

Finding an Apartment near UIC

Coursera Capstone project

Coursera IBM Data Science Certification

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Report Content

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Introduction

1) **Scenario and Background**

Wanting to pursue a Masters in Computer Science, I applied to a number of colleges in the US. I recently got an admit from the University of Illinois at Chicago for their Masters in Computer Science program. Having finalised the university, I was going to move to Chicago in a few months' time.

2) **Problem to be resolved:**

I wanted to find a suitable apartment to share with a friend. The apartment had to be near the university to cut down on commuting time and also to be safe because Chicago is the crime capital of the US. The criteria for selecting the apartment was as follows:

- i) Minimum 2 bedrooms.
- ii) Near the university (within 3-5 miles)
- iii) Subway station nearby.
- iv) Good venues nearby for relaxation and eating out.
- v) Per person monthly rent not more than \$800.

3) **Interested Audience**

I believe the methodology, tools and strategy used in this project is relevant for a person moving to a new city and has to find a place to live. The use of FourSquare data and mapping techniques combined with data analysis will help resolve the key questions arisen while searching for the place to live.

Data Section

1) Data Requirements

- i) List of apartments for rent in Chicago near the University of Illinois at Chicago. The data was scraped from the apartments.com website.
<https://www.apartments.com/off-campus-housing/il/chicago/university-of-illinois-at-chicago/student-housing/>
- ii) The neighborhood of each apartment is found using the Google Maps Geocoding API.
- iii) List of subway metro stations in Chicago with name and geo locations. The data was sourced from:
<https://data.cityofchicago.org/Transportation/CTA-System-Information-List-of-L-Stops/8pix-ypme/data>
- iv) List of neighborhoods was taken from the apartments data because I needed the venues for the neighborhoods which had an apartment available for rent.
- v) List of top 20 venues for each neighbourhood. The data was sourced using the Foursquare api.

2) Data Processing

- a) The Geo Location of each apartment and Neighborhood was found using google maps geocoding api.
- b) The subway stations data had features which were not of use to us, so they were removed.
- c) Distance of each apartment from UIC was calculated using Google Distance Matrix API.
- d) The Beds column scraped from the website which contains the no of bedrooms was cleaned, so that it can be used for analysis and calculating per room rent.
- e) The per room rent column was added and was calculated as Rent/Bedroom.

3) Data

a) Apartment Listing:

The initial web scrapped data frame:

	Title	Price	Address	Beds
0		\$858		2-4 Bed
1	Landmark West Loop, Chicago, IL	\$1,850	Landmark West Loop, Chicago, IL	Studio - 2 Bed
2	The Van Buren, Chicago, IL	\$2,215	The Van Buren, Chicago, IL	Studio - 2 Bed
3	milieu, Chicago, IL	\$1,977	milieu, Chicago, IL	Studio - 2 Bed
4	the Duncan, Chicago, IL	\$1,146	the Duncan, Chicago, IL	Studio - 1 Bed

The final apartment listing data frame:

	Title	Price	Address	Beds	Neighborhood	Latitude	Longitude	Distance from UIC	Price per bed
0	Common Addams	858.0	1407 W 15th St, Chicago, IL 60608	2.0	Little Italy	41.861494	-87.661816	1.242	429
1	Landmark West Loop, Chicago, IL	1850.0	1035 W Van Buren St, Chicago, IL 60607	1.0	West Loop	41.876311	-87.654182	0.527	1850
2	The Van Buren, Chicago, IL	2215.0	808 W Van Buren St, Chicago, IL 60607	1.0	West Loop	41.876896	-87.647523	0.320	2215
3	milieu, Chicago, IL	1977.0	205 S Peoria, Chicago, IL 60607	1.0	West Loop	41.878992	-87.649431	0.749	1977
4	the Duncan, Chicago, IL	1146.0	1515 W Monroe St, Chicago, IL 60607	1.0	West Loop	41.879794	-87.665430	1.388	1146

The price column indicates the rent per month.

The Beds column is the number of bedrooms in the property.

b) Subway Station data:

	Neighborhood	Latitude	Longitude
0	Little Italy, Chicago	41.8695	-87.6511
1	West Loop, Chicago	41.8854	-87.6627
2	Chicago Loop, Chicago	41.8786	-87.6251
3	West Town, Chicago	41.8936	-87.6722
4	River North, Chicago	41.8924	-87.6341

c) Neighbourhood data:

	STATION_NAME	Latitude	Longitude
0	18th	41.857908	-87.669147
1	35th/Archer	41.829353	-87.680622
2	35th-Bronzeville-IIT	41.831677	-87.625826
3	43rd	41.816462	-87.619021
4	47th	41.809209	-87.618826
5	47th	41.810318	-87.63094
6	51st	41.80209	-87.618487
7	54th/Cermak	41.85177331	-87.75669201
8	63rd	41.780536	-87.630952
9	69th	41.768367	-87.625724
10	79th	41.750419	-87.625112

d) **Neighbourhood venues:**

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Little Italy, Chicago	41.86954	-87.651133	Tuscany	41.869631	-87.651807	Italian Restaurant
1	Little Italy, Chicago	41.86954	-87.651133	Mario's Italian Lemonade	41.869529	-87.653783	Dessert Shop
2	Little Italy, Chicago	41.86954	-87.651133	Fontano's Subs	41.871888	-87.653545	Sandwich Place
3	Little Italy, Chicago	41.86954	-87.651133	Al's Italian Beef	41.869365	-87.653964	Sandwich Place
4	Little Italy, Chicago	41.86954	-87.651133	UIC - Student Recreation Facility	41.872566	-87.646604	College Gym

Methodology

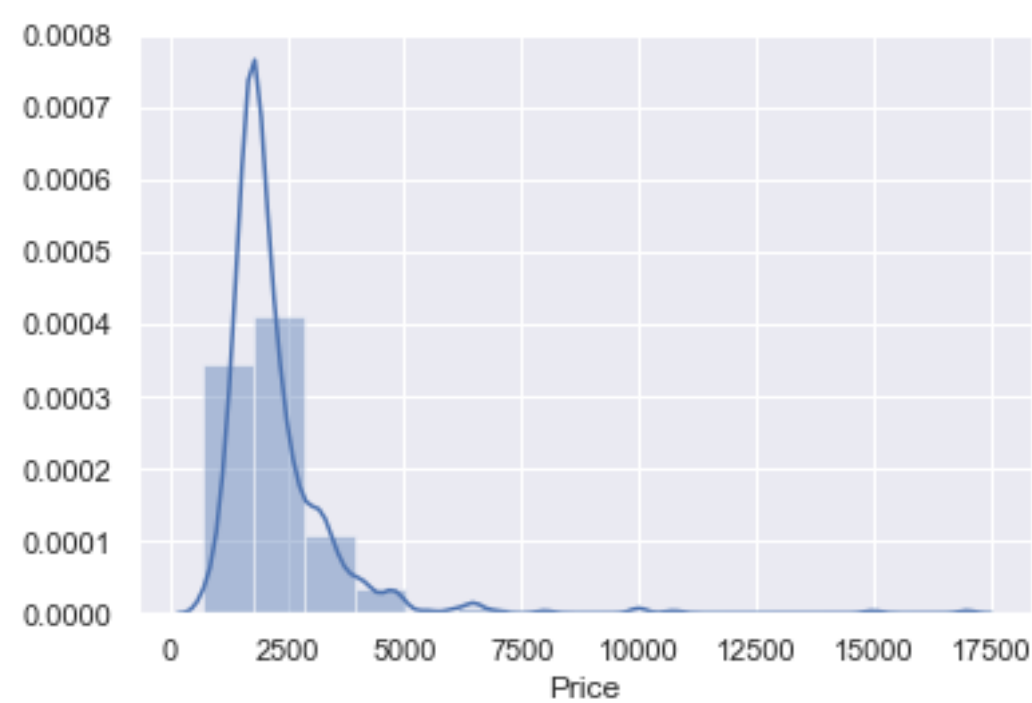
The main strategy to find the answer was based on analysing and mapping the data, in order to facilitate the choice of at least two candidate places for rent. The information was consolidated in one map where one could see the details of the apartment, the cluster of neighbourhoods and the relative location from a subway station and from the university. A measurement tool icon was also provided. The popups on the map items will display the details of the apartment, neighbourhood and subway station, a permanent marker on the university. Visualisation greatly helps in making the decision as all the details could be seen.

The Tools:

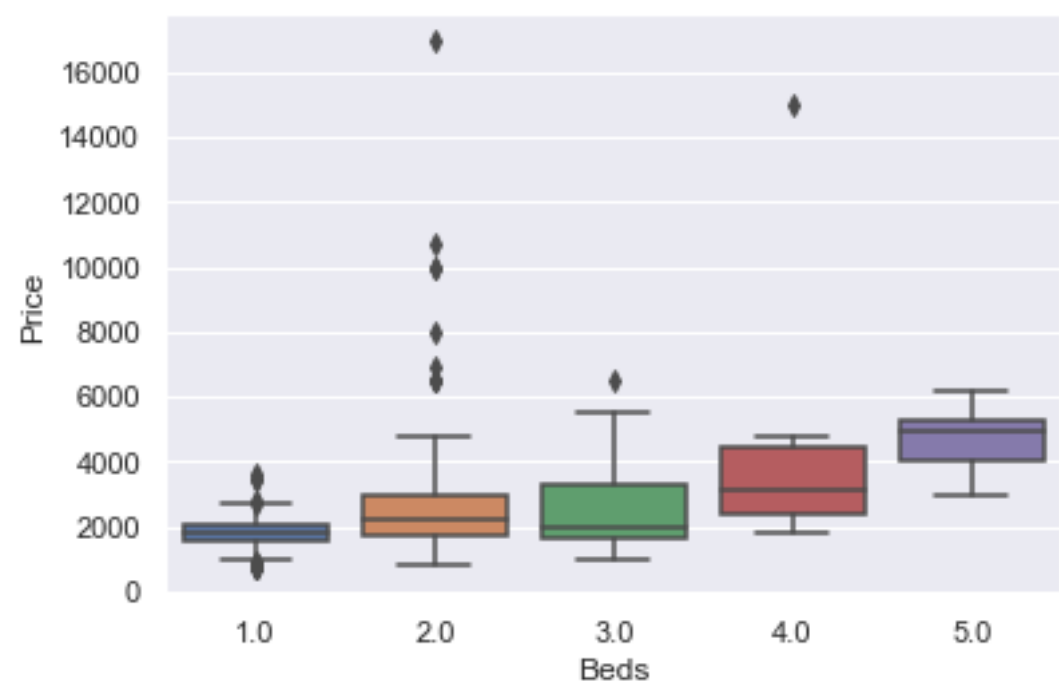
- The properties available for rent were web scraped using beautiful soup in a different notebook and the csv file was saved for easy use.
- Google Maps Geocoding API was used to get the geo location of each apartment and neighbourhood.
- Google Maps Distance Matrix API was used to get the distance of the apartment from the university.
- Seaborn graphic was used for general statistics on rental data.
- Maps were plotted using Folium with popups labels which allowed quick identification of location, rent and feature, thus making the selection very easy.

Analysis and Plotting

Rental Price Statistics

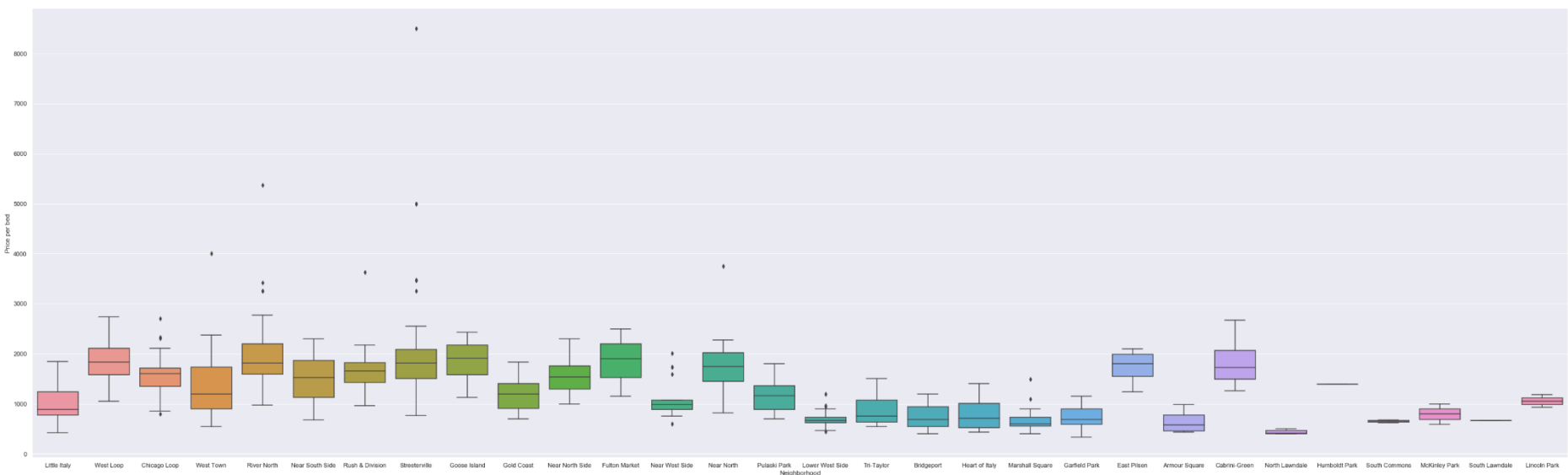


Distribution plot of price (rent)



Box plot of price vs beds

Box Plot of neighbourhoods vs rent



Average rent of property in each neighbourhood:

```
In [19]: Chicago_rental.groupby('Neighborhood')['Price'].mean()
```

```
Out[19]: Neighborhood
Armour Square      1518.750000
Bridgeport         1323.076923
Cabrini-Green      3210.666667
Chicago Loop       2044.797872
East Pilsen        3468.750000
Fulton Market      2232.000000
Garfield Park      1517.230769
Gold Coast         1641.666667
Goose Island       3196.545455
Heart of Italy     1525.000000
Humboldt Park      1395.000000
Lincoln Park       3300.000000
Little Italy       2148.000000
Lower West Side    1678.590909
Marshall Square    1442.368421
McKinley Park      1087.500000
Near North         2573.823529
Near North Side    2690.409091
```

Average rent of property in Chicago, near UIC:

Finding mean rent of an apartment in Chicago

```
In [20]: Chicago_rental['Price'].mean()
```

```
Out[20]: 2261.171171171171
```

Neighbourhood Venues Analysis

Number of Venues returned for each neighbourhood:

In [87]: Chicago_venues.groupby('Neighborhood').count()

Neighborhood						
Armour Square, Chicago	100	100	100	100	100	100
Bridgeport, Chicago	100	100	100	100	100	100
Cabrini-Green, Chicago	100	100	100	100	100	100
Chicago Loop, Chicago	100	100	100	100	100	100
East Pilsen, Chicago	100	100	100	100	100	100
Fulton Market, Chicago	100	100	100	100	100	100
Garfield Park, Chicago	53	53	53	53	53	53
Gold Coast, Chicago	100	100	100	100	100	100
Goose Island, Chicago	100	100	100	100	100	100
Heart of Italy, Chicago	93	93	93	93	93	93
Humboldt Park, Chicago	60	60	60	60	60	60
Lincoln Park, Chicago	100	100	100	100	100	100

Unique categories from all the returned venues:

Let's find out how many unique categories can be curated from all the returned venues

In [88]: print('There are {} uniques categories.'.format(len(Chicago_venues['Venue Category'].unique())))

There are 263 uniques categories.

Grouping rows by neighbourhood and by taking the mean of the frequency of occurrence of each category:

In [91]: Chicago_grouped = Chicago_onehot.groupby('Neighborhood').mean().reset_index()

Chicago_grouped

Out[91]:

	Neighborhood	African Restaurant	American Restaurant	Amphitheater	Animal Shelter	Aquarium	Argentinian Restaurant	Art Gallery	Art Museum	Arts & Crafts Store	Arts & Entertainment	Asian Restaurant	Athletics & Sports
0	Armour Square, Chicago	0.000000	0.000000	0.00	0.00	0.00	0.00	0.010000	0.00	0.000000	0.00	0.02	0.000000
1	Bridgeport, Chicago	0.000000	0.010000	0.00	0.00	0.00	0.00	0.050000	0.00	0.000000	0.00	0.00	0.000000
2	Cabrini-Green, Chicago	0.000000	0.010000	0.00	0.00	0.00	0.00	0.000000	0.00	0.000000	0.00	0.00	0.000000
3	Chicago Loop, Chicago	0.000000	0.020000	0.01	0.00	0.00	0.00	0.000000	0.01	0.020000	0.00	0.00	0.000000
4	East Pilsen, Chicago	0.000000	0.000000	0.00	0.00	0.00	0.00	0.020000	0.00	0.000000	0.00	0.03	0.000000
5	Fulton Market, Chicago	0.000000	0.000000	0.00	0.00	0.00	0.00	0.010000	0.00	0.000000	0.00	0.00	0.000000

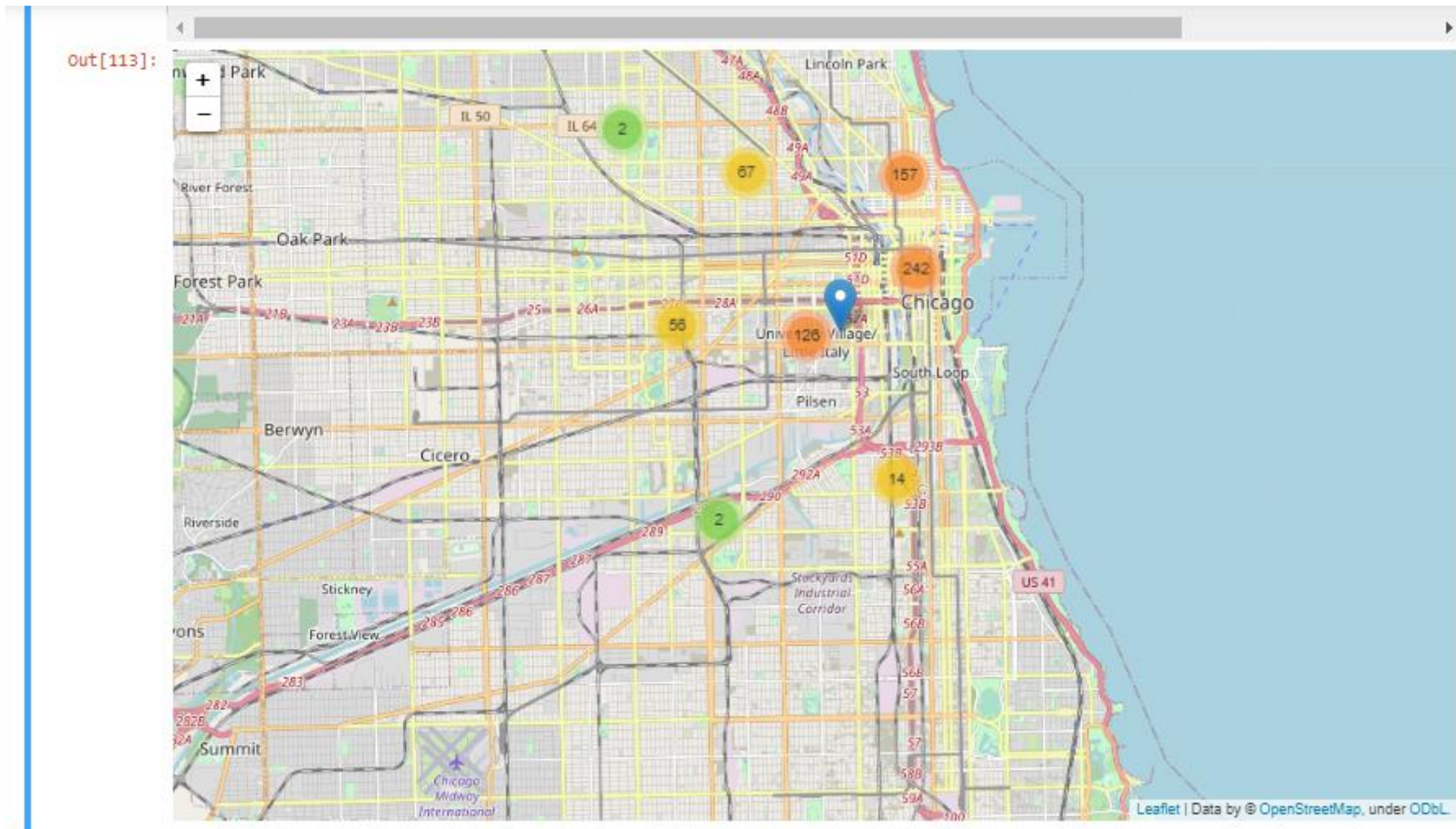
Each neighbourhood along with the top 20 most common venues:

Out[96]:

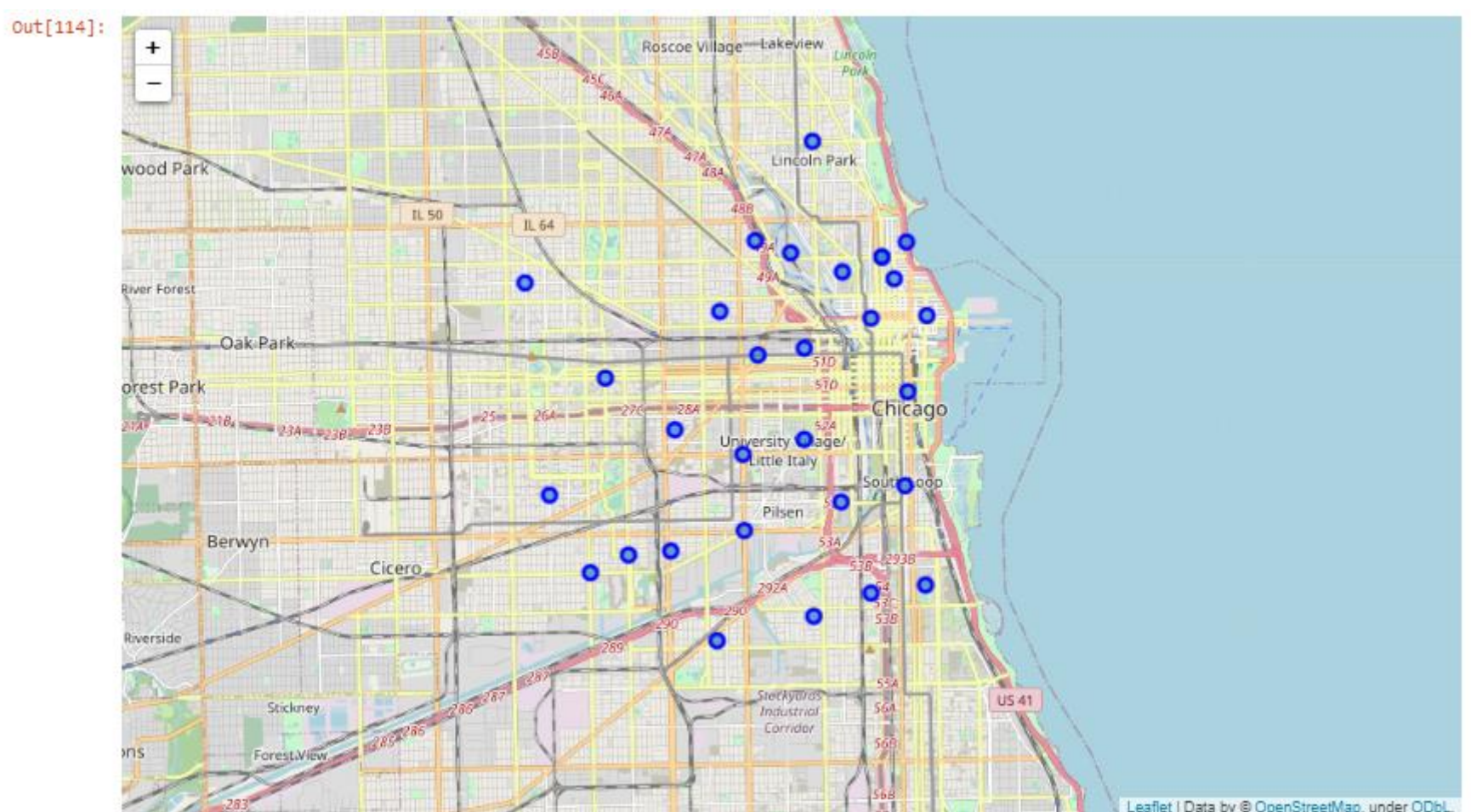
	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue	11th Most Common Venue	12th Most Common Venue	13th Most Common Venue
0	Armour Square, Chicago	Chinese Restaurant	Bar	Pizza Place	Bakery	Mexican Restaurant	Hot Dog Joint	Sandwich Place	Coffee Shop	Korean Restaurant	Park	Wings Joint	Asian Restaurant	Re
1	Bridgeport, Chicago	Bar	Pizza Place	Mexican Restaurant	Hot Dog Joint	Art Gallery	Sandwich Place	Chinese Restaurant	Grocery Store	Bakery	Food Truck	Lounge	Park	I
2	Cabrini-Green, Chicago	Coffee Shop	Gym	Steakhouse	Hotel	Gym / Fitness Center	Italian Restaurant	Café	Grocery Store	Pizza Place	Burger Joint	Restaurant	New American Restaurant	
3	Chicago Loop, Chicago	Hotel	Park	Pizza Place	Burger Joint	Steakhouse	Coffee Shop	Theater	Italian Restaurant	Music Venue	Pub	Vegetarian / Vegan Restaurant	Portuguese Restaurant	A Re
4	East Pilsen, Chicago	Chinese Restaurant	Park	Yoga Studio	Vietnamese Restaurant	Asian Restaurant	Bar	Dessert Shop	Grocery Store	Mexican Restaurant	Hot Dog Joint	Sandwich Place	New American Restaurant	Ice

Plotting our Data

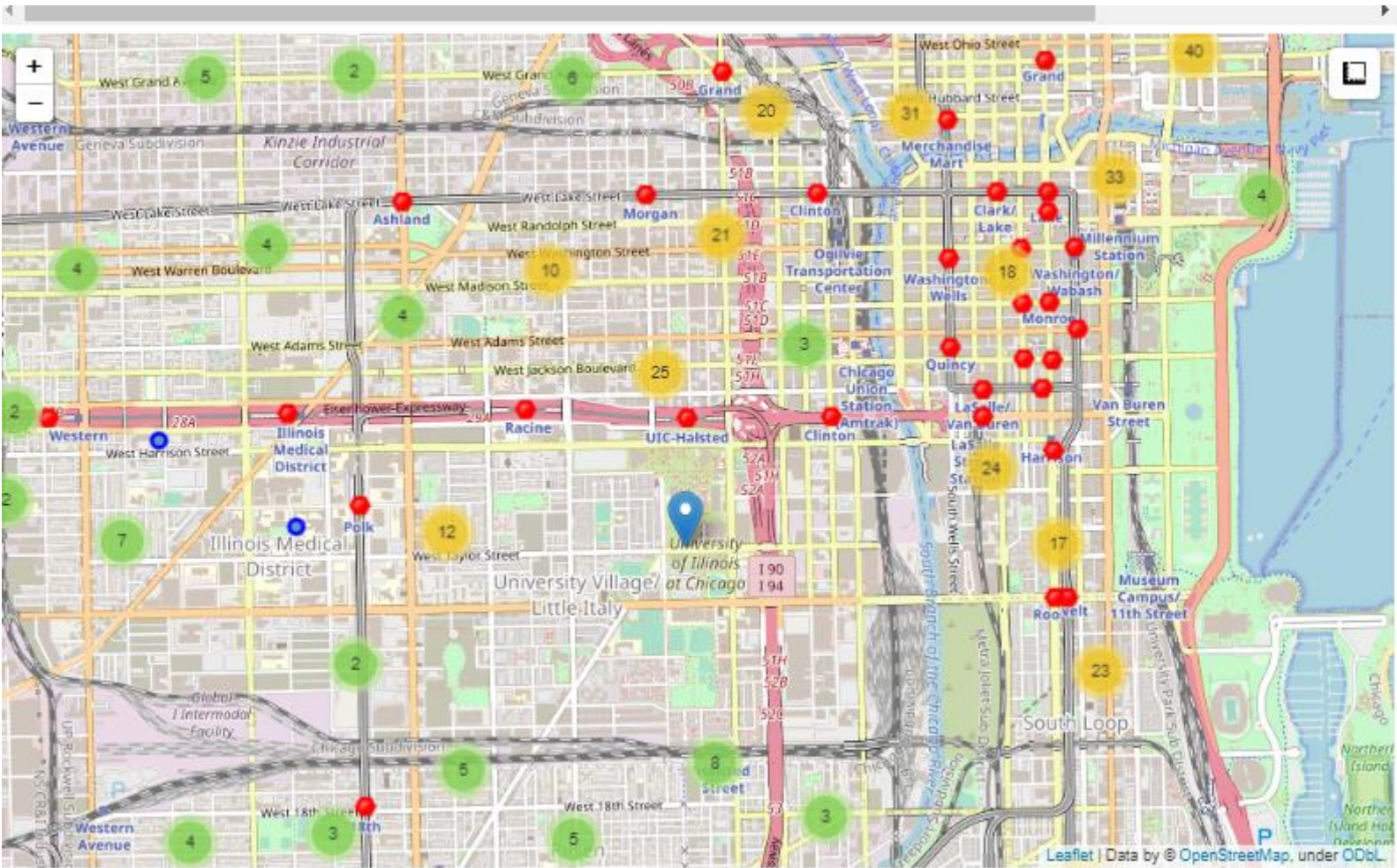
Map of Chicago with all the properties superimposed on top with popup showing details and a marker which points to UIC:



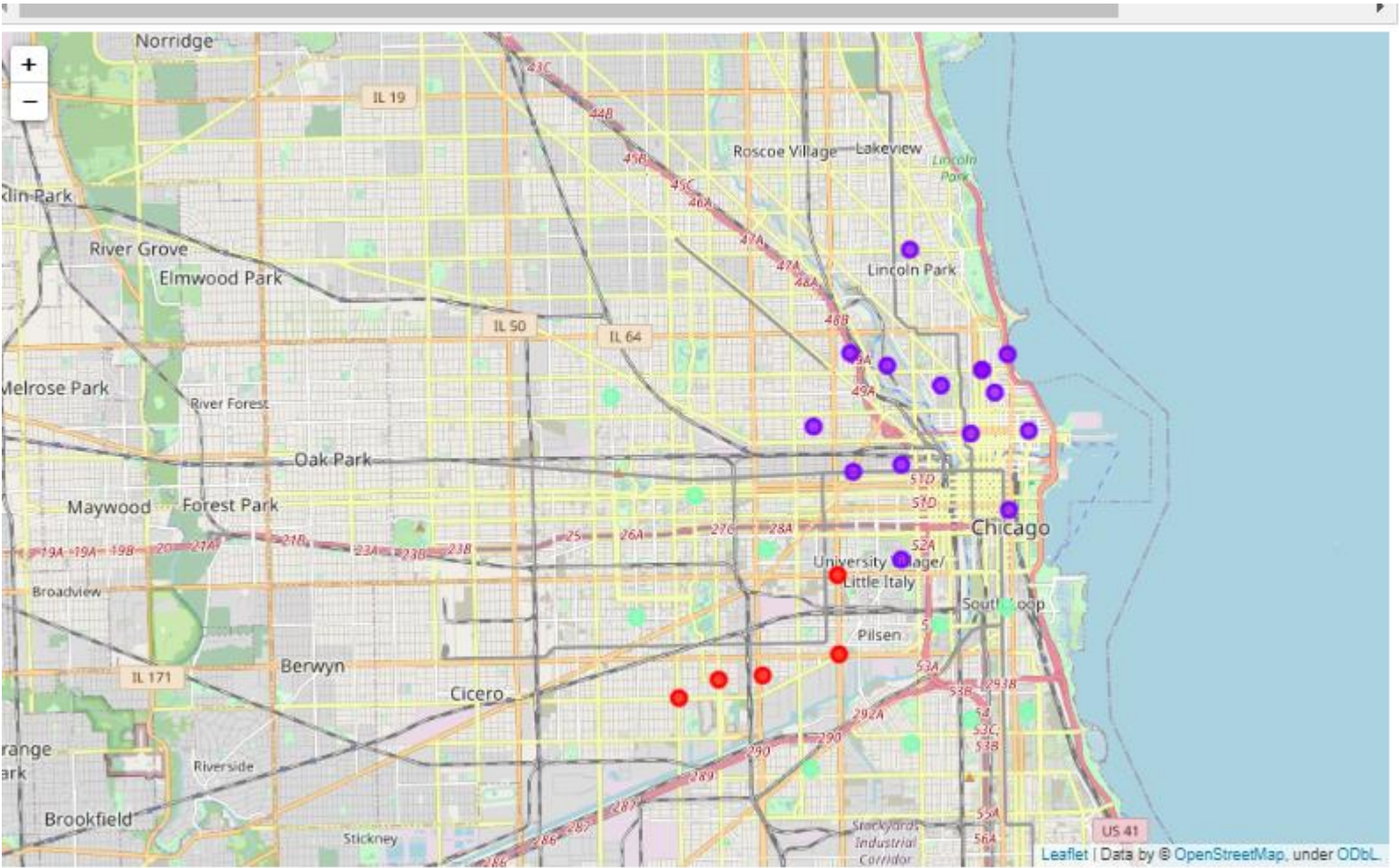
Map of Chicago with neighbourhoods superimposed on top with popup showing details:



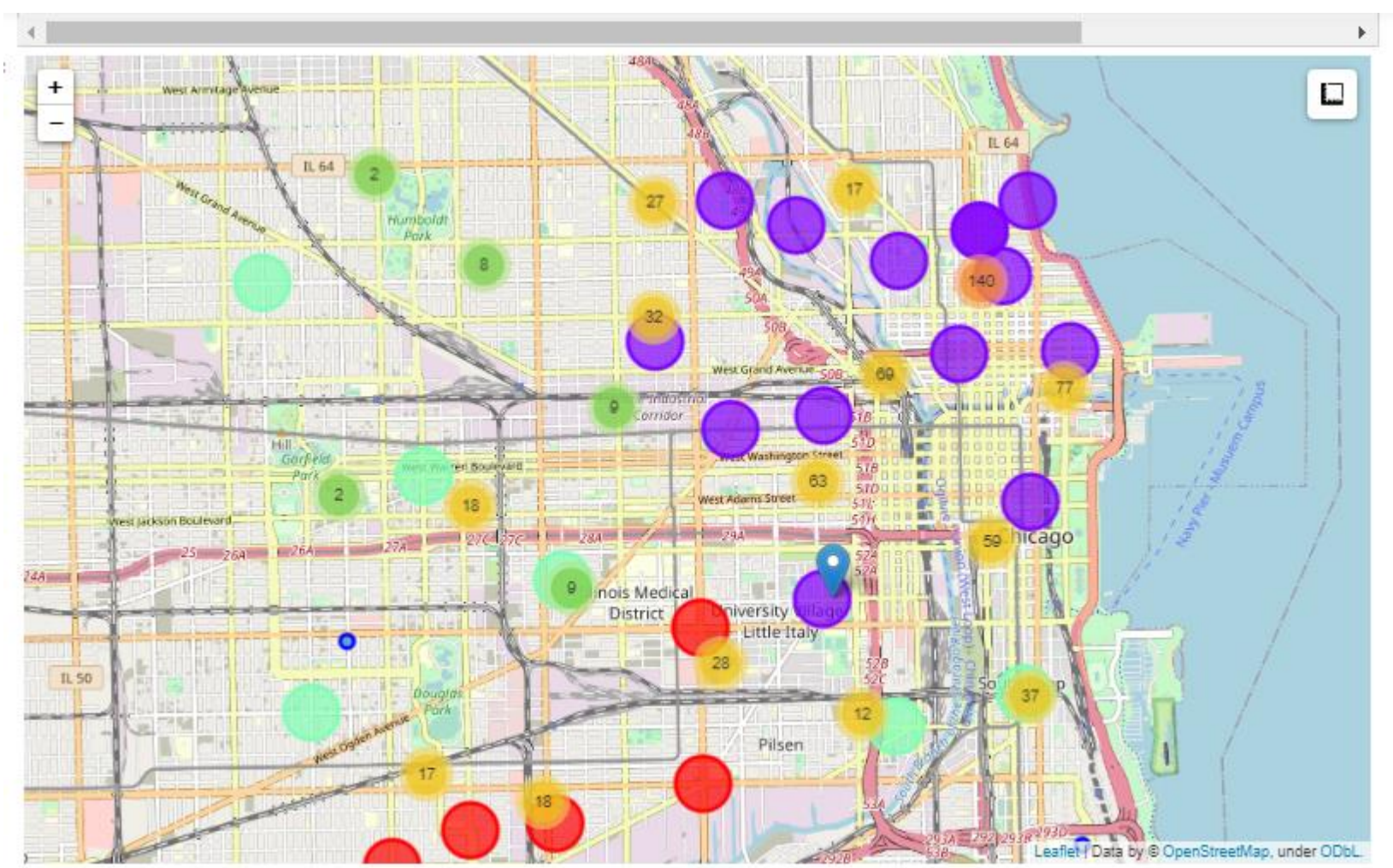
Plotting map of Chicago with properties and subway stations superimposed on top (properties in blue and subway stations in red):



Neighbourhood clusters:



Neighbourhood Clusters along with properties.

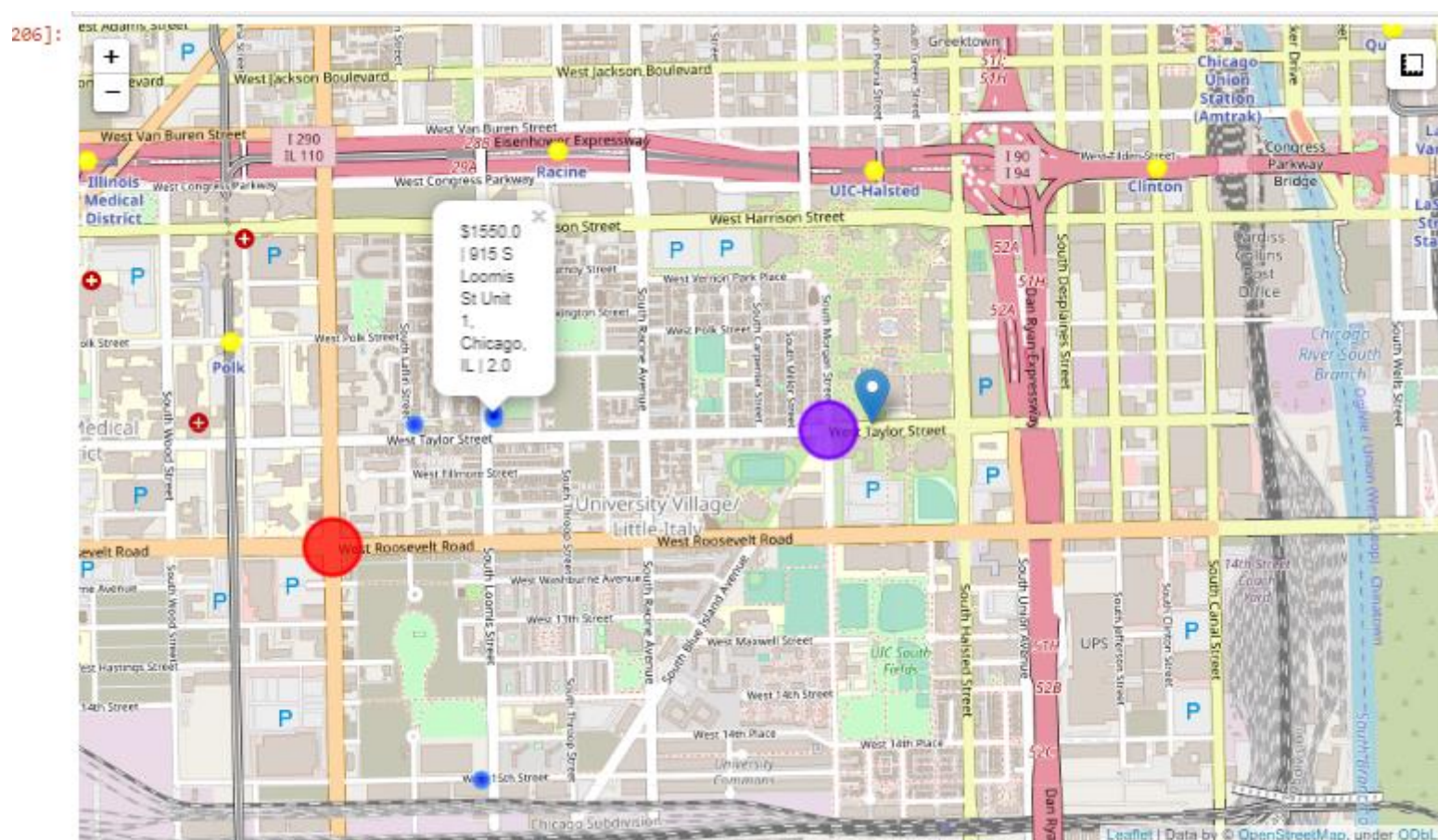


Results and Discussion

Apartment Selection

The one consolidated map shows all information for decision: Apartments address, price, neighbourhood, cluster of neighbourhoods and subway station nearby.

Blue dots= apartments, Red dots=Subway station, Bubbles=Cluster of Neighbourhoods



My analysis found out that out of all the 666 places available for rent, 15 properties fit my criteria of rent price and distance from campus. Having plotted all our data on the folium map with measurement tool, I was able to shortlist 3 properties.

Property 1: 915 S Loomis St Unit 1, with 2 bedrooms in the Little Italy Neighbourhood and near Polk subway station which is around 600 m and around 800 m from UIC, with monthly rent 1550 Dollars

Property 2: 1508 W 17th St Unit R2, with 2 bedrooms in the Lower West Side Neighbourhood and near 18th Subway station which is around 300m and around 1.6 km from UIC, with monthly rent 1300 dollars

Property 3: Common Addams, with 2 bedrooms in the Little Italy Neighbourhood and near 18th Subway station which is around 600m and around 1.2 km from UIC, with monthly rent 858 dollars.

Based on the venues in the neighbourhood, I feel that Little Italy neighbourhood is better suited as it has a good mixture of restaurants, cafes, coffee shops, grocery stores and gym. That means that Property 1 and Property 3 are a better choice since both of them are really close to the university as well as subway stations. I will go for property 1 as it is at walkable distance from the university and subway station.

Conclusion

Purpose of this project was to identify suitable properties available for rent in Chicago around University of Illinois, Chicago with 2 bedroom and rent per month under 800\$ per person. By analysing the data, I first shortlisted all the properties that fit the conditions and then by getting the top venues around each neighbourhood from Foursquare data I was able to select the apartment which was at walkable distance from University and subway station with the kind of venues in the neighbourhood that I would prefer.