CLUSTERING THE CITY OF LONDON FOR THE

OPENING OF AN

AFRICAN RESTAURANT

INTRODUCTION

▶ **DESCRIPTION OF THE PROBLEM**

▶ The City of London is a city and county that contains the historic centre and the primary central business district (CBD) of London. The City is now only a tiny part of the metropolis of London, though it remains a notable part of central London. However, the City of London is not a London borough, a status reserved for the other 32 districts (including London's only other city, the City of Westminster).

▶ The City is a major business and financial centre. The City has a resident population of 9,401 (ONS estimate, mid-2016) but over 300,000 people commute to and work there. About three quarters of the jobs in the City of London are in the financial, professional, and associated business services sectors.

▶ There are many restaurants across the city of London. To name a few: Roganic , CORE by Clare Smyth, The Five Fields and Portland Restaurant. Most of these restaurants offer continental, European or American dishes.

▶ However many of the restaurants do not offer African dishes. Approximately 922,684 Africans live in London. There are decent number of Africans namely Nigerians, South Africans, Kenyans to name a few that reside in the greater London Area. These individuals are engaged in various occupations, business or schooling.

INTEREST

- My project seeks to find the most populous areas in London that would offer prospective investors open restaurants to cater mostly for Africans who will want to have a taste of African dishes.

- The project will explore the various neighborhoods in London and segment them and recommend which area is suitable for such business.

DATA ACQUISITION AND CLEANING

The black population data was acquired from https://en.wikipedia.org/wiki/Ethnic_groups_in_London and stored onto an FTP server and read into a data frame.

For the coordinates of London, data was acquired from www.maptools.com and used in the same was as above.

After the data has been imported and read into a pandas data frame, some data cleaning will be done. I noticed after the data has been read into the data frame, some rows had some missing values and in some instances missing values were represent with not a number (NAN) values. These rows had to be dropped especially after the two data sets had been merged. This was quite necessary because when the city has been divided and clusters created, the visualization cannot be done on NAN VALUES. I also had to drop some columns in the black population data set as they were not needed in my analysis.

BLACK POPULATION DATA SET

London Borough	Black African Population	Black Caribbean Population	Other Black Population	Total Black Population	Post Code
Lambeth	35,187	28,886	14,469	78,542	SW2, SW9, SE5
Southwark	47,413	17,974	12,124	77,511	SE1
Lewisham	32,025	30,854	12,063	74,942	SE6
Croydon	28,981	31,320	12,955	73,256	CR0
Newham	37,811	15,050	7,395	60,256	E6, E16, IG11
Brent	24,391	23,723	10,518	58,632	HA0
Hackney	27,976	19,168	9,714	56,858	E8
Enfield	28,222	17,334	8,131	53,687	N11, N14
Greenwich	35,164	8,051	5,440	48,655	SE3, SE12
Haringey	23,037	18,087	6,706	47,830	N11, N22
Waltham Forest	18,815	18,841	7,135	44,791	E11
Barking and Dagenham	28,685	5,227	3,228	37,140	IG11
Ealing	17,299	13,192	6,369	36,860	W4
Wandsworth	14,818	12,297	5,641	32,756	SW12
Barnet	19,392	4,468	3,571	27,431	EN5, NW7
Islington	12,622	7,943	5,729	26,294	EC1, N1
Redbridge	12,357	9,064	3,424	24,845	IG2
Hammersmith and Fulham	10,552	7,111	3,842	21,505	SW6
Merton	10,442	8,126	2,243	20,811	SW19
Hillingdon	11,275	4,615	4,192	20,082	UB8

GEOGRAPHICAL DATA SET

Borough	Latitude	Longitude
Barking and Dagenham	51.5607	0.1557
Barnet	51.6252	0.1517
Bexley	51.4549	0.1505
Brent	51.5588	0.2817
Bromley	51.4039	0.0198
Camden	51.5290	0.1255
Croydon	51.3714	0.0977
Ealing	51.5130	0.3089
Enfield	51.6538	0.0799
Greenwich	51.4892	0.0648
Hackney	51.5450	0.0553
Hammersmith and Fulham	51.4927	0.2339
Haringey	51.6000	0.1119
Harrow	51.5898	0.3346
Havering	51.5812	0.1837
Hillingdon	51.5441	0.4760
Hounslow	51.4746	0.3680
Islington	51.5416	0.1022
Kensington and Chelsea	51.5020	0.1947
Kingston upon Thames	51.4085	0.3064
Lambeth	51.4607	0.1163
Lewisham	51.4452	0.0209
Merton	51.4014	0.1958

ONE-HOT ENCODING

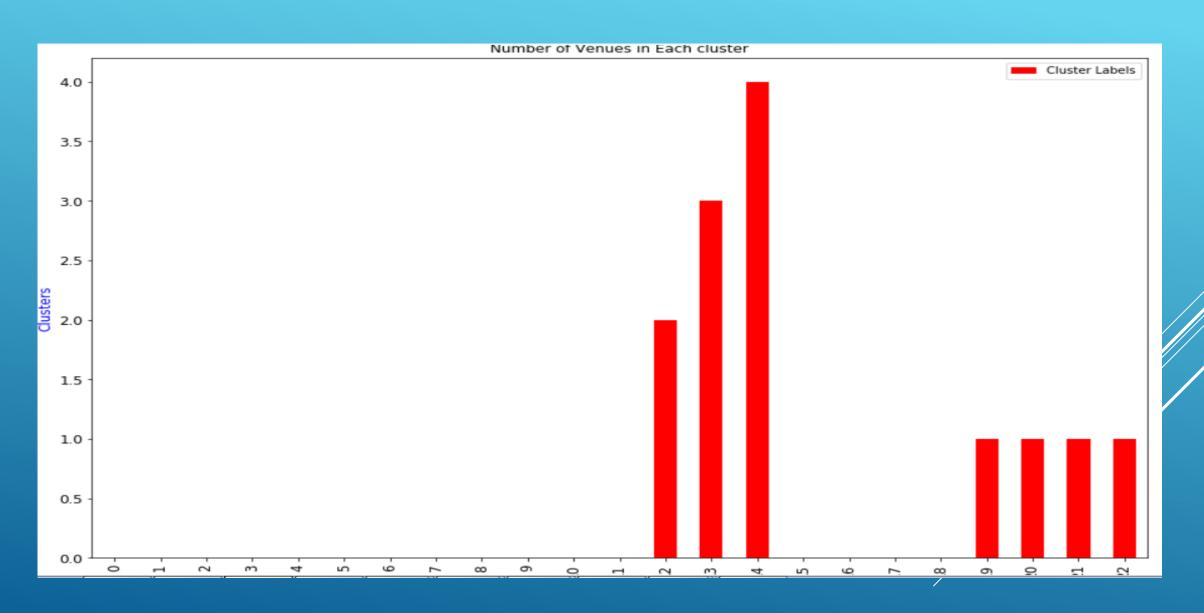|	Neighbourhood	Airport	Airport Lounge	Airport Service	American Restaurant	Asian Restaurant	Bakery	Bar	Books
0	BECKENHAM, LONDON	0.0000	0.0000	0.0000	0.0	0.05	0.000	0.05	
1	BEXLEY, SIDCUP	0.0000	0.0000	0.0000	0.0	0.00	0.050	0.00	
2	BEXLEYHEATH, LONDON	0.0000	0.0000	0.0000	0.0	0.00	0.050	0.00	
3	BRENTFORD	0.0000	0.0000	0.0000	0.0	0.00	0.000	0.00	
4	CARSHALTON	0.0000	0.0000	0.0000	0.0	0.00	0.000	0.00	
5	CHIGWELL	0.0000	0.0000	0.0000	0.0	0.00	0.050	0.00	
6	KENLEY	0.0000	0.0000	0.0000	0.0	0.00	0.125	0.00	
7	LONDON, BARKING	0.0625	0.0625	0.0625	0.0	0.00	0.000	0.00	
8	LONDON, SIDCUP	0.0000	0.0000	0.0000	0.0	0.00	0.050	0.00	
9	MITCHAM	0.0000	0.0000	0.0000	0.0	0.00	0.000	0.00	
10	NORTHOLT	0.0000	0.0000	0.0000	0.0	0.00	0.000	0.00	

TOP 5 NEIGHBORHOODS

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	BECKENHAM, LONDON	Pizza Place	Coffee Shop	Clothing Store	Portuguese Restaurant	Electronics Store
1	BEXLEY, SIDCUP	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store
2	BEXLEYHEATH, LONDON	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store
3	BRENTFORD	Fast Food Restaurant	Warehouse Store	Video Game Store	Grocery Store	Furniture / Home Store
4	CARSHALTON	Historic Site	Video Game Store	Grocery Store	Furniture / Home Store	Fast Food Restaurant

MERGED DATA SET WITH BLACK NEIGHBORHOOD

	Borough	Latitude	Longitude	Location	Neighbourhood	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Bexley	51.4549	0.1505	Albany Park	BEXLEY, SIDCUP	0	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store
1	Bexley	51.4549	0.1505	Bexleyheath (also Bexley New Town)	BEXLEYHEATH, LONDON	0	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store
2	Bexley	51.4549	0.1505	Longlands	LONDON, SIDCUP	0	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store
3	Bromley	51.4039	0.0198	Beckenham	BECKENHAM, LONDON	0	Pizza Place	Coffee Shop	Clothing Store	Portuguese Restaurant	Electronics Store
4	Bromley	51.4039	0.0198	Cudham	SEVENOAKS	0	Pizza Place	Coffee Shop	Clothing Store	Portuguese Restaurant	Electronics Store
5	Croydon	51.3714	0.0977	Kenley	KENLEY	0	Pizza Place	Fast Food Restaurant	Supermarket	Bakery	Pub
6	Croydon	51.3714	0.0977	Thornton Heath	THORNTON HEATH	0	Pizza Place	Fast Food Restaurant	Supermarket	Bakery	Pub
7	Ealing	51.5130	0.3089	Northolt	NORTHOLT	0	Home Service	Business Service	Clothing Store	Grocery Store	Furniture / Home Store
8	Hillingdon	51.5441	0.4760	Northwood	NORTHWOOD	2	Stables	Warehouse Store	Chocolate Shop	Furniture / Home Store	Fast Food Restaurant
9	Hounslow	51.4746	0.3680	Brentford	BRENTFORD	3	Fast Food Restaurant	Warehouse Store	Video Game Store	Grocery Store	Furniture / Home Store
10	Merton	51.4014	0.1958	Mitcham	MITCHAM	4	Pub	Warehouse	Chocolate	Furniture /	Fast Food

A BAR CHART SHOWING THE NUMBER OF VENUES IN EACH CLUSTER

K – MEANS CLUSTERING

K – Means clustering is grouping similar data points together and discover underlying pattern. The neighbourhoods were grouped into clusters of 5.

Cluster 1

	Borough	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
0	Bexley	0	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store	Hotel
1	Bexley	0	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store	Hotel
2	Bexley	0	Italian Restaurant	Pub	Supermarket	Coffee Shop	Clothing Store	Hotel
3	Bromley	0	Pizza Place	Coffee Shop	Clothing Store	Portuguese Restaurant	Electronics Store	Ice Cream Shop
4	Bromley	0	Pizza Place	Coffee Shop	Clothing Store	Portuguese Restaurant	Electronics Store	Ice Cream Shop
5	Croydon	0	Pizza Place	Fast Food Restaurant	Supermarket	Bakery	Pub	Italian Restaurant
6	Croydon	0	Pizza Place	Fast Food Restaurant	Supermarket	Bakery	Pub	Italian Restaurant
7	Ealing	0	Home Service	Business Service	Clothing Store	Grocery Store	Furniture / Home Store	Fast Food Restaurant

Cluster 2

Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
Sutton	1	Historic Site	Video Game Store	Grocery Store	Furniture / Home Store	Fast Food Restaurant
Sutton	1	Historic Site	Video Game Store	Grocery Store	Furniture / Home Store	Fast Food Restaurant
Sutton	1	Historic Site	Video Game Store	Grocery Store	Furniture / Home Store	Fast Food Restaurant
Sutton	1	Historic Site	Video Game Store	Grocery Store	Furniture / Home Store	Fast Food Restaurant

Cluster 3

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
8	Hillingdon	2	Stables	Warehouse Store	Chocolate Shop	Furniture / Home Store	Fast Food Restaurant

Cluster 4

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
9	Hounslow	3	Fast Food Restaurant	Warehouse Store	Video Game Store	Grocery Store	Furniture / Home Store

Cluster 5

	Borough	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
10	Merton	4	Pub	Warehouse Store	Chocolate Shop	Furniture / Home Store	Fast Food Restaurant

RESULTS AND DISCUSSION

Results :We can see from the clusters above, there are no restaurants offering a composition of African food. Most of the restaurants above are Italian Restaurants, fast food chains or bakeries.
Most of the black population in London leave in Croydon and Ealing to name a few areas.
In the clusters above for example the most popular restaurants are Pizza Restaurants and in the case of Ealing, there are not many restaurants.
Such areas for example have an estimated number of 110,116 Africans living in those areas.

Discussion: London is a big and vibrant metropolitan city and a hot spot for businesses. Different classification methods can be used to cluster the neighbourhoods.
I used the k-means algorithm in the study.

CONCLUSION

The areas discussed above are a good hunting ground for prospective investors who may want to open an African restaurant for different nationals from countries such as South Africa, Kenya and Sierra Leone to name a few.

REFERENCES

www.maptools.com
https://en.wikipedia.org/wiki/List_of_London_boroughs
https://en.wikipedia.org/wiki/Ethnic_groups_in_London