



London - The Battle of Neighbors

Coursera Capstone Project

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Introduction



Problem statement

The coronavirus / COVID-19 pandemic, one of the biggest health crises of our time and the greatest challenges has affected every country in the world.

UK among the countries most affected.

Lockdown & COVID-19 restrictions in UK - **everyone must stay at home, travel is not possible, non-essential shops, leisure and entertainment venues, pubs and restaurants as well as schools closed.**



Results

Lifestyle changes

Boom in walking

Exercising

Outdoor activities

“Covid-Free” Activities

The background of the slide is a teal-tinted image of a laptop screen. On the screen, there is a line graph with a fluctuating line and a pie chart. The text 'Project description' is overlaid on the left side of the screen in white. The laptop keyboard is visible at the bottom of the frame.

Project description

Explore boroughs in London offering the **most venues for walking, recreation, or any other similar entertainment or activity.**

The venues should offer/provide the **possibility of social distancing.**

Data



Data Sources

The list of **London boroughs** on **Wikipedia** to scrap the data from (name, area, population, and headquarters for every borough in London ([link](#))).

Foursquare API - to fetch venues that meet our requirements for every borough.

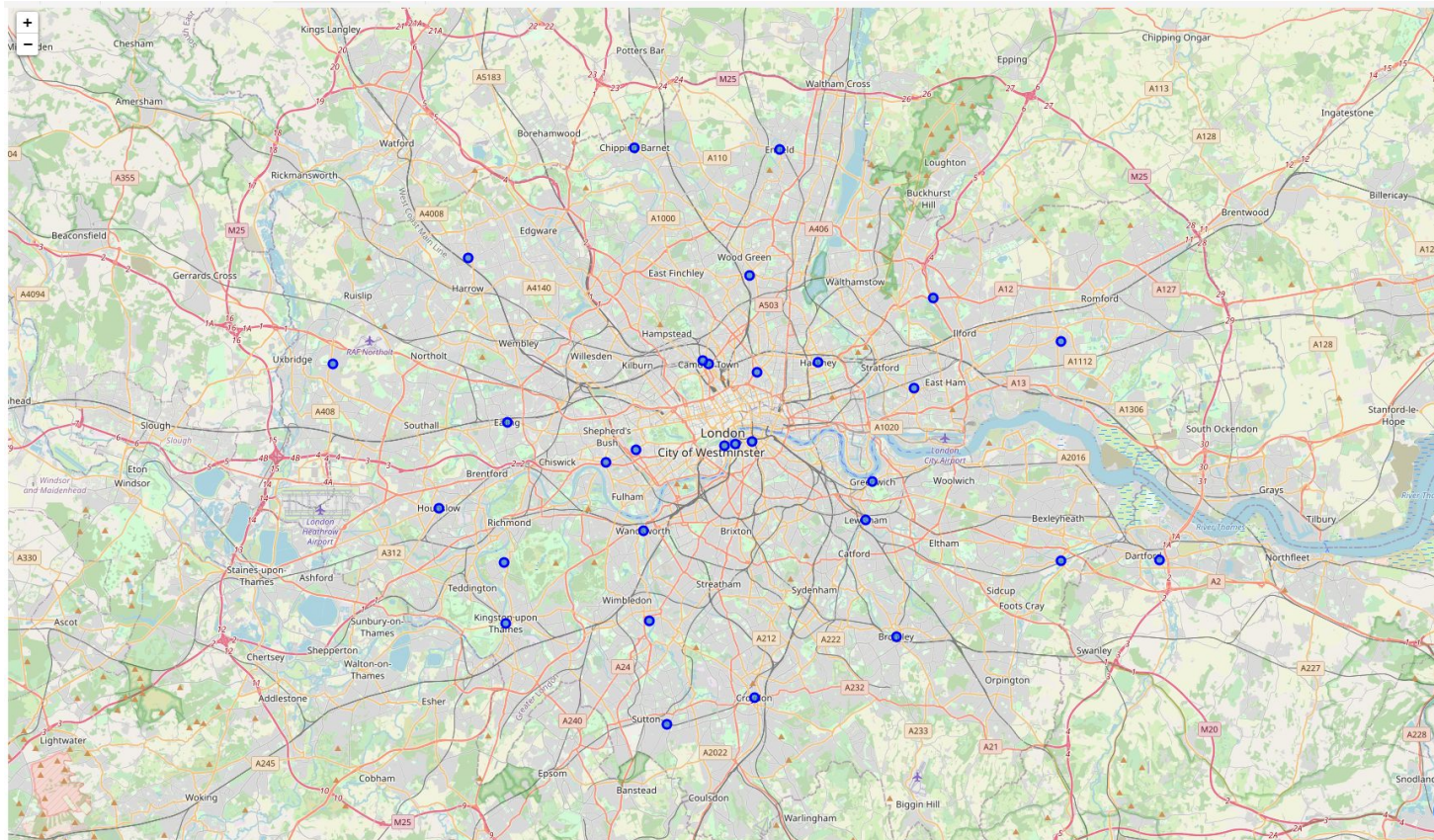


Data cleaning and processing

Beautiful Soup Library - scrap the data from Wikipedia

Geopy library - get the latitude and longitude values of boroughs in London

Folium library - visualize the London boroughs on a map.



Map of London with boroughs superimposed on top

Exploratory Analysis



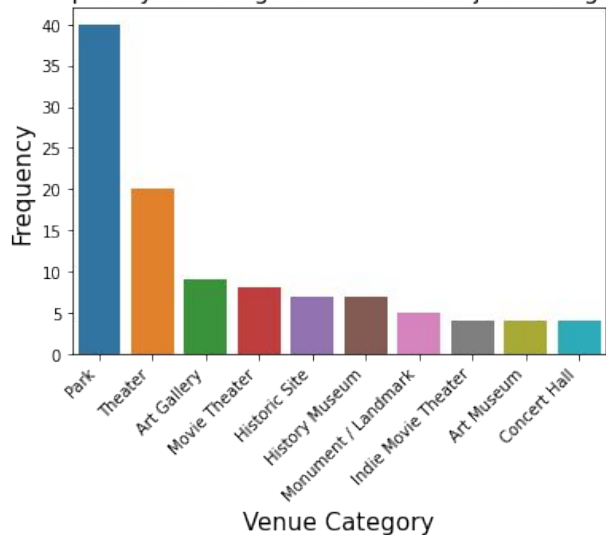
Explore Boroughs in London

Use the **Foursquare API** to explore the boroughs and segment them. Design the limit as 100 venues and the radius 750 meter for each borough from their given latitude and longitude information.

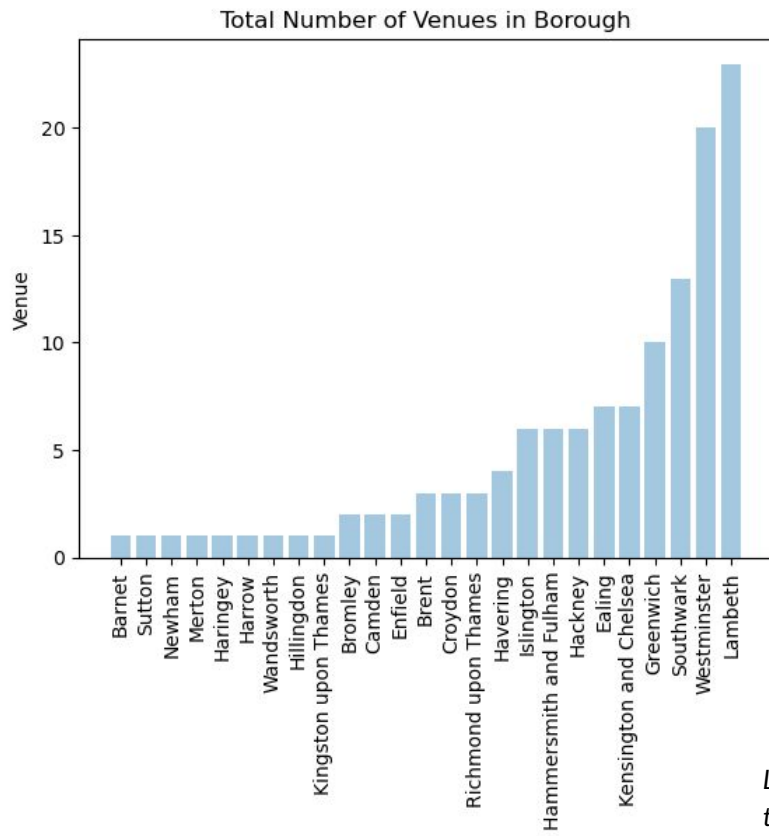
Since we were not interested in all the venues for this analysis, but only those venues that provide some type of fun, recreational and similar activity, we've searched for the following venues: **Park, Museum, Historic Site, Monument, Gallery, Theater, Performing Arts, Golf, Soccer, Fun, Concert Hall, Music Venue, Opera House.**

Explore Boroughs in London

10 Most Frequently Occuring Venues in 32 Major Boroughs of London



Park is the most common venue in all 32 boroughs of London.



Lambeth and Westminster are leading boroughs in total number of venues.



Analyzing Boroughs in London

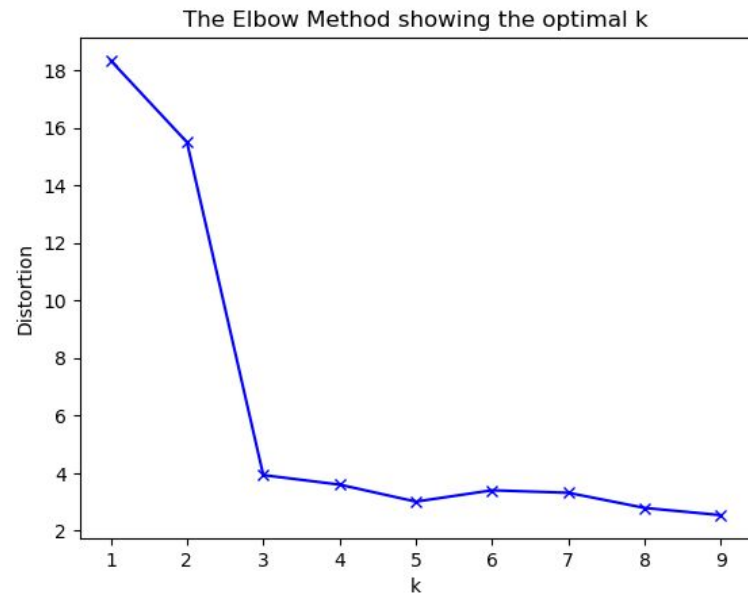
1:

	Borough	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
0	Barnet	Park	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	
1	Brent	Soccer Stadium	Soccer Field	Park	Theme Park Ride / Attraction	Indie Theater	Art Museum	Concert Hall	
2	Bromley	Movie Theater	Park	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	
3	Camden	Park	Music Venue	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	
4	Croydon	Park	Museum	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	

Table showing a list of the top 10 venue categories for each borough.

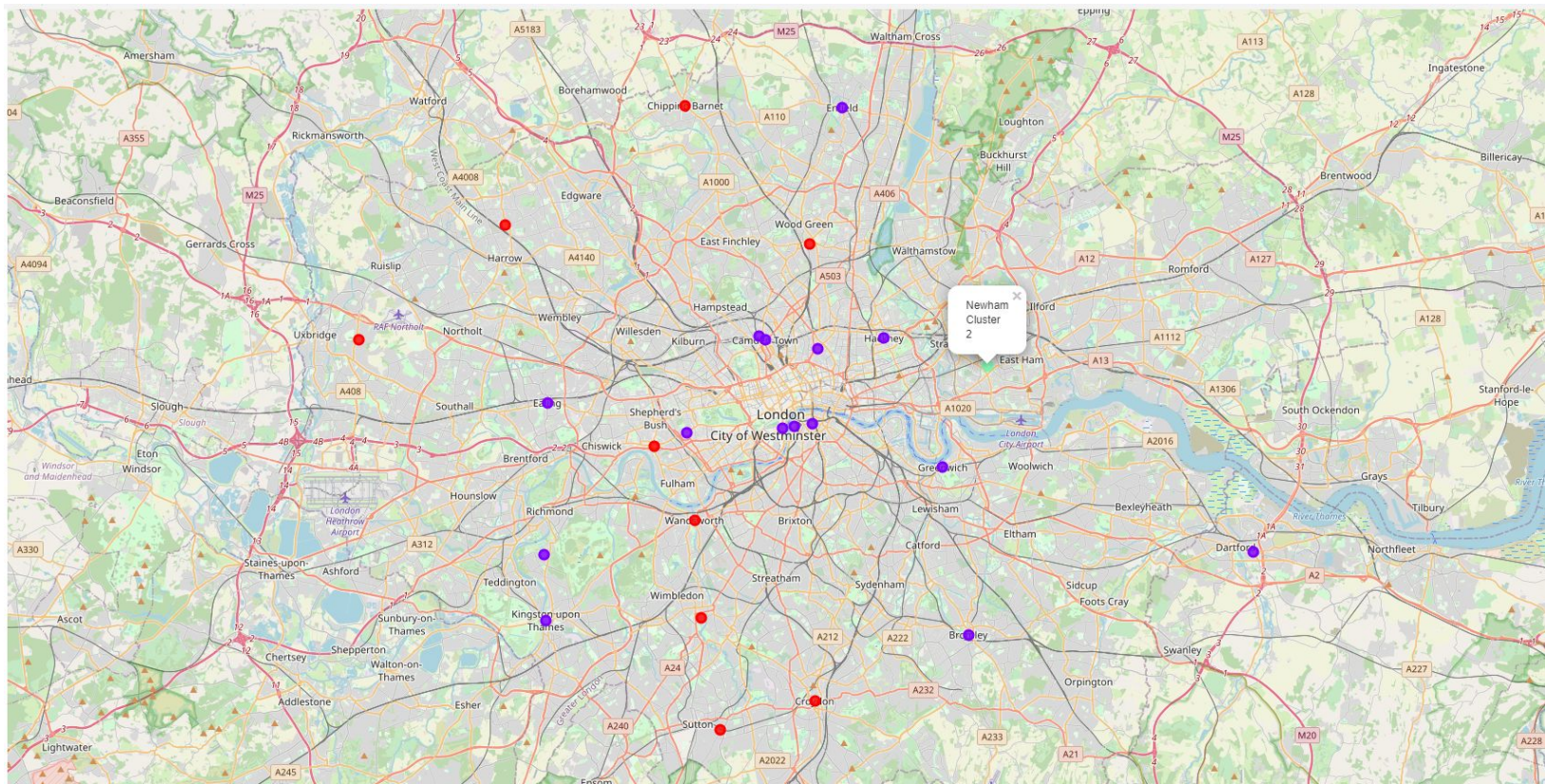
Clustering Boroughs

Analyzing the K-Means with elbow method to get the optimal K.



	Borough	Headquarters	Area	Population	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	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
1	Barnet	Barnet House, 2 Bristol Avenue, Colindale	33.49	395896	51.653090	-0.200226	0.0	Park	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater
3	Brent	Brent Civic Centre, Engineers Way	16.70	329771	51.442026	0.231523	1.0	Soccer Stadium	Soccer Field	Park	Theme Park Ride / Attraction	Indie Theater	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum
4	Bromley	Civic Centre, Stockwell Close	57.97	332336	51.402805	0.014814	1.0	Movie Theater	Park	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater
5	Camden	Camden Town Hall, Judd Street	8.40	270029	51.542305	-0.139560	1.0	Park	Music Venue	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater
6	Croydon	Barnard Weatherill House, Mint Walk	33.41	386710	51.371305	-0.101957	0.0	Park	Museum	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater
7	Ealing	Perceval House, 14-16 Uxbridge Road	21.44	341806	51.512655	-0.305195	1.0	Park	Art Gallery	Performing Arts Venue	Theater	Indie Theater	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum
8	Enfield	Civic Centre, Silver Street	31.74	333794	51.652085	-0.081018	1.0	Park	Theater	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater
9	Greenwich	Woolwich Town Hall, Wellington Street	18.28	287942	51.482084	-0.004542	1.0	Historic Site	Park	History Museum	Art Gallery	Indie Movie Theater	Museum	Theater	Indie Theater	Art Museum	Concert Hall
10	Hackney	Hackney Town Hall, Mare Street	7.36	281120	51.543240	-0.049362	1.0	Park	Movie Theater	History Museum	Theater	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	Indie Movie Theater
11	Hammersmith and Fulham	Town Hall, King Street	6.33	185143	51.492038	-0.223640	0.0	Park	Concert Hall	Theater	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Golf Course	Historic Site	History Museum	Indie Movie Theater
12	Haringey	Civic Centre, High Road	11.42	268647	51.587930	-0.105410	0.0	Park	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater
13	Harrow	Civic Centre, Station Road	19.49	251160	51.596827	-0.337316	0.0	Park	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater
14	Havering	Town Hall, Main Road	43.35	259552	51.544385	-0.144307	1.0	Art Gallery	Park	Music Venue	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater
15	Hillingdon	Civic Centre, High Street	44.67	306870	51.542519	-0.448335	0.0	Park	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater
17	Islington	Customer Centre, 222 Upper Street	5.74	242467	51.538429	-0.099905	1.0	Theater	Movie Theater	Art Museum	Park	Music Venue	Indie Theater	Concert Hall	Golf Course	Historic Site	History Museum
18	Kensington and Chelsea	The Town Hall, Horton Street	4.68	156129	51.498480	-0.199043	1.0	Park	History Museum	Art Gallery	Opera House	Museum	Indie Theater	Art Museum	Concert Hall	Golf Course	Historic Site
19	Kingston upon Thames	Guildhall, High Street	14.38	177507	51.409627	-0.306262	1.0	Theater	Theme Park Ride / Attraction	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater	Monument / Landmark
20	Lambeth	Lambeth Town Hall, Brixton Hill	10.36	326034	51.501301	-0.117287	1.0	Theater	Movie Theater	Concert Hall	Skate Park	Park	Indie Movie Theater	Historic Site	History Museum	Indie Theater	Monument / Landmark
22	Merton	Civic Centre, London Road	14.52	206548	51.410870	-0.188097	0.0	Park	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater
23	Newham	Newham Dockside, 1000 Dockside Road	13.98	353134	51.530000	0.029318	2.0	Movie Theater	Theater	Art Museum	Concert Hall	Golf Course	Historic Site	History Museum	Indie Movie Theater	Indie Theater	Monument / Landmark
25	Richmond upon Thames	Civic Centre, 44 York Street	22.17	198019	51.440553	-0.307639	1.0	Golf Course	Historic Site	Park	Theme Park Ride / Attraction	Monument / Landmark	Art Museum	Concert Hall	History Museum	Indie Movie Theater	Indie Theater
26	Southwark	160 Tooley Street	11.14	318830	51.502922	-0.103458	1.0	Theater	Art Museum	Park	Movie Theater	Music Venue	Art Gallery	Performing Arts Venue	Opera House	Skate Park	Museum
		Civic Office, St Nicholas							Theme Park Ride /	Monument /						Indie Movie	

Dataframe that includes cluster label as well as the top 10 venues for each neighborhood.



Visualizing clusters on the map.

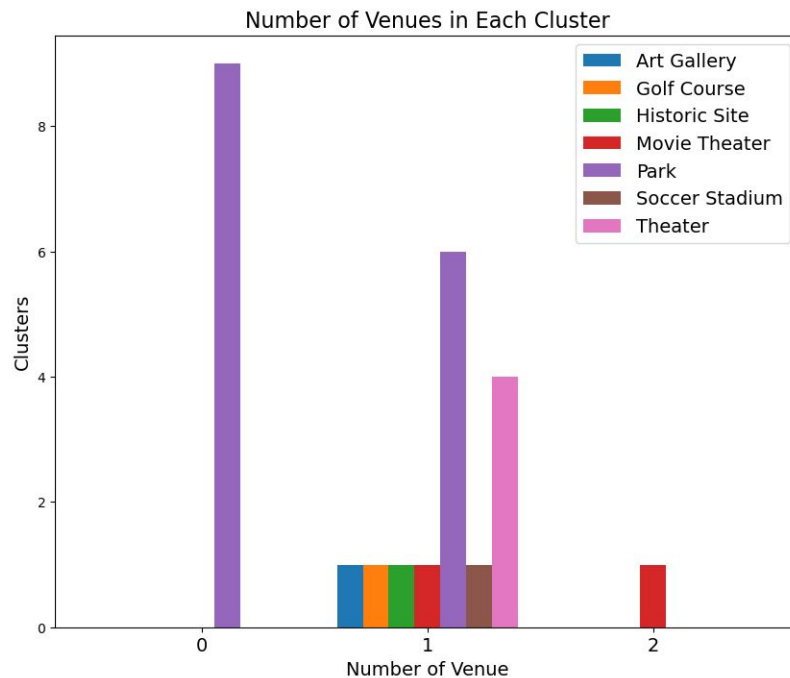
Results

Clusters

Cluster 0 : "Parks"

Cluster 1 : "Multiple Fun Venues"

Cluster 2 : "Theaters"






Examining clusters

Cluster 0 - Most common venue in all boroughs is **Park**. Second most common venue is **Theme Park / Attraction** and third is **Landmark/Monument**. Cluster 0 venues provide **outdoor activities** and can be accessed during the **Lockdown in London**.

Cluster 1 - Most common venues are **different**. Cluster 1 venues provide **both outdoor and indoor activities**.

Cluster 2 - **Movie Theaters and Theaters** are most common venues.

Discussion & Conclusion



London is a big city with a high population density, meaning that **different approaches can be tried in clustering and classification studies**. Moreover, it is obvious that not every classification method can yield the same high quality results.

I used the K Means algorithm as part of this clustering study. When I tested the Elbow method, I set the optimum K value to 3 and used 32 boroughs. However, **I have not taken into account “City of London” since it is not stated as Borough and covers a rather small area in the administrative and geographical meaning**. However, it could affect the provided results.

The venues to filter are decided by me based on what might be useful and appropriate for this type of analysis. **The venues categories/types can be expanded.**



Conclusion

As we could see from this analysis, even amidst the global pandemic and lockdown, London has a lot to offer to its citizens.

Parks have proven to be one of the most common venues in most of the boroughs. However, **Landmarks/Monuments** as well as **Theme Parks/Attractions** are also very common.

This research shows / offers data that can make it easier to **choose boroughs for the next activity and adventure in the city, facilitate relocation, or provide tourist information** for those interested in this type of activity in the future.