



Location for new Retail Business

London Borough Analysis

1. Description of the problem and a discussion of the background.

London is one of the biggest cities in Europe. Population 7.9 million on area 592.43 sq./mi. This city is attracting domestic and international investors. Analysis is for customers who planning open retails store and would like to know area better. I am planning to provide data for 32 London Boroughs about: area, population, earnings, domestic visitors spend, and oversea visitor spend. I will also count correlation between them. In second part I will get information about venues and categories. Then I will select venues related to retail. Finally, I will form borough cluster for retail venue.

2. Description of the data and how it will be used to solve the problem.

Scraping London Borough data from Wikipedia website https://en.wikipedia.org/wiki/List_of_London_boroughs Obtain csv. File of earnings & tourist data from government website <https://data.london.gov.uk/dataset/tourism-spend-estimates> <https://data.london.gov.uk/dataset/earnings-workplace-borough> Problem: unable to find specific borough latitude and longitude file. Problem solution create own csv. File on base of Geo names organisation website <https://www.geonames.org/> Collecting information about Venus using Foursquare API Create locations and clusters map

3. Methodology

Data Cleaning, I used Beautiful Soup library in order to scrap data from Wikipedia Another dates were obtained from UK government page by using Panda to read the csv file. I standardized and merged data to below format.

	Borough	Area (sq mi)	Population 2013	Earnings 2019	Overseas fif £min.	Domestic fif £min.	Day fif £min.
0	Barking and Dagenham	13.93	194352	20980.0	47	10	63
1	Barnet	33.49	369088	21661.0	155	31	392
2	Bexley	23.38	236687	21440.0	87	19	134
3	Brent	16.70	317264	22818.0	125	26	223
4	Bromley	57.97	317899	0.0	128	23	263
5	Camden	8.40	229719	29315.0	591	163	771
6	Croydon	33.41	372752	26094.0	162	31	261
7	Ealing	21.44	342494	22824.0	171	35	361
8	Enfield	31.74	320524	21720.0	130	29	157
9	Greenwich	18.28	264008	22689.0	89	27	213
10	Hackney	7.36	257379	24990.0	73	17	129

Summary:

London has 32 Borough

The biggest population: 1. Barnet, 2. Croydon, 3. Ealing

The highest income: 1. Tower Hamlets, 2. Westminster, 3. Islington

The highest domestic spend by visitors: 1 Westminster, 2. Kingston and Chelsea, 3. Camden

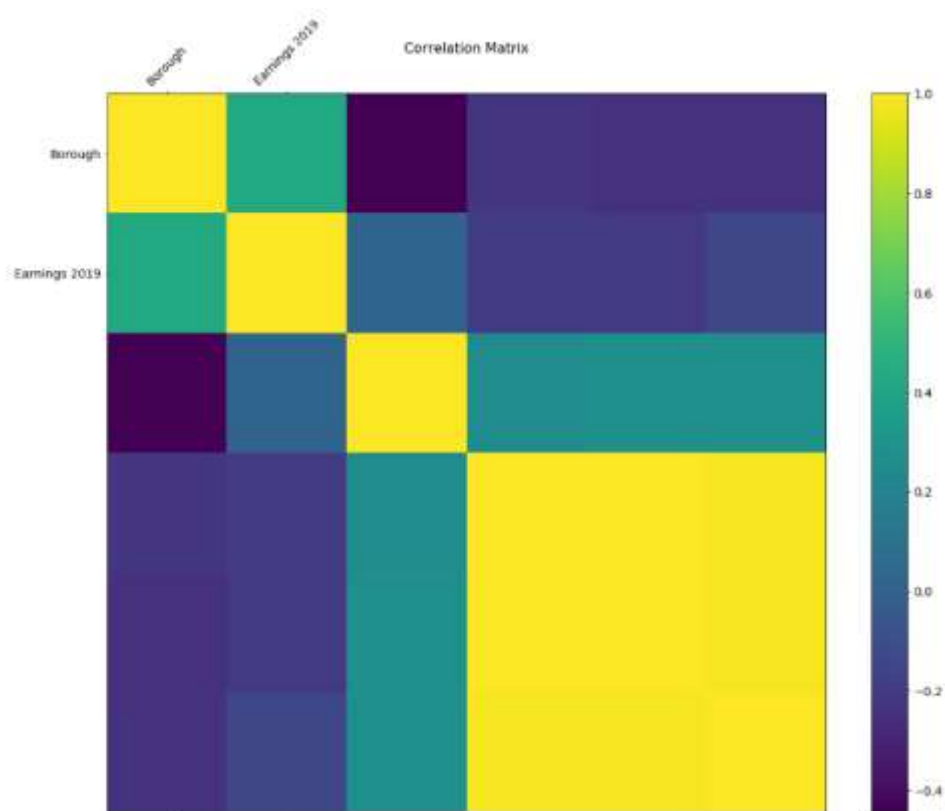
The highest overseas spend by visitors: 1. Westminster, 2. Kingston and Chelsea. 3. Camden

I counted P-value.

Only Earning 2019 has P-value < 0.05

	Area (sq mi)	Population 2013	Earnings 2019	Overseas f/f £mln.	Domestic f/f £mln.	Day f/f £mln.
Area (sq mi)	1.000000	0.433163	-0.444858	-0.218030	-0.240641	-0.235366
Population 2013	0.433163	1.000000	0.021266	-0.188983	-0.196796	-0.137426
Earnings 2019	-0.444858	0.021266	1.000000	0.259659	0.277895	0.282601
Overseas f/f £mln.	-0.218030	-0.188983	0.259659	1.000000	0.998735	0.979242
Domestic f/f £mln.	-0.240641	-0.196796	0.277895	0.998735	1.000000	0.979022
Day f/f £mln.	-0.235366	-0.137426	0.282601	0.979242	0.979022	1.000000

I used matplotlib library to visualised relationship between variables.

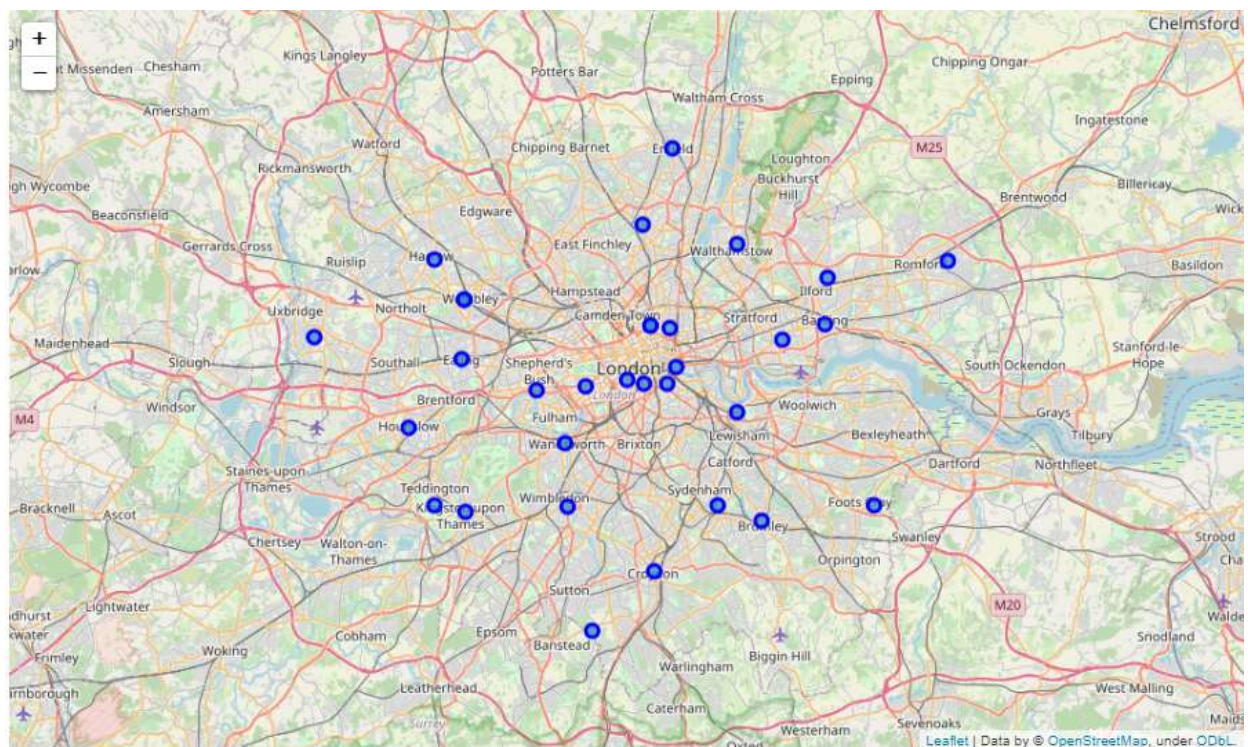


Getting coordinates & Visualise

I created specific csv file with London Borough using information from Geo names organisation website.

	Borough	Latitude	Longitude
0	Barking and Dagenham	51.5363	0.0815
1	Barnet	51.5523	-0.3026
2	Bexley	51.4167	0.1333
3	Brent	51.5523	-0.3026
4	Bromley	51.4057	0.0144

I visualised 32 London boroughs on map using folium library.



I Utilized the Foursquare API to explore the borough's and segment them. I create a new data frame called London venues, then checked how many venues were returned for each borough.

I restricted venues analysis to retail store by crated new London freq. data

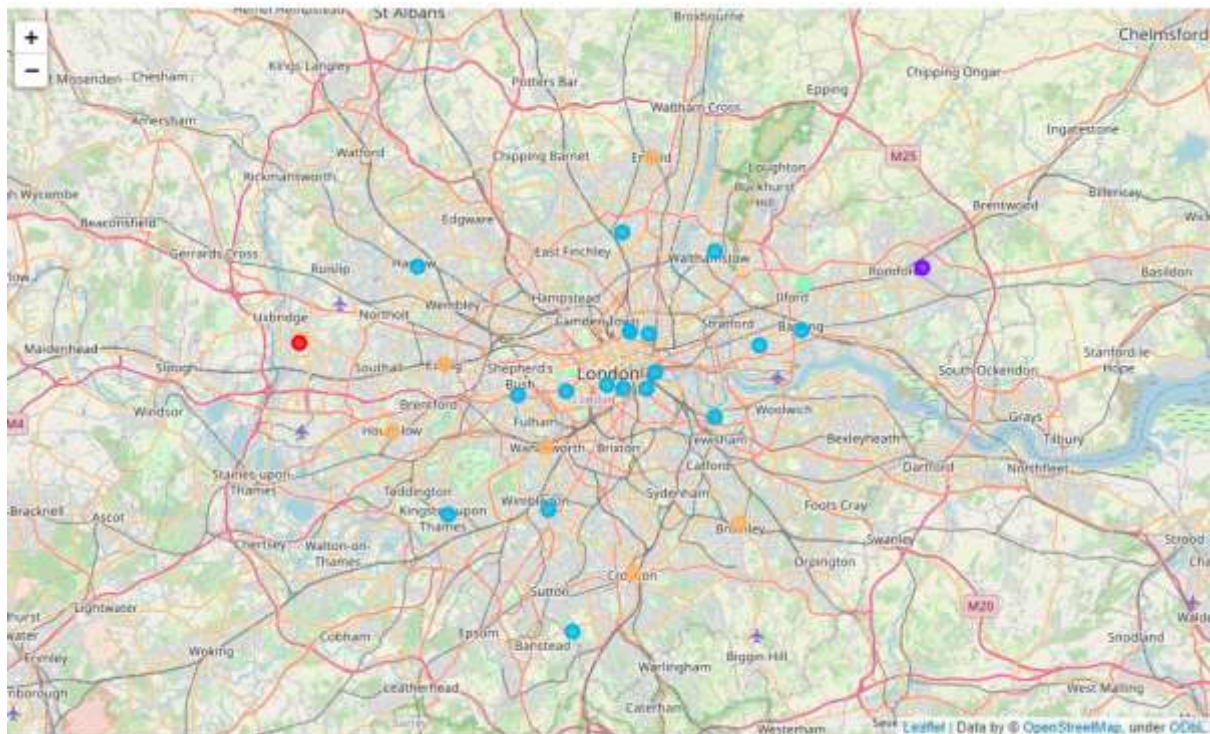
	Borough	Boutique	Clothing Store	Convenience Store	Department Store	Fabric Shop	Lounge	Shoe Store	Shopping Mall	Souvenir Shop	Sporting Goods Shop	Thrift / Vintage Store	Womens Store
0	Barking and Dagenham	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
1	Bromley	0.000000	0.129032	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	Camden	0.021277	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.021277	0.000000
3	Croydon	0.000000	0.083333	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
4	Ealing	0.000000	0.100000	0.000000	0.025000	0.00	0.000000	0.000000	0.025000	0.000000	0.000000	0.000000	0.000000
5	Enfield	0.000000	0.104167	0.000000	0.041667	0.00	0.000000	0.026033	0.041667	0.000000	0.026033	0.000000	0.026033
6	Greenwich	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.100000	0.000000
7	Hackney	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
8	Hammersmith and Fulham	0.000000	0.043478	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
9	Hampsey	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
10	Harrow	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
11	Hillingdon	0.000000	0.000000	0.000000	0.000000	0.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
12	Hounslow	0.000000	0.000000	0.045455	0.045455	0.00	0.000000	0.000000	0.000000	0.000000	0.045455	0.000000	0.045455
13	Islington	0.021277	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.021277	0.000000
14	Kensington and Chelsea	0.000000	0.000000	0.000000	0.000000	0.00	0.023256	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
15	Kingston upon Thames	0.000000	0.043478	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
16	Lambeth	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
17	Merton	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
18	Newham	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
19	Redbridge	0.000000	0.000000	0.000000	0.000000	0.00	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
20	Southwark	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
21	Sutton	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
22	Tower Hamlets	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.142857	0.000000	0.000000	0.000000
23	Waltham Forest	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
24	Wandsworth	0.000000	0.111111	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25	Walthamstow	0.000000	0.000000	0.000000	0.000000	0.00	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Analyse Each Borough

creating the new data frame and display the top 10 venues for each borough

	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
0	Barking and Dagenham	51.5363	0.0815	1.0	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
4	Bromley	51.4057	0.0144	3.0	Clothing Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
5	Camden	51.5350	-0.1037	1.0	Thrift / Vintage Store	Boutique	Womens Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
6	Croydon	51.3724	-0.1004	3.0	Clothing Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
7	Ealing	51.5134	-0.3042	3.0	Clothing Store	Shopping Mall	Department Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shoe Store	Lounge	Fabric Shop

I visualizing the resulting clusters using folium library



The blue colour means cluster 3

Examine Clusters

Cluster 1

	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
15	Hillingdon	51.52758	-0.46078	0	Fabric Shop	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Department Store	Convenience Store

Cluster 2

	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
14	Havering	51.5779	0.2121	1	Shoe Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Lounge	Fabric Shop	Department Store	Convenience Store

Cluster 3

	Borough	Latitude	Longitude	Cluster Labels	Common Venue	Common Venue	Common Venue	Common Venue	Common Venue	Common Venue	Common Venue	Common Venue	Common Venue	Common Venue
0	Barking and Dagenham	51.53630	0.08150	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
5	Camden	51.53500	-0.10370	2	Thrift / Vintage Store	Boutique	Womens Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
9	Greenwich	51.47785	-0.01176	2	Thrift / Vintage Store	Womens Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
10	Hackney	51.53330	-0.08330	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
11	Hammersmith and Fulham	51.49290	-0.22580	2	Clothing Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
12	Haringey	51.60160	-0.11290	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
13	Harrow	51.57880	-0.33380	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
17	Islington	51.53500	-0.10370	2	Thrift / Vintage Store	Boutique	Womens Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
18	Kensington and Chelsea	51.49500	-0.17360	2	Lounge	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Fabric Shop	Department Store	Convenience Store
19	Kingston upon Thames	51.41230	-0.30040	2	Clothing Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
20	Lambeth	51.49635	-0.11152	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
22	Merton	51.41570	-0.19180	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
23	Newham	51.52550	0.03520	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
26	Southwark	51.49660	-0.08600	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
27	Sutton	51.33330	-0.16670	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
28	Tower Hamlets	51.50823	-0.07630	2	Souvenir Shop	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
29	Waltham Forest	51.58860	-0.01180	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store
31	Westminster	51.49937	-0.12846	2	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store	Convenience Store

Cluster 4

	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
24	Redbridge	51.5667	0.0833	3	Lounge	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Fabric Shop	Department Store	Convenience Store

Cluster 5

	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
4	Bromley	51.4057	0.0144	4	Clothing Store	Lingerie Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	
6	Croydon	51.3724	-0.1004	4	Clothing Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store
7	Ealing	51.5134	-0.3042	4	Clothing Store	Shopping Mall	Department Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shoe Store	Lounge	
8	Enfield	51.6521	-0.0815	4	Clothing Store	Department Store	Womens Store	Sporting Goods Shop	Shopping Mall	Shoe Store	Thrift / Vintage Store	Souvenir Shop	Lounge	
16	Hounslow	51.4676	-0.3618	4	Clothing Store	Womens Store	Sporting Goods Shop	Department Store	Convenience Store	Thrift / Vintage Store	Souvenir Shop	Shopping Mall	Shoe Store	Lounge
30	Wandsworth	51.4573	-0.1949	4	Clothing Store	Womens Store	Thrift / Vintage Store	Sporting Goods Shop	Souvenir Shop	Shopping Mall	Shoe Store	Lounge	Fabric Shop	Department Store

4. Discussion

The goal was to provide information about location for new business. Comparing results of population, area, earning and visitors spend we obtain 3 localizations: Westminster, Kingston and Chelsea, Camden. Analyse our biggest cluster 3 all those localizations are included. The most popular venues are Women's Store, Clothing store and Vintage store. On the other hand, Cluster 5 may be suitable for the business as well. The most popular venues are Clothing store, Shopping Mall, Department store

5. Conclusion

This project concludes that 3 London Borough with the highest Income are potentially good for new business location

Tower Hamlet

Westminster

Islington

I have added that 2 other boroughs represent the highest spend by internal and external visitors. They are in cluster 3

Kingston and Chelsea

Camden