**Capstone Project – The Battle of London Neighbourhoods**

Sin Wee Lee

16/03/2019

# Introduction

## 1.1 Background

London, capital and one of the largest city of both England and the United Kingdom, voted most attractive city to work for overseas worker in a global survey of 3666,000 people, beating New York, Berlin and Barcelona to take the top spot in 2018 (Total Jobs and Boston Consulting Group).

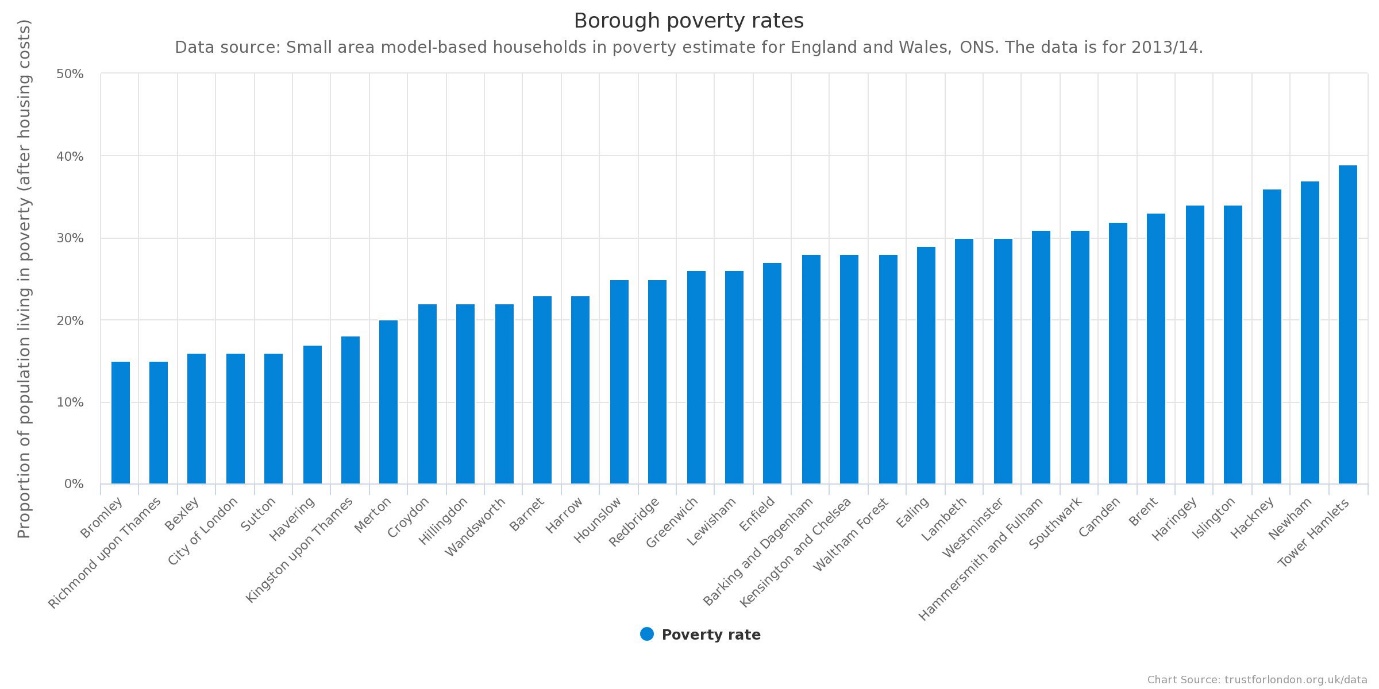
However, with Brexit fast approaching, there are not clear forecasts on the impacts of Brexit on the social, economic and the development of the city. To anticipate the impacts, local authorities (local government) are looking at ways to reduce cost and have more targeted development at borough level.

Although London as a whole has been booming for the last decade, the segregation of wealth across London are still visible since the 80s. Thus, it will be interesting to see how the social, economic impacts influence the facilities, venues and amenities available in the boroughs.

In order for the stakeholders, the local authorities and the business chamber of commerce to understand the social and economic impacts based on the facilities and amenities of certain borough and how this insights can provide targeting local and business development for London boroughs.

This project aims to address this by carried out a comparative study on the facilities and amenities between the two boroughs with the highest income rate and the lowest in London.

In London, there are 32 London boroughs and the City of London. Among them, Tower Hamlet have the highest poverty and Bromley has the lowest. Although the data are from 2013/14, the stats remained at the same level.



**Notes:**

London’s Poverty profile is created by charitable funder, Trust for London, and the independent think tank, New Policy Institute.

**Questions to answer:**

1. What types of facilities (venues) and amenities are available in the area with different poverty line?
2. How venues changing based on the spending power?
3. What are the distinctive venues that represent in these boroughs
4. Suggestions and recommendations of development in these areas.

By answering the above questions, the findings can be used for the targeting development for the rest of the London Boroughs so that unnecessary development can be avoided and overall budget can be sustained.

# Data Descriptions

The data folder for this project will consists the following data set:

**TH\_neighbourhoods.csv**

Number of Instances: 15

Sources: <https://www.distancesto.com/coordinates/gb/>

Date accessed: 11/03/2019

This dataset consists of three attributes:

* *Neighbourhood:* the neighbourhood name in Tower Hamlet
* *latitude:* latitude of the neighbourhood
* *longitude:* longitude of the neighbourhood

Sample data: *first 7 instances of the dataset*

|  |  |  |
| --- | --- | --- |
| **neighbourhood** | **latitude** | **longitude** |
| **Bethnal Green** | 51.526962 | -0.06674 |
| **Blackwall and Cubitt Town** | 51.495182 | -0.009826 |
| **Bow East** | 51.528309 | -0.019482 |
| **Bow West** | 51.528309 | -0.019482 |
| **Canary Wharf** | 51.505219 | -0.0189 |
| **Island Gardens** | 51.487061 | -0.007988 |
| **Lansbury** | 51.513294 | -0.027155 |

**BROM\_neighbourhoods.csv**

Number of Instances: 20

Sources: <https://www.distancesto.com/coordinates/gb/>

Date accessed: 11/03/2019

This dataset consists of three attributes:

* *Neighbourhood:* the neighbourhood name in Tower Hamlet
* *latitude:* latitude of the neighbourhood
* *longitude:* longitude of the neighbourhood

Sample data: *first 9 instances of the dataset*

|  |  |  |
| --- | --- | --- |
| **neighbourhood** | **latitude** | **longitude** |
| **Bickley** | 51.40174 | 0.043712 |
| **Biggin Hill** | 51.331959 | 0.029057 |
| **Bromley Common & Keston** | 51.375875 | 0.043819 |
| **Bromley Town** | 51.402805 | 0.014814 |
| **Chelsfield & Pratts Bottom** | 51.357943 | 0.127288 |
| **Chislehurst** | 51.411572 | 0.076955 |
| **Copers Cope** | 51.419348 | -0.031502 |
| **Cray Valley East** | 51.401639 | 0.020742 |
| **Crystal Palace** | 51.419366 | -0.071133 |

Based on the problem definition, factors that will influence the decision in this project will be:

* number and the type of venues and facilities available in the surrounding area of these boroughs
* the most frequent venues and facilities’ for each boroughs

To define the surrounding area of the borough, we will be using:

* London Boroughs poverty information from: <https://www.trustforlondon.org.uk/data/poverty-borough>. *Accessed: 11/03/2019*
* latitudes and longitudes of Tower Hamlet and Bromley obtained from: <https://www.distancesto.com/coordinates/gb/>. *Accessed: 11/03/2019*
* venues, type and locations in every borough will be obtained using Foursquare API

Further information of the boroughs can be found at:

* Bromley: <https://en.wikipedia.org/wiki/London_Borough_of_Bromley>
* Tower Hamlet: <https://en.wikipedia.org/wiki/London_Borough_of_Tower_Hamlets>

# Methodology

In this project, we will be only concentrating the two boroughs with the largest poverty rate gaps.

In the first step, we will be looking into the top 5 most common venues for each of the borough, this will provide us with an overview of the types of venues popular in the boroughs.

Second steps we will be clustering the neighbourhood for each borough to investigate the cluster formations

in third and final steps, we will be drill into each of cluster to obtain the reviews of some of the venues to seek the quality of service at venues in this separate borough.

With this analysis, we will be able to draw some conclusions on how poverty rate in particular borough impacting the venues in the areas using Foursquare geospatial data.

## 3.1 Boroughs Locations

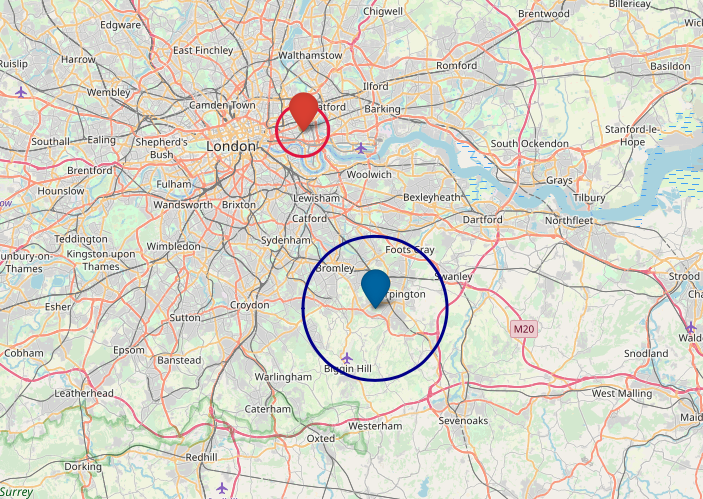


Figure 1: Boroughs Locations in London

Preliminary observations from the above map show that based on the locations for the two boroughs, Tower Hamlet is located very near to the London centre, where as Bromley borough located at the boundary of the M25 Ring road, which is about 2 hours’ drive from London centre. In terms of area size, Tower Hamlet convers about 19.77km2 and Bromley is about 150.2km2. Based on this information, we can used them as distance references when retrieving venues, type and locations using Foursquare API.

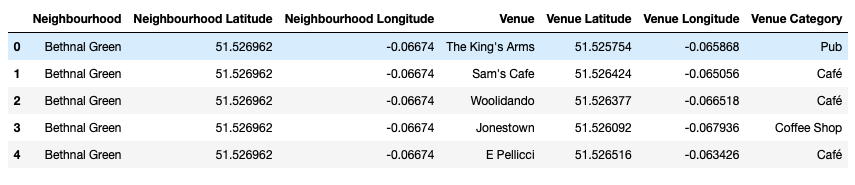
## 3.2 Data generations

Now that we have our location candidates, let's use Foursquare API to get info on venues in each of the wards within each borough

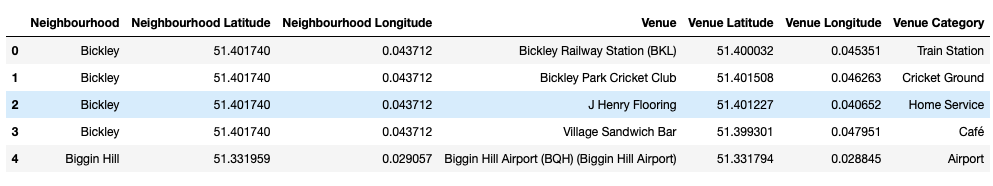
As an exploratory project, we will retrieve the venues based on the areas of each borough. We will then do the necessary manipulations and analysis to achieve our objectives.

We began by retrieving 100 venues with a radius of 500 meters of each of the neighbourhood:

Tower Hamlet:



Bromley:



Using the data, we successfully retrieved the following:

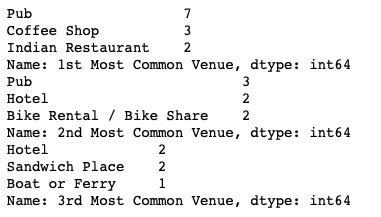
* Total venues in Tower Hamlet neighbourhoods returned by Foursquare: **520**
* Total venues in Bromley neighbourhoods returned by Foursquare: **193**
* Total unique venue categories in Tower Hamlet = **156**
* Total unique venue categories in Bromley = **76**
* Tower Hamlet venues dataframe is called: **TH\_venues**
* Bromley venues dataframe is called: **BROM\_venues**

# Analysis of Results and Discussions

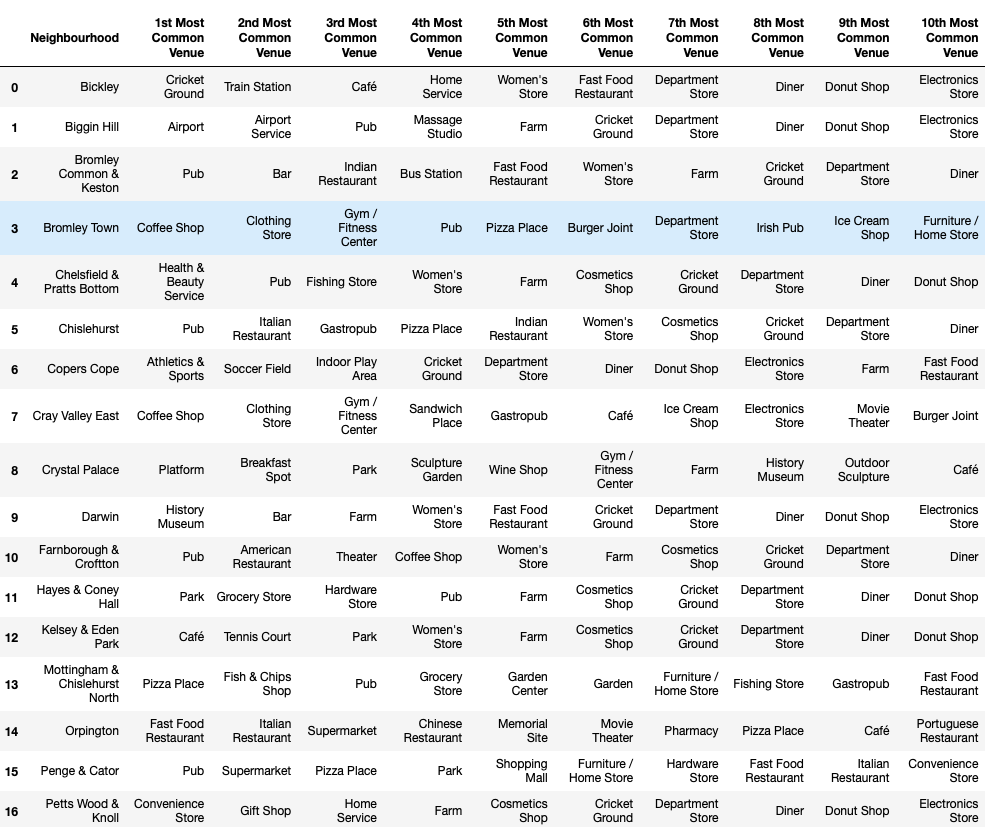
We begin our analysis of neighbourhood by seeking the top 10 most common venues at each boroughs.

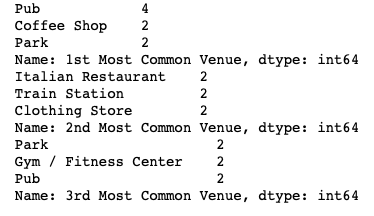
## Ten most common venues in Tower Hamlet





## Ten most common venues in Bromley





Let's analyse the most common venue between the two boroughs:

* Tower Hamlet: referring to the first 3 most common venues in Tower Hamlet, we can easily identify that mist venues are food and beverage venues, with 84% of the venues. It is seeming that in most of the Tower Hamlet venues are for essential sustenance providers. Furthermore, due to the location of the borough, the boroughs have provided bike rental and bike share venues for the residents to commute within the area.
* Bromley: However, in Bromley, although also includes food and beverage venues, the venues also includes clothing stores, gyms, parks and Italian restaurants, as such that these are life style luxuries that are mostly common for area that have low poverty rates.

If we look at the big pictures between the two boroughs, we can somehow identity that in general, majority of the venues in Tower Hamlets are food and beverage or sustenance venues, such as cafe, pubs restaurant, grocery stores etc. However, Bromley provides more lifestyle venues such as Gyms, massage studios, health and beauty studio, golf course, theatre and garden centre just to name a few.

In summary, currently, there are clear discrepancies between venues in these two boroughs based on the poverty rate in these two boroughs.

Now that we know the discrepancies between the two boroughs, are there any similarities between two boroughs?

## Examine the clusters

The next step is to cluster all the neighbourhoods in Tower Hamlet and Bromley to find out the similarities between the neighbourhood. This is done by applying K-mean clustering. Following are the clusters formed using k = 5.

**Cluster 1:**

****

Let's examine cluster 1. Based on the data from both boroughs, in cluster 1, only poplar is located at Tower Hamlet. Further investigation indicates that Poplar is located

at the boundary of the financial hub of London, canary wharf, where most financial sector employees are resided with low poverty rate. Due to this reason, the venues are similar with the venues in cluster in Bromley.

**Cluster 2:**

****

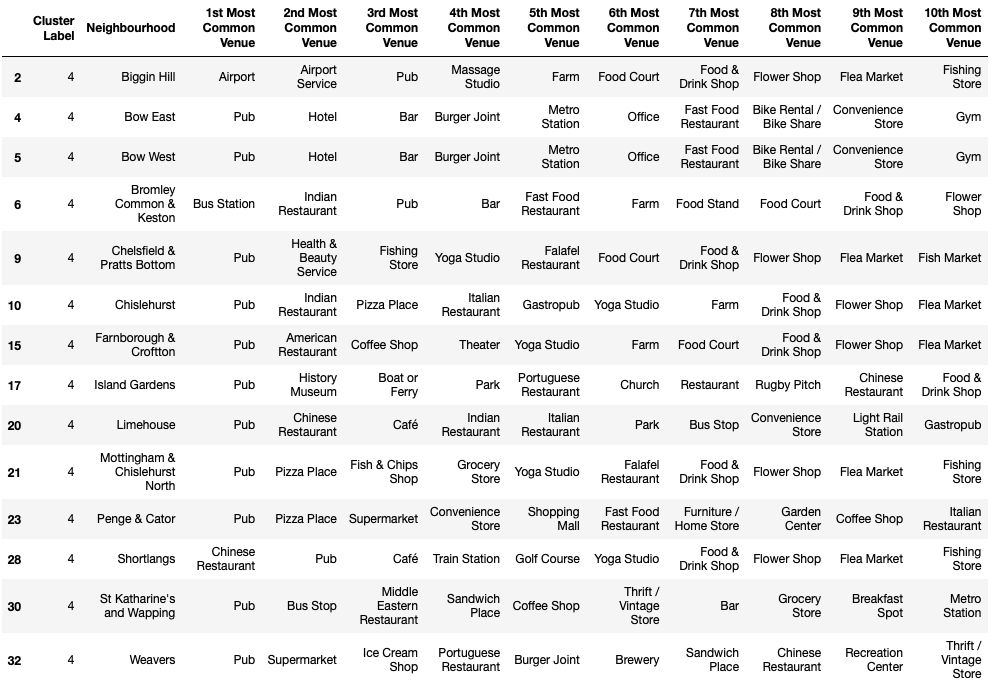
Cluster 2 only have one neighbourhood, which is Darwin, located in Bromley. Analysing the venues shows that the area are leisure areas where more lifestyle venues are located, such as yoga studio, flower shop, bars etc.

**Cluster 4:**



Cluster 4 only have one neighbourhood, which is Copers, located in Bromley. Analysing the venues shows that the area are leisure areas where more sport lifestyle venues are located, such as athletics & sports, soccer field, indoor play area and yoga studio.

**Cluster 5:**

****

Finally, cluster 5 have even split between two boroughs. Generally, this cluster consists of the food and drinks venues in both boroughs. From this cluster, we can clearly identify that pubs are the favourite leisure venues for all residents in both areas, regardless of the poverty rate.

# Conclusions

In conclusion, based on the poverty rate, we can clearly see there are discrepancies in terms of the venues at each borough. At Tower Hamlet, it is clearly shown that most venues provided are essential venues for day-to-day life as in Bromley, much of the venues are lifestyle venues and required certain level of incomes.