Houston Neighborhoods Investigation

Yong Chang

10/4/2019

Introduction

- Background information

  - Houston is the largest city in the United States by total area, whose government is not consolidated with that of a county, parish or borough. It has many neighborhoods. and it has been described as the most racially and ethnically diverse major metropolis in the U.S.A. It is home to many cultural institutions, restaurants and exhibits, Everyday many people come to Houston for business, traveling, shopping, etc..
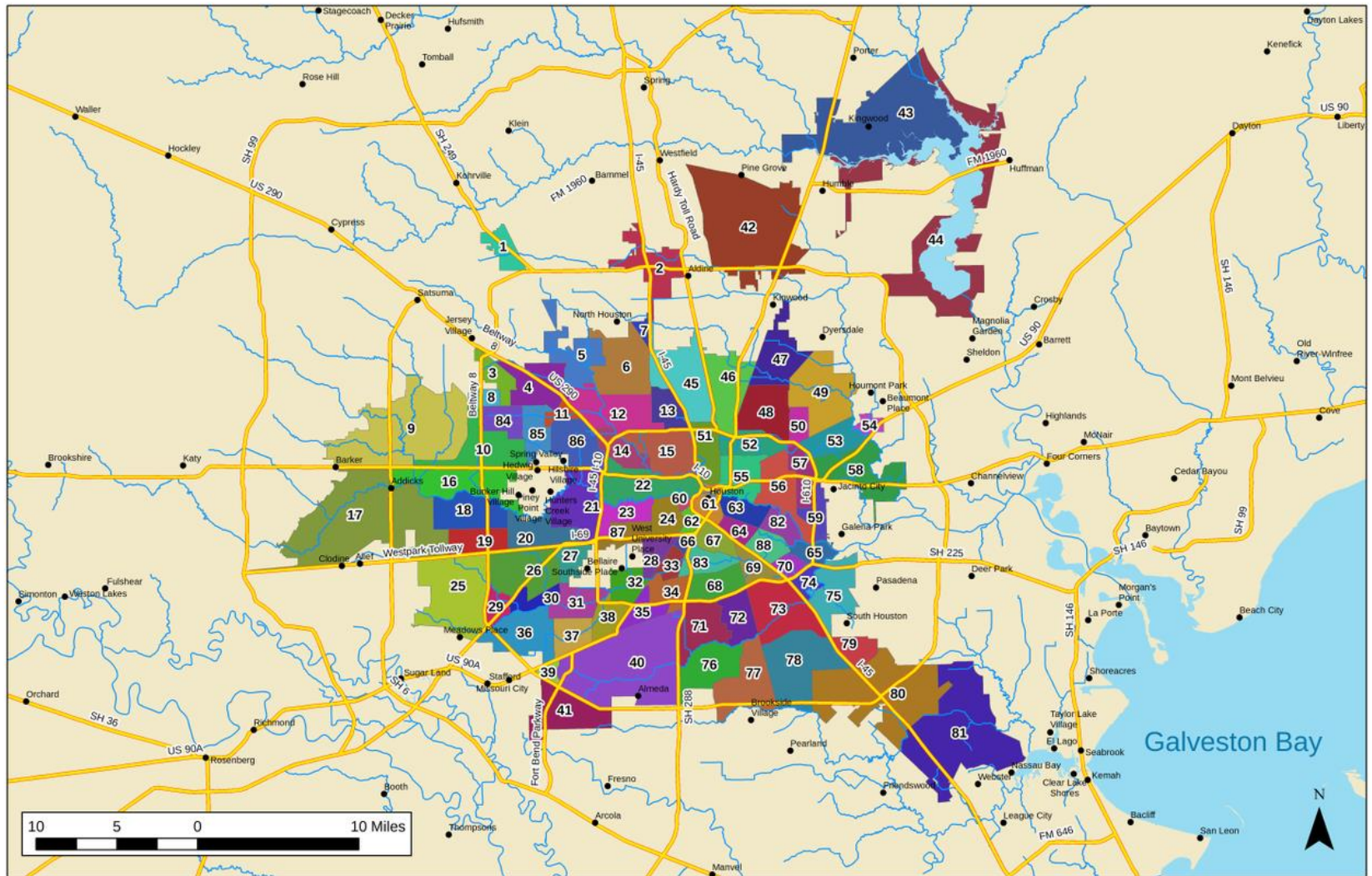
- Business Problem

  - Many people don't know the features of the Houston's neighborhoods. It is good to investigate the neighborhoods, so people can quickly find places to eat, shop, visit, or for other purposes. This project will investigate the venues of all the neighborhoods of Houston and make a report of that.

- Interest

  - Many people come to Houston over the world. They want to know more about the city before they arrive. This investigation will be very useful for them to get familiar with the city and plan for their trip. In addition, the local people living in Houston can get benefits for exploring their home city with the results of this report, and they can enjoy more about this great city.

Houston Neighborhoods Map

Data Acquisition

- **Data Sources**
  - Get the neighborhood names from the Wikipedia page of Houston.
  - Use the Geocoder Python package to get the latitude and the longitude coordinates of each neighborhood.
  - Use the Foursquare to collect the venues of the neighborhoods.

- **Raw Data Example**

	#	Name	Location relative to Downtown Houston	Approximate boundaries
0	1	Willowbrook	Northwest	Along Texas State Highway 249 northwest of Bel...
1	2	Greater Greenspoint	North	Around the junction of Beltway 8 and Interstat...
2	3	Carverdale	Northwest	South of the junction of Beltway 8 and U.S. Ro...
3	4	Fairbanks / Northwest Crossing	Northwest	Along U.S. Route 290 between Interstate 610 an...
4	5	Greater Inwood	Northwest	North of Fairbanks / Northwest Crossing and ea...

Methodology

- To perform the analysis, we will work on key steps as below:
    - Exploratory Data Analysis (EDA)
    - Data Collection of Latitude/Longitude from Geocoder
    - Houston Map Using Latitude/Longitude Collected
    - Define Foursquare Credentials and Version
    - Using Foursquare to Investigate All the neighborhoods
    - Houston Neighborhoods Analysis Using K-Means Method
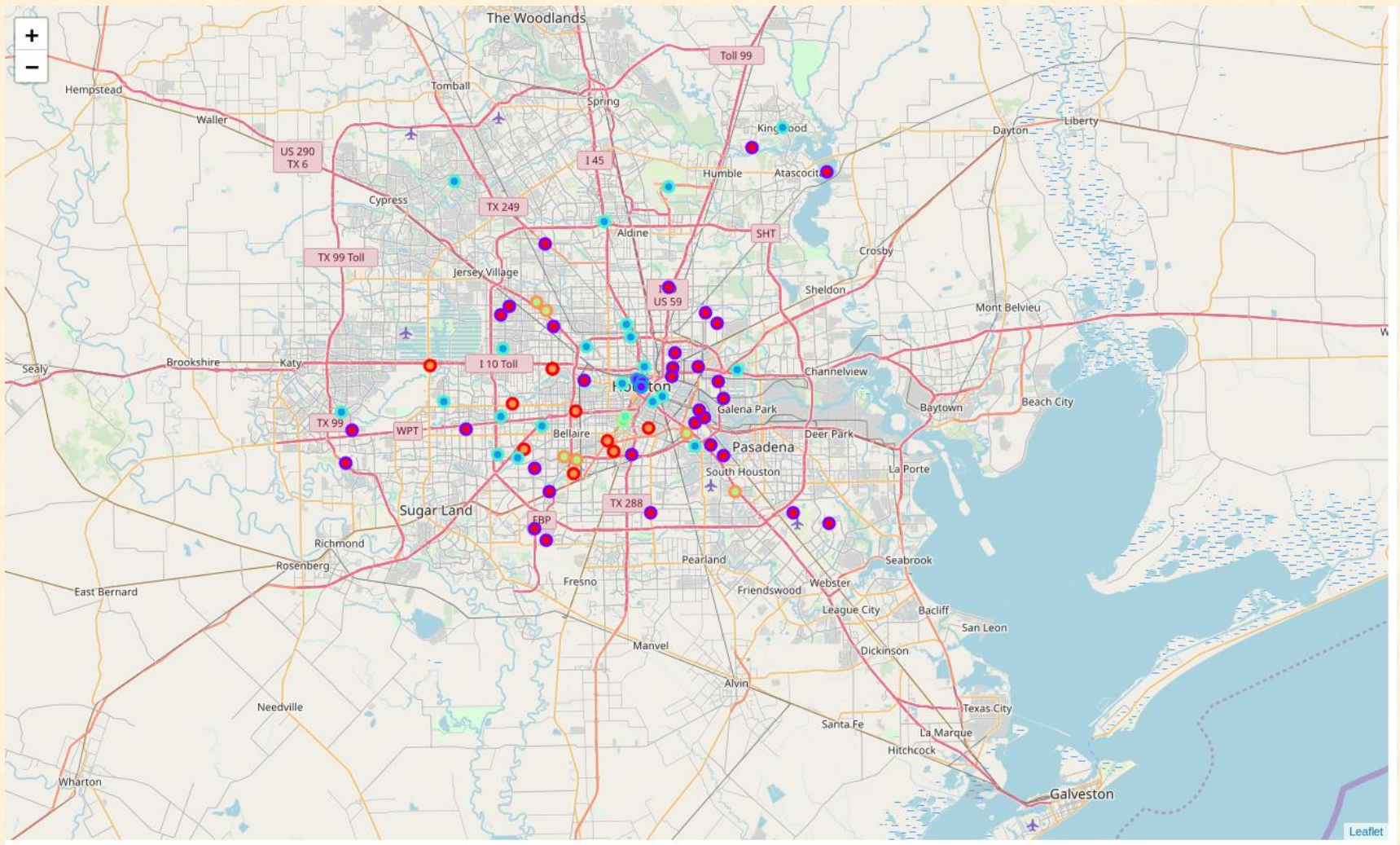
- Examples of Houston Neighborhoods Analysis

	Neighborhood	Location	latitude	longitude	ID	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Willowbrook	Northwest	29.660254	-95.456096	1	0	Liquor Store	Bank	Taco Place	Furniture / Home Store	Supermarket
1	Greater Greenspoint	North	29.944719	-95.416074	2	3	Hotel Pool	Thrift / Vintage Store	BBQ Joint	Italian Restaurant	Seafood Restaurant
2	Carverdale	Northwest	29.848687	-95.539450	3	1	Food Truck	Paper / Office Supplies Store	Soccer Field	Supermarket	Breakfast Spot
3	Fairbanks / Northwest Crossing	Northwest	29.853820	-95.504597	4	5	Clothing Store	Seafood Restaurant	Burger Joint	Buffet	Restaurant
4	Greater Inwood	Northwest	51.462601	-0.361756	5	3	Bakery	Bed & Breakfast	Discount Store	Pub	Coffee Shop
5	Acres Home	Northwest	29.770793	-95.328129	6	1	Flower Shop	American Restaurant	Business Service	Music Venue	Gas Station
6	Hidden Valley	North	39.489543	-119.752991	7	3	Convenience Store	Coffee Shop	Fast Food Restaurant	Shipping Store	Supermarket
7	Westbranch	West	29.839541	-95.551522	8	1	Hot Dog Joint	Gym	Fast Food Restaurant	Sports Bar	Furniture / Home Store
8	Addicks / Park Ten	West	29.782451	-95.642446	9	0	Bakery	Clothing Store	Chinese Restaurant	Thai Restaurant	Fast Food Restaurant
9	Spring Branch West	West	29.801410	-95.547879	10	3	Chinese Restaurant	Discount Store	Café	Fried Chicken Joint	Korean Restaurant
10	Langwood	Northwest	29.826282	-95.482795	11	1	Hotel	Arcade	Gas Station	Electronics Store	Bank
11	Central Northwest (formerly Near Northwest)	Northwest	29.919558	-95.493324	12	1	Automotive Shop	Fried Chicken Joint	Sandwich Place	Latin American Restaurant	Business Service
12	Independence Heights	North	29.828348	-95.388004	13	3	Pharmacy	Sandwich Place	BBQ Joint	Karaoke Bar	Bank
13	Lazybrook / Timbergrove	Northwest	29.803899	-95.439195	14	3	Fast Food Restaurant	New American Restaurant	Diner	Italian Restaurant	German Restaurant
14	Greater Heights	Northwest	29.814581	-95.381944	15	3	Paper / Office Supplies Store	Beer Garden	Bakery	Farmers Market	Bar
15	Memorial	West	29.718625	-95.390936	16	4	Zoo Exhibit	Bar	Garden	Spa	Southern / Soul Food Restaurant

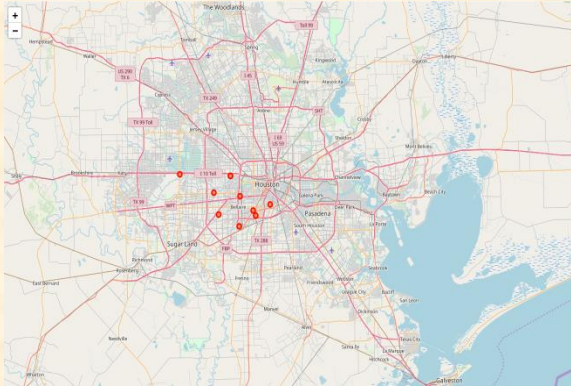# Results – Houston's Neighborhoods Map Before Clustering

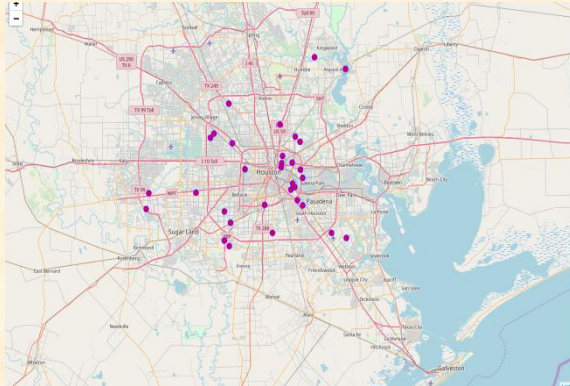# Results – Houston's Neighborhoods Map After Clustering
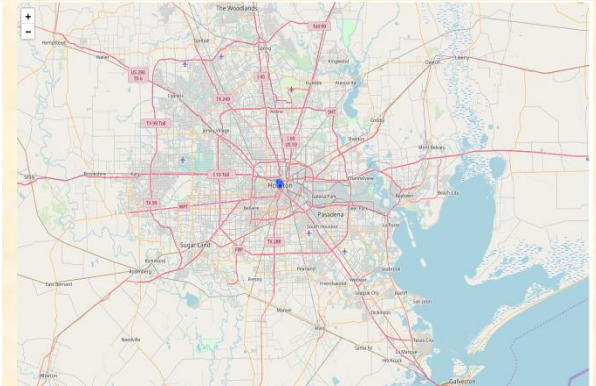
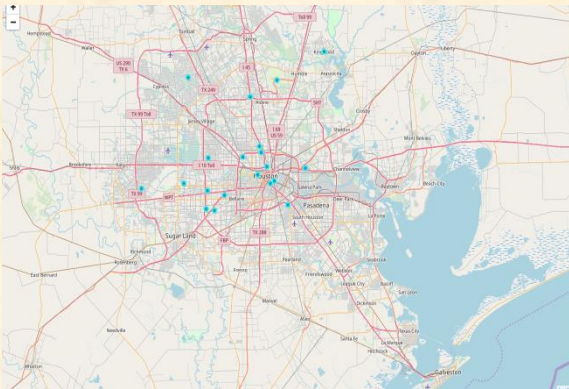# Results – Houston's Neighborhoods Individual Cluster Maps
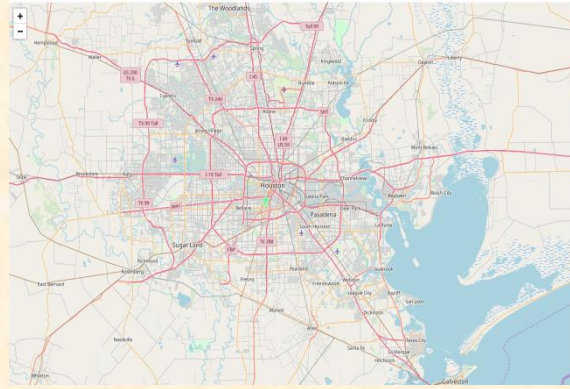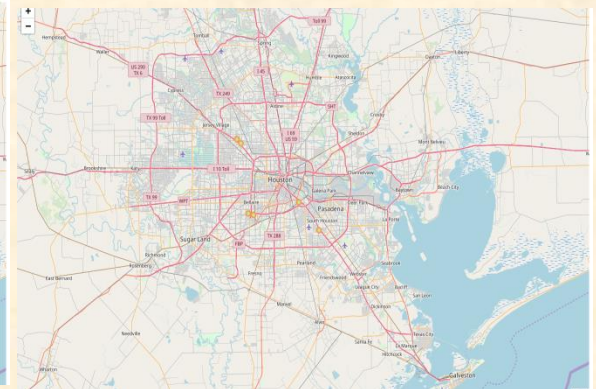
Group 1

Group 2

Group 3

Group 4

Group 5

Group 6

Discussion

- For Houston, the neighborhoods are clustered into 6 groups. The number size of each group are:
    - Group1 - 11
    - Group2 - 37
    - Group3 - 7
    - Group4 - 24
    - Group5 - 2
    - Group6 - 6

- The biggest group has 37, and it shows the wide spread of the restaurants. This makes good sense as Houston is a city with name for its diversity and good food. Due to weather conditions, Houston is not a place with a lot of travel sites. The second largest one has 24, and it shows the shopping is a popular activity. The third one has 11, which indicates the activities around the Banking. Considering it as the oil Capital city, one can imagine how busy the banks are. The fourth group shows the coffee and fast food. The fifth one which has a number as 6, shows the real life of Houstonians, they go to supermarkets, home furniture stores, etc. The smallest one, which only has a number 2, reflects the only popular visiting area of Houston, the Memorial park area. It has a big zoo, a good outdoor park, and museums nearby. This is the place people looking for relaxation with family.

Conclusion

- The project gives good results with useful information. As we know, everyday many people come to Houston over the world. Houston is so big and diversified. The visitors would want to know more about the city before they arrive. This result is very useful for them to get familiar with the city and plan for their trip. The local people can get benefits as well.

- Looking forward, this project has space to be further improved. One example is that it may combine with zip code along with the population information. As the project is based on the neighborhoods, and the neighborhoods varies in the size, population, etc. One example is that if we weighs the population factor, that probably will improve the analysis accuracy.

Thank you!