Vegan Restaurants in London – Overview

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Figure 1 Microsoft Word stock images

1. Introduction

This report will focus on studying vegan restaurants occurrence around London area. Data collected from foursquare will be presented with collective statistics and mapping tools.

1.1 Background

London currently has 152 vegan friendly restaurants and it was the first city on Happy Cow to have more than 100 completely vegan restaurants in 2017. According to a survey by finder.com, the number of vegans in the UK is set to skyrocket by 327% by 2020. According to The Vegan Society's larger survey, the number of vegans quadrupled from 2014–18; in 2018 there were approximately 600,000 vegans in the UK, equivalent to 1.16% of the British population.

1.2 Problem

Unfortunately, more than often finding that one perfect vegan establishment relates to long search and trouble scheduling. Having mapped out locations with the vegan restaurants could help customers with planning their journey and even discover some new places. That prepared map is very convenient for planning a meeting or a takeaway. All in one place!

1.3 Interest

Vegan restaurants are not only for vegans. Anyone can from time to time try something more veggie based and benefit from plant base meal.

2. Data acquisition and cleaning

Data acquisition and cleaning step were focusing on creating two data frames that will be use into analysis of presence vegan restaurants. First of the data frames is a collective table of out-postcodes of London and their longitude and latitude. Second data frame is a location of the vegan restaurants.

2.1 Data sources

Data for this project were collected from three different types of webpages. Two of which were extracted from the tables on said pages and one was an open source webpage with links for .csv file.

2.1.1 London postcodes

One of the first sources were Wikipedia pages containing lists of areas and postcodes in London. Due to their complexity of London's postcodes data were extracted from an individual Wikipedia page of each of the London postcode areas instead from collective table from https://en.wikipedia.org/wiki/London_postal_district .

8 areas of London and their source from Wikipedia (clockwise):

- E - Eastern: (https://en.wikipedia.org/wiki/E_postcode_area),
- EC - Eastern Central: (https://en.wikipedia.org/wiki/EC_postcode_area),
- SE - South Eastern: (https://en.wikipedia.org/wiki/SE_postcode_area),
- SW - South Western: (https://en.wikipedia.org/wiki/SW_postcode_area),
- WC - Western Central: (https://en.wikipedia.org/wiki/WC_postcode_area),
- W - Western: (https://en.wikipedia.org/wiki/W_postcode_area),
- NW - North Western: (https://en.wikipedia.org/wiki/NW_postcode_area),
- N – Northern: (https://en.wikipedia.org/wiki/EC_postcode_area).

HTML parser beautiful soup was used to obtain the data from webpages above. Data were saved in string and ready for data cleaning stage.

2.1.2 London postcodes geological location

Geological location as longitude and latitude were obtained by directly downloading open .csv file from Freemaptools.com (https://www.freemaptools.com/download-uk-postcode-lat-lng.htm). This geolocation data was already in data frame format which made data cleaning step very swift.

2.1.3 Foursquare data

Foursquare data focused on vegan restaurant location and their short description. Data were obtained within 30 km from the centre of city of London. It was directly requested from python code into .json file. The data obtained in this process were later transformed depending on the needed analytical method. Foursquare categorises vegan and vegetarian restaurants together under one venue id: 4bf58dd8d48988d1d3941735. Because of it I had to use venue type command to select vegan only establishments.

Using Foursquare to find vegan restaurants in a 30 000 m radius from the center of London, which covers all London area.

```
[78]: search_query = 'vegan'
radius = 30000
print(search_query + ' .... OK!')
```

```
vegan .... OK!
```

2.2 Data cleaning

2.2.1 London postcodes

As a London postcode data were scrapped directly from the webpage it needed the most attention in the data cleaning stage. Each of the postcode areas were primary extracted as a string. From that string a list was created only containing postcodes, local authority area name and coverage of the jurisdiction data. List was then rid of headings and non-geographic postcodes data. Next the data were divided into three categories using for loop and allocated to empty tables. For each of the post codes than an empty data frame was created with the headings: Postcode district, Coverage and Local authority area. Earlier prepared data were

than appended into new data frame. This process was repeated eight times for each main postcode area. Following that a main London post code data frame was created by appending eight individual postcode data frames.

2.2.2 London Geospatial data

As the London geospatial data were already in form of data frame the cleaning process was simpler than postcodes table. The id rubric was removed, and the headings names were unified with the London postcodes data frame. Next left Join in pandas was used to connect both London post codes and London post code geospatial data.

2.2.3 Foursquare data

In Foursquare data columns 'labeledLatLngs', 'cc', 'formattedAddress', 'neighborhood' and 'crossStreet' were removed.

2.3 Feature selection

Geographical coordinates and postcodes were the most important features used in this report. Overall, 186 post codes were found in London and only 50 pure vegan establishments (Using foursquare.)

3. Exploratory Data Analysis

Gathered data presented on a 2D map as green circles.

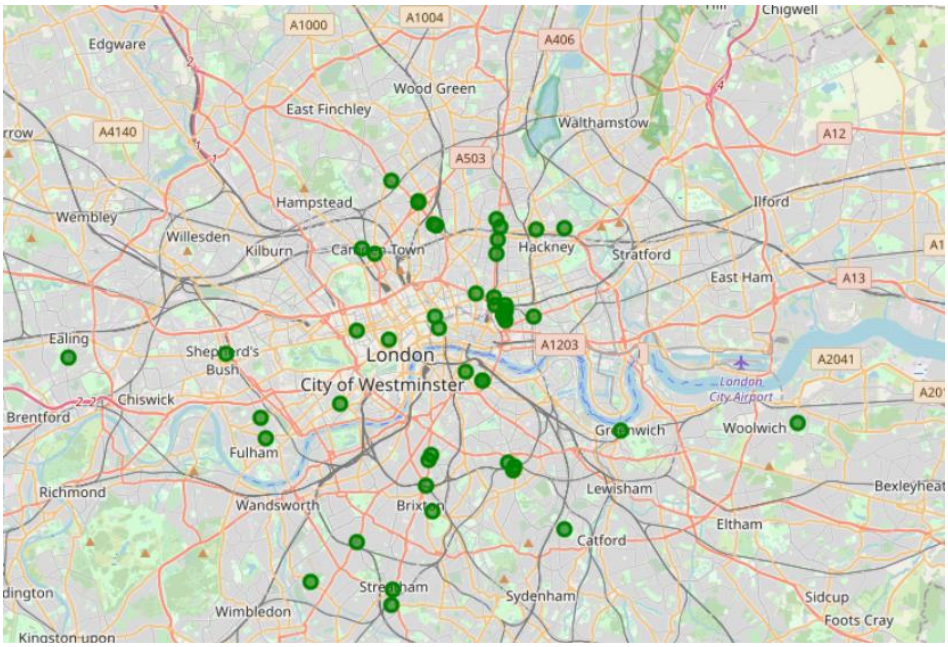

Figure 2 Map of London with placed Vegan venues obtained via Foursquare engine.

Some trends can be already spotted just with this simple mapping. Number of actual vegan restaurants is 35. Other venues are two food tracks, a vegan cooking school*, two bakeries, tearoom, café, farmers market, regular market, food stand, Fried Chicken Joint, two grocery store and donut shop. One of the venues appeared as a 'building'. After using function .loc to localised it venue was uncovered as a London Vegetarian and Vegan School. After research, another London Vegetarian and Vegan School appeared. The id and location data (latitude and longitude) differed between them and that so both were kept for the record.

3.1 Relationship between Vegan venues and the City Centre

An average distance of the vegan establishment from the centre of London (51.5073219, -0.1276474) is 5420 meters. Diagram below (fig. 3) shows the distance of Foursquare vegan venues (green dot) from the centre of London (black dot). Base on figure 3 we can observe slight shift within placement of the vegan establishment. Most of the venues are spread put on the east west axis (horizontal). Additionally, even though vegan venues are more comfortably spread out on the west side of London, east side is still populated by vegan places. Vegan places on the east side, however, are more condensed near 51.54 and 51.56 ° latitude and around -0.1°. Range between the furthest South and North establishments is ~ 0.4° in longitude. The difference between East and West vegan places is 0.04° in latitude.

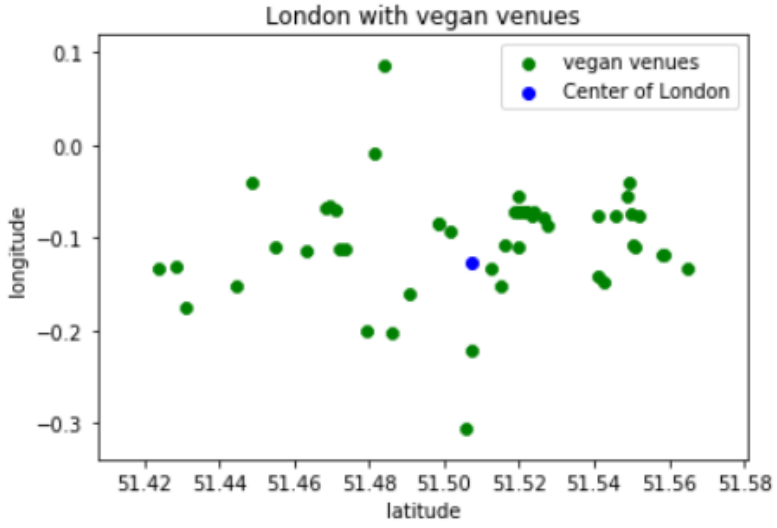

Figure 3 Representation of London city centre in relation to vegan venues around it.

3.2 Relationship between Postcodes and vegan venues

To show a relationship between Postcodes and vegan venues postcode geolocation data was combined with Foursquare vegan data. To achieve that new function was defined that separated out-code part of the postcode. After both databases had key values, they were merged using a left Joint. Next the venues were grouped by the out-code postcode and summarised. Figure 4 show the representation of the vegan venues within the postcodes:

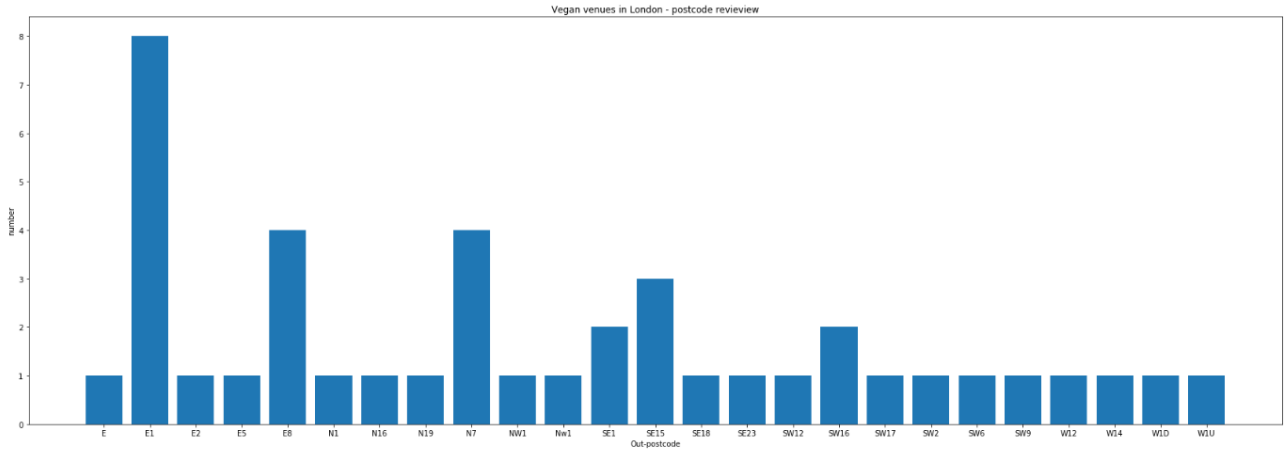

Figure 4 Diagram that shows in which postcode area is the most vegan venues.

E1 area postcode is the most 'populated' by the vegan establishments (8) based on the data in figure 4. Second popular with 4 vegan restaurants are E8, also in East London and N7 in the North London. Next with 3 venues is SE15 in South East district. With 2 places stand SE1 (South East) and SW15 (South West).

Collectively Eastern Districts including East Central has 15 vegan venues. Northern, South Eastern and South Western Districts have 7 venues, respectively. There are 4 vegan places in the West district of London and North Western districts have 2 of them. All the data are shown in relation to each other in figure 5.

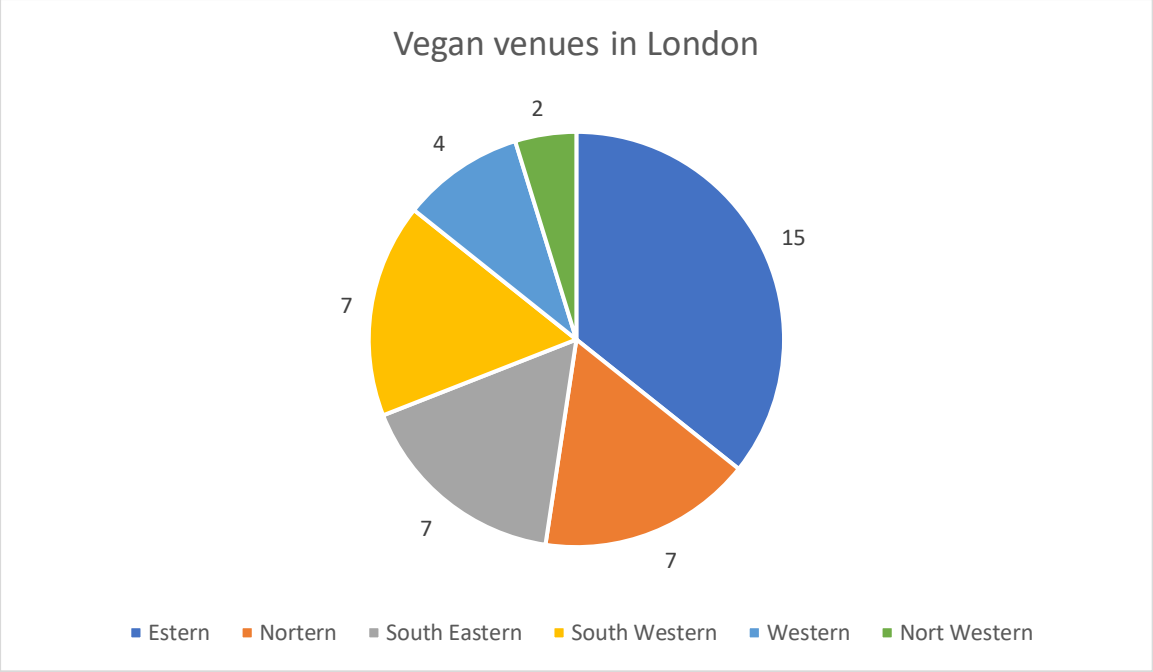

Figure 5 Shows London venues data in relation to each other.

4. Predictive Modelling

Predictive modelling used in this report is based on clustering with the aim to segregate groups with similar location and assign them into clusters. 4 clusters were chosen for this analysis to see if they would cover natural Cardinal directions (East, South, West and North). KMeans were used for clustering vegan venues locations. Figure 6 shows clusters with centroids in red and London city centre with blue star.

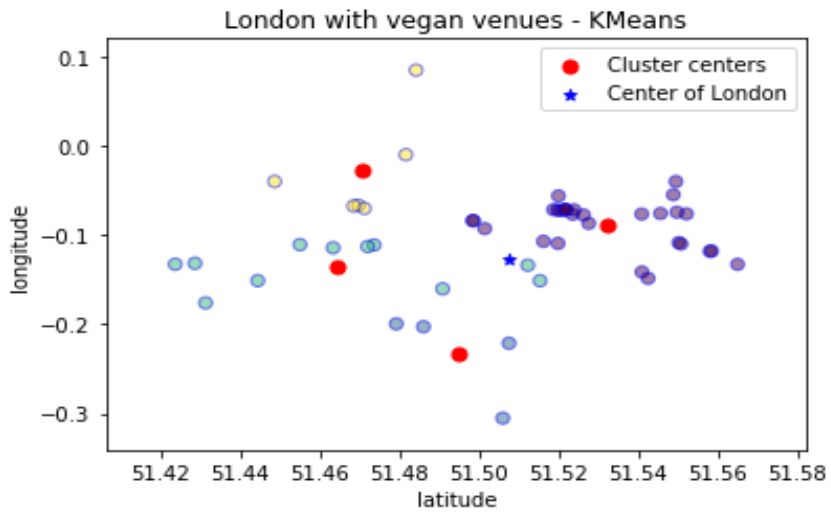

Figure 6 Presents Clustering of vegan venues placement based on their longitude and latitude with using KMeans in Python.

In figure 6 there is a saturation towards the centre of London. The main clusters show similar placement to a Cardinal direction with some modifications.

To test the assigning mechanism new vegan venue not included in the Foursquare data was introduced. Biff's Jack Shack was chosen, and its coordinates is 51.5518° N, 0.0752° W. Its postcode is in the North (N16). After running the code:

Predicting in which cluster new restaurant would be placed:

```
In [80]: kmeans.predict([[lat_B, lng_B]])
Out[80]: array([3], dtype=int32)
```

the Biff's Jack Shack was assigned into array 3.

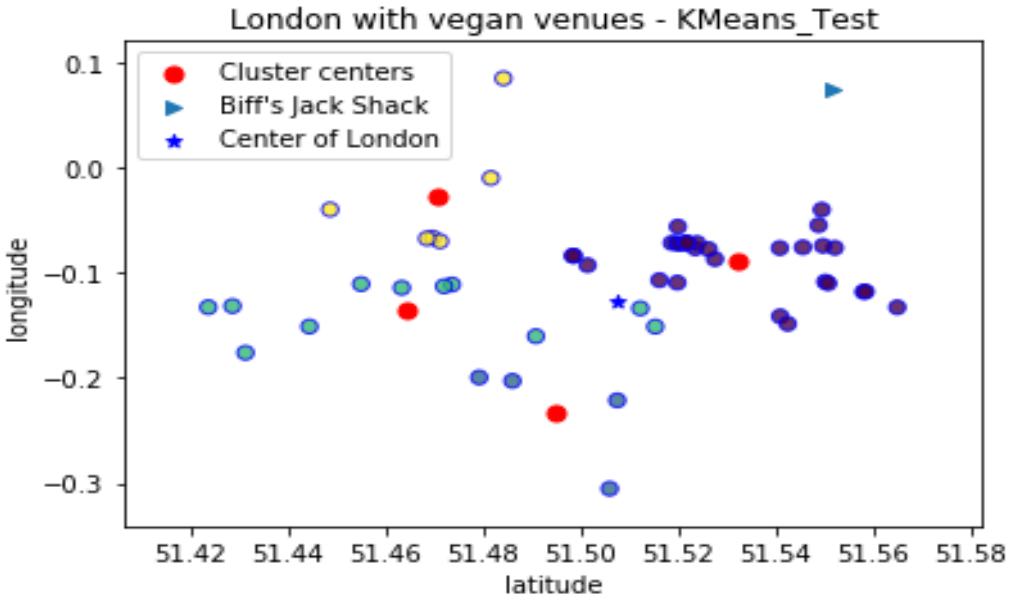

Figure 7 Presents testing of clustering of vegan venues placement based on their longitude and latitude with using KMeans in Python. Testing data venue is represented by a triangle and it is named Biff's Jack Shack.

As seen in figure 7 Biff's Jack Shack is assign near the purple cluster (3). With any new vegan restaurant, the model can be tested and improved.

5. Conclusions

In conclusion the most veganised area in London is Eastern E1 (8 venues). Overall Eastern districts have the largest amount of vegan venues and restaurants which are densely clustered

(15 venues). The least ‘populated’ district with 2 venues is North Western postal district. In general, vegan restaurants can be found around the centre of London city.

6. Future directions

With veganism growing in the British population and with more people being curious about plant base diet vegan restaurants and general vegan venues most likely will grow. The best place to open a new vegan restaurant in relation to lack of competition could be North Western London’s district. More details should be collected in time to take under considerations other business factors. On the other hand, the best place to see variety of places with purely vegan menu are in the Eastern district, especially closely to E1.

* at least one, most likely two Vegan and vegetarian cooking schools.

Thank you for your time!