Choosing the Best Borough to set up a Restaurant in London

BsC . Francisco Guerrero

How?

- Imagine that you are a businessman and you want to set up a restaurant in London .Altough money is not considered as a problem , you should be cautious in order to not lose your invesment and time

So

- You read newspapers , and digital media and you have heard this new wave of machine learning , artificial intelligence and open source

As a result

- You figure that all the exploratory analysis can be done without moving from your chair , and using the internet and following a certain criteria

Criteria

- Crime statistics
- Restaurants number
- Population
- Average Wage
-

Tools

- Python 3.6
- Numpy
- Pandas
- Folium
- Beautiful Soup

Data

- The data was collected from different sources , for that I used distinct tools because it was untidy and messy

Population

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	North London Business Park, Oakleigh Road South	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

The data was collected from wikipedia it has the above form, Beautiful Soup was needed for interpret it

Restaurants

- London’s public databases offer the real number of restaurants,pubs and takeaways for 2001-2017 as an excel table, it shows the number of each per Borough ,

Restaurant number in xls format

Area code	Area name	Year																
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
E12000007	**London**	**5,455**	**5,525**	**5,540**	**5,575**	**5,915**	**5,940**	**6,175**	**5,985**	**5,910**	**6,175**	**6,210**	**6,655**	**6,715**	**7,035**	**7,515**	**7,745**	**7,990**
E09000001	City of London	180	190	190	175	180	170	205	185	180	195	190	205	230	255	270	270	295
E09000002	Barking and Dagenham	30	30	30	35	35	35	35	35	30	30	30	40	40	35	45	40	35
E09000003	Barnet	205	195	200	200	200	200	205	195	210	215	205	235	250	240	255	245	270
E09000004	Bexley	85	80	75	80	85	95	95	95	90	95	95	105	105	105	100	110	110
E09000005	Brent	120	125	130	120	125	145	155	140	145	150	155	165	170	165	185	200	190
E09000006	Bromley	145	150	150	155	165	175	165	165	170	175	160	180	185	180	180	190	200
E09000007	Camden	445	425	405	405	445	430	440	415	410	440	445	465	480	510	565	570	600
E09000008	Croydon	145	150	160	155	165	170	175	160	160	155	170	165	155	155	175	185	205
E09000009	Ealing	145	155	160	155	155	150	165	165	160	165	160	175	165	175	190	190	190
E09000010	Enfield	120	115	115	125	115	130	135	130	125	130	140	135	125	135	155	155	150
E09000011	Greenwich	70	75	65	75	70	75	90	95	90	100	100	120	125	120	125	140	145
E09000012	Hackney	95	100	100	110	110	120	120	130	120	125	140	160	165	180	230	245	285
E09000013	Hammersmith and Fulham	175	165	180	195	200	205	205	200	195	215	230	240	225	255	260	265	270
E09000014	Haringey	105	100	105	105	120	120	120	120	115	115	110	120	120	130	160	175	175
E09000015	Harrow	100	100	110	110	125	125	135	130	135	135	145	150	140	155	155	155	150
E09000016	Havering	75	75	80	75	95	90	90	105	110	115	100	105	105	110	125	125	130
E09000017	Hillingdon	130	130	145	130	140	130	135	130	125	140	135	150	150	160	160	155	165
E09000018	Hounslow	90	90	85	90	105	110	115	120	115	115	110	125	125	130	145	140	150
E09000019	Islington	205	210	210	215	235	245	250	245	245	245	250	270	270	280	320	340	370
E09000020	Kensington and Chelsea	370	380	365	370	375	350	365	330	345	375	360	365	375	375	385	400	400
E09000021	Kingston upon Thames	90	90	95	90	100	110	110	110	110	105	100	115	105	110	115	120	120
E09000022	Lambeth	160	170	175	175	185	185	190	195	175	180	180	210	215	255	260	285	295
E09000023	Lewisham	70	80	80	80	90	90	90	85	90	90	90	105	95	110	120	140	130
E09000024	Merton	105	100	100	105	115	110	115	100	100	105	100	120	115	105	115	115	120
E09000025	Newham	45	55	50	60	75	85	85	80	75	80	75	95	110	110	120	120	125
E09000026	Redbridge	95	90	85	100	105	110	115	115	115	110	115	120	110	125	120	130	130
E09000027	Richmond upon Thames	175	195	180	195	205	190	180	175	175	195	180	195	190	190	200	185	195
E09000028	Southwark	130	135	145	140	165	175	180	185	180	180	185	190	215	230	265	270	295
E09000029	Sutton	85	80	80	75	80	80	90	95	95	85	80	85	85	90	95	90	95
E09000030	Tower Hamlets	135	160	165	175	175	180	200	195	210	215	215	245	260	285	300	320	320
E09000031	Waltham Forest	75	70	65	65	85	80	85	80	65	75	80	95	95	95	115	125	135
E09000032	Wandsworth	210	220	215	220	235	245	240	225	230	245	240	235	240	285	270	280	275
E09000033	Westminster	1,055	1,045	1,030	1,015	1,065	1,030	1,095	1,050	1,005	1,085	1,130	1,170	1,170	1,195	1,230	1,260	1,270

Crime statistics

- London open data has collected the incidences of crime types per LSOA in 9 years (2008-2016). It’s a medium size file (~1 gb) and contains 13 million records

Crime database structure

6	E01004563	Wandsworth	Robbery	Personal Property	0	2008	6
7	E01001320	Ealing	Theft and Handling	Other Theft	0	2012	5
8	E01001342	Ealing	Violence Against the Person	Offensive Weapon	0	2010	7
9	E01002633	Hounslow	Robbery	Personal Property	0	2013	4
10	E01003496	Newham	Criminal Damage	Criminal Damage To Other Building	0	2013	9
11	E01004177	Sutton	Theft and Handling	Theft/Taking of Pedal Cycle	1	2016	8
12	E01001985	Haringey	Theft and Handling	Motor Vehicle Interference & Tampering	0	2013	12
13	E01003076	Lambeth	Violence Against the Person	Other violence	0	2015	4
14	E01003852	Richmond upon Thames	Robbery	Personal Property	0	2014	1
15	E01004547	Wandsworth	Violence Against the Person	Offensive Weapon	0	2011	10
16	E01002398	Hillingdon	Theft and Handling	Theft/Taking Of Motor Vehicle	0	2016	2
17	E01002358	Havering	Violence Against the Person	Wounding/GBH	0	2012	2

Tidying the data

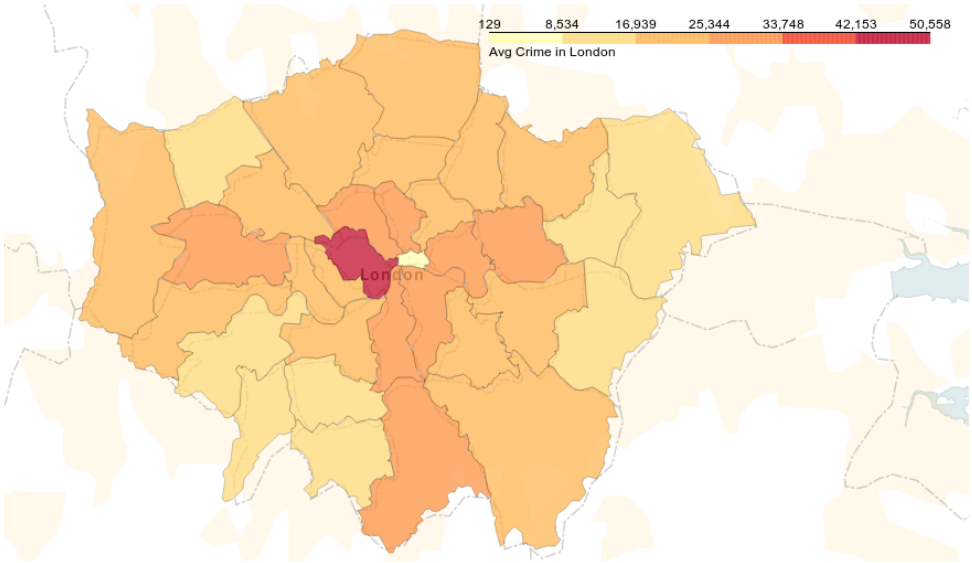
- In order to work with the data , we need to apply some processing to it.
- The intended objective is to set all the crime ocurrences , restaurants , populations in boroughs

Tyding the Data

Crime distribution in London

	borough	count
0	Barking and Dagenham	16605
1	Barnet	23576
2	Bexley	12681
3	Brent	25283
4	Bromley	20483
5	Camden	30571
6	City of London	86
7	Croydon	28921
8	Ealing	27951
9	Enfield	21542
10	Greenwich	20174
11	Hackney	24124
12	Hammersmith and Fulham	20584
13	Haringey	23696
14	Harrow	12983
15	Havering	15438
16	Hillingdon	23297
17	Hounslow	20752
18	Islington	25587
19	Kensington and Chelsea	19109

Average crime per borough



However

- It’s very important to note that not all places have the same number of population , so in order to find the most dangerous places we’ll use Crime Density

Crime density

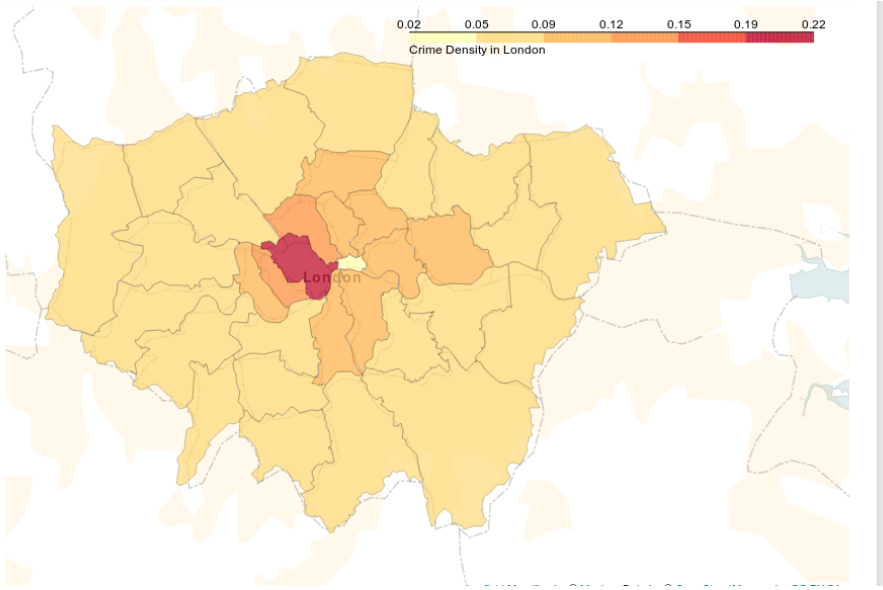
- I’ ve defined crime density as the Avg(Crime per borough) for this i’ve scraped population from wikipedia table using beautiful soup.

Result

	Borough	Pop	Latitude	Longitude	count
0	Barking and Dagenham	194,352	51.5607	0.1557	16605
1	Barnet	369,088	51.6252	-0.1517	23576
2	Bexley	236,687	51.4549	0.1505	12681
3	Brent	317,264	51.5588	-0.2817	25283
4	Bromley	317,899	51.4039	0.0198	20483

Crime Density

This shows some interesting results , as more farthest from the centre crime disminishes



Restaurants

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	Borough	2001	2002.0	2003.0	2004.0	2005.0	2006.0	2007.0	2008.0	2009.0	2010.0	2011.0	2012.0	2013.0	2014.0	2015.0	2016.0	2017.0
0	Barking and Dagenham	90	95.0	95.0	90.0	90.0	90.0	85.0	95.0	95.0	95.0	95.0	95.0	95.0	105.0	125.0	130.0	135.0
1	Barnet	120	115.0	120.0	130.0	135.0	140.0	120.0	135.0	140.0	135.0	135.0	140.0	145.0	155.0	165.0	180.0	180.0
2	Bexley	105	115.0	105.0	105.0	115.0	115.0	120.0	100.0	105.0	100.0	100.0	110.0	100.0	105.0	125.0	135.0	125.0
3	Brent	120	120.0	120.0	145.0	150.0	160.0	145.0	135.0	135.0	135.0	125.0	140.0	125.0	135.0	160.0	170.0	155.0
4	Bromley	115	125.0	130.0	125.0	130.0	135.0	145.0	150.0	140.0	140.0	130.0	140.0	140.0	140.0	170.0	180.0	175.0

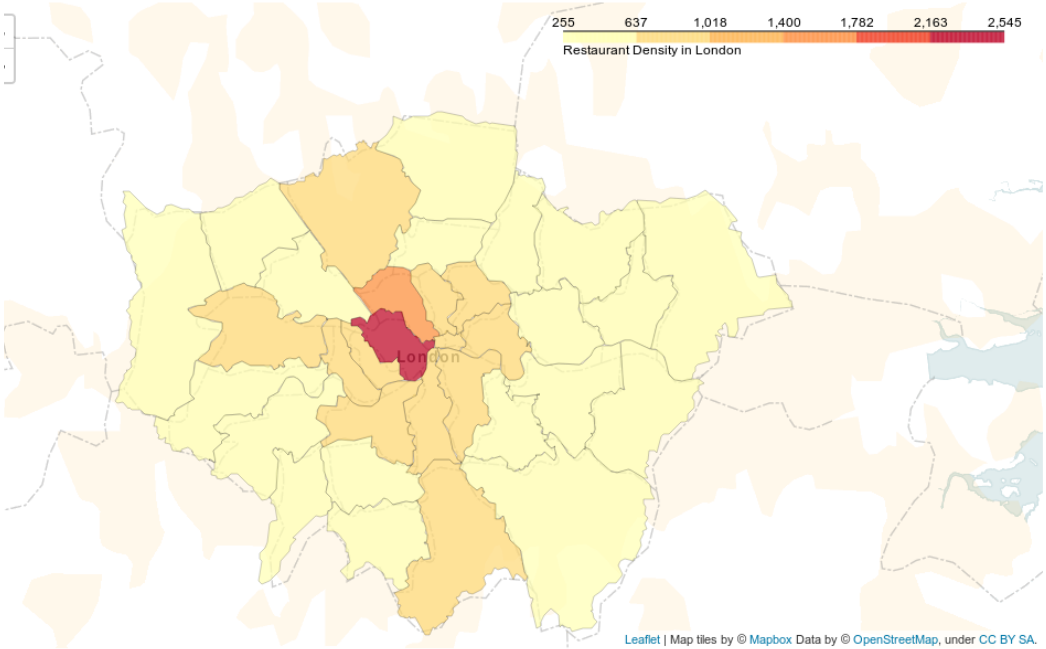
This the head of the ordered data from restaurants . We'll use for the initial analysis 2017 data

Merging Data

	Borough	Population	Latitude	Longitude	Crime_count	Crime_Density	Unlicensed	Licensed	Takeaway	Pubs	TotalRes	Rdensity	ULdensity
0	Barking and Dagenham	194,352	51.5607	0.1557	16605	0.085438	65.0	35.0	135.0	20.0	255.0	0.001312	0.000515
1	Barnet	369,088	51.6252	-0.1517	23576	0.063876	215.0	270.0	180.0	80.0	745.0	0.002018	0.001314
2	Bexley	236,687	51.4549	0.1505	12681	0.053577	85.0	110.0	125.0	95.0	415.0	0.001753	0.000824
3	Brent	317,264	51.5588	-0.2817	25283	0.079691	170.0	190.0	155.0	70.0	585.0	0.001844	0.001135
4	Bromley	317,899	51.4039	0.0198	20483	0.064432	150.0	200.0	175.0	95.0	620.0	0.001950	0.001101

This is the essential dataframe that it'll be used for further analysis

Total number of Restaurants



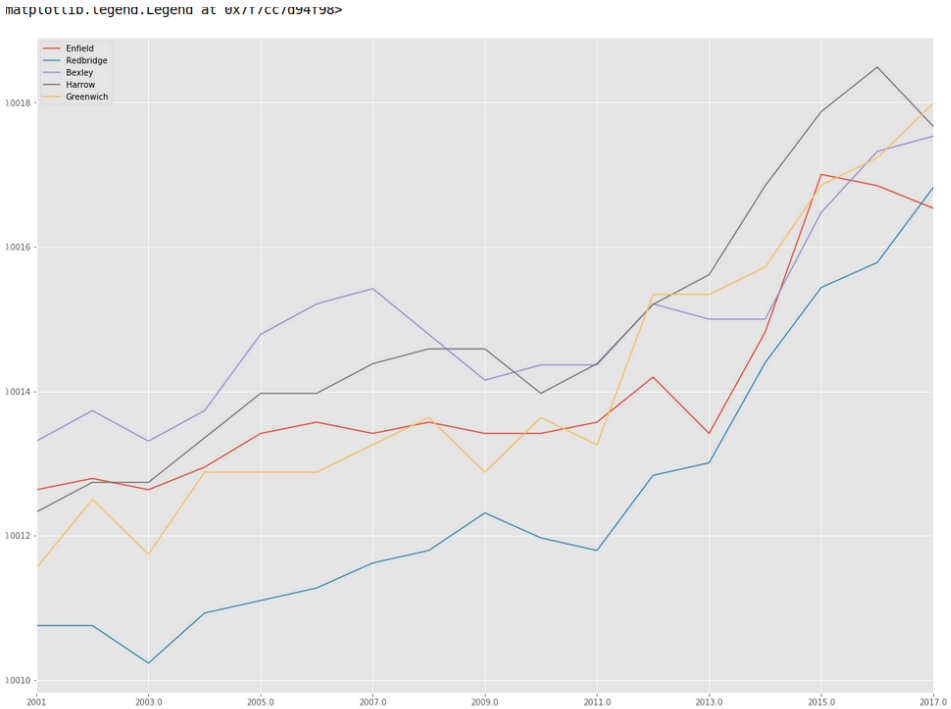
In this slide we can appreciate the number of restaurants per borough including takeaways, and pubs

After ordering

	Borough	Population	Rdensity	ULdensity
0	Enfield	320,524	0.001654	0.000936
1	Redbridge	288,272	0.001682	0.000919
2	Bexley	236,687	0.001753	0.000824
3	Harrow	243,372	0.001767	0.001089
4	Greenwich	264,008	0.001799	0.000985
5	Lewisham	286,180	0.001835	0.000978
6	Brent	317,264	0.001844	0.001135
7	Ealing	342,494	0.001869	0.001124
8	Hounslow	262,407	0.001905	0.001086
9	Sutton	195,914	0.001914	0.001021

After ordering based on crime density and Restaurant density it shows the borough in order of the most viables ones

Which is the most suitable one



For finding the best borough i've plottted the time series of restaurant number to find in which borough the business are growing or viceversa

Choosing

	Area	2018
)	Greenwich	573.7
l	Redbridge	554.7
2	Harrow	538.3
3	Bexley	513.8
4	Enfield	479.1

As a first conclussion from the slide from above Greenwich and harrow are the most suitable places to set up a restaurant however in order to choose between both I downloaded average wage per borough these data helped me, And i could find that Greenwich is the most suitable place

Foursquare API

- The foursquare api are not suitable for this application because their numbers of venues is not the real ,

Results from foursquare API

Venue Category	Borough
African Restaurant	1
American Restaurant	3
Asian Restaurant	1
Chinese Restaurant	4
Coffee Shop	27
English Restaurant	2
Fast Food Restaurant	15
French Restaurant	1
Greek Restaurant	1
Indian Restaurant	17
Italian Restaurant	9
Mediterranean Restaurant	3
Mexican Restaurant	1
Middle Eastern Restaurant	1
Portuguese Restaurant	7
Restaurant	1
Sandwich Place	11
Thai Restaurant	2
Turkish Restaurant	5
Vietnamese Restaurant	1

Four Square Api cshows aus the info orf venues registered in fin four square system , however hte numeber of venues in API mismatch the the number of venues from official databases