

Introduction

Background: we should always do proper research where planning our next move in life. Safety is the major concern when moving to a new area.

Problem: In 2019/20 the crime rate in London stood at 101.48 crimes committed per thousand people. This projects aims to find out the least crime rate brough on basis of total crimes. Explore the neighbourhoods of that brough to find out the 10 most common venues in each neighbourhood. Finally clustering was done by K Means clustering.

Interest: Peoples who are want to relocate to London will be interested to identify the safest borough in London and explores its neighbourhoods and common venues around each neighbourhood.

Data Acquisition and Prepossessing

First Data source: This data counts the number of crimes at two different geographic levels of London (LSOA and borough) by year, according to crime type.

Second Data source: The second source pf data is scraped from a Wikipedia page that contains the list of London boroughs.

Third Data source: The third data source is the <u>list of Neighbourhoods in the Royal</u>
Borough of Kingston upon Thames as found on a Wikipedia page

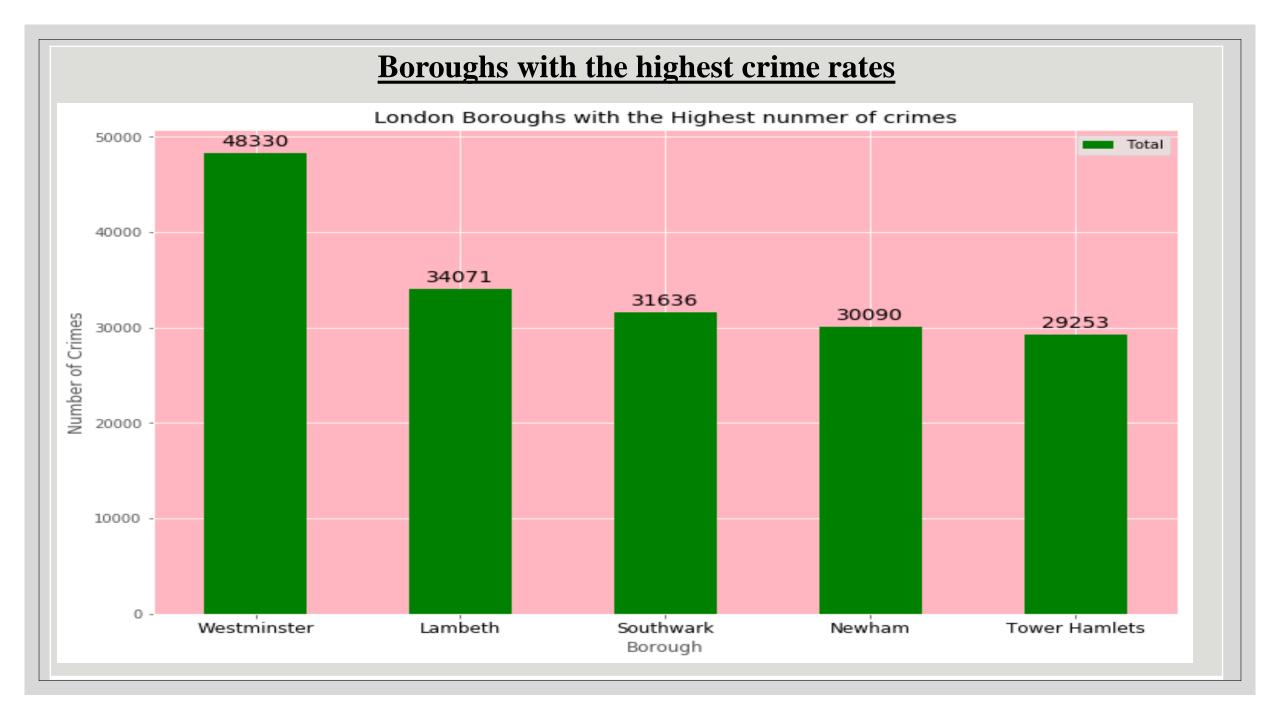
Data pre-processing:

- The data preparation for each of the three sources of data is done separately. From the London crime data, the crimes during the most recent year (2016) are only selected. The major categories of crime are pivoted to get the total crimes per borough as per the category.
- The second data is scraped from a Wikipedia page using the Beautiful Soup library in python. Using this library we can extract the data in the tabular format as shown in the website. This is important because we will be merging the two datasets together using the Borough names.
- The third source of data is acquired from the list of neighbourhoods in the safest borough on Wikipedia. This dataset is created from scratch, the pandas data frame is created with the names of the neighbourhoods and the name of the borough with the latitude and longitude.

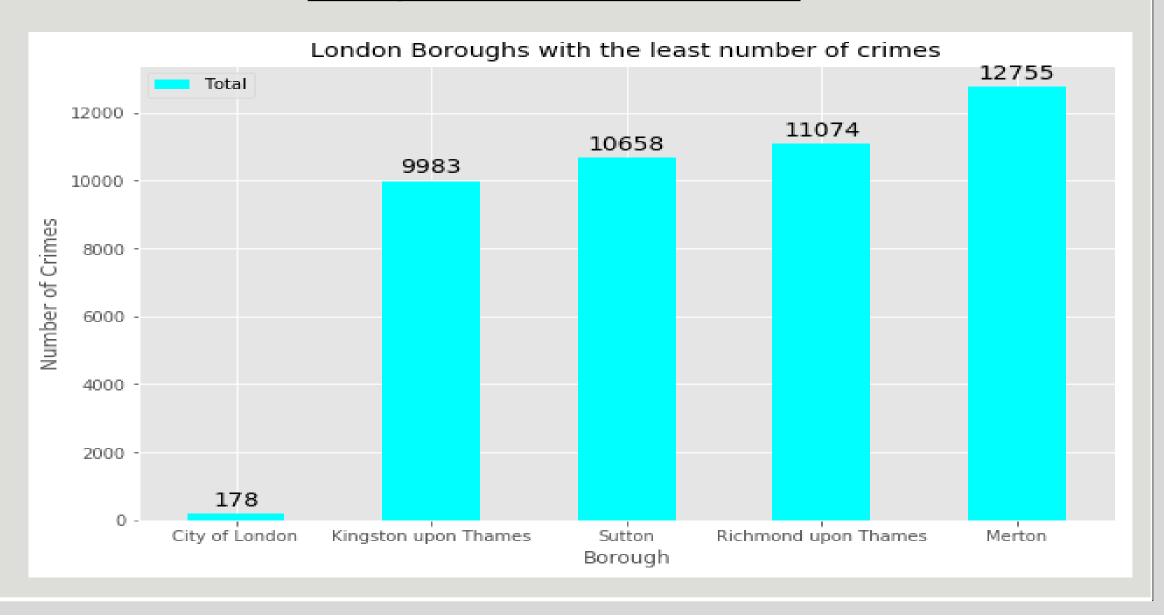
Methodology

The count for each of the major categories of crime returns the value 33 which is the number of London boroughs. 'Theft and Handling' is the highest reported crime during the year 2016 followed by 'Violence against the person', 'Criminal damage'. The lowest recorded crimes are 'Drugs', 'Robbery' and 'Other Notifiable offenses'

	Burglary	Criminal Damage	Drugs	Other Notifiable Offences	Robbery	Theft and Handling	Violence Against the Person	Total
count	33.000000	33.000000	33.000000	33.000000	33.000000	33.000000	33.000000	33.000000
mean	2069.242424	1941.545455	1179.212121	479.060606	682.666667	8913.121212	7041.848485	22306.696970
std	737.448644	625.207070	586.406416	223.298698	441.425366	4620.565054	2513.601551	8828.228749
min	2.000000	2.000000	10.000000	6.000000	4.000000	129.000000	25.000000	178.000000
25%	1531.000000	1650.000000	743.000000	378.000000	377.000000	5919.000000	5936.000000	16903.000000
50%	2071.000000	1989.000000	1063.000000	490.000000	599.000000	8925.000000	7409.000000	22730.000000
75%	2631.000000	2351.000000	1617.000000	551.000000	936.000000	10789.000000	8832.000000	27174.000000
max	3402.000000	3219.000000	2738.000000	1305.000000	1822.000000	27520.000000	10834.000000	48330.000000



Boroughs with the lowest crime rate



Neighbourhoods in Kingston upon Thames anworth Ham Kingson Vale + Wimbledon Teddington Common Wimbledon Colobe Copse Hill Bushy Park South Wimbledon Hampton Kingston upon Raynes Park Merton Park Thames New @ilden Molesey Hampton Morden Court Park West Barnes Berrounds Motsile Park Lower Morden Thames Ditton St Helier Long Ditton Lower Green 0 Esher-Worcester 0 Park Hinchley Wood North Cheam Esher Hook 3177 Stoneleigh West End West Ewell Sutton Claygate Ches gton Cheam Leaflet

Modelling:

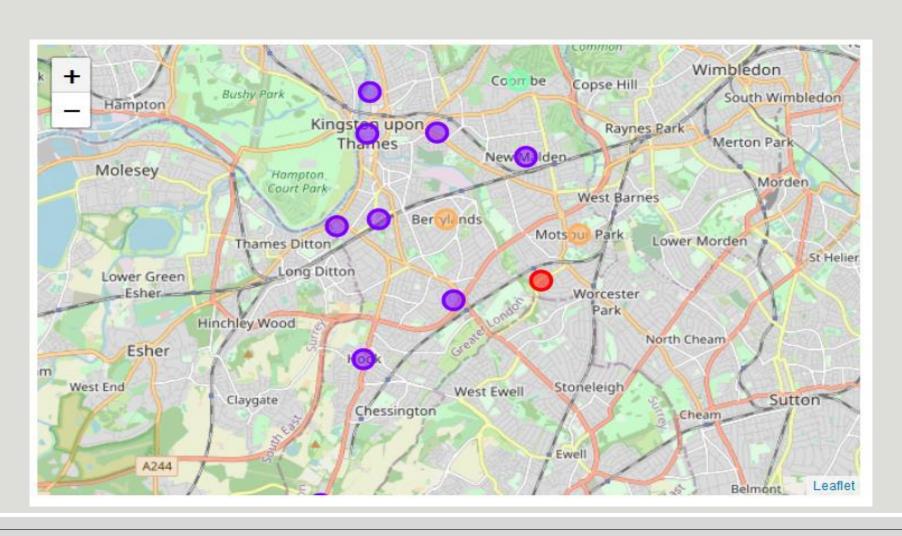
Using the final dataset containing the neighbourhoods in Kingston upon Thames along with the latitude and longitude, we can find all the venues within a 500 meter radius of each neighbourhood by connecting to the Foursquare API. This returns a json file containing all the venues in each neighbourhood which is converted to a pandas data frame. This data frame contains all the venues along with their coordinates and category.

Venue details of each Neighbourhood

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Berrylands	51.393781	-0.284802	Surbiton Racket & Fitness Club	51.392676	-0.290224	Gym / Fitness Center
1	Berrylands	51.393781	-0.284802	Alexandra Park	51.394230	-0.281206	Park
2	Berrylands	51.393781	-0.284802	K2 Bus Stop	51.392302	-0.281534	Bus Stop
3	Berrylands	51.393781	-0.284802	Kamala Food and Wine	51.397810	-0.284045	Wine Shop
4	Canbury	51.417499	-0.305553	Canbury Gardens	51.417409	-0.305300	Park

Results

Clustered neighbourhoods in the Borough of Kingston upon Thames



Cluster 1:

After running the K-means clustering we can access each cluster created to see which neighbourhoods were assigned to each of the five clusters. Looking into the neighbourhoods the first cluster.

	Neigh	borhood	Borough	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	1 0	ld Malden	Kingston upon Thames	51.382484	-0.25909	0	Pub	Food	Train Station	Department Store	Dessert Shop	Discount Store	Donut Shop	Electronics Store	English Restaurant	Falafel Restaurant

Cluster2:

The second cluster is the biggest cluster with 9 of the 15 neighbourhoods in the borough Kingston upon Thames. Upon closely examining these neighbourhoods we can see that the most common venues in these neighbourhoods are Restaurants, Pubs, Gym, Cafe, Supermarkets, and Grocery Store.

	Neighborhood	Borough	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	Canbury	Kingston upon Thames	51.417499	-0.305553	1	Pub	Hotel	Supermarket	Indian Restaurant	Fish & Chips Shop	Park	Plaza	Café	Shop & Service	Spa
4	Hook	Kingston upon Thames	51.367898	-0.307145	1	Indian Restaurant	Bakery	Supermarket	Fish & Chips Shop	Women's Store	Food	Dessert Shop	Discount Store	Donut Shop	Electronics Store
5	Kingston upon Thames	Kingston upon Thames	51.409627	-0.306262	1	Coffee Shop	Café	Clothing Store	Italian Restaurant	Pub	Bakery	Department Store	Hotel	Ice Cream Shop	Lebanese Restaurant
7	Malden Rushett	Kingston upon Thames	51.341052	-0.319076	1	Pub	Grocery Store	Restaurant	Garden Center	Fast Food Restaurant	Department Store	Dessert Shop	Discount Store	Donut Shop	Electronics Store
9	New Malden	Kingston upon Thames	51.405335	-0.263407	1	Gym	Indian Restaurant	Bar	Gastropub	Sushi Restaurant	Supermarket	Korean Restaurant	Fish & Chips Shop	Dessert Shop	Discount Store
10	Norbiton	Kingston upon Thames	51.409999	-0.287396	1	Indian Restaurant	Food	Italian Restaurant	Pub	Hotel	Breakfast Spot	Fried Chicken Joint	Hardware Store	Wine Shop	Japanese Restaurant
12	Seething Wells	Kingston upon Thames	51.392642	-0.314366	1	Indian Restaurant	Pub	Coffee Shop	Gym	Fast Food Restaurant	Playground	Pet Café	Restaurant	Chinese Restaurant	Café
13	Surbiton	Kingston upon Thames	51.393756	-0.303310	1	Coffee Shop	Pub	Grocery Store	Italian Restaurant	Pharmacy	Breakfast Spot	Gym / Fitness Center	Gastropub	French Restaurant	Farmers Market
14	Tolworth	Kingston upon Thames	51.378876	-0.282860	1	Grocery Store	Pharmacy	Bowling Alley	Pizza Place	Coffee Shop	Discount Store	Café	Restaurant	Sandwich Place	Bus Stop

Cluster-3:

The third cluster has one neighbourhood which consists of Venues such as Grocery shops, Bars, Electronics Store, Women's Store, and Fish & Chips Shop.

	Neighborhood	Borough 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
6	Kingston Vale	Kingston upon Thames 51.43185	-0.258138	2	Grocery Store	Bar	Sandwich Place	Soccer Field	Women's Store	Fish & Chips Shop	Dessert Shop	Discount Store	Donut Shop	Electronics Store

Cluster4:

The fourth cluster has one neighbourhood which consists of Venues such as Dessert Shop, Tea Room, Electronics Store, Women's Store, and Discount Store.

	Neighborhood	Borough Latitu	de Lon	gitude	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
3	Coombe	Kingston upon Thames 51.419	45 -0.2	265398	3	Tea Room	Women's Store	French Restaurant	Dessert Shop	Discount Store	Donut Shop	Electronics Store	English Restaurant	Falafel Restaurant	Farmers Market

Cluster5:

The fifth cluster has two neighbourhoods in it, these neighbourhoods have common venues such as Parks, Gym/Fitness centres, Bus Stops, Restaurants, Electronics Stores and Soccer fields etc.

	Neighborhood	Borough	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		10th Most Common Venue
C	Berrylands	Kingston upon Thames	51.393781	-0.284802	4	Wine Shop	Gym / Fitness Center	Park	Bus Stop	Food	Discount Store	Donut Shop	Electronics Store	English Restaurant	Falafel Restaurant
8	Motspur Park	Kingston upon Thames	51.390985	-0.248898	4	Gym	Park	Bus Stop	Soccer Field	Women's Store	Fast Food Restaurant	Dessert Shop	Discount Store	Donut Shop	Electronics Store

Discussion

- The aim of this project is to help people who want to relocate to the safest borough in London, expats can chose the neighbourhoods to which they want to relocate based on the most common venues in it.
- For example if a person is looking for a neighbourhoods with good connectivity and public transportation we can see that Clusters 1,2 and 5 have Train stations and Bus stops.
- If a person is looking for a neighbourhood with stores and restaurants in a close proximity then the neighbourhoods in the third cluster is suitable.
- For a family I feel that the neighbourhoods in Cluster 5 are more suitable dues to the common venues in that cluster, these neighbourhoods have common venues such as Parks, Gym/Fitness centres, Bus Stops, Restaurants, Electronics Stores and Soccer fields which is ideal for a family.

Conclusion

- This project helps a person get a better understanding of the neighbourhoods with respect to the most common venues in that neighbourhoods.
- It is always helpful to make use of technology to stay one step ahead i.e. finding out more about places before moving into a neighbourhoods. We have just taken safety as a primary concern to shortlist the borough of London.
- The future of this project includes taking other factors such as cost of living in the areas into consideration to shortlist the borough based on safety and a predefined budget.