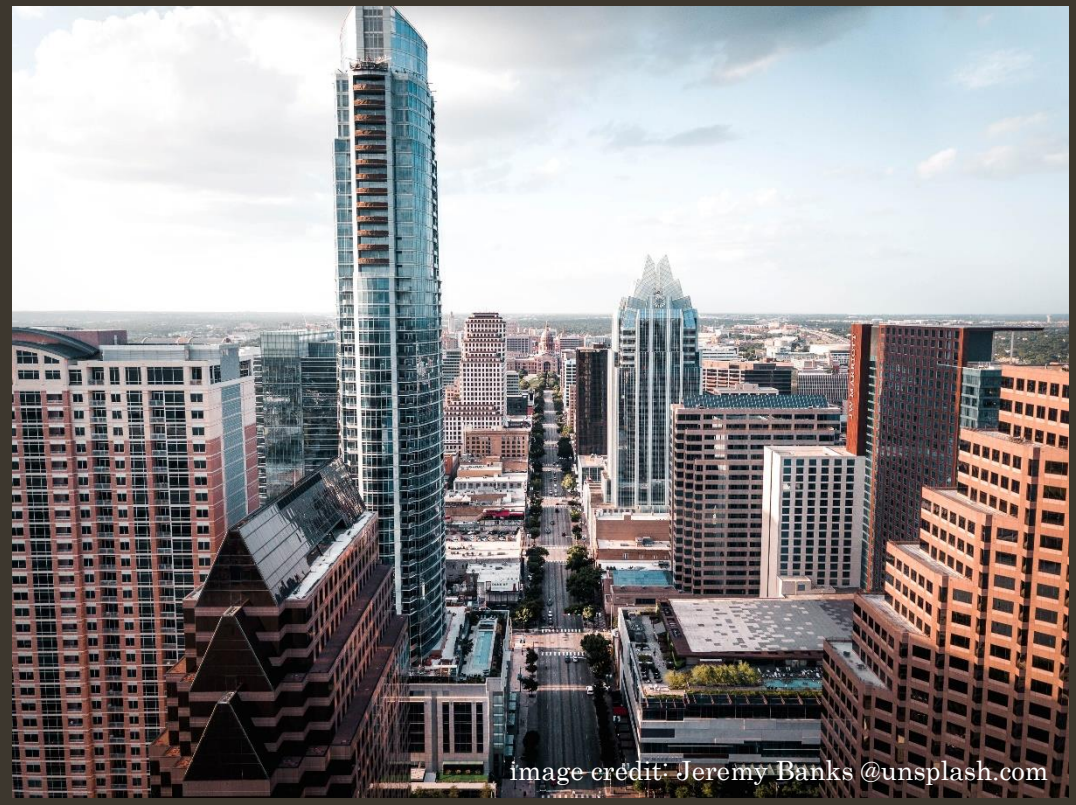
- The project focuses on finding locations to build the invest portfolio
- First Goal: Where are the best neighborhoods to invest in Austin, TX?
- Second Goal: What are the best property types to invest in these neighborhoods?

Interested Parties:

- Companies in the REIT business who want to capitalize in the shift in location of the Tech industry
- Investors looking to invest real estate in Austin, TX

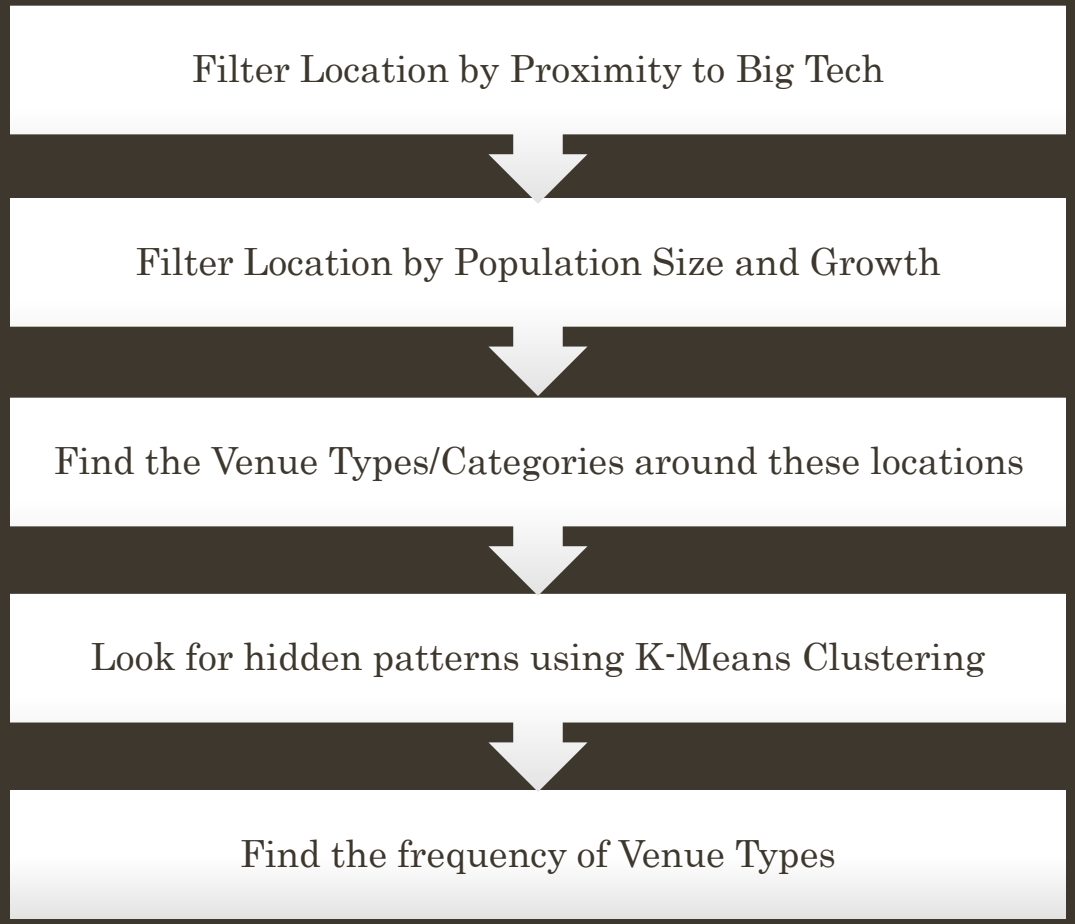
Data/Data Sources

- Neighborhood data from data.austintexas.gov
- Big Tech data from Wikipedia (Silicon Hills)
- Location Data from OSM (Open Street Map) database via Nominatim
- Decennial Population (2000 and 2010) of U.S. Census Bureau from Kaggle
- Venues data from Foursquare API



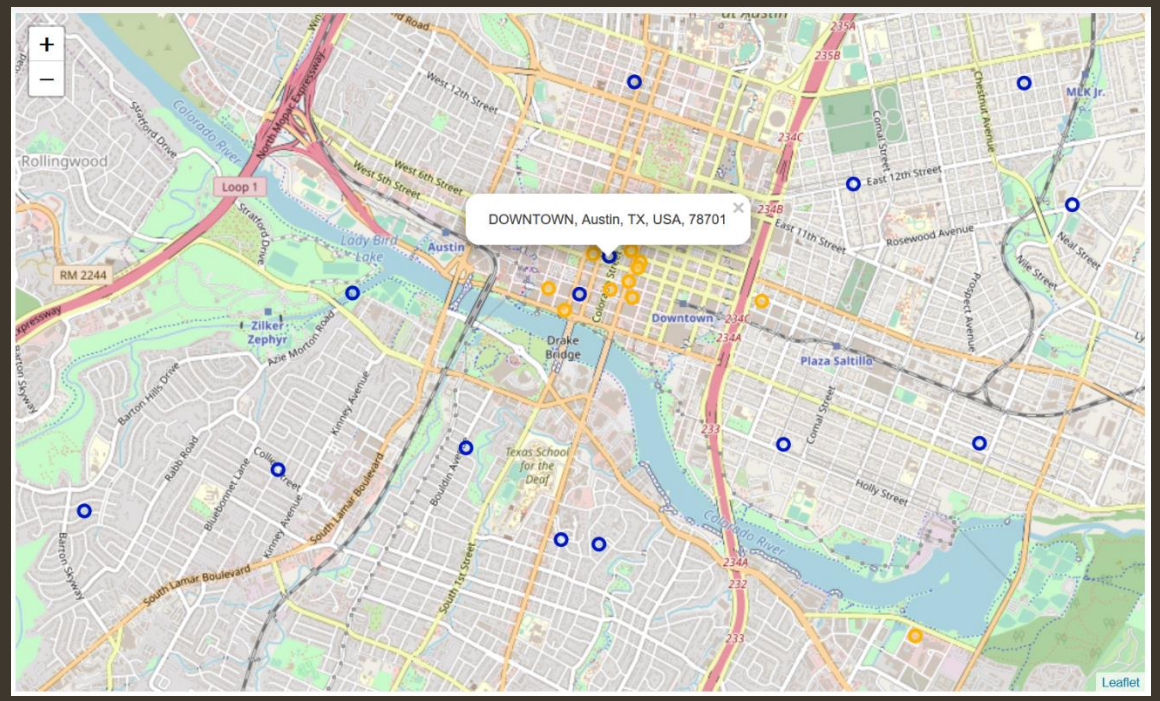
Methodology: Overview

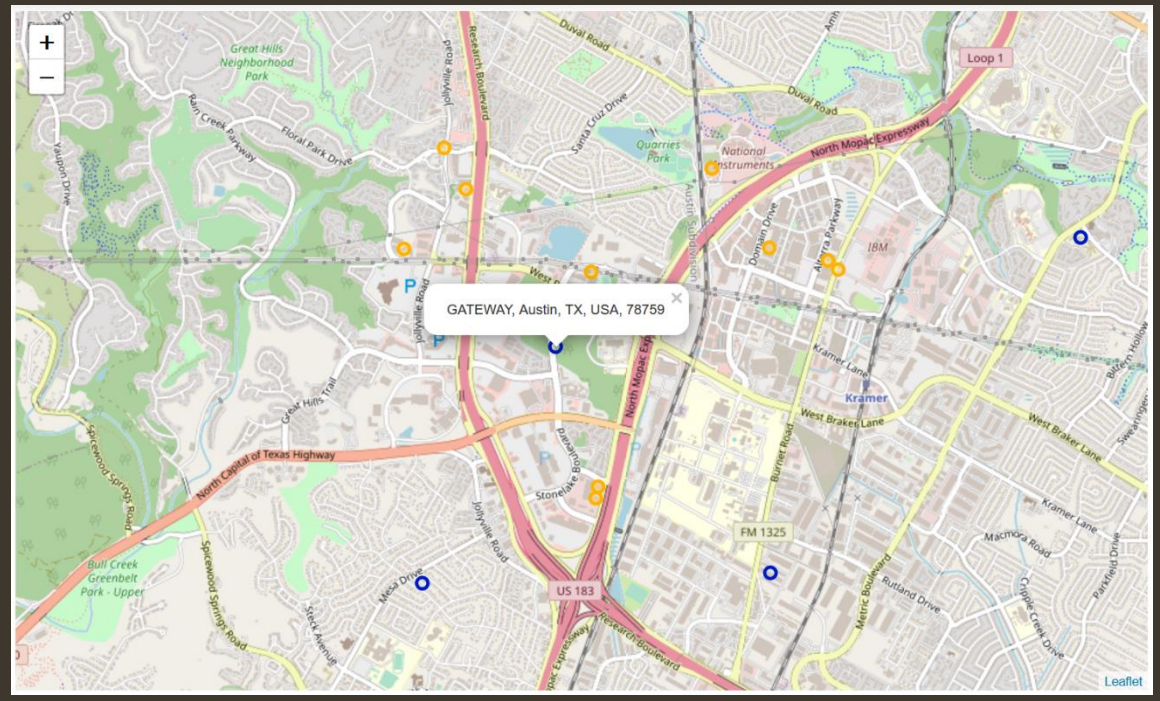
- First, find the neighborhoods in Austin, TX where Big Tech is nearest
- Second, find the neighborhoods where population is high and growing
- Third, find the venues in these selected neighborhoods
- Fourth, use venue category as features of these neighborhoods. Use K-Means clustering to see if any hidden trends occur.
- Fifth, find the frequency of venue category/real estate type that occurs.



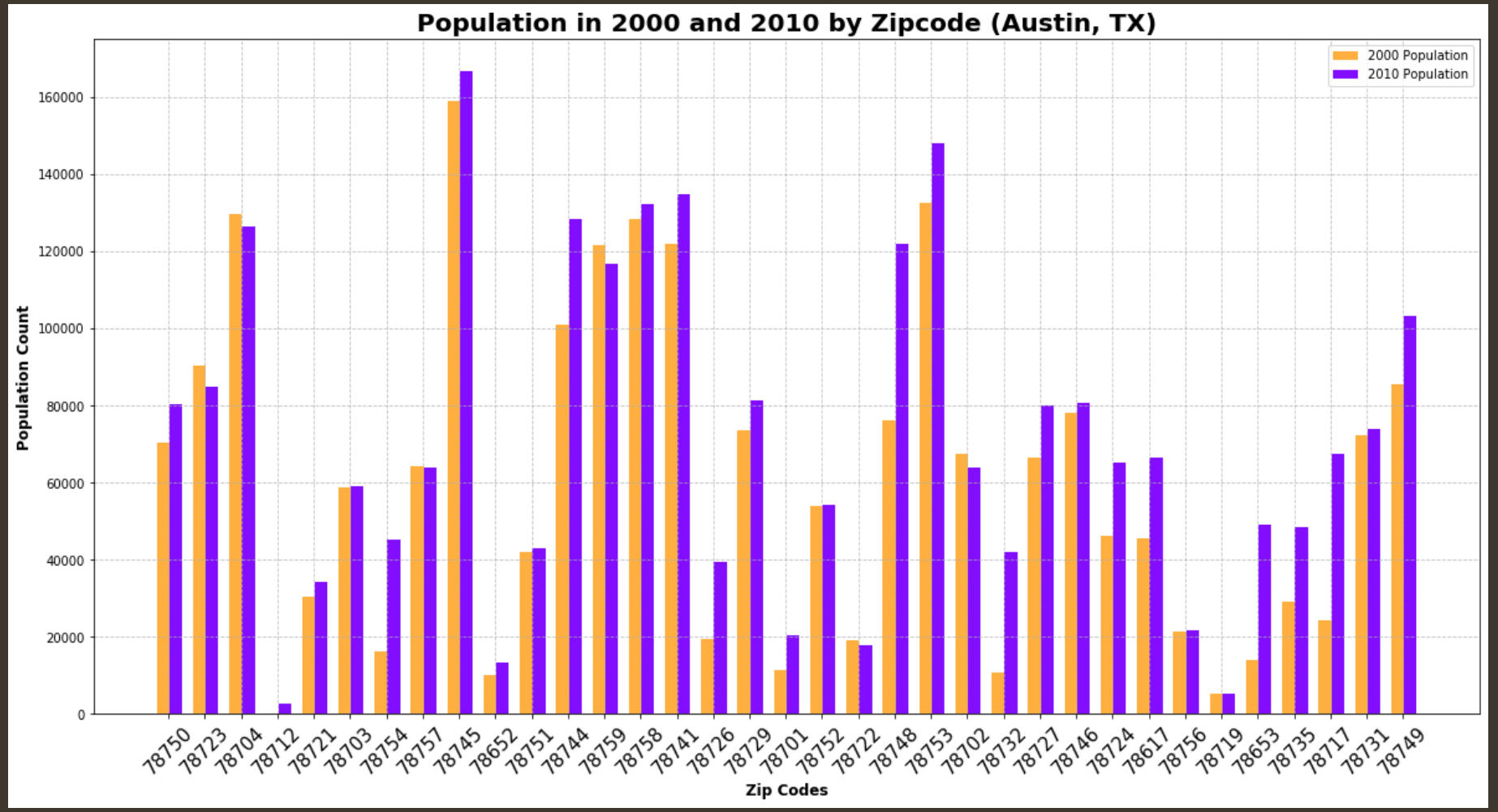
Methodology: Neighborhoods near Big Tech

- Neighborhoods in zip Code 78759: Westover Hills, Gateway, Spicewood
- Neighborhoods in zip code 78701: UT Austin, Downtown Austin, West Austin, East Cesar Chavez

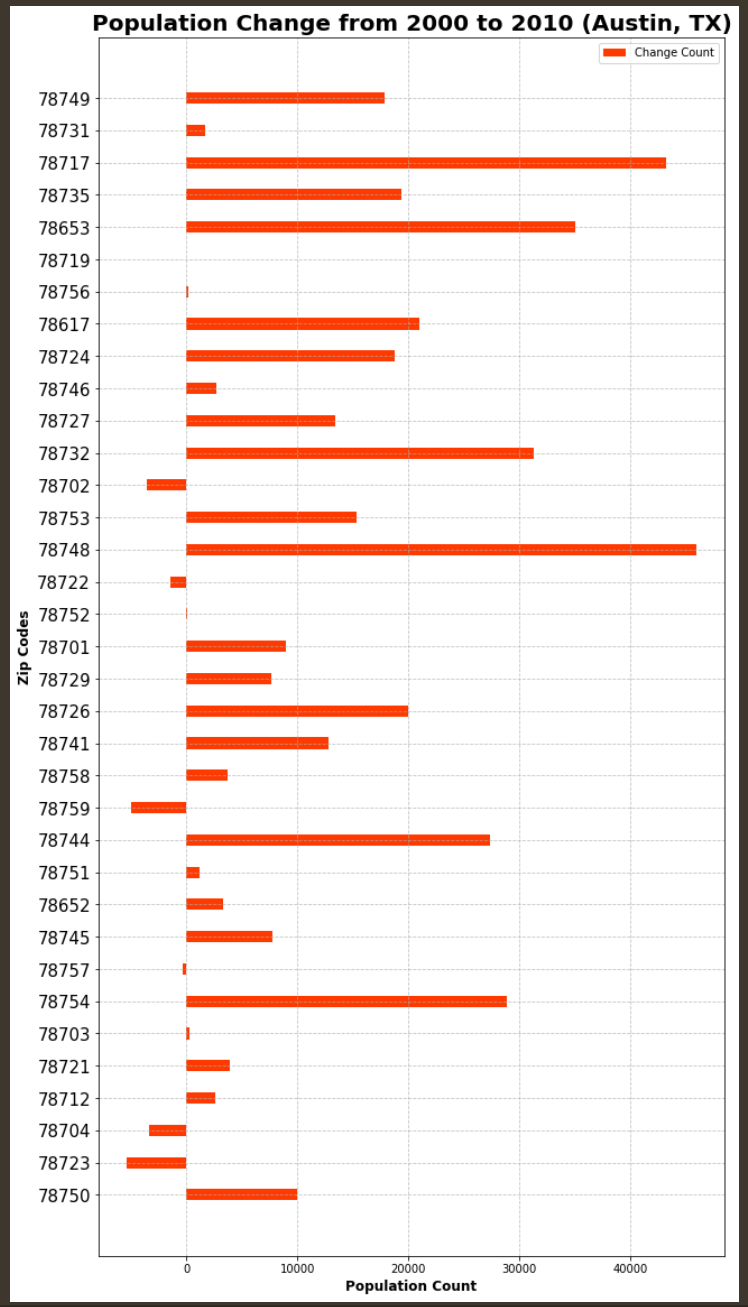




Methodology: Zip Code by Population Size



Methodology: Zip Code by Population Growth



Methodology: Chosen Zip Codes

- Zipcodes with good standing in both population size and growth were chosen
- Zipcode 78748: 7th in Population Growth and 1st in Population Growth
- Zipcode 78744: 5th in Population Growth and 6th in Population Growth
- Neighborhoods in 78748: Dittmar Crossing, Cherry Creek, South Brodie, Slaughter Creek
- Neighborhoods in 78744: McKinney, Bluff Springs, Onion Creek, Franklin Park

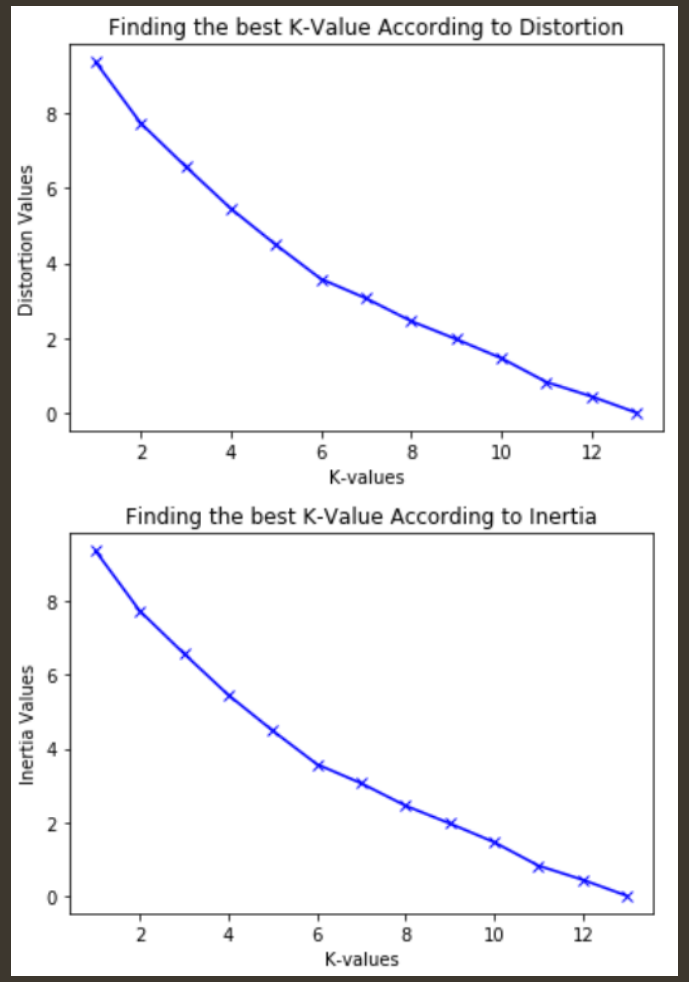
Methodology: All Chosen Zip Codes and Their Neighborhoods

- 78759
- 78701
- 78748
- 78744

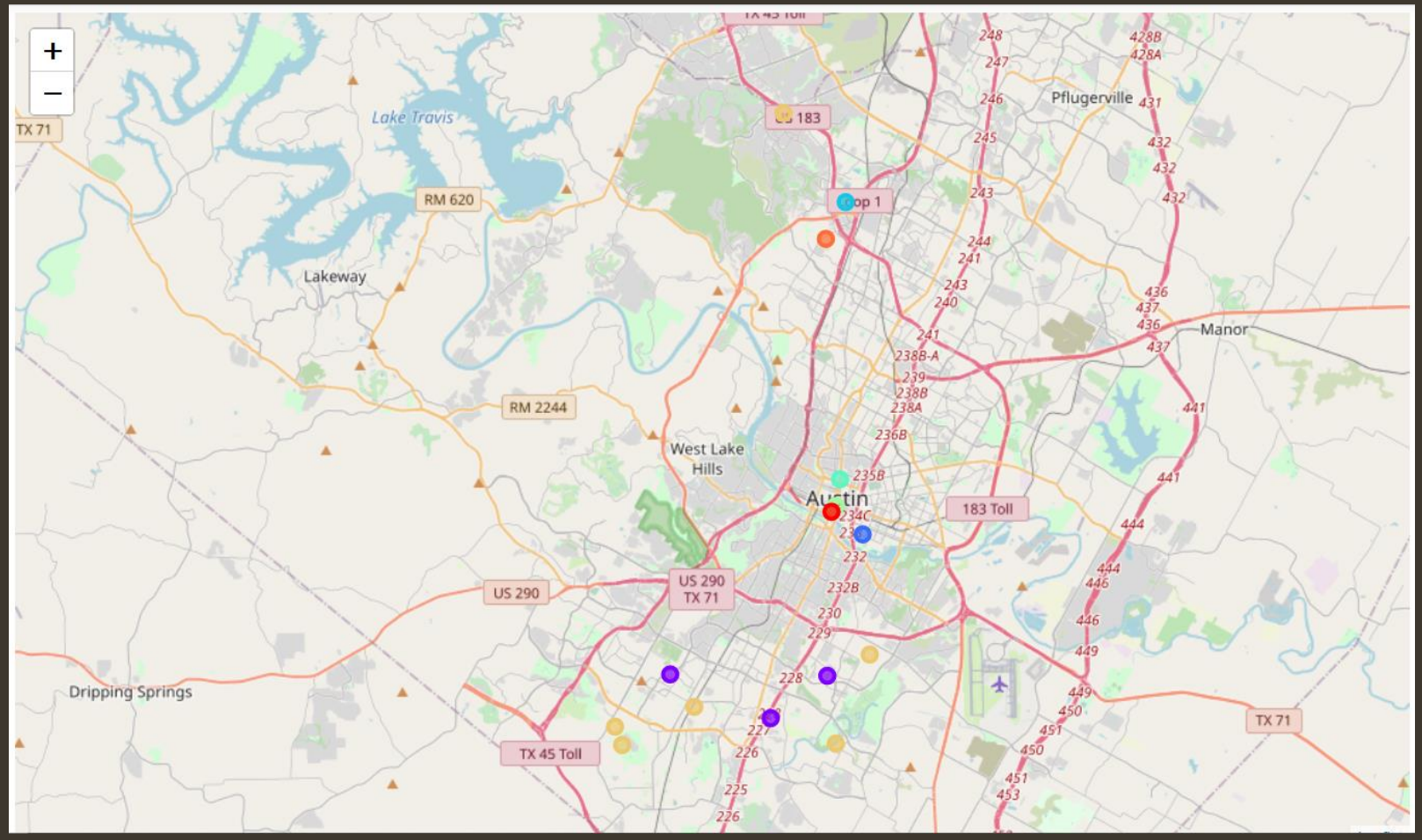
	Neighborhood	Latitude	Longitude
0	Dittmar Crossing, Austin, TX, USA	30.183729	-97.813116
1	CHERRY CREEK, Austin, TX, USA	30.197113	-97.824812
2	SOUTH BRODIE, Austin, TX, USA	30.175622	-97.851637
3	SLAUGHTER CREEK, Austin, TX, USA	30.167554	-97.848329
4	MCKINNEY, Austin, TX, USA	30.205876	-97.728015
5	BLUFF SPRINGS, Austin, TX, USA	30.178720	-97.775929
6	ONION CREEK, Austin, TX, USA	30.168117	-97.744817
7	FRANKLIN PARK, Austin, TX, USA	30.196898	-97.748800
8	UT, Austin, TX, USA	30.279308	-97.742845
9	DOWNTOWN, Austin, TX, USA	30.268054	-97.744764
10	WEST AUSTIN NG, Austin, TX, USA	30.265587	-97.746996
11	EAST CESAR CHAVEZ, Austin, TX, USA	30.255896	-97.731707
12	WESTOVER HILLS, Austin, TX, USA	30.379933	-97.749599
13	GATEWAY, Austin, TX, USA	30.395185	-97.739643
14	SPICEWOOD, Austin, TX, USA	30.432946	-97.770378

Methodology: K-Means Clustering, Elbow Method

- **There was no significant bend in the elbow method!**
- Proposed Source of Problem: Some locations had an abundance of venues (such as Downtown Austin) and some had very few (such as the suburbs)
- This large unequal venue density moved the algorithm to adjust cluster centers, leading to no desirable k-value
- No hidden trend was found due to this problem
- Arbitrary k-value of 8 was then chosen



Methodology: Cluster Map with K-value=8



Methodology: Venue Category Frequency

- From 1st most common to 5th most common: hotel real estate, food/restaurant real estate, cocktail bar real estate, yoga studio real estate and food/restaurant real estate again

Hotel	0.200000
Trail	0.133333
Video Store	0.133333
Food	0.066667
Soccer Field	0.066667
IT Services	0.066667
Dog Run	0.066667
Recreation Center	0.066667
Print Shop	0.066667
American Restaurant	0.066667
Restaurant	0.066667

Name: 1st Most Common Venue, dtype: float64

Food	0.200000
Coffee Shop	0.133333
Dog Run	0.133333
Gym	0.066667
Convenience Store	0.066667
Bakery	0.066667
Trail	0.066667
Gym / Fitness Center	0.066667
Pool	0.066667
Financial or Legal Service	0.066667
Mexican Restaurant	0.066667

Name: 2nd Most Common Venue, dtype: float64

Cocktail Bar	0.133333
Bus Stop	0.133333
Intersection	0.133333
Theme Park	0.066667
Bubble Tea Shop	0.066667
Yoga Studio	0.066667
Creperie	0.066667
Hotel	0.066667
Music Venue	0.066667
Dog Run	0.066667
Warehouse Store	0.066667
Mexican Restaurant	0.066667

Name: 3rd Most Common Venue, dtype: float64

Yoga Studio	0.266667
Mexican Restaurant	0.133333
Gay Bar	0.066667
French Restaurant	0.066667
Gym	0.066667
Soccer Field	0.066667
Bar	0.066667
Cycle Studio	0.066667
Liquor Store	0.066667
Indian Restaurant	0.066667
Athletics & Sports	0.066667

Name: 4th Most Common Venue, dtype: float64

Food	0.200000
Yoga Studio	0.133333
Financial or Legal Service	0.133333
New American Restaurant	0.066667
Steakhouse	0.066667
Food Truck	0.066667
Cosmetics Shop	0.066667
Pizza Place	0.066667
Speakeasy	0.066667
Scenic Lookout	0.066667
Dance Studio	0.066667

Name: 5th Most Common Venue, dtype: float64

Results & Discussion

- Zip Codes near Big Tech: 78759 and 78701
- Zip Codes with Good Population Size and Growth: 78748 and 78744
- K-Means clustering had a problem, perhaps due to a large density difference in venues between neighborhoods
- For example, in the suburbs there isn't much venue variety since it is all housing compared to downtown where variety is expected due to different businesses
- Perhaps choose a different algorithm for machine learning
- The common venue type/real estate type: hotels, food/restaurant (x2), cocktail bars, yoga studio

Conclusion (Open-Ended)

- **Where to invest? The neighborhoods in 78759, 78701, 78748, 78744**
- **What type of real estate to invest in? Hotels, food/restaurant, cocktail bars, and yoga studios**
- Recommendations:
  - Use Google API (funding required)
  - Use ZTAC instead of Zip Code
  - Apply 2020 population data when available
  - Consider different factors such as income and household type
  - Use a different machine learning algorithm

All image credit: pexels.com