

Reinventing Restaurants: A Data Based Approach

How to survive in a COVID-19 pandemic economy ?

Capstone Project:

Battle of the Neighborhoods

by Ayan Guha





Introduction

- ❖ Restaurants are shuttered due to COVID-19 pandemic
- ❖ Customer base is quarantined in their homes
- ❖ A mobile restaurant can visit the customers in their neighborhoods
- ❖ It is time for a transition

Business problem ?

Which neighborhoods should the restaurant visit ?

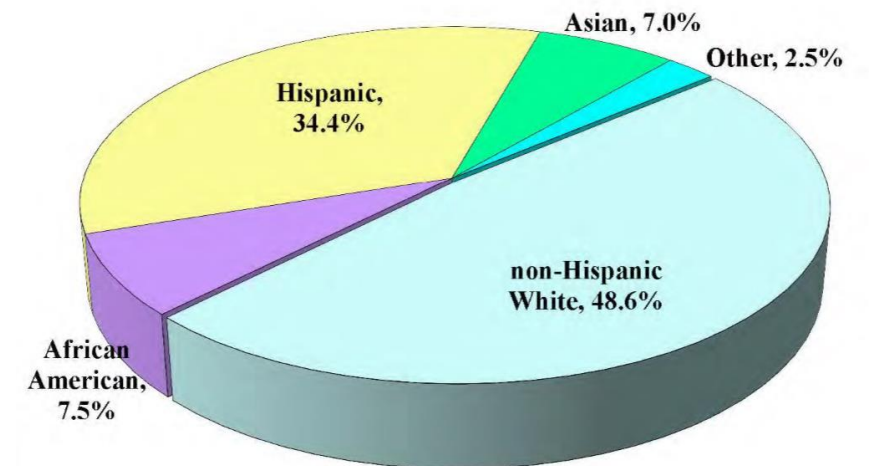
Exploring the Neighborhoods in Austin:



Data Source

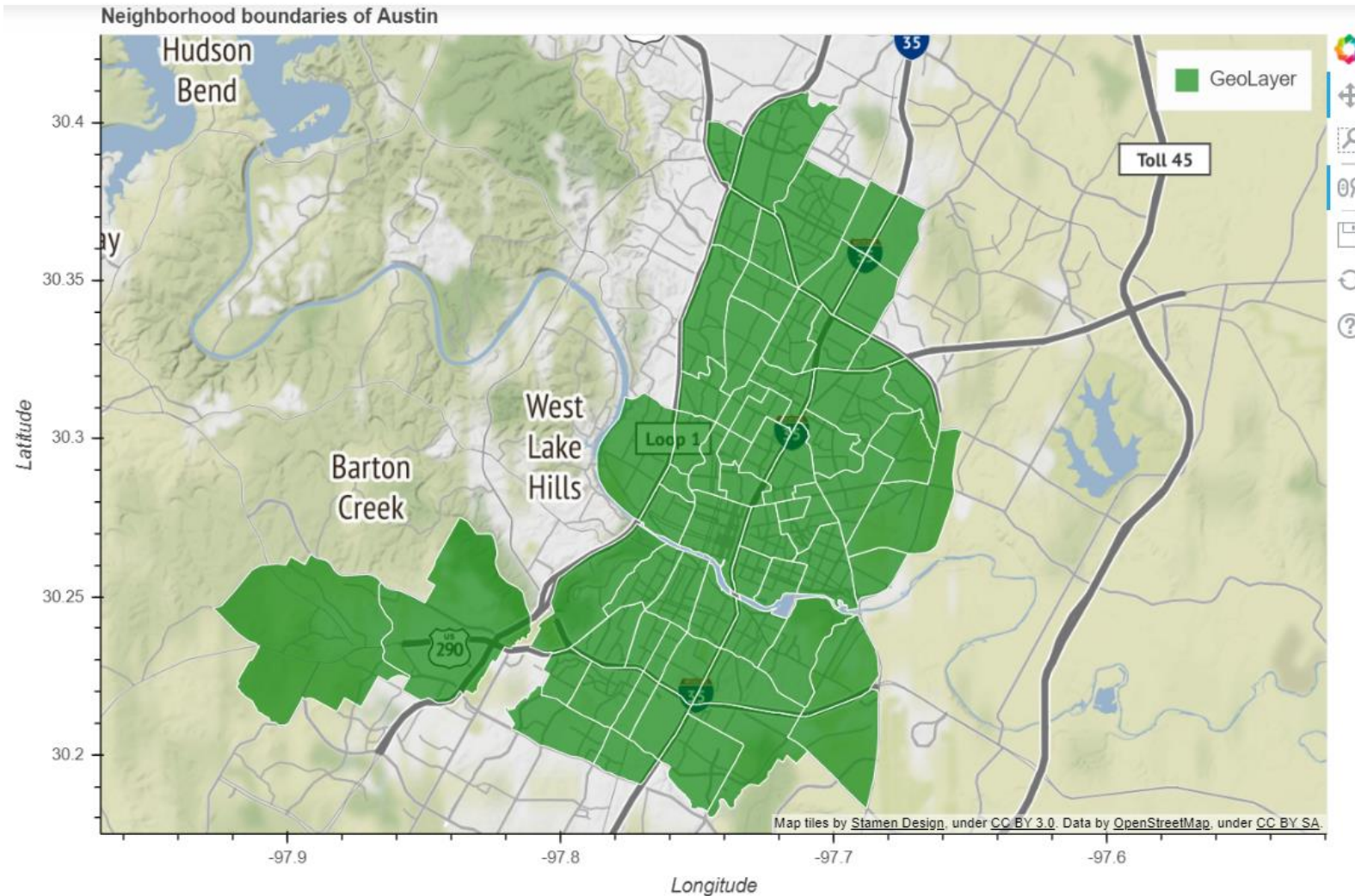
- ❖ data.austintexas.gov
(<https://data.austintexas.gov/>) :
- ❖ United States Census Bureau
(<https://www.census.gov/data.html>)

**Racial and Ethnic Mix, City of Austin,
2014 ACS Census Estimates**

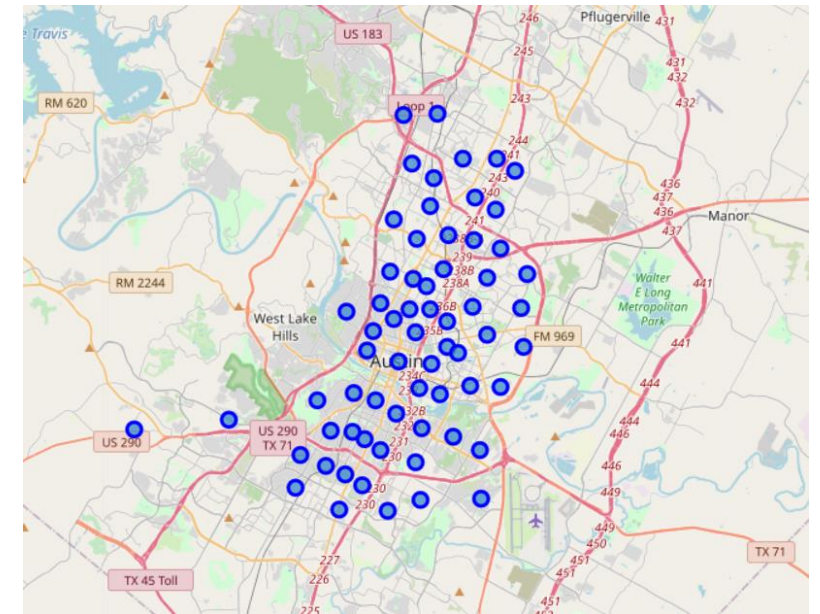


There are 65 neighborhoods in Austin:

Data cleaned, Put in a dataframe & Calculated Centroids of neighborhoods



Neighborhoods in Austin



Neighborhood centroids



Using Foursquare API :

We explored all the trending venues within 1000m of each Centroid location

	Neighborhood	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Allandale	Barley Swine	30.341256	-97.738458	New American Restaurant
1	Allandale	Yard Bar	30.342881	-97.738871	Bar
2	Allandale	Bufalina Due	30.341030	-97.738422	Pizza Place
3	Allandale	Three Little Pigs	30.340192	-97.738426	Food Truck
4	Allandale	Lick Ice Creams Burnet Road	30.341143	-97.738408	Ice Cream Shop
5	Allandale	Taqueria Arandas No. 3	30.341555	-97.739067	Mexican Restaurant
6	Allandale	Growler Room	30.344500	-97.738420	Food & Drink Shop
7	Allandale	Asahi Imports	30.336347	-97.739225	Supermarket
8	Allandale	Hot Rod Coffee Trailer	30.341761	-97.738946	Food Truck
9	Allandale	The Aristocrat Lounge	30.340241	-97.738617	Lounge



Popular Categories

	Categories	Venue Category
0	Mexican Restaurant	143
1	Food Truck	131
2	Coffee Shop	114
3	Park	73
4	Sandwich Place	71
5	Bar	71
6	Convenience Store	69
7	Hotel	69
8	Pizza Place	68
9	Taco Place	59

The most popular categories are “Mexican Restaurants” followed by “Food Trucks”

Austin has the fastest-growing food truck industry in U.S. & 2nd most food trucks per capita

	Neighborhood	Venues
0	Bouldin Creek	100
1	Central East Austin	100
2	Downtown	100
3	East Cesar Chavez	100
4	Gateway	100
5	Riverside	100
6	UT	100
7	West University	100
8	Zilker	100
9	North University	89

2nd downtown is taking shape in Gateway, which returned large number of venues along with Central Austin neighborhoods

Restaurants & Food Truck Dataframe :

Segmenting neighborhoods based on Restaurant & Food Truck Categories

Shape of grouped & sorted neighborhood restaurant dataframe: (65, 11)

	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
0	Allandale	Food Truck	Mexican Restaurant	Thai Restaurant	New American Restaurant	Fast Food Restaurant	Ethiopian Restaurant	Indian Chinese Restaurant	Hawaiian Restaurant	Greek Restaurant
1	Barton Hills	Food Truck	Ethiopian Restaurant	Israeli Restaurant	Indian Restaurant	Indian Chinese Restaurant	Hawaiian Restaurant	Greek Restaurant	Gluten-free Restaurant	French Restaurant
2	Bouldin Creek	Food Truck	New American Restaurant	Italian Restaurant	Thai Restaurant	Mexican Restaurant	Restaurant	Vegetarian / Vegan Restaurant	Japanese Restaurant	Sushi Restaurant
3	Brentwood	Mexican Restaurant	American Restaurant	Thai Restaurant	Vietnamese Restaurant	Asian Restaurant	Falafel Restaurant	Korean Restaurant	Mediterranean Restaurant	Japanese Restaurant
4	Central East Austin	Food Truck	Mexican Restaurant	Restaurant	Italian Restaurant	American Restaurant	Argentinian Restaurant	Asian Restaurant	Cajun / Creole Restaurant	Chinese Restaurant

Where are the food trucks?

	Neighborhood	Food Truck
0	Central East Austin	0.160000
1	Southeast	0.125000
2	MLK-183	0.111111
3	East Cesar Chavez	0.090000
4	Georgian Acres	0.086957
5	Montopolis	0.083333
6	West Congress	0.083333
7	Franklin Park	0.083333
8	South River City	0.082192
9	Old Enfield	0.080000

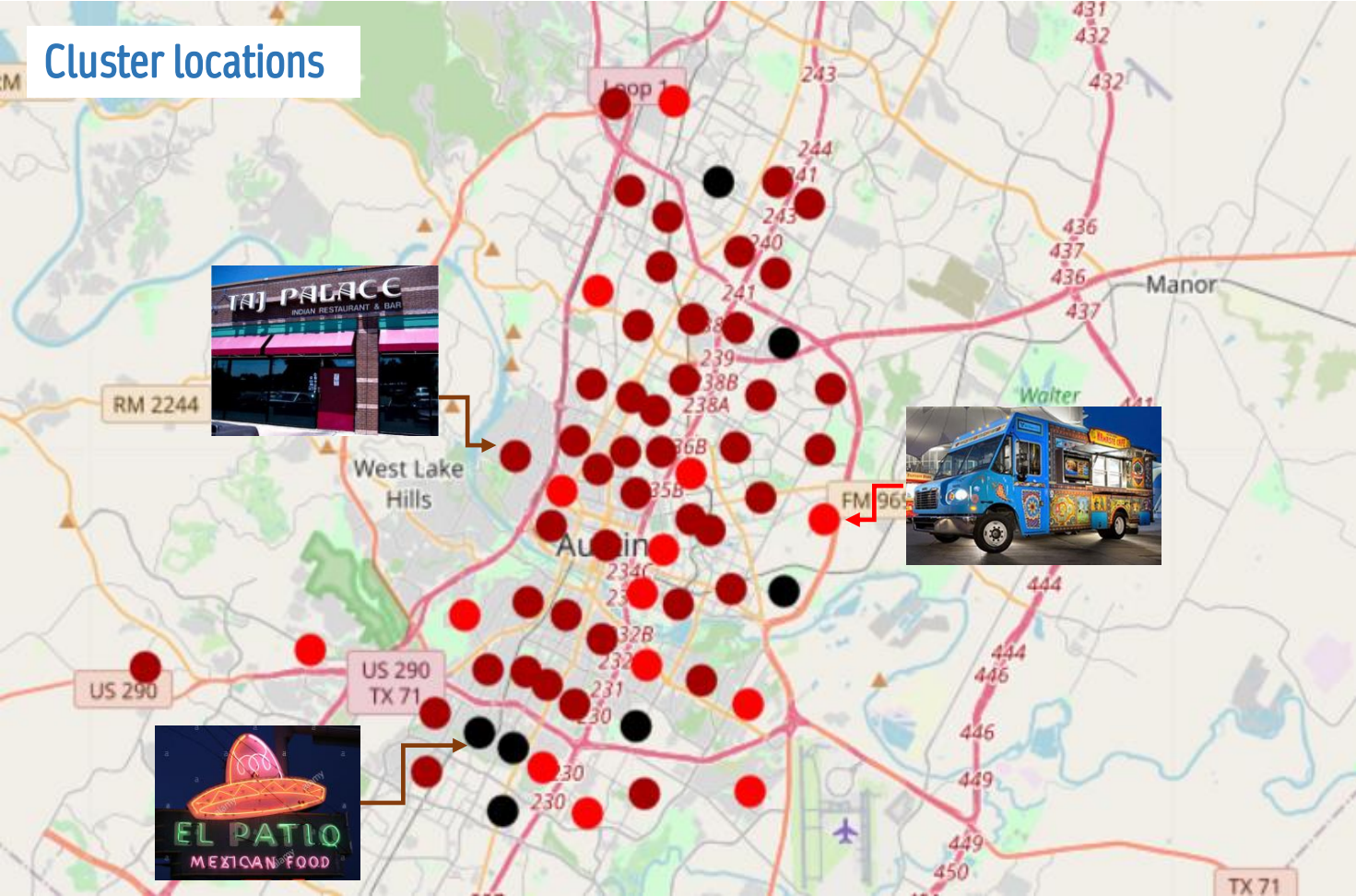
Central East Austin has the highest number of food trucks followed by **Southeast & MLK-183**.

East & Southeast Austin are hottest locations for Food Trucks.

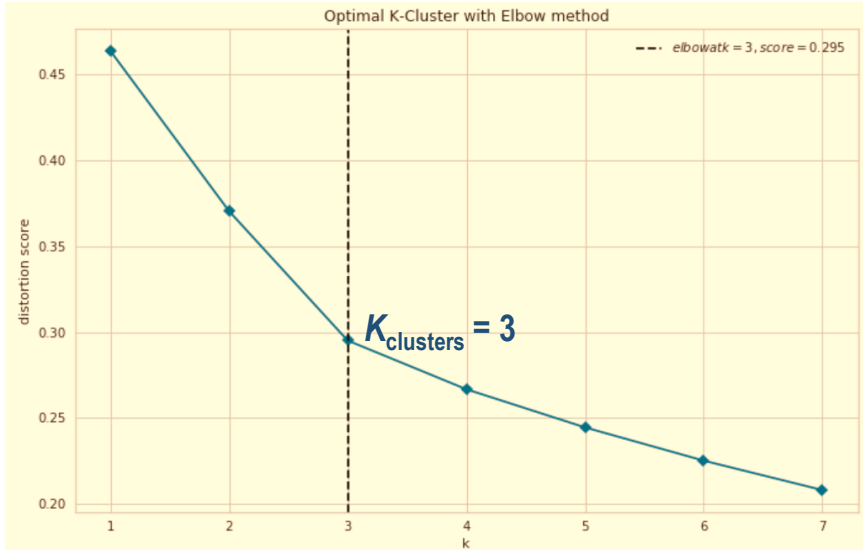


k-Means Clustering :

An iterative algorithm that partitions the dataset into non-overlapping clusters
Performed k-means clustering on the hot-encoded Restaurant dataframe, k = 3



How many optimum clusters?

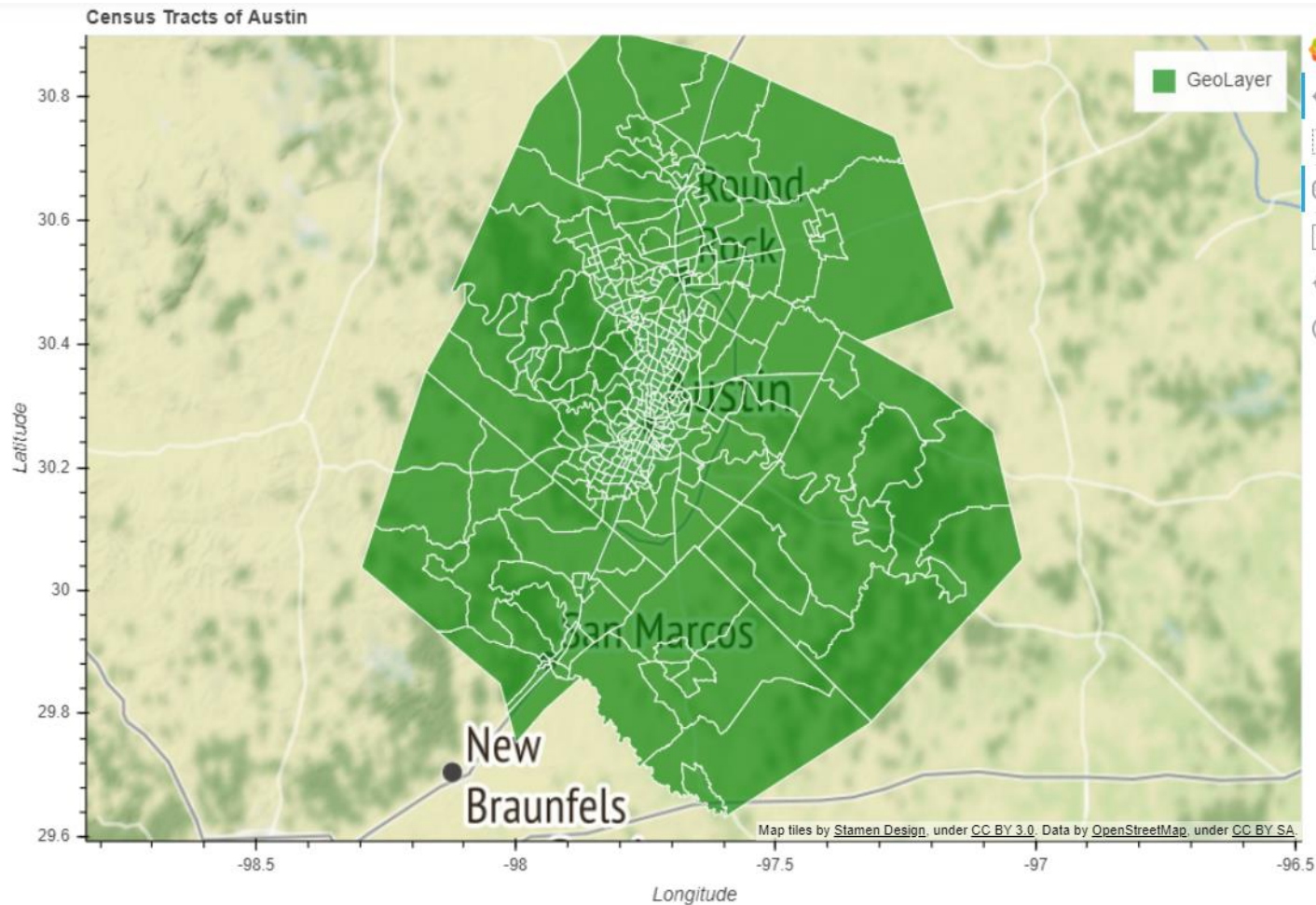


kElbowVisualizer implements the “elbow” method to select the optimal number of clusters

Cluster Label	Marker Color	1 st Most Common Venue
0	Red	Food Truck
1	Magenta	Multi-cuisine restaurants
2	Black	Mexican Restaurants

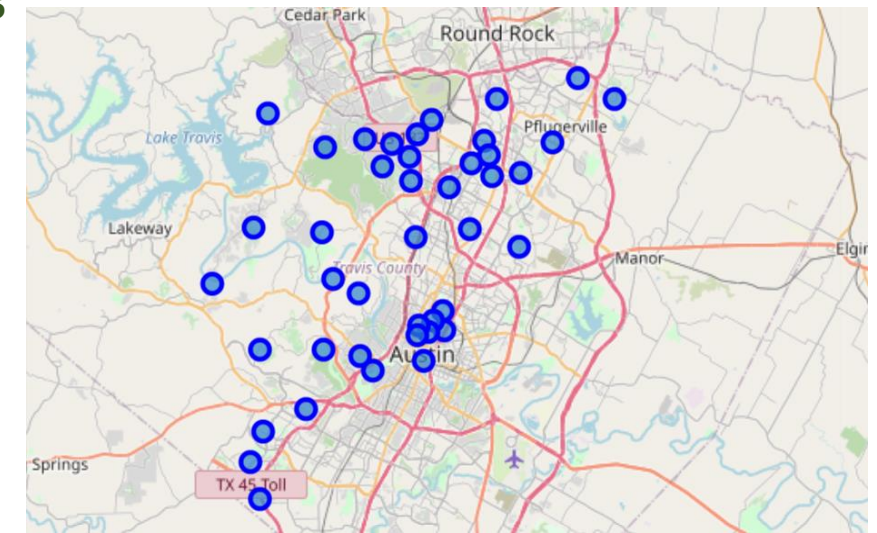
Let us look at the Census Tracts in Austin:

Data cleaned, Put in a dataframe & Calculated Centroids of Census Tracts



Goal: To find the tracts where Asian Indians live and if there is any underserved restaurant business in any of those locations.

Census Tract Centroids (Travis County)



Travis County, whose county seat is Austin, is the fifth most populous county in Texas



Using Foursquare API :

We explored all the trending venues within 1000m of each Census Tract Centroid

Census_Tract	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Antonelli's Cheese Shop	30.304378	-97.726498	Cheese Shop
1	Quack's 43rd St Bakery	30.304731	-97.726511	Bakery
2	Hyde Park Bar & Grill	30.304222	-97.726705	American Restaurant
3	Antonelli's Cheese House	30.304281	-97.726466	Cheese Shop
4	Asti Trattoria	30.304794	-97.726176	Italian Restaurant
5	Fresh Plus Grocery	30.304841	-97.726369	Grocery Store
6	Mother's Cafe & Garden	30.304420	-97.726027	Vegetarian / Vegan Restaurant
7	Julio's	30.304624	-97.726398	Mexican Restaurant
8	Uncle Nicky's	30.304278	-97.726667	Italian Restaurant
9	Juiceland	30.307210	-97.724873	Juice Bar



Popular Categories

The most popular categories in Travis County are sandwich shops followed by coffee shops

	Categories	Count
0	Sandwich Place	45
1	Coffee Shop	39
2	Fast Food Restaurant	36
3	Pizza Place	34
4	Food Truck	32
5	Mexican Restaurant	29
6	Park	26
7	Hotel	25
8	Gym	25
9	Grocery Store	24

	Census Tract	Count
0	1100	100
1	601	100
2	604	100
3	603	100
4	500	92
5	1849	78
6	401	71
7	302	63
8	1722	52
9	1910	52

Grouping Census Tract dataframe by occurrence of Indian Restaurant

Location of Indian Restaurants

Census Dataframe (for Tracts with Indian Restaurants)

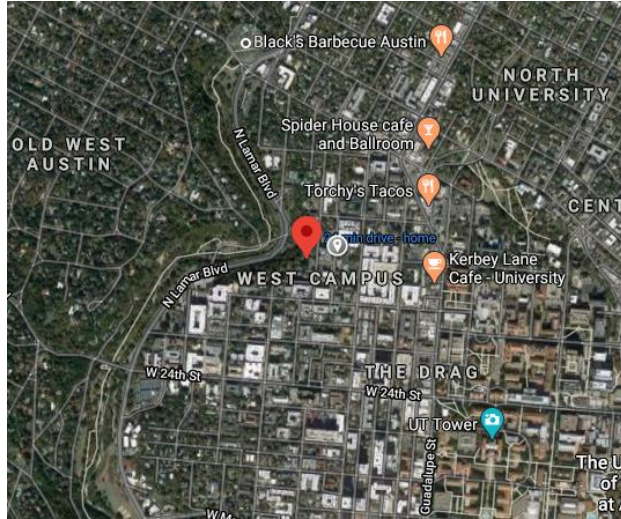
Demographic information of these 9 Census Tracts

- [illegible]



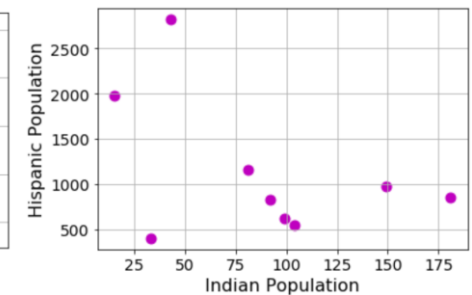
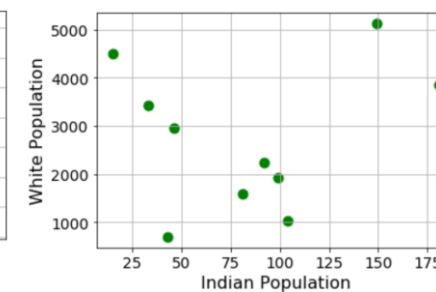
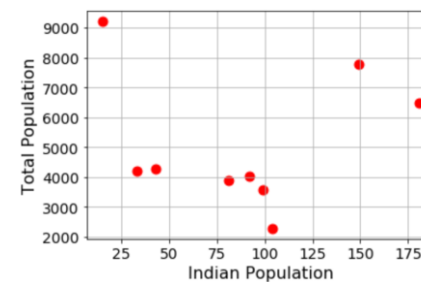
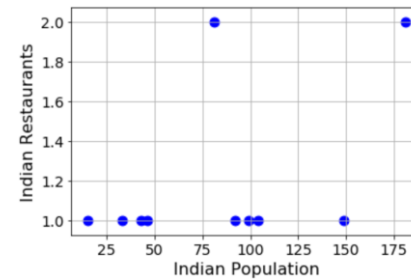
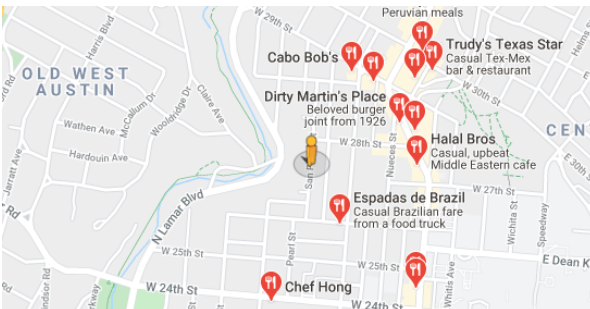
Our final Data Frame:

Includes (a) White, African American, Hispanic, Asian Indian population (b) Indian Restaurant and (c) Centroid co-ordinates



	Census_Tract	Total_population	White	African_Americans	Hispanic	Indian	Indian_Restaurant	Latitude	Longitude
	0	601	9207.0	4491.0	494.0	1972.0	15.0	1	30.287412 -97.738044
	1	603	7793.0	5121.0	149.0	972.0	149.0	1	30.291992 -97.746270
	2	604	6496.0	3842.0	138.0	852.0	181.0	2	30.285534 -97.747727
	3	1752	3583.0	1934.0	91.0	622.0	99.0	1	30.357620 -97.749829
	4	1756	3997.0	2959.0	104.0	402.0	46.0	1	30.426141 -97.769773
	5	1785	4025.0	2249.0	281.0	828.0	92.0	1	30.444346 -97.736238
	6	1819	4265.0	696.0	310.0	2820.0	43.0	1	30.363431 -97.702651
	7	1826	2276.0	1033.0	294.0	543.0	104.0	1	30.402243 -97.683026
	8	1850	3890.0	1594.0	522.0	1159.0	81.0	2	30.411905 -97.701786
	9	1910	4210.0	3424.0	37.0	398.0	33.0	1	30.269903 -97.798175

603 is next to the University of Texas, 2nd highest Asian Indian population but served by only 1 Indian Restaurant



Tract # 603 is an underserved Restaurant business location

Conclusions:

- (a) Our goal was to find a profitable location to start a mobile food business catering to Asian Indian population
- (b) Using k-Means algorithm we created 3 unique clusters of restaurants & food trucks
- (c) Analyzing Census Data we pinpointed the tract where a mobile restaurant can serve an underserved population
- (d) Census Tract # 603 (within Cluster #1) is the optimum location that would satisfy our goal.

