

Finding safe neighborhoods In Chicago,IL

Introduction:

A Friend of mine recently was offered a job at Chicago,IL. The following questions will be addressed to aid them to find a safe and fun place to call home.

- Can we find the Neighborhoods where the Crime rates are low?.
- Can we find the safest schools in the Neighborhood?
- Can we find the Neighborhoods packed with venues like Parks, Restaurants, etc..?

Data Sources

- [Crimes data](#) From Kaggle - to check whether any major crimes committed in the neighborhoods which involved arrest.
- [Chicago Public Schools Report](#) - to find the Highest safety score schools in the neighborhood.
- **Folium** is used for visualization of the neighborhoods.
- **Foursquare API** is used get the venue details around the neighborhoods.

List of neighborhoods with the Safest schools.

Neighborhood_NUMBER	Neighborhood	NAME_OF_SCHOOL	Latitude	Longitude
7	LINCOLN PARK	Abraham Lincoln Elementary School	41.924497	-87.644522
5	NORTH CENTER	Alexander Graham Bell Elementary School	41.949528	-87.686055
74	MOUNT GREENWOOD	Annie Keller Elementary Gifted Magnet School	41.697198	-87.697264
6	LAKE VIEW	Augustus H Burley Elementary School	41.937965	-87.669852
50	PULLMAN	Edgar Allan Poe Elementary Classical School	41.702620	-87.606456
12	FOREST GLEN	Edgebrook Elementary School	41.999460	-87.761821
24	WEST TOWN	Ellen Mitchell Elementary School	41.892055	-87.683179
44	CHATHAM	James E McDade Elementary Classical School	41.734514	-87.619177

The **Chicago Public School Report** dataset was used to find the Highest Safety Score schools in the neighborhood. The table shows the neighborhood and its safest schools with their geospatial coordinates.

List of neighborhoods with No arrest involved

Neighborhood_NUMBER	Arrest	Latitude	Longitude
67	False	41.763181	-87.657709
74	False	41.689079	-87.696064
71	False	41.740521	-87.647391
25	False	41.875684	-87.760479
5	False	41.939625	-87.673996

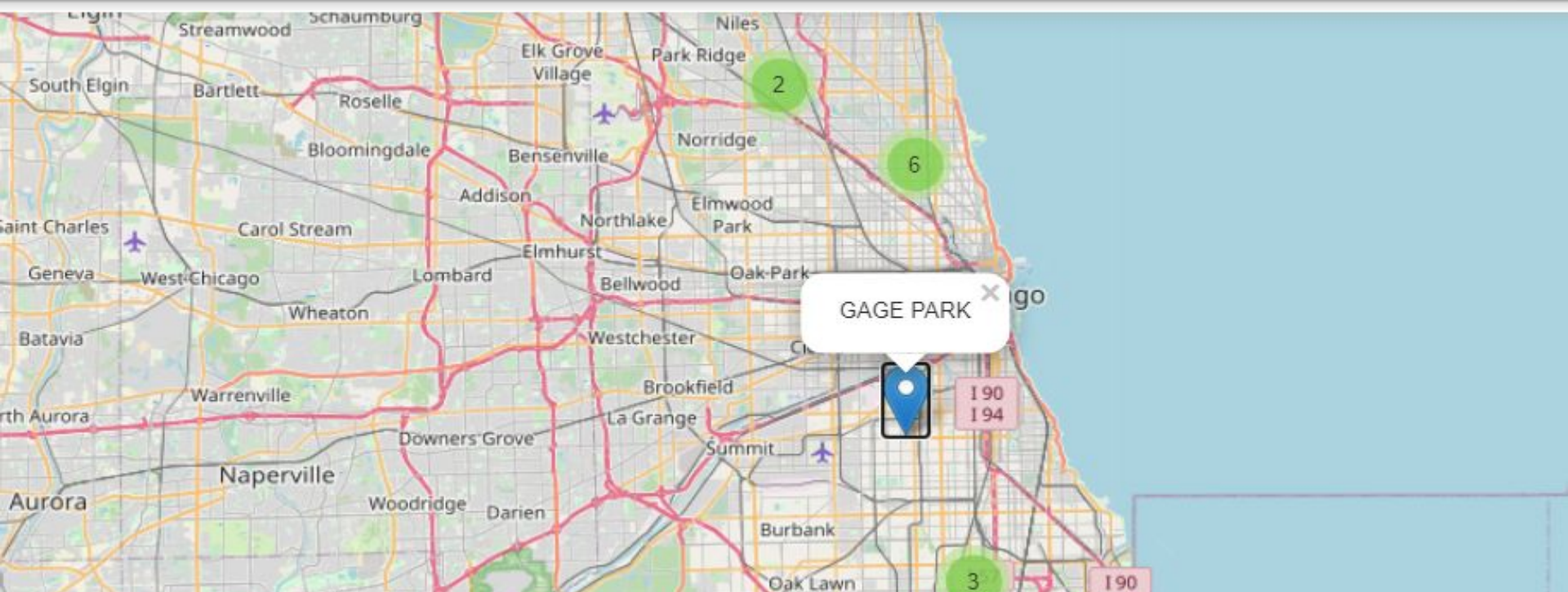
The **Crimes** dataset was used to find the neighborhoods where there were no major crimes involved i.e Arrest value is False. The table shows the neighborhoods, arrest information and their Geospatial coordinates.

Safe neighborhoods and schools

Neighborhood	NAME_OF_SCHOOL	Latitude	Longitude
LINCOLN PARK	Abraham Lincoln Elementary School	41.924497	-87.644522
NORTH CENTER	Alexander Graham Bell Elementary School	41.949528	-87.686055
MOUNT GREENWOOD	Annie Keller Elementary Gifted Magnet School	41.697198	-87.697264
LAKE VIEW	Augustus H Burley Elementary School	41.937965	-87.669852
PULLMAN	Edgar Allan Poe Elementary Classical School	41.702620	-87.606456
FOREST GLEN	Edgebrook Elementary School	41.999460	-87.761821
WEST TOWN	Ellen Mitchell Elementary School	41.892055	-87.683179
CHATHAM	James E McDade Elementary Classical School	41.734514	-87.619177
NORTH PARK	Northside College Preparatory High School	41.981352	-87.708672
NORWOOD PARK	Norwood Park Elementary School	41.988181	-87.802992
WEST RIDGE	Stephen Decatur Classical Elementary School	42.009307	-87.704655
GAGE PARK	Talman Elementary School	41.794074	-87.690298

The **Crimes** dataset and **Chicago Public Schools** dataset were merged to create this table which shows the safe neighborhoods with their schools and their corresponding Geospatial coordinates.

Using Folium to visualize the neighborhoods



Using Foursquare API to get the venues

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
CHATHAM	Fast Food Restaurant	Discount Store	Intersection	Restaurant	Train Station	Food	Gas Station	Gastropub	Gift Shop	Donut Shop
FOREST GLEN	Sandwich Place	American Restaurant	Bus Station	Ice Cream Shop	Grocery Store	Gas Station	Mexican Restaurant	Optical Shop	Park	Diner
GAGE PARK	Mexican Restaurant	Convenience Store	Park	Asian Restaurant	Sandwich Place	Currency Exchange	Yoga Studio	Gas Station	Furniture / Home Store	Fried Chicken Joint
LAKE VIEW	Gym / Fitness Center	Salon / Barbershop	Pizza Place	Bar	Gym	Furniture / Home Store	Massage Studio	Restaurant	Thrift / Vintage Store	Yoga Studio
LINCOLN PARK	Bar	Coffee Shop	Sushi Restaurant	Sandwich Place	Italian Restaurant	Thai Restaurant	Pizza Place	Gym	Burger Joint	Café
MOUNT GREENWOOD	Park	Intersection	Gourmet Shop	Home Service	Eastern European Restaurant	Falafel Restaurant	Fast Food Restaurant	Flower Shop	Food	Food Truck
NORTH CENTER	Pizza Place	Bus Station	Sandwich Place	Pub	Fast Food	Mexican	Cosmetics	Convenience	Mediterranean	Coffee Shop

Foursquare API was used to get the venue details around each

KMeans Clustering

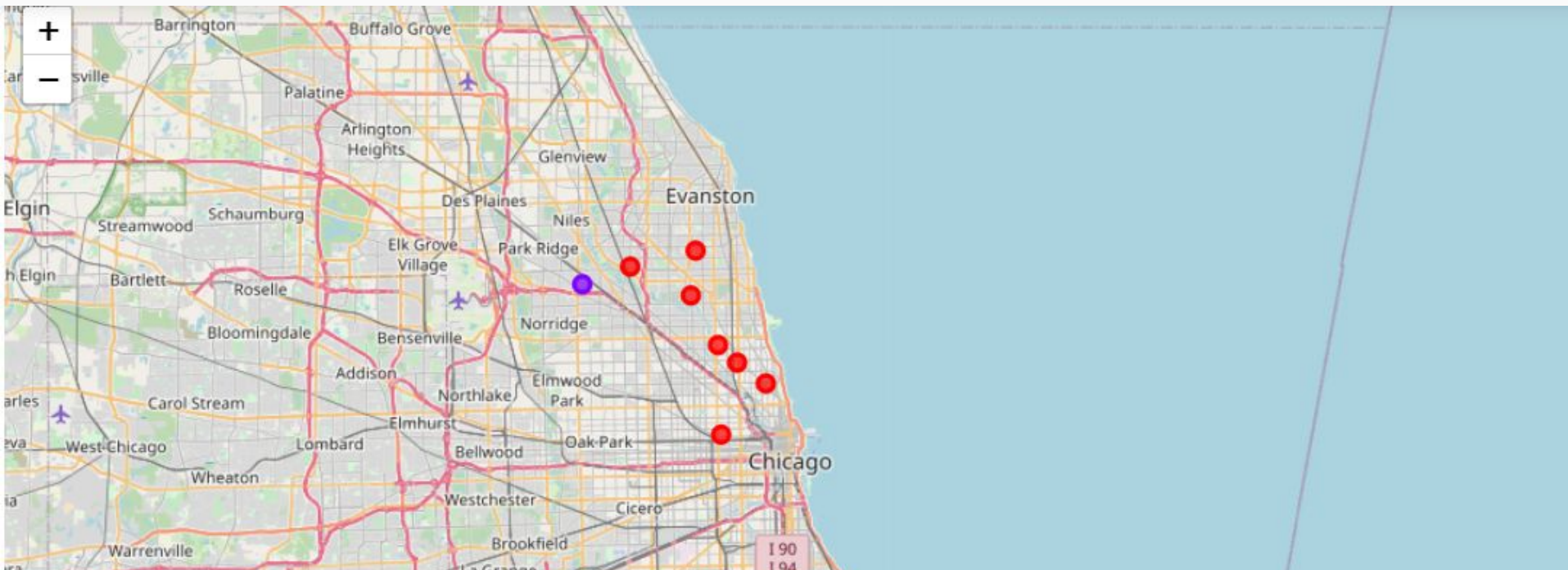
KMeans can arrange data only unsupervised, and can group data based on their similarities. Therefore **KMeans** is a perfect fit for this project to cluster the neighborhoods based on their similarities. I found **3** is the optimal number of clusters that the **KMeans** algorithm can create based on the **WCSS(Within Cluster Sum Of Square)** measure or in other words the **Elbow Method**.

Result of KMeans algorithm

Neighborhood	NAME_OF_SCHOOL	Latitude	Longitude	Cluster Labels	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
LINCOLN PARK	Abraham Lincoln Elementary School	41.924497	-87.644522	0	Bar	Coffee Shop	Sushi Restaurant	Sandwich Place	Italian Restaurant	Thai Restaurant	Pizza Place
NORTH CENTER	Alexander Graham Bell Elementary School	41.949528	-87.686055	0	Pizza Place	Bus Station	Sandwich Place	Pub	Fast Food Restaurant	Mexican Restaurant	Cosmetics Shop
MOUNT GREENWOOD	Annie Keller Elementary Gifted Magnet School	41.697198	-87.697264	1	Park	Intersection	Gourmet Shop	Home Service	Eastern European Restaurant	Falafel Restaurant	Fast Food Restaurant
LAKE VIEW	Augustus H Burley Elementary School	41.937965	-87.669852	0	Gym / Fitness Center	Salon / Barbershop	Pizza Place	Bar	Gym	Furniture / Home Store	Massage Studio
PULLMAN	Edgar Allan Poe Elementary Classical School	41.702620	-87.606456	2	History Museum	Food	Yoga Studio	Gourmet Shop	Donut Shop	Eastern European Restaurant	Falafel Restaurant
FOREST GLEN	Edgebrook Elementary School	41.999460	-87.761821	0	Sandwich	American	Ice Cream	Grocery	Gas	Mexican	

The table shows the Cluster labels that the **KMeans**

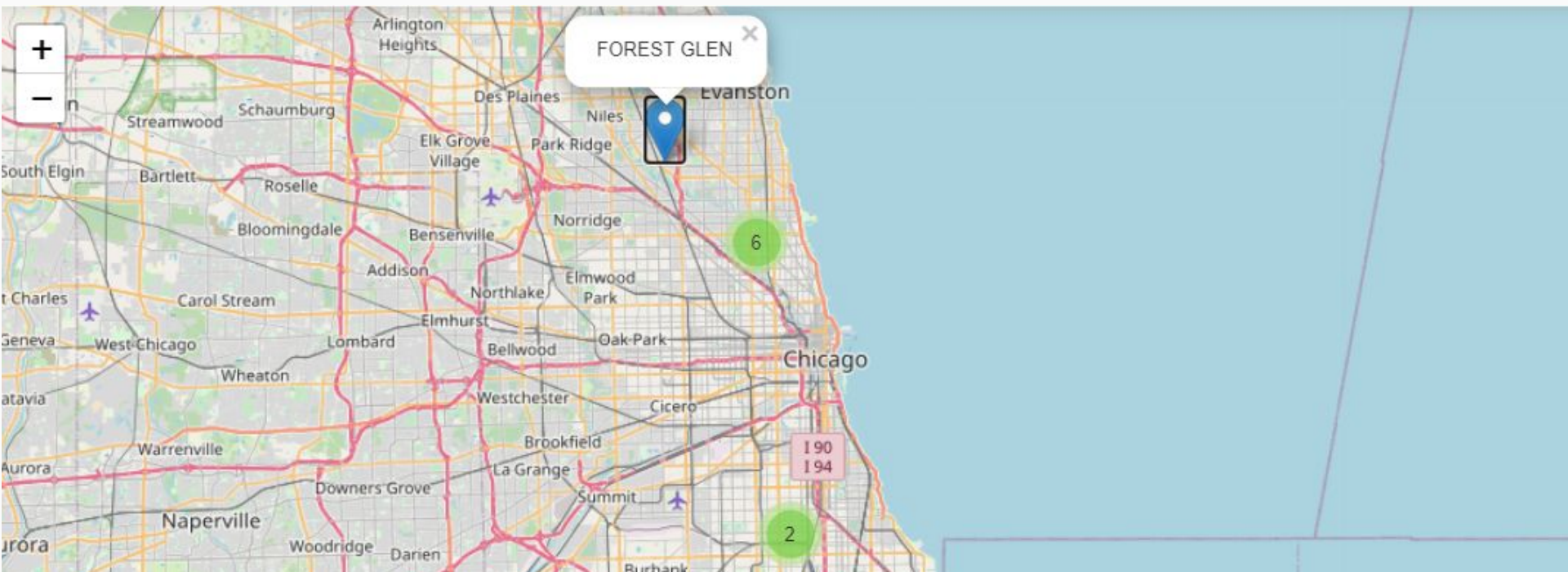
Using Folium to view the KMeans algorithm Model



List of Cluster 1 Neighborhoods

Neighborhood	NAME_OF_SCHOOL	Latitude	Longitude	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
LINCOLN PARK	Abraham Lincoln Elementary School	41.924497	-87.644522	Bar	Coffee Shop	Sushi Restaurant	Sandwich Place	Italian Restaurant	Thai Restaurant	Pizza Place	Gym
NORTH CENTER	Alexander Graham Bell Elementary School	41.949528	-87.686055	Pizza Place	Bus Station	Sandwich Place	Pub	Fast Food Restaurant	Mexican Restaurant	Cosmetics Shop	Convenience Store
LAKE VIEW	Augustus H Burley Elementary School	41.937965	-87.669852	Gym / Fitness Center	Salon / Barbershop	Pizza Place	Bar	Gym	Furniture / Home Store	Massage Studio	Restaurant
FOREST GLEN	Edgebrook Elementary School	41.999460	-87.761821	Sandwich Place	American Restaurant	Bus Station	Ice Cream Shop	Grocery Store	Gas Station	Mexican Restaurant	Optical Shop
WEST TOWN	Ellen Mitchell Elementary School	41.892055	-87.683179	Pub	Art Museum	Pizza Place	Yoga Studio	Flower Shop	Liquor Store	Hot Dog Joint	Grocery Store
CHATHAM	James E McDade Elementary Classical School	41.734514	-87.619177	Fast Food Restaurant	Discount Store	Intersection	Restaurant	Train Station	Food	Gas Station	Gastropub

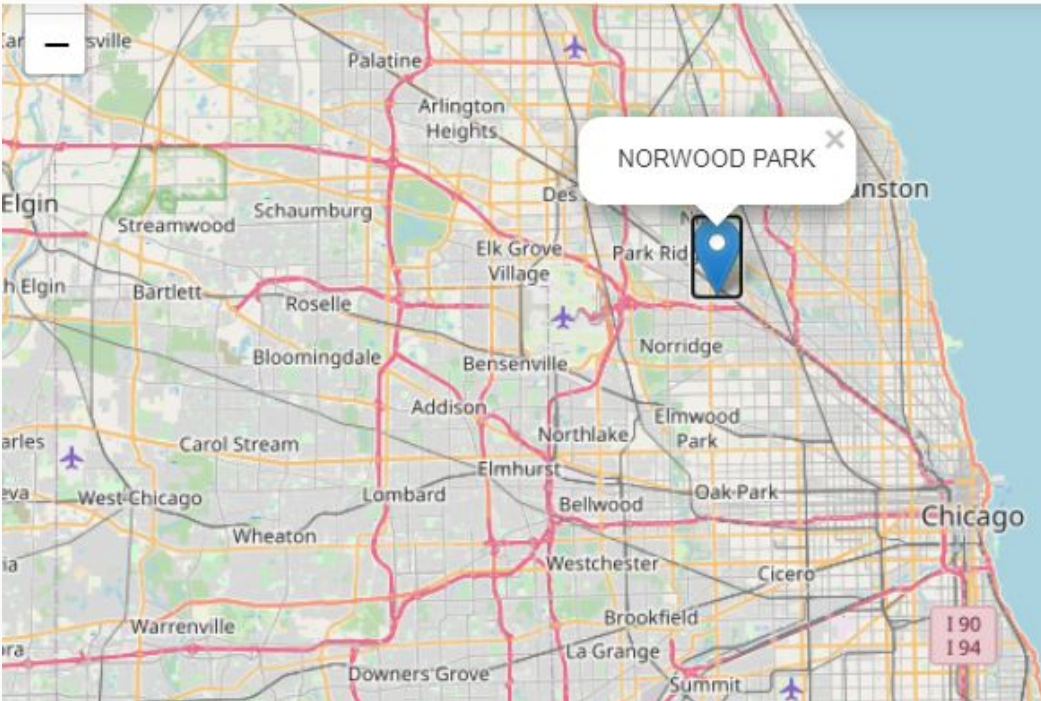
Cluster 1 neighborhoods using Folium



List of Cluster 2 neighborhoods

Neighborhood	NAME_OF_SCHOOL	Latitude	Longitude	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
MOUNT GREENWOOD	Annie Keller Elementary Gifted Magnet School	41.697198	-87.697264	Park	Intersection	Gourmet Shop	Home Service	Eastern European Restaurant	Falafel Restaurant	Fast Food Restaurant	Flower Shop	Food
NORWOOD PARK	Norwood Park Elementary School	41.988181	-87.802992	Park	Dog Run	Diner	Gym	Hobby Shop	Clothing Store	Juice Bar	Fast Food Restaurant	Gastropub

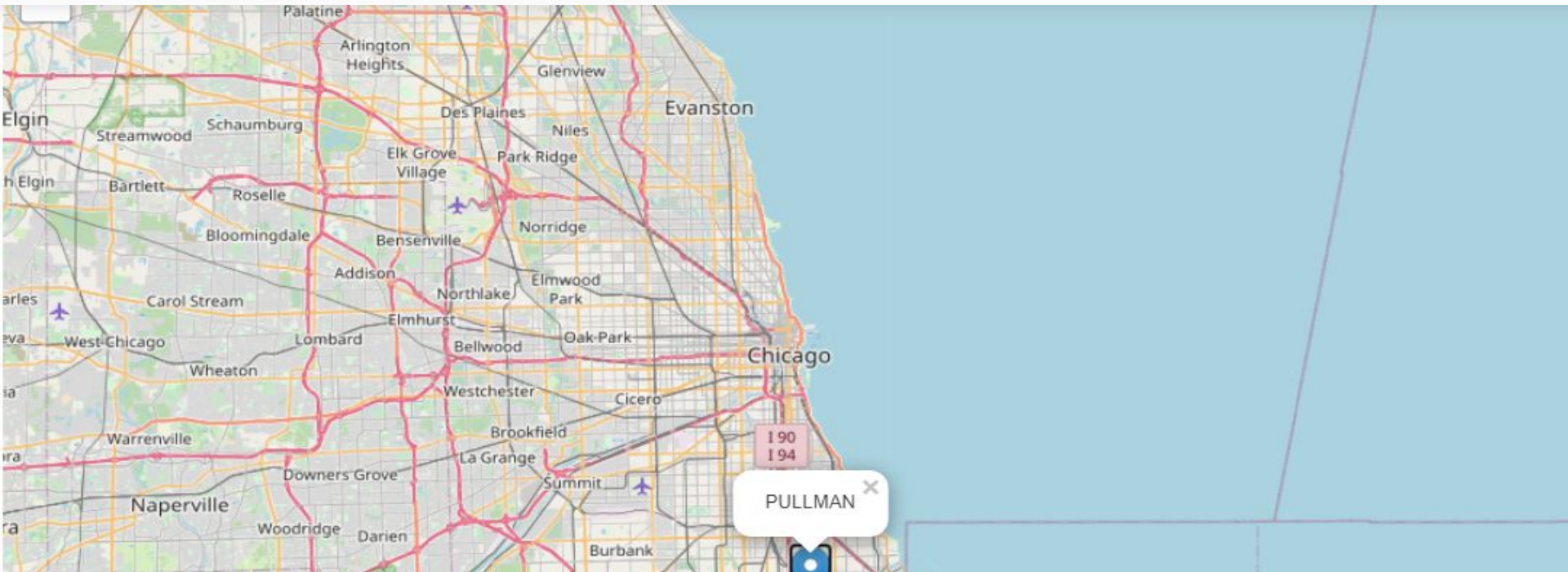
Cluster 2 neighborhoods using Folium



List of Cluster 3 neighborhoods

Neighborhood	NAME_OF_SCHOOL	Latitude	Longitude	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	Co
PULLMAN	Edgar Allan Poe Elementary Classical School	41.70262	-87.606456	History Museum	Food	Yoga Studio	Gourmet Shop	Donut Shop	Eastern European Restaurant	Falafel Restaurant	Fast Food Restaurant	Flower Shop	

Cluster 3 neighborhoods using Folium



Conclusion and Future direction

Based on the KMeans clustering results, even though the cluster 1 contains 9 neighborhoods and variety of venues, cluster 2 seems fitting for the family's wants. It shows neighborhoods that are not only safe with the safest schools but also Parks as the 1st most common venue in the neighborhood and packed with Restaurants, other variety shops. The neighborhood also has a Dog run for the family dog to enjoy!.

However if the family's needs and wants change, the data can be expanded and more analysis will be done and various machine learning techniques will be applied to get the desired results.