

Battle of the Neighborhoods

Finding the right move in London

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1. Introduction

1.1. Background

Each year approximately 200,000 people move from other areas of the UK into London and another 200,000 move from abroad into London. This means nearly half a million people move to London every year. Moving house is often an exceptionally long and complicated process which can be incredibly stressful. Therefore, it is in the best interest of both the mover and the estate agents to ensure that the move is as smooth as possible. In order to streamline this process ideally everything the mover wants to know about a potential move location can be found all in the same place. One hugely important variable to take into account when moving house is the number of and quality of amenities near the potential move location. It is advantageous for movers to see all of these amenities prior to making a decision on the move.

1.2. The Problem

When moving to an area the mover may want to know what kind of venues are near the area they will be moving to. However, on most of the popular estate agent websites this information is not always available. It is common for estate agents to show nearby schools but not coffee shops, restaurants, yoga classes etc. What if the mover wants to know how many Italian restaurants are nearby or how many bookstores there are within 500m? Currently they would have to scroll through the internet trying to find this information for themselves. Wouldn't it be convenient if all of this information were in one place?

1.3. Interest

This feature would be of interest to movers in the process of helping them to find an ideal location to move to. This project aims to cluster areas of London depending on the venues in each area and creating a score for each borough to find which borough is the most ideal.

2. Data acquisition and cleaning

2.1. Data acquisition

The data for the project was collected from a variety of sources:

- Data containing London boroughs with their latitude and longitudes scraped from wiki page (https://en.wikipedia.org/wiki/List_of_London_boroughs)
- Data containing average rent price for each London borough (<https://data.london.gov.uk/dataset/average-private-rents-borough>)
- Foursquare location data will be used to access details for all venues in London.

2.2. Data Cleaning

Data for the list of London boroughs and average rent prices per borough were cleaned removing unwanted columns and formatting each column and then combined into one table. Then a rent score was created using min-max scaling where each borough was given a score between 0 and 1 where 1 is the cheapest and 0 is most expensive. This data frame is shown below in Figure 1. This Data along with Foursquare location data will be used to find the best borough in London to move too based on rent prices and number and quality of nearby venues.

Figure 1. Showing the cleaned data frame before analysis.

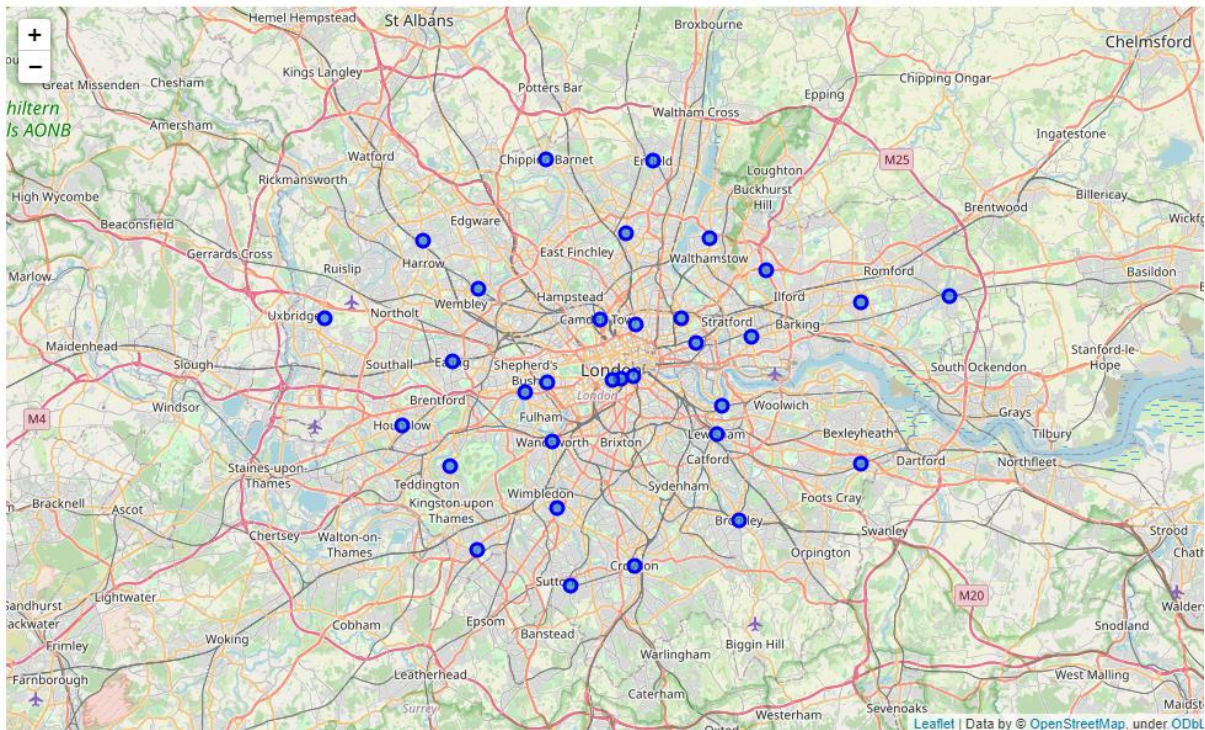
	Borough	Population	Latitude	Longitude	Avg. Price	Rent_score
0	Barking and Dagenham	212906	51.554117	0.150504	1192	0.949153
1	Barnet	395896	51.653090	-0.200226	1548	0.781544
2	Bexley	248287	51.441679	0.150488	1084	1.000000
3	Brent	329771	51.563826	-0.275760	1578	0.767420
4	Bromley	332336	51.402805	0.014814	1318	0.889831

3. Methodology

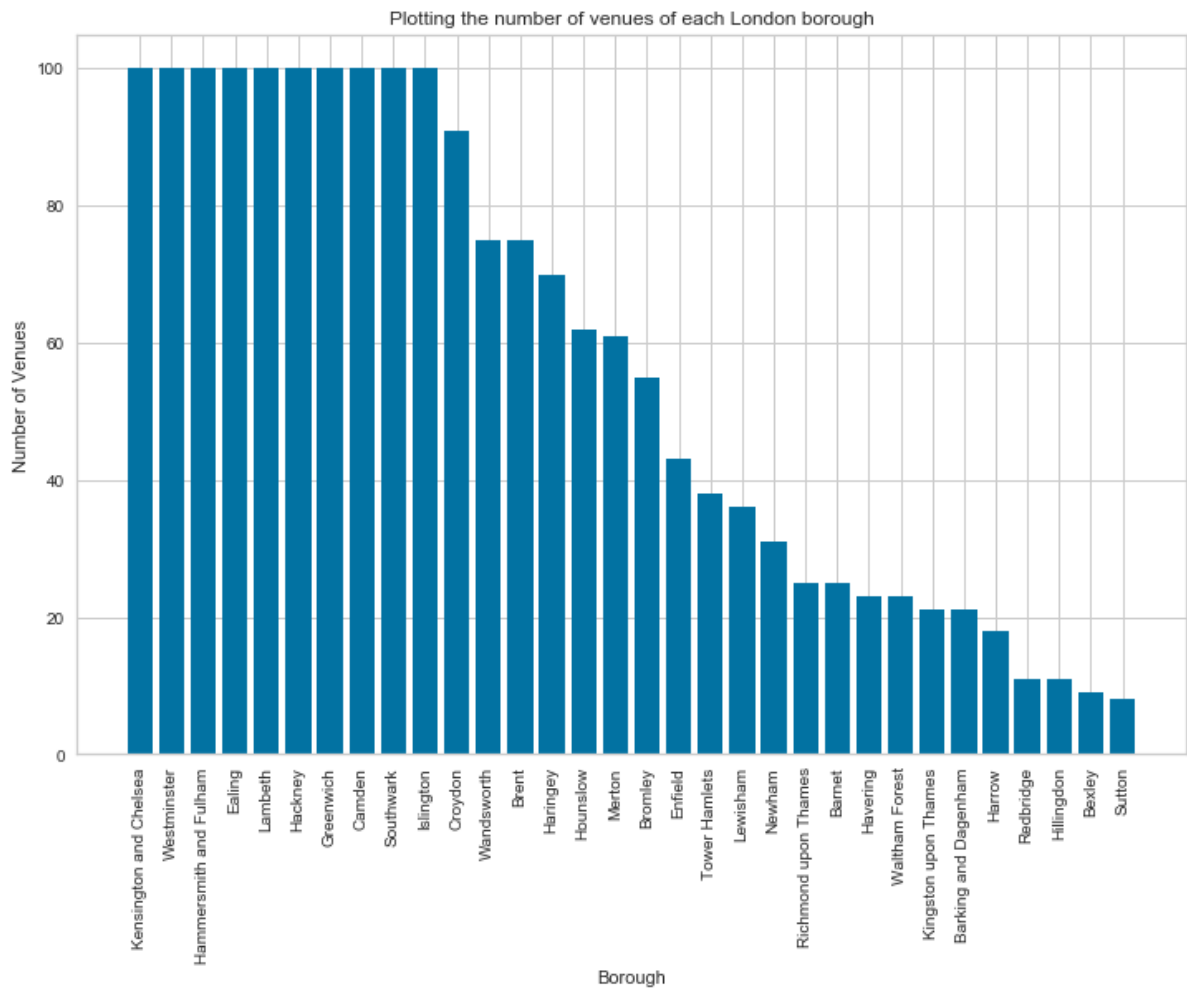
Once the data has been collected and cleaned into the table shown above there are a serious of steps in order to analyse the data:

- All boroughs were plotted onto a map of London using the Folium library.

Figure 2. Map of London with Boroughs plotted on top.

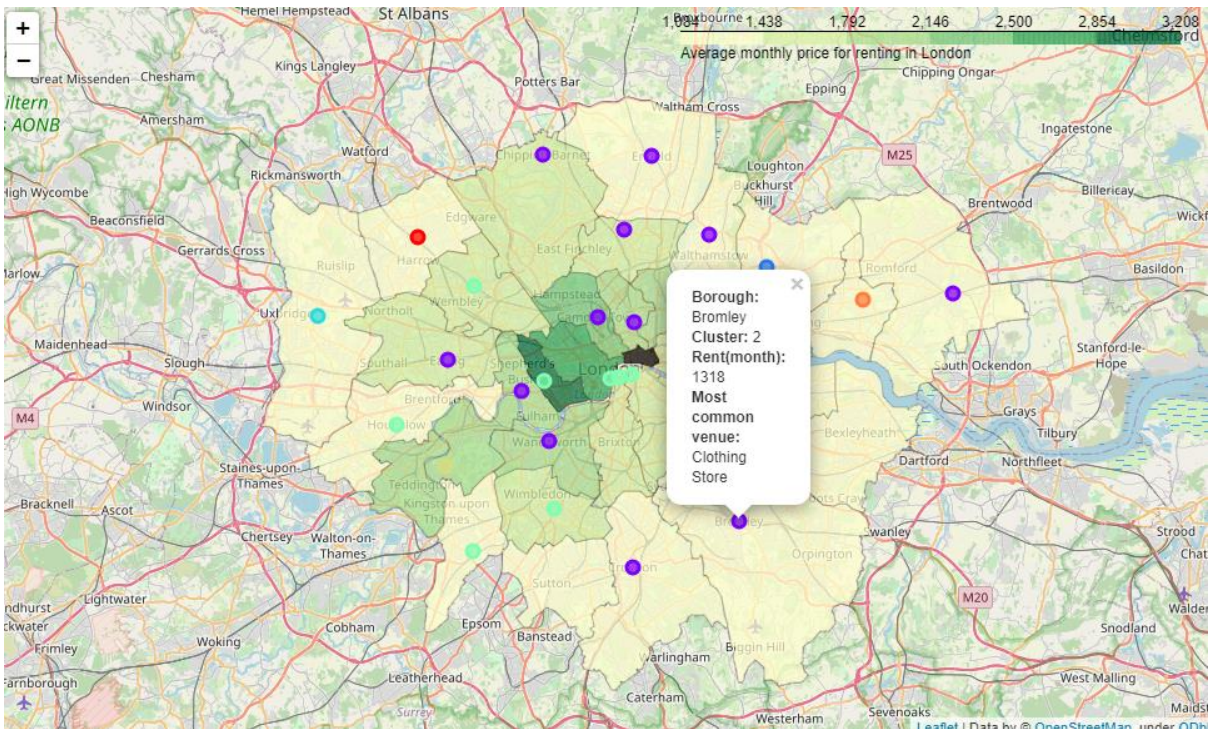


- Then using the Foursquare API the venue data is collected for each London borough.
- The number of venues for each borough was plotted and the data frame modified so it only includes boroughs where there were 10 or more nearby venues.



- Then one-hot vectors for the different venue categories in all boroughs and to generate the top 10 most common venues for each borough.
- K-means clustering was then used as we are trying to cluster unlabelled data. This will produce clusters of London boroughs based on the similarity of the nearby venues.

Figure 3. Map of clustered London boroughs showing rent price and most common venue in each borough.



- Finally, all of the clusters were examined individually to observe the most common venues within each cluster.

4. Results

Let us examine each of the 7 clusters in order to determine the most common venues for each borough in London.

Cluster 1:

The top venues for Cluster 1 are Indian restaurant, Thai restaurant, Grocery store and supermarket.

	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	9th Most Common Venue	10th Most Common Venue
12	Harrow	Indian Restaurant	Thai Restaurant	Grocery Store	Supermarket	Kitchen Supply Store	Gym / Fitness Center	Gym	Park	Fast Food Restaurant	Sandwich Place

Cluster 2:

The top venues in Cluster 2 include mainly Pub, Coffee shop, Pizza place and Grocery store.

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	9th Most Common Venue	10th Most Common Venue
Barnet	Pub	Coffee Shop	Pizza Place	Bookstore	Pharmacy	Grocery Store	Italian Restaurant	Bakery	Supermarket	Soccer Stadium
Bromley	Clothing Store	Pub	Coffee Shop	Gym / Fitness Center	Supermarket	Pizza Place	Indian Restaurant	Burger Joint	Café	Park
Camden	Pub	Coffee Shop	Café	Pizza Place	Music Venue	Italian Restaurant	Grocery Store	Fish & Chips Shop	Supermarket	Ice Cream Shop
Croydon	Coffee Shop	Pub	Italian Restaurant	Platform	Hotel	Clothing Store	Park	Mediterranean Restaurant	Bookstore	Korean Restaurant
Ealing	Coffee Shop	Pub	Italian Restaurant	Park	Bakery	Hotel	Pizza Place	Café	Burger Joint	Thai Restaurant
Enfield	Pub	Coffee Shop	Clothing Store	Pharmacy	Park	Supermarket	Department Store	Bookstore	Fish & Chips Shop	Indian Restaurant
Greenwich	Pub	Grocery Store	Garden	Pizza Place	Gym / Fitness Center	Café	Coffee Shop	Park	Trail	Bar
Hackney	Pub	Café	Bakery	Brewery	Coffee Shop	Park	Cocktail Bar	Gastropub	Vietnamese Restaurant	Supermarket
Hammer-smith and Fulham	Pub	Coffee Shop	Park	Gym / Fitness Center	Sandwich Place	Café	Cocktail Bar	Thai Restaurant	Bakery	Japanese Restaurant
Haringey	Pub	Café	Fast Food Restaurant	Grocery Store	Turkish Restaurant	Clothing Store	Chinese Restaurant	Bakery	Pharmacy	Greek Restaurant
Havering	Platform	Pub	Coffee Shop	Grocery Store	Park	Supermarket	Pizza Place	Sandwich Place	Chinese Restaurant	Soccer Stadium
Islington	Pub	Coffee Shop	Burger Joint	Cocktail Bar	Park	Bakery	Mediterranean Restaurant	Boutique	Gastropub	Italian Restaurant
Lewisham	Pub	Coffee Shop	Supermarket	Restaurant	Gym	Food Truck	Bakery	Café	Street Food Gathering	Fish & Chips Shop
Tower Hamlets	Pub	Café	Pizza Place	Burger Joint	Art Gallery	Park	Canal Lock	Bar	Bus Stop	Climbing Gym
Waltham Forest	Café	Pub	Coffee Shop	Turkish Restaurant	Gym / Fitness Center	Bus Stop	Soccer Field	Mini Golf	Supermarket	Park
Wandsworth	Pub	Gym / Fitness Center	Bus Stop	Coffee Shop	Clothing Store	Hotel	Grocery Store	Supermarket	Pharmacy	Park

Cluster 3:

The top venues in Cluster 3 are a Park, Pub, Soccer field and Golf course.

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	9th Most Common Venue	10th Most Common Venue
Redbridge	Park	Pub	Soccer Field	Golf Course	Gym / Fitness Center	Pizza Place	English Restaurant	Eastern European Restaurant	Hotel	Metro Station

Cluster 4:

The top venues in Cluster 4 are Chinese restaurant, Fast food restaurant, Grocery Store and Construction and Landscaping.

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	9th Most Common Venue	10th Most Common Venue
Hillingdon	Chinese Restaurant	Fast Food Restaurant	Grocery Store	Construction & Landscaping	Park	Pharmacy	Coffee Shop	Pub	Plaza	Escape Room

Cluster 5:

The top venues in Cluster 5 include Hotels, Coffee shops, Theatres, Clothing stores and various restaurants.

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	9th Most Common Venue	10th Most Common Venue
Brent	Coffee Shop	Clothing Store	Bar	Hotel	Sporting Goods Shop	Sandwich Place	Supermarket	Grocery Store	Pub	Food Court
Hounslow	Indian Restaurant	Fast Food Restaurant	Hotel	Coffee Shop	Clothing Store	Grocery Store	Supermarket	Discount Store	Pharmacy	Bakery
Kensington and Chelsea	Hotel	Café	Italian Restaurant	Juice Bar	Pub	Restaurant	Bakery	Indian Restaurant	Japanese Restaurant	Lebanese Restaurant
Kingston upon Thames	Grocery Store	Indian Restaurant	Gym / Fitness Center	Pizza Place	Restaurant	Pharmacy	Sandwich Place	Coffee Shop	Soccer Field	Café
Lambeth	Theater	Hotel	Coffee Shop	Garden	Café	Pub	Bar	Plaza	Event Space	Art Gallery
Merton	Coffee Shop	Clothing Store	Sushi Restaurant	Lebanese Restaurant	Bar	Thai Restaurant	Grocery Store	Pub	Tram Station	Hotel
Southwark	Theater	Coffee Shop	Hotel	Bakery	Pub	Seafood Restaurant	Scenic Lookout	Café	Park	Street Food Gathering
Westminster	Hotel	Café	Coffee Shop	Plaza	Hotel Bar	Garden	Monument / Landmark	Outdoor Sculpture	Park	Historic Site

Cluster 6:

The top venues in Cluster 6 are a Pub, Boat and ferry, a Sports club, Playground, and a Café.

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	9th Most Common Venue	10th Most Common Venue
Richmond upon Thames	Pub	Boat or Ferry	Sports Club	Playground	Café	Garden Center	Park	Trail	Bus Station	German Restaurant

Cluster 7:

The top venues in Cluster 7 include Bus stops, Grocery stores, Gyms, and a Gas station.

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	9th Most Common Venue	10th Most Common Venue
Barking and Dagenham	Bus Stop	Gas Station	Grocery Store	Diner	Gym / Fitness Center	Soccer Stadium	Supermarket	Chinese Restaurant	Park	Golf Course
Newham	Bus Stop	Grocery Store	Pub	Gym / Fitness Center	Fish & Chips Shop	Café	Bakery	Market	Metro Station	Pharmacy

5. Discussion

This analysis allows us to gain some insight into the quality of different London boroughs in the context of moving to London. It can successfully aid and streamline the decision-making process when moving to London as the mover can now see nearby venues in each borough helping them to make a decision.

One of the main observations is that the boroughs that are more central tend to have more hotels and theatres whereas boroughs in outer London are more likely to have pubs or food shops as a nearby venue.

As this analysis only used the boroughs of London in the analysis with a limit of 100 features for each borough, the analysis may not be utilising the full spectrum of venues in London. Having more venue samples may result in a more successful analysis.

If the location data was dealt with on a deeper level for example using the neighbourhoods in each London borough this may have resulted in more accurate grouping of data points which results in better clustering.

6. Conclusion

The movement of people in and out of London is ever changing and a huge market. Having a recommendation system based on location data is essential when making decisions based on where to move. However, a borough clustering system has many more applications such as organising city structure and resources and being used as an invaluable tool for businesses looking to start in London.