



# **Coursera Data Science Final Project**

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## Business Problem

An individual wishes to move to London, however he has never lived in a large city before and wishes to live in a quieter borough of London. He is a freelance writer and likes to write in local coffee shops, thus it is important he lives in an area with lots of coffee shops to choose from. This project will be focus on helping to find the best borough of London for the individual to live in.



# Data

The data used for this project was scraped from: [https://en.wikipedia.org/wiki/List\\_of\\_London\\_boroughs](https://en.wikipedia.org/wiki/List_of_London_boroughs).

It was then prepared using pandas in python to produce the dataframe shown on the next slide.

	London Boroughs				Greater London Authorities				
	Borough	Latitude	Longitude	Density	Borough	Latitude	Longitude	Density	
0	Barking and Dagenham	51.5607	0.1557	13952.0	16	Hounslow	51.4746	-0.3680	12143.0
1	Barnet	51.6252	-0.1517	11021.0	17	Islington	51.5416	-0.1022	37573.0
2	Bexley	51.4549	0.1505	10123.0	18	Kensington and Chelsea	51.5020	-0.1947	33247.0
3	Brent	51.5588	-0.2817	18998.0	19	Kingston upon Thames	51.4085	-0.3064	11599.0
4	Bromley	51.4039	0.0198	5484.0	20	Lambeth	51.4607	-0.1163	30332.0
5	Camden	51.5290	-0.1255	27348.0	21	Lewisham	51.4452	-0.0209	21089.0
6	Croydon	51.3714	-0.0977	11157.0	22	Merton	51.4014	-0.1958	13996.0
7	Ealing	51.5130	-0.3089	15975.0	23	Newham	51.5077	0.0469	22763.0
8	Enfield	51.6538	-0.0799	10098.0	24	Redbridge	51.5590	0.0741	13236.0
9	Greenwich	51.4892	0.0648	14442.0	25	Richmond upon Thames	51.4479	-0.3260	8632.0
10	Hackney	51.5450	-0.0553	34970.0	26	Southwark	51.5035	-0.0804	26792.0
11	Hammersmith and Fulham	51.4927	-0.2339	28228.0	27	Sutton	51.3618	-0.1945	11572.0
12	Haringey	51.6000	-0.1119	23064.0	28	Tower Hamlets	51.5099	-0.0059	35765.0
13	Harrow	51.5898	-0.3346	12487.0	29	Waltham Forest	51.5908	-0.0134	17732.0
14	Havering	51.5812	0.1837	5584.0	30	Wandsworth	51.4567	-0.1910	23471.0
15	Hillingdon	51.5441	-0.4760	6421.0	31	Westminster	51.4973	-0.1372	27363.0



# Methodology

The individual has two criteria for choosing a borough in London: he wishes to live in a 'quiet' area and be close to multiple coffee shops.

In order to identify which boroughs are 'quiet', we will find the population density by dividing the population of the borough by its area in square miles. This will give us the population per square mile.

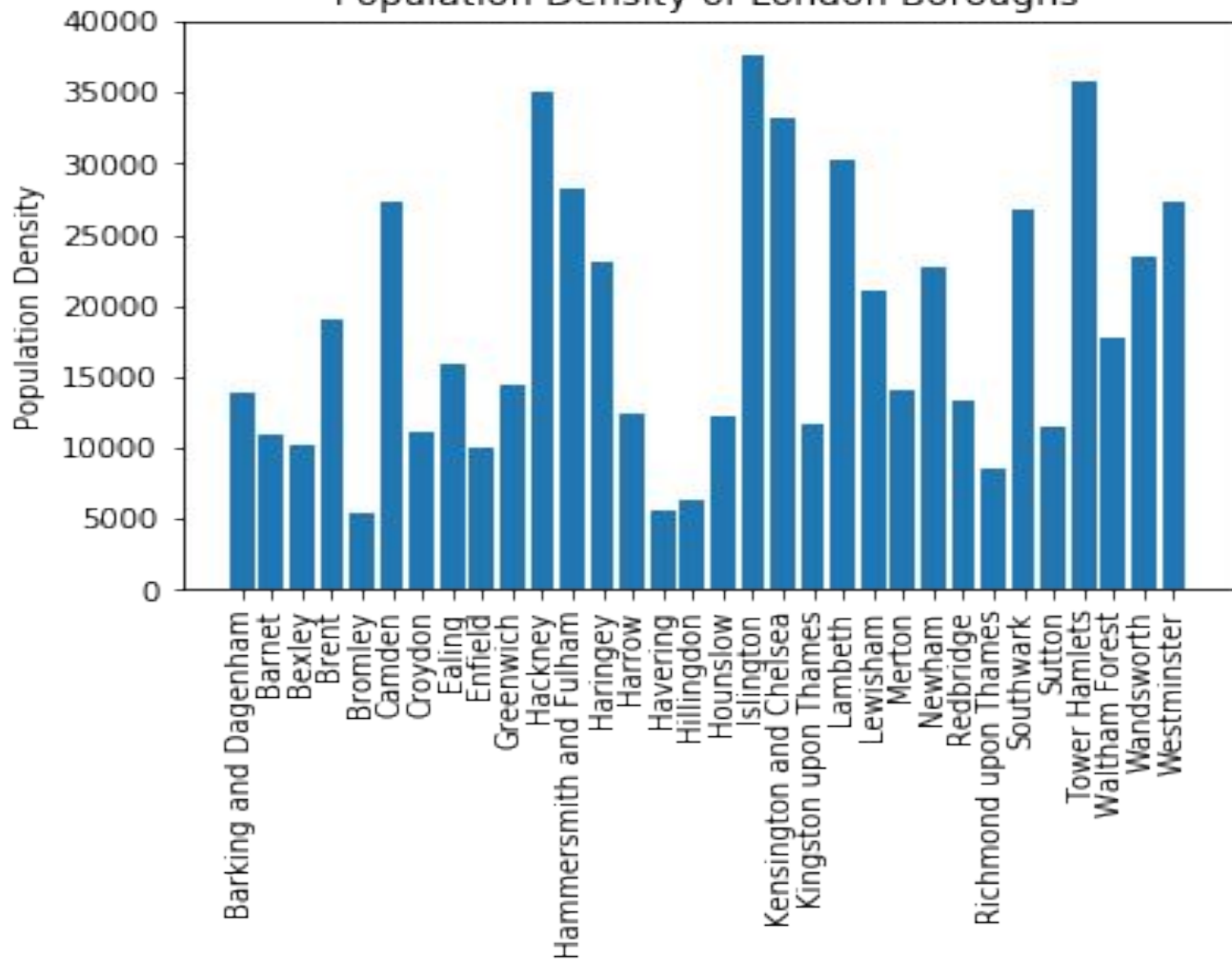
In order to ensure the borough has multiple coffee shops, we will use the Foursquare API to find all the coffee shops within a 1km radius of the centre of the borough. To do this we will use the coordinates found in our dataframe.




# Population Density

On the next slide we see a bar chart showing the population density of each London borough.

Population Density of London Boroughs





For this project we will consider a borough with population density below 10,000 people per square mile to be 'quiet'. Below we see the boroughs that fit this criteria.

	<b>Borough</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Density</b>
<b>4</b>	Bromley	51.4039	0.0198	5484.0
<b>14</b>	Havering	51.5812	0.1837	5584.0
<b>15</b>	Hillingdon	51.5441	-0.4760	6421.0
<b>25</b>	Richmond upon Thames	51.4479	-0.3260	8632.0

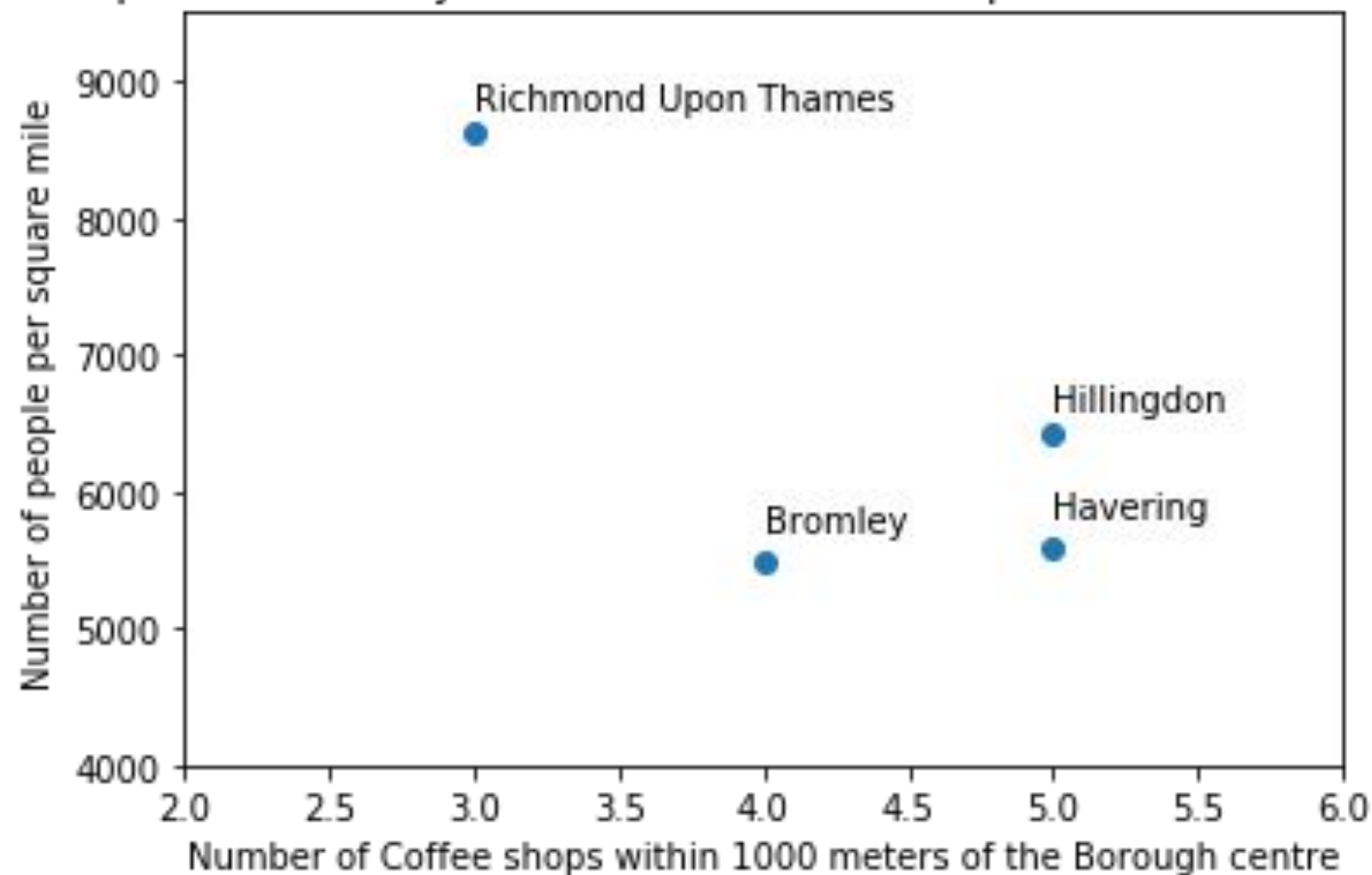





## Local Coffee Shops

Next we will investigate which of these boroughs meet the criteria of having lots of coffee shops to choose from. On the next slide we see the total number of coffee shops within 1km of the borough centre plotted against the population density. The boroughs that are 'quiet' and have a low population density appear in the lower right portion of the scatter plot.

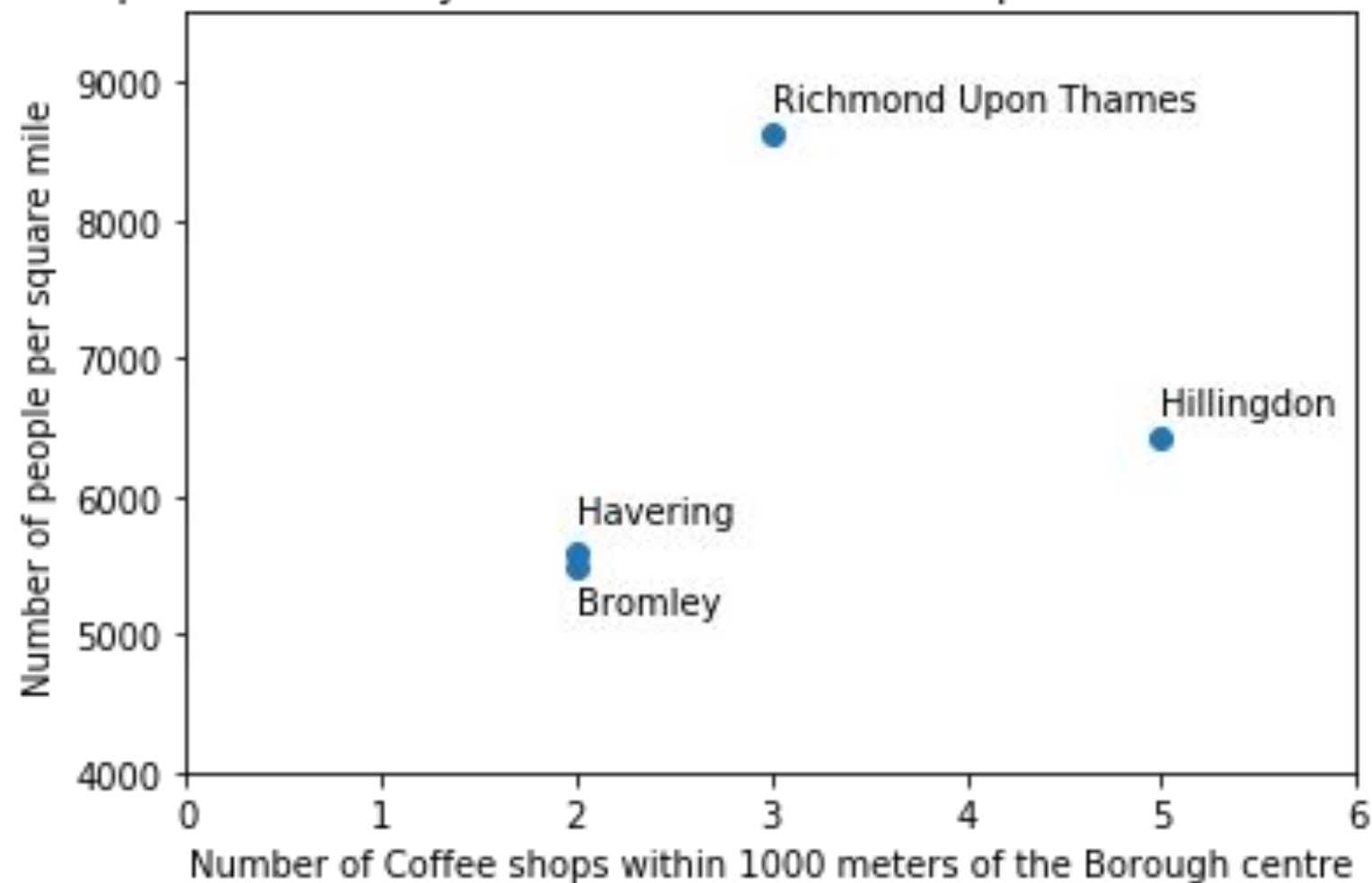
Population Density vs Number of Coffee shops in London Boroughs





Another factor to consider is should coffee shops in the same chain (e.g Starbucks) count multiple times in the quantity of coffee shops. Below we investigate how the data looks if we remove these duplicates. On the next slide we see the number distinct of coffee shops within 1km of the borough centre plotted against the population density

Population Density vs Number of Coffee shops in London Boroughs





## Conclusion

If we go by the definition of total number of coffee shops, then we see Havering is the most appropriate borough. This is closely followed by Hillingdon and Bromley. Therefore, we would recommend all three boroughs to the individual, this would allow him to take into account factors not considered in this report and choose his preferred borough.

Looking at the results for when multiple coffee shops of the same chain are counted once, we see Hillingdon is the most appropriate borough. However, this time, it is not closely followed by any other borough. Because of this we would recommend only Hillingdon to the individual.

Should none of the boroughs be appropriate for him, we could increase the cut-off point for population density (ie greater than 10,000 per square mile). This would allow more boroughs to be considered and, potentially, a different conclusion to be made.