Affordable Housing Development in Chicago

WHERE TO BUILD A NEW AFFORDABLE HOUSING DEVELOPMENT IN CHICAGO?

APPLIED DATA SCIENCE CAPSTONE — FINAL PROJECT

Introduction

- Chicago has to build more affordable housing developments to ensure that enough housing stock in the long term

- The question is where these affordable housing developments should be build

- Criteria and Assumptions:
  - Proximity to social support networks is important → better to build in areas with high existing affordable housing
  - Relevant amenities → better to build in areas with suitable amenities

- Interest
  - City government
 - Providers of goods and services: budget grocery chains etc.

Data

- Available from the federal government website

- Contains thousands of affordable units that are supported by the City of Chicago
  - Updated periodically
  - Does not include every city-assisted unit available for rent

- Consists of 389 housing properties (rows) and 19 descriptor columns grouped into 60 community areas

- Columns used for this project:
  - Property Name
  - Community Area that the Property belongs to
  - Number of Units in each Property
  - Longitude and Latitude of each Property
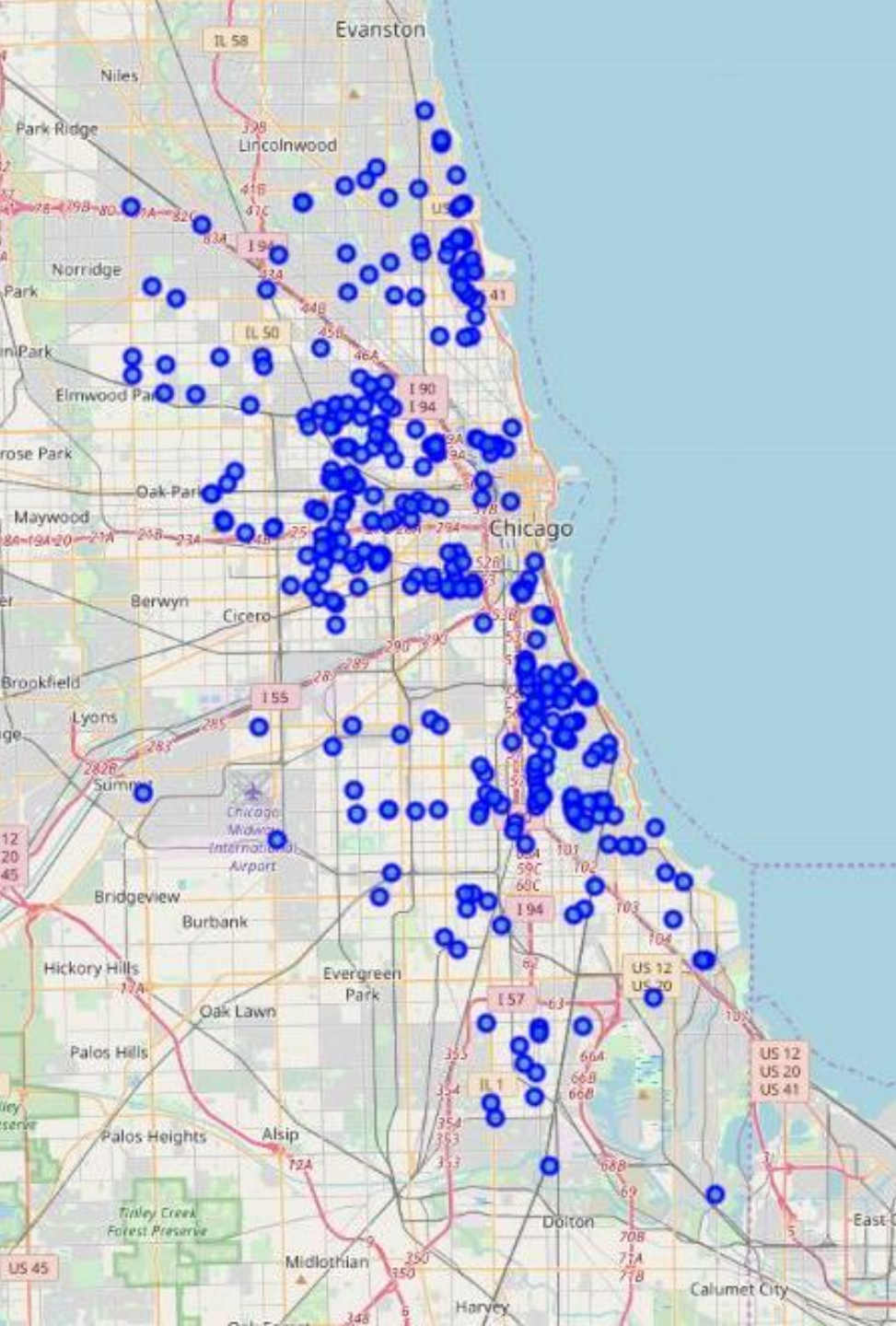
Methodology

Show all the affordable housing units available in the data set (image to the left)

Box plot of Units in each Grand Boulevard Development
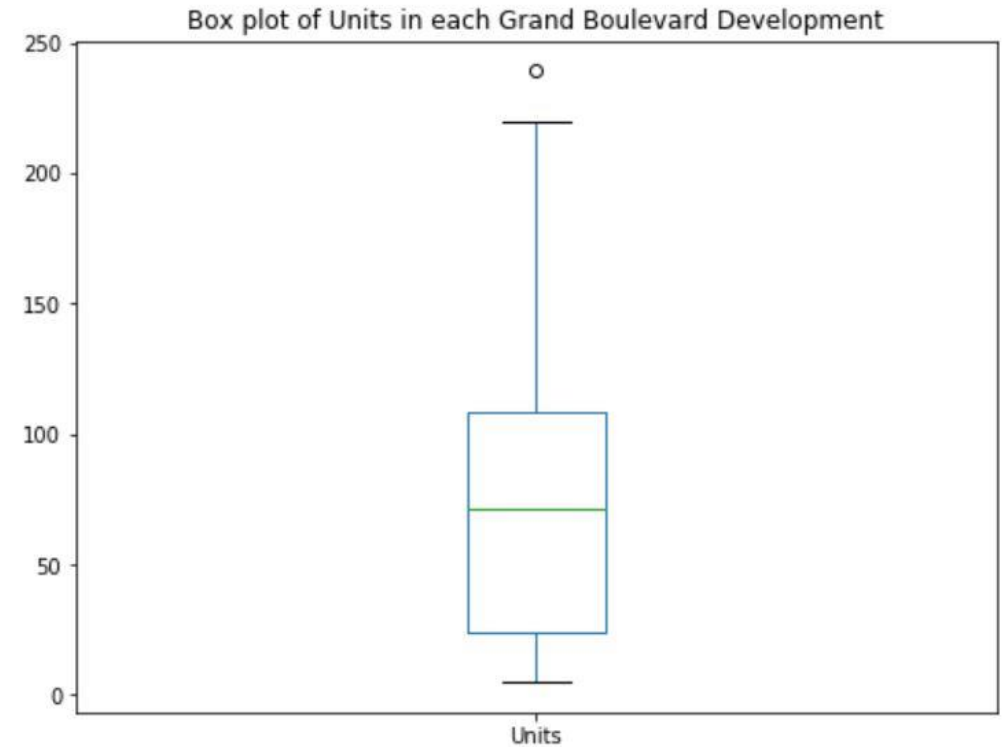
Units

Pick Grand Boulevard since it has the highest units of affordable housing, 2201 compared to mean of 350

Subsequently, only consider properties above the 1st interquartile range of 24 units based on the box plot (ensure that subsequent analysis is significant)

	Property Name	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Bronzeville Family Apts.	Grocery Store	Train Station	Coffee Shop	Clothing Store	Sushi Restaurant
1	Bronzeville Senior Apts.	Park	Grocery Store	Coffee Shop	Gas Station	Discount Store
2	Cornerstone Apts.	Baseball Field	Cosmetics Shop	Bus Station	Stadium	Fountain
3	Evans Langley	Baseball Field	Cosmetics Shop	Bus Station	Stadium	Fountain
4	Geneva Gables	Restaurant	Train Station	Sports Bar	BBQ Joint	Smoke Shop

Identify the top 5 venues per property
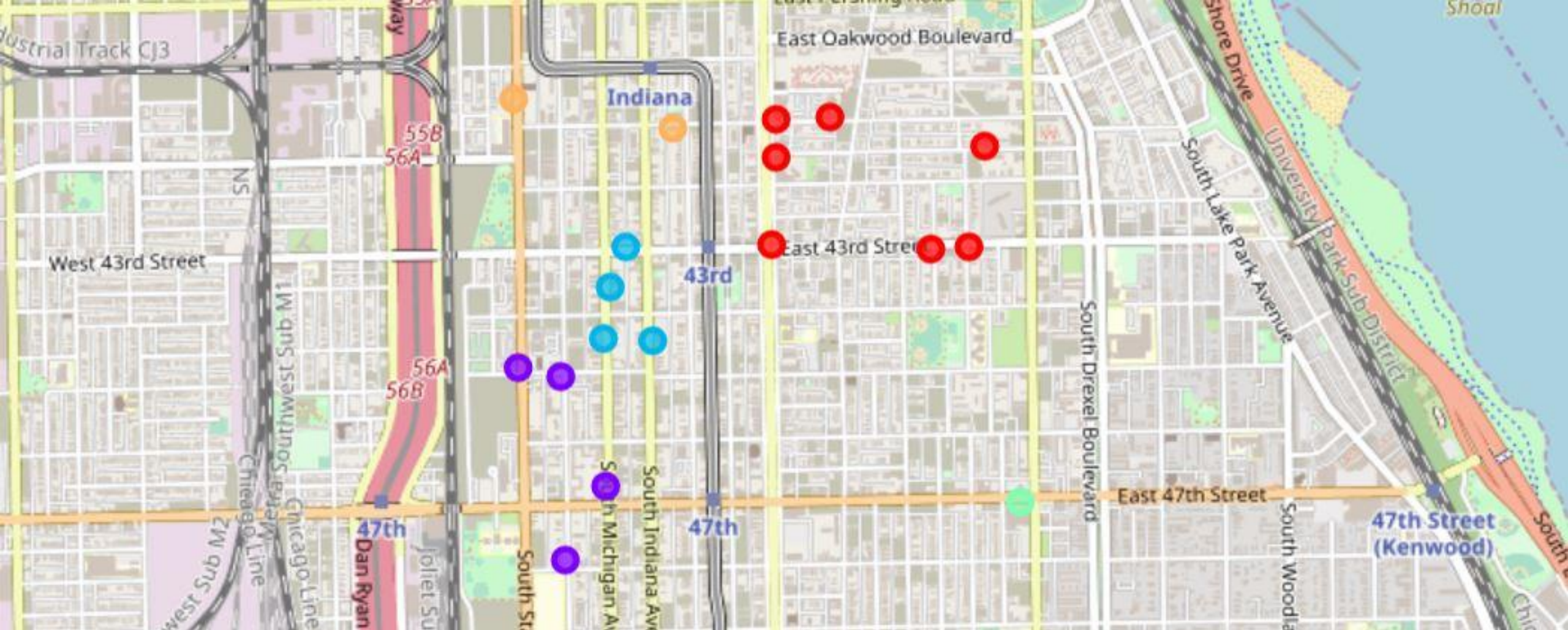
Visualize the 5 Clusters

K-means clustering was used; clustered based on proximity of location and common venues

Results

Cluster 0 – Relaxed Living Cluster

	Property Name	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
5	Bronzeville Senior Apts.	41.820382	-87.614382	0	Park	Grocery Store	Coffee Shop	Gas Station	Discount Store
6	Hearts United II-The Quincy (scattered sites)	41.816666	-87.609060	0	Coffee Shop	Park	BBQ Joint	Bookstore	Playground
9	Hearts United I-The Langston (scattered sites)	41.819576	-87.608483	0	Coffee Shop	Park	Vineyard	Boutique	History Museum
11	Paul G. Stewart Phase III Tower	41.819229	-87.616452	0	Coffee Shop	Restaurant	History Museum	Clothing Store	Sports Bar
12	Park Boulevard Tower/Grand Renaissance Apts.	41.816750	-87.616649	0	Coffee Shop	Clothing Store	Art Gallery	Grocery Store	Sports Bar
15	Hearts United III-The Leontyne (scattered sites)	41.816602	-87.610556	0	Coffee Shop	Park	BBQ Joint	Boutique	Clothing Store
17	Bronzeville Family Apts.	41.820350	-87.616514	0	Grocery Store	Train Station	Coffee Shop	Clothing Store	Sushi Restaurant

This cluster is in the northeast section of Grand Boulevard and all the properties are to the east of (and close to the) 43rd and Indiana subway stations. The most common venue for this cluster is coffee shops followed by parks and grocery stores which support a more relaxed and wholesome lifestyle.

Results

Cluster 1 – Unhealthy Food Cluster

	Property Name	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
3	Legends South - Savoy Square	41.813195	-87.626337	1	Park	BBQ Joint	Fast Food Restaurant	Café	Fried Chicken Joint
7	Progressive Square	41.807699	-87.624560	1	Park	Train Station	Fried Chicken Joint	Liquor Store	Bakery
13	Margaret Ford Manor Independent Living	41.812980	-87.624707	1	Park	BBQ Joint	Fast Food Restaurant	Liquor Store	Bakery
16	Rosenwald Courts Apts.	41.809826	-87.622999	1	American Restaurant	Plaza	Train Station	Liquor Store	Fried Chicken Joint

This cluster is located to the west of Grand Boulevard. The most common venue for this cluster is parks but it is also surrounded by places offering relatively unhealthy food such as fast food, liquor and fried chicken.

Results

Cluster 2 – Tourism Cluster

	Property Name	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Geneva Gables	41.814061	-87.623112	2	Restaurant	Train Station	Sports Bar	BBQ Joint	Smoke Shop
1	Indiana Manor Town Homes	41.813971	-87.621192	2	Restaurant	Art Gallery	Sports Bar	Train Station	BBQ Joint
18	Washington Park SRO	41.803755	-87.621217	2	Restaurant	Sandwich Place	Chinese Restaurant	Convenience Store	Fast Food Restaurant
19	Legends South - Mahalia Place	41.816663	-87.622265	2	Gym	Performing Arts Venue	BBQ Joint	Boutique	Discount Store
20	Legends South - Gwendolyn Place	41.815550	-87.622857	2	Food Truck	Smoke Shop	Park	Bike Rental / Bike Share	Bed & Breakfast

This cluster is located mostly to the west of 43rd station with one location located further south. The most common venue is restaurant and there are attractions such as art galleries and performing arts centres which would attract both local and foreign tourists.

Results

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Cluster 3 – Recreation Cluster

	Property Name	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
2	Cornerstone Apts.	41.803042	-87.607589	3	Baseball Field	Cosmetics Shop	Bus Station	Stadium	Fountain
4	Evans Langley	41.803040	-87.607755	3	Baseball Field	Cosmetics Shop	Bus Station	Stadium	Fountain
10	Shops & Lofts at 47	41.809414	-87.607086	3	Fast Food Restaurant	Convenience Store	Cosmetics Shop	Discount Store	Seafood Restaurant

This cluster is located at the south of Grand Boulevard. The most common venues are related to sports such as baseball fields and stadiums. Make-up is also a prominent feature, with cosmetic shops included as the top 3 venue close to all properties.

Results

Cluster 4 – Town Centre Cluster

	Property Name	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
8	Legends South - Coleman Place	41.820075	-87.620423	4	Southern / Soul Food Restaurant	Flower Shop	BBQ Joint	Convenience Store	Motel
14	Legends South - Hansberry Square	41.820911	-87.626526	4	Motel	Intersection	Train Station	Flower Shop	Southern / Soul Food Restaurant

This cluster is located north of Grand Boulevard and relatively closely to Indiana station. A motel is included as one of the most common locations, along with an intersection and train station, suggesting that this cluster is the hub of the town.

Discussion

- Relaxed Living Cluster 0 is most suitable
  - Coffeeshops and park support social cohesion
  - Grocery store gives residents cheap and convenient access to healthy food (esp. important since residents are poor)
  - Surrounded by affordable and healthy entertainment such as museums and bookshops

- Other locations are not as suitable
  - Surrounded by unhealthy food options
  - Surrounded by shops selling vices (smoke shops)
  - Do not have as many supportive amenities

Limitations

- Data set is not representative of all affordable housing in Chicago

- Many other relevant factors not taken into consideration
  - E.g. crime rate and per capita income
  - E.g. proportion of each racial group in each community area → might worsen racial segregation in Chicago

- Did not consider if there were empty plots of land
  - If chosen area is full, city government would either have to find another site or buy over existing site (not feasible given cost)

Conclusion

Model is able to fulfill its objective of identifying the best possible area to build new affordable housing development

If limitations can be overcome, this tool can be adopted by and relied upon by the city government

THANK YOU