

# An analysis on the similarities and differences of neighborhoods in Downtown

## Chicago, Illinois & Downtown Houston, Texas



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### Problem Description/ Introduction

This is a Data Science Capstone Project for the completion of the IBM Data Science Certification. In this project, a segmentation of the downtown area of two major US cities, Chicago and Houston will be performed and their similarities and or differences explored. This can be of use to someone who is looking at making a comparison between both cities either for settling, finding a job or any new opportunity.

### Data Description

For the completion of this project, the following data sets and API will be used;

- Foursquare API for generating venues in the selected areas,
- A data set containing US cities zip codes along with their coordinates. This will be used to generate data frames for Chicago and Houston, (<https://public.opendatasoft.com/explore/dataset/us-zip-code-latitude-and-longitude> ),
- A data set containing Chicago zip codes and the area name, (<https://www.chicagotribune.com/chicommunity-areas-htmlstory.html> ),
- A data set containing Houston zip codes and the area name, (<https://web.har.com/zipcode> ).

The data containing the zip codes and area names were merged to create a new data frame for identifying the neighborhoods in both cities which will be used for segmentation and then clustering.

### Methodology

I created two data frames from the data sets containing the zip codes and coordinates of both locations.

	Zip_Code	City	State	Latitude	Longitude	AreaName
0	60651	Chicago	IL	41.901485	-87.74055	Austin, Humboldt Park
1	60644	Chicago	IL	41.881331	-87.75671	Austin
2	60646	Chicago	IL	41.995331	-87.76010	Forest Glen, Jefferson Park, North Park, Norwo...
3	60616	Chicago	IL	41.847400	-87.63126	Armour Square, Bridgeport, Douglas, Lower West ...
4	60647	Chicago	IL	41.921126	-87.70085	Hermosa, Humboldt Park, Logan Square, West Town

Fig.1: Chicago coordinates Data frame

	Zip	City	State	Latitude	Longitude	AreaName
0	77046	Houston	TX	29.733181	-95.43131	Houston - Inner Loop (GREENWAY PLAZA, HOUSTON,)
1	77015	Houston	TX	29.778526	-95.18118	Houston - Northeast (CLOVERLEAF, GREENS BAYOU, H...
2	77072	Houston	TX	29.700898	-95.59002	Houston - Southwest (HOUSTON,)
3	77034	Houston	TX	29.636430	-95.21789	Houston - Southeast (HOUSTON,)
4	77003	Houston	TX	29.749278	-95.34741	Houston - Inner Loop (HOUSTON,)

Fig.2: Houston coordinates Data frame

Also, the python Folium library was used to generate the maps for visualization and the Foursquare API for generating the venues of the locations.

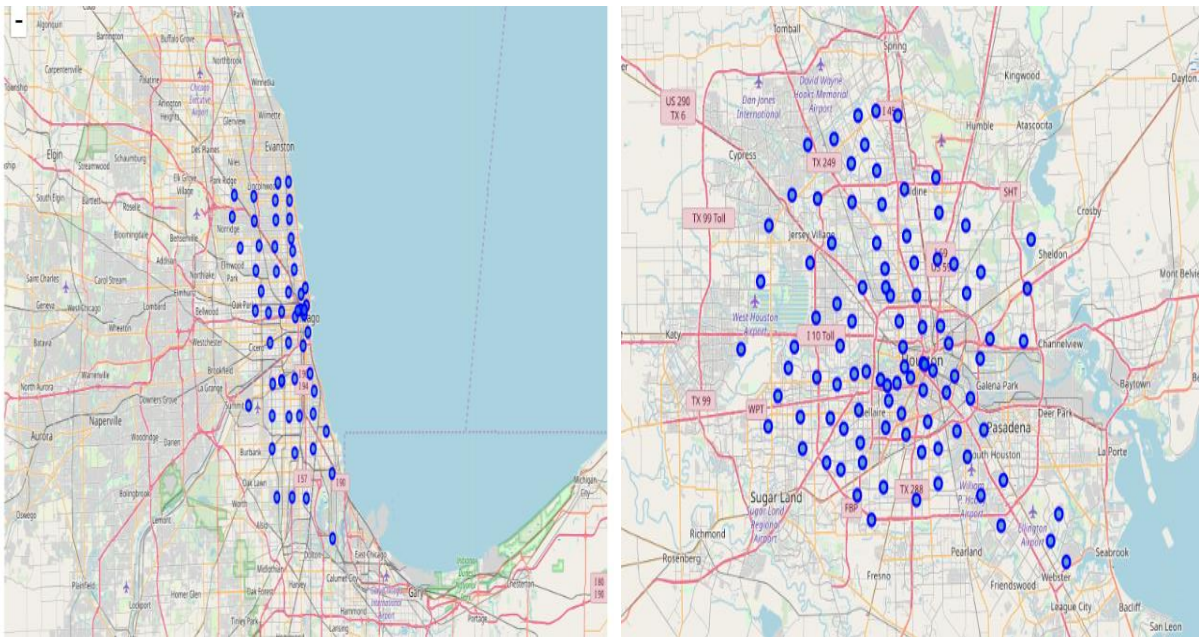


Fig.3: Maps of Chicago & Houston showing area name by zip code

	Neighbourhood	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	10th Most Common Venue
0	Loop	Hotel	Coffee Shop	Sandwich Place	Theater	Italian Restaurant	Plaza	Museum	American Restaurant	Bakery	Public Art
1	Loop, Near South Side	Football Stadium	Historic Site	Park	Sporting Goods Shop	Sports Club	Harbor / Marina	Donut Shop	Museum	Parking	Grocery Store
2	Loop, Near West Side	Sandwich Place	Coffee Shop	New American Restaurant	Mediterranean Restaurant	Mexican Restaurant	Vegetarian / Vegan Restaurant	Donut Shop	Italian Restaurant	Grocery Store	BBQ Joint
3	Loop, Near West Side, Near South Side	Greek Restaurant	Sandwich Place	Café	Coffee Shop	Bus Station	Pizza Place	Dance Studio	Bar	Sports Bar	Shipping Store

Fig.4: Downtown Chicago neighborhoods with the Top 10 venues

	Neighbourhood	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	10th Most Common Venue
0	Houston - Inner Loop (ASTRODOME,ASTROWORLD,HOU...	Gym	Recreation Center	Pharmacy	Park	Doctor's Office	Food	Fast Food Restaurant	Eye Doctor	Electronics Store	Dumpling Restaurant
1	Houston - Inner Loop (GREENWAY PLAZA,HOUSTON,)	Bank	Seafood Restaurant	Bar	Burger Joint	Food Truck	Café	Sandwich Place	Nightclub	Clothing Store	Mexican Restaurant
2	Houston - Inner Loop (HEIGHTS,HOUSTON,HOUSTON ...)	Yoga Studio	Italian Restaurant	Mexican Restaurant	Breakfast Spot	Fast Food Restaurant	Beer Garden	Sushi Restaurant	Gourmet Shop	Gym / Fitness Center	Donut Shop
3	Houston - Inner Loop (HOUSTON,)	Bar	Mexican Restaurant	Hotel	Sandwich Place	Coffee Shop	Pizza Place	Italian Restaurant	Furniture / Home Store	Burger Joint	Bank
4	Houston - Inner Loop (HOUSTON,CLUTCH CITY,)	Hotel	Sandwich Place	Coffee Shop	Steakhouse	Seafood Restaurant	Burger Joint	Bakery	Shopping Mall	Lounge	Fast Food Restaurant

Fig.5: Downtown Houston neighborhoods with the Top 10 venues

## Segmentation & Clustering

The k-means clustering was used to generate the clusters and 2 clusters were generated for Downtown Chicago and 3 for Downtown Houston.

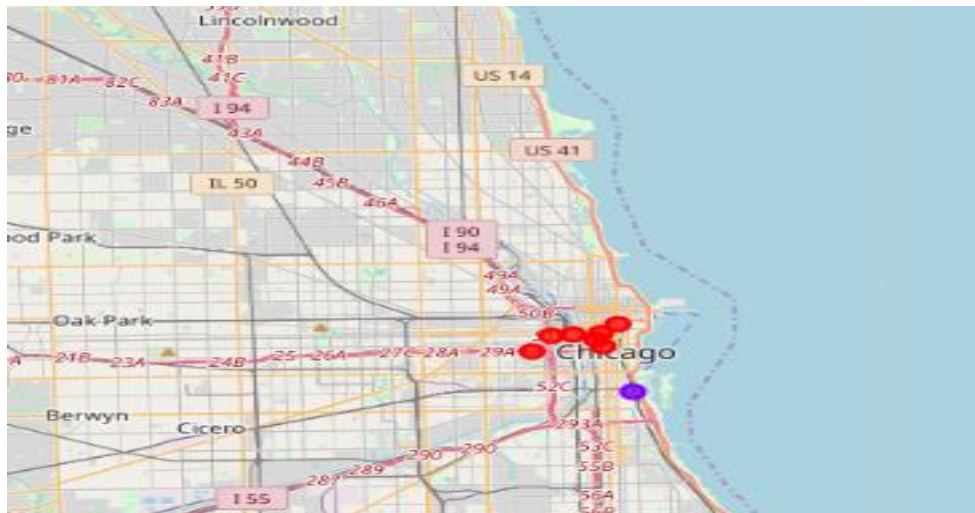


Fig.6: Downtown Chicago showing clusters

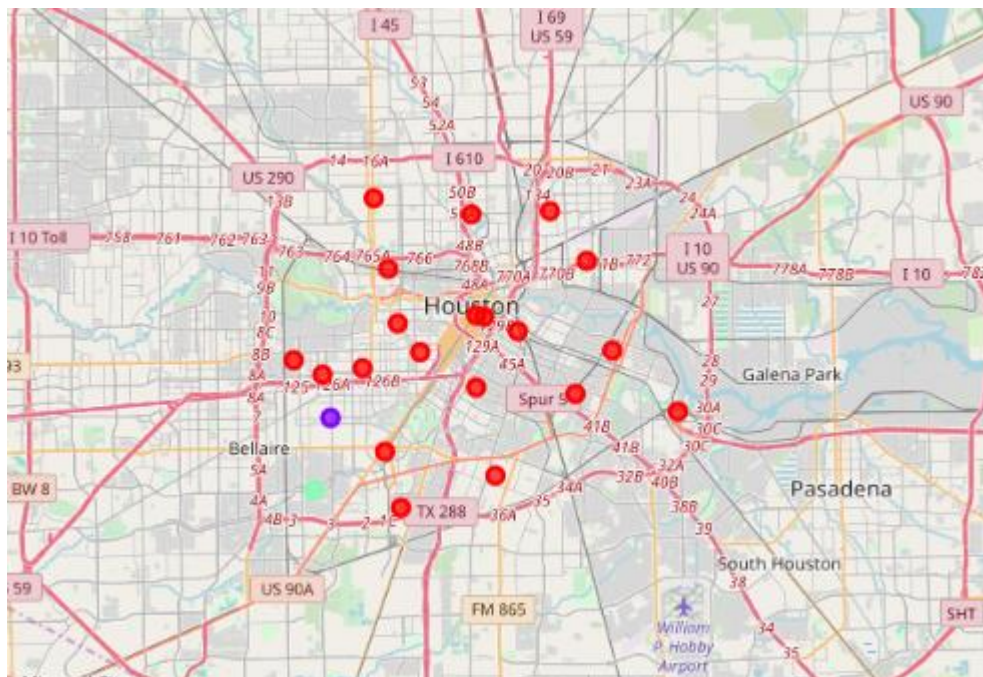


Fig.7: Downtown Houston showing clusters

## Conclusion

Following the segmentation and clustering of the neighborhoods in both Downtown Chicago and Houston, we can observe that there are a lot of similarities between both cities. As is expected, both cities downtown area represents the business district.