The Battle of the Neighborhoods

To Find the best place to construct a student hall in London City

Background

- London is considered as one of the popular destinations for higher education where students from all around the world travel to pursue their educations

- The total number of international students at London's universities in 2018-19 is 125,035 which is a 5.8% rise from 2017-18 which demonstrates the UK capital's growing appeal for prospective students

The Problem

- International students face a major challenge of finding an accommodation when they move into a new city.

- It is not easy to secure a place in a student hall as they are in very high demand.

The Solution

- To construct a student hall in an area which is both safe and easily accessible for the student.

- Building a student hall is also a real-estate opportunity, hence it should also be in an profitable area.

Who benefits from the solution?

- By exploring the different neighbourhoods and boroughs in London, I aim to solve two persistent problems which is for an international student who look for a safe place to stay during their course of study and to a real-estate developer who is looking for a profitable opportunity to build a student hall

- Hence an overseas **student**/ or any student looking for accommodation as well as a **real-estate investor** looking for an opportunity to construct a student hall benefits from this research

Data Collection

This research needs three sets of data

London Recorded Crime Data

- This is collected from the Metropolitan Police's Recorded Crime for the time period of 01/08/2018 to 31/07/2020

List of London Borough

- This is collected from Wikipedia

Foursquare API Data

- This data will be accessed through FourSquare API interface and will be arranged as a dataframe for visualization.

Data Description

London Recorded Crime Data

- The table displays the London crime records classified by boroughs and the nature of the crime

- There are 1568 observations and 27 columns.

- Information such as sum of crime incidents in the 24 months and monthly average are calculated from the data because it will be helpful in recommending solutions to our problem statement

	MajorText	MinorText	BoroughName	201808	201809	201810	201811	201812	201901	201902	...	201910	201911	201912	202001	202002	202003	202004
0	Arson and Criminal Damage	Arson	Barking and Dagenham	5	3	8	5	1	5	2	...	9	8	6	4	5	6	2
1	Arson and Criminal Damage	Criminal Damage	Barking and Dagenham	101	107	132	105	88	97	127	...	109	97	121	97	103	107	80
2	Burglary	Burglary - Business and Community	Barking and Dagenham	18	33	32	39	33	45	24	...	30	30	25	31	17	28	29
3	Burglary	Burglary - Residential	Barking and Dagenham	84	99	94	106	164	114	107	...	97	114	130	116	123	97	57
4	Drug Offences	Drug Trafficking	Barking and Dagenham	7	10	9	7	4	5	2	...	8	12	3	14	5	6	12

5 rows × 27 columns

	BoroughName	MonthlyAverage
0	Barking and Dagenham	1618.625000
1	Barnet	2467.208333
2	Bexley	1407.166667
3	Brent	2488.833333
4	Bromley	1980.375000
5	Camden	3002.666667
6	Croydon	2769.416667
7	Ealing	2524.000000
8	Enfield	2447.416667
9	Greenwich	2287.750000

Data Description

List of Boroughs

- List of London boroughs is extracted from Wikipedia.

- A dataframe with columns like Population, Latitudes and Longitudes are created

- It will be useful to calculate the ratio of reported crime to population and get neighborhood data from FourSquare.

List of boroughs and local authorities [edit]

Borough	Inner	Status	Local authority	Political control	Headquarters	Area (sq mi)	Population (2013 est)[1]	Co-ordinates	Nr. in map
Barking and Dagenham [note 1]			Barking and Dagenham London Borough Council	Labour	Town Hall, 1 Town Square	13.93	194,352	51.5607°N 0.1557°E	25
Barnet			Barnet London Borough Council	Conservative	Barnet House, 2 Bristol Avenue, Colindale	33.49	369,088	51.6252°N 0.1517°W	31
Bexley			Bexley London Borough Council	Conservative	Civic Offices, 2 Watling Street	23.38	236,687	51.4549°N 0.1505°E	23
Brent			Brent London Borough Council	Labour	Brent Civic Centre, Engineers Way	16.70	317,264	51.5588°N 0.2817°W	12
Bromley			Bromley London Borough Council	Conservative	Civic Centre, Stockwell Close	57.97	317,899	51.4039°N 0.0198°E	20
Camden	✓		Camden London Borough Council	Labour	Camden Town Hall, Judd Street	8.40	229,719	51.5290°N 0.1255°W	11
Croydon			Croydon London Borough Council	Labour	Bernard Weatherill House, Mint Walk	33.41	372,752	51.3714°N 0.0977°W	19
Ealing			Ealing London Borough Council	Labour	Perceval House, 14-16 Uxbridge Road	21.44	342,494	51.5130°N 0.3089°W	13
Enfield			Enfield London Borough Council	Labour	Civic Centre, Silver Street	31.74	320,524	51.6538°N 0.0799°W	30

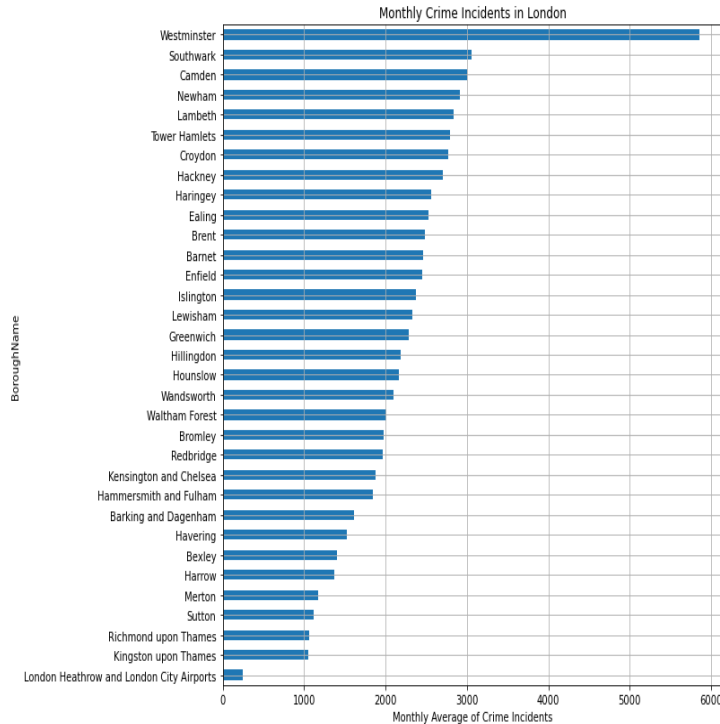|	BoroughName	Population	Latitude	Longitude
0	Barking and Dagenham	194352	51.5607	0.1557
1	Barnet	369088	51.6252	-0.1517
2	Bexley	236687	51.4549	0.1505
3	Brent	317264	51.5588	-0.2817
4	Bromley	317899	51.4039	0.0198

Data Description

Foursquare API

- The list of top 50 popular places in the neighborhood is accessed through FourSquare API interface

- This will be helpful in exploring and recommending locations across different venues according to the presence of amenities and essential facilities.

	BoroughName	Borough Latitude	Borough Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Barking and Dagenham	51.5607	0.1557	Central Park	51.559560	0.161981	Park
1	Barking and Dagenham	51.5607	0.1557	Crowlands Heath Golf Course	51.562457	0.155818	Golf Course
2	Barking and Dagenham	51.5607	0.1557	Robert Clack Leisure Centre	51.560808	0.152704	Martial Arts School
3	Barking and Dagenham	51.5607	0.1557	Beacontree Heath Leisure Centre	51.560997	0.148932	Gym / Fitness Center
4	Barking and Dagenham	51.5607	0.1557	Becontree Heath Bus Station	51.561065	0.150998	Bus Station

Data Exploration - Dangerous Areas

Monthly Crime Incidents in London

But, the boroughs have different population & it cannot be directly compared with absolute number of incidents.

So, the ratio of crime incidents to population were compared.
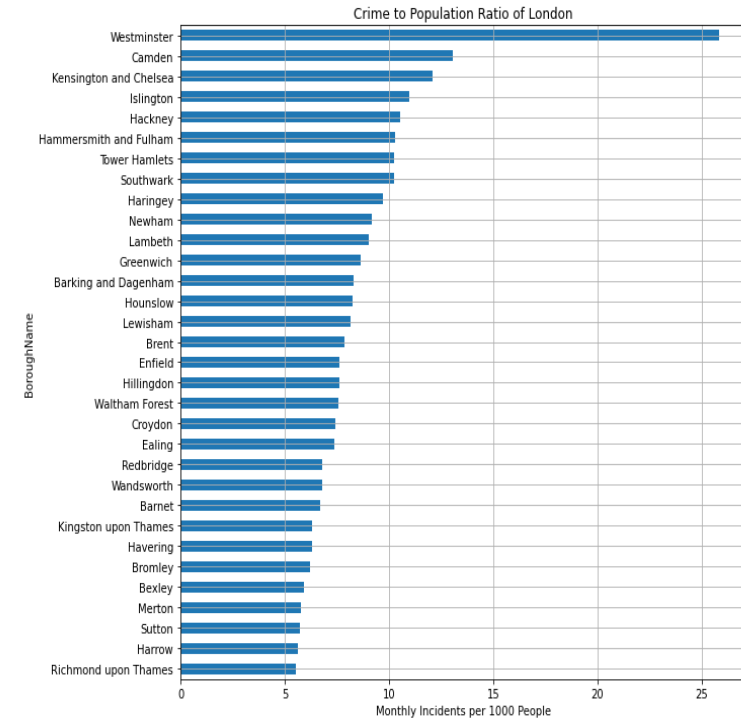

Crime to Population Ratio of London

This bar chart represents the different boroughs in descending order of monthly crime incidents. Westminster has the highest number of reported crime incidents followed by Southwark and Camden.

Hence, this bar chart represents the number of recorded crimes per 1000 people. Now, Westminster and Camden are the top 2 dangerous areas whereas Southwark and Newham go further down the list.
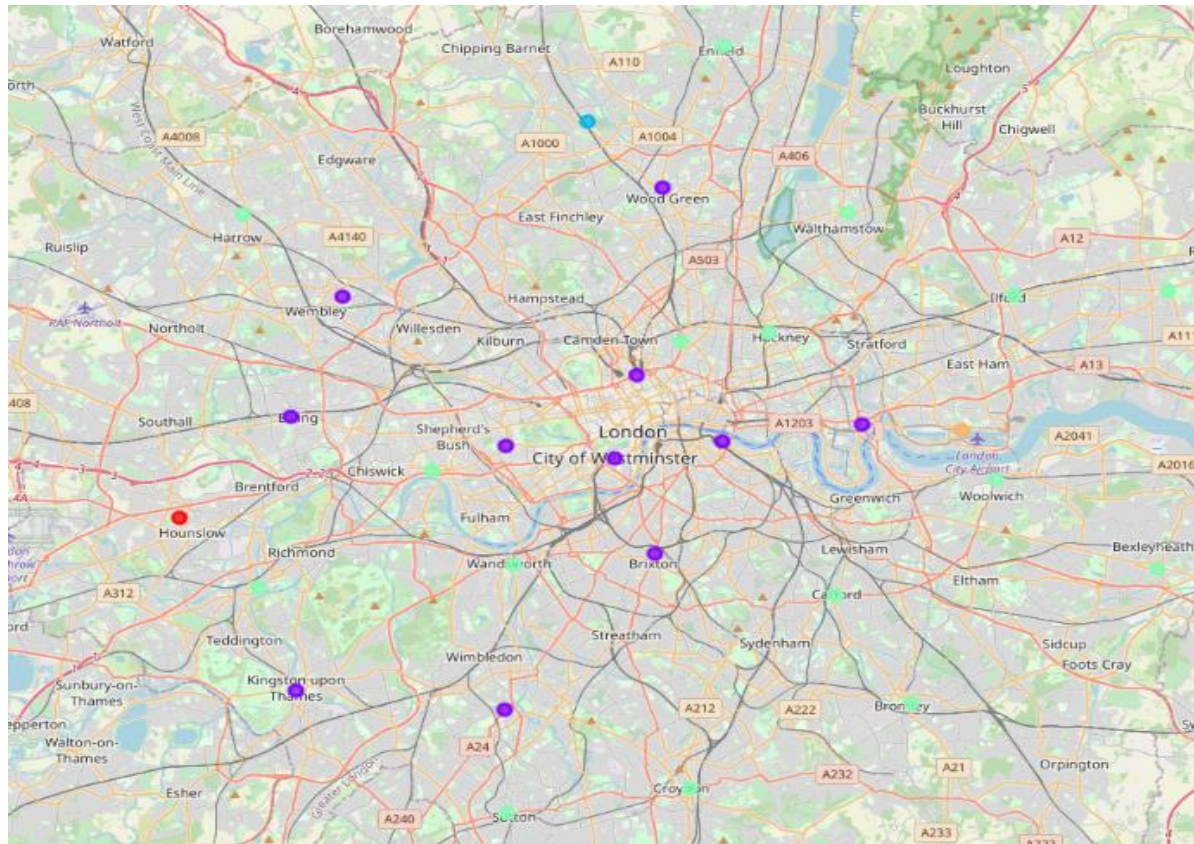
Popular Areas

- Data from Foursquare API was used in finding out the popular venues in the boroughs through the process of One hot encoding
- Venues from the same boroughs were grouped by borough names and popular categories were discovered by frequency

	BoroughName	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
0	Barking and Dagenham	Pool	Bus Station	Supermarket	Gym / Fitness Center	Martial Arts School	Park	Golf Course	Dumpling Restaurant	Fast Food Restaurant	Farmers Market
1	Barnet	Café	Bus Stop	Yoga Studio	Creperie	Fish Market	Fish & Chips Shop	Film Studio	Fast Food Restaurant	Farmers Market	Event Space
2	Bexley	Pub	Coffee Shop	Clothing Store	Pharmacy	Fast Food Restaurant	Supermarket	Bakery	Plaza	Department Store	Portuguese Restaurant
3	Brent	Coffee Shop	Hotel	Grocery Store	Clothing Store	Bar	Sandwich Place	Sporting Goods Shop	American Restaurant	Indian Restaurant	Italian Restaurant
4	Bromley	Coffee Shop	Clothing Store	Pizza Place	Burger Joint	Gym / Fitness Center	Bar	Portuguese Restaurant	Chocolate Shop	Supermarket	Bookstore

Clustering of Boroughs

Based on the venue categories, K-means clustering was conducted to categorize and group the boroughs based on their similarity. The coloured dots represent the different clusters.

The 5 different Clusters

Cluster 0: Lively Area (Restaurants, Markets)

	BoroughName	CrimeToPop	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
16	Hounslow	8.23768	0	Pizza Place	Café	Park	Bed & Breakfast	Yoga Studio

Cluster 1: Hangout Area (Pubs, Cafes)

	BoroughName	CrimeToPop	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
3	Brent	7.844676	1	Coffee Shop	Hotel	Grocery Store	Clothing Store	Bar
5	Camden	13.071042	1	Café	Hotel	Coffee Shop	Burger Joint	Breakfast Spot
7	Ealing	7.369472	1	Coffee Shop	Italian Restaurant	Clothing Store	Park	Vietnamese Restaurant

Cluster 2: Quiet Area (Yoga studios)

	BoroughName	CrimeToPop	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1	Barnet	6.684607	2	Café	Bus Stop	Yoga Studio	Creperie	Fish Market

Cluster 3: Busy Area (Coffee Shops, Clothing stores)

	BoroughName	CrimeToPop	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Barking and Dagenham	8.328317	3	Pool	Bus Station	Supermarket	Gym / Fitness Center	Martial Arts School
2	Bexley	5.945264	3	Pub	Coffee Shop	Clothing Store	Pharmacy	Fast Food Restaurant
4	Bromley	6.229573	3	Coffee Shop	Clothing Store	Pizza Place	Burger Joint	Gym / Fitness Center

Cluster 4: Traveller Area (Airport, Currency exchange)

	BoroughName	CrimeToPop	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
23	Newham	9.169424	4	Hotel	Currency Exchange	Rafting	Sandwich Place	Pharmacy

Determination of the best boroughs

➧ Our key criteria of location decision will be based on safety and atmosphere.

➧ Based on Safety and Atmosphere, and the individual's area preference scores are calculated.

	BoroughName	CrimeToPop	Cluster Labels	Safety	Atmosphere
0	Barking and Dagenham	8.328317	3.0	0.861862	0.7
1	Barnet	6.684607	2.0	0.942858	1.0
2	Bexley	5.945264	3.0	0.979291	0.7
3	Brent	7.844676	1.0	0.885694	0.9
4	Bromley	6.229573	3.0	0.965281	0.7

	BoroughName	Safety	Atmosphere	Score
1	Barnet	0.942858	1.0	1.942858
22	Merton	0.987051	0.9	1.887051
19	Kingston upon Thames	0.961135	0.9	1.861135
7	Ealing	0.909110	0.9	1.809110
3	Brent	0.885694	0.9	1.785694
20	Lambeth	0.826563	0.9	1.726563
25	Richmond upon Thames	1.000000	0.7	1.700000
13	Harrow	0.995243	0.7	1.695243
12	Haringey	0.792479	0.9	1.692479
27	Sutton	0.990822	0.7	1.690822

Barnet, Merton, Kingston upon Thames, Ealing and Brent are among the top places recommended by the safety and atmosphere scores to the students and real-estate developers.

Conclusion

- **Barnet, Merton, Kingston upon Thames, Ealing and Brent are among the top places recommended by the safety and atmosphere scores to the students and real-estate developers**
- The top five boroughs all belong to the Busy Area cluster and Hangout Area Clusters with many Pubs, coffee shops and clothing stores.
- What differentiates them is the safety score, which was calculated from monthly recorded crimes per 1000 people.

	BoroughName	MonthlyAverage	Population	Latitude	Longitude	CrimeToPop
1	Barnet	2467.208333	369088	51.6252	-0.1517	6.684607
22	Merton	1176.208333	203223	51.4014	-0.1958	5.787772
19	Kingston upon Thames	1053.083333	166793	51.4085	-0.3064	6.313714
7	Ealing	2524.000000	342494	51.5130	-0.3089	7.369472
3	Brent	2488.833333	317264	51.5588	-0.2817	7.844676

Limitations

- One of the limitations in this research is that the best places recommended are far away from the city centre and in the suburbs.

- This is because, only popular venues and the number crime incidents were taken into account to recommend a safe and profitable location to build a student hall. Therefore, a crime which is as serious as homicides were treated as same as petty burglaries. Also, venues with popular stores were only taken into account but we have not considered its importance to a student.

- Further research needs to be done on the basis of distance from the city centre, level of seriousness of each crime, current housing prices to overcome this limitation.

- However, this research still holds good because of the in-depth exploration of each neighborhood and recommendations of suitable places to construct a student hall based on the limited categories taken in to account for the purpose of this project.