Battle of the Neighborhoods

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Detecting optimal neighborhoods for coffee shops is valuable for profitability

- Coffee is widely loved by the British. As a result, several coffee shops can be found in several neighborhoods in Bristol, UK, especially around the city center.
- Coffee shops present within neighborhoods bring about competition, and also compete with cafes at the long run.
- Detecting optimal neighborhoods close to the city center for a coffee shop business is advantageous to a coffee house company.
  - To make profitability
  - Proximity to the coffee shop
- Both coffee house companies and locals within the city will be interested in our findings.

Basic requirement agreed with stakeholders

- Neighborhood should be as close to the city center as possible, at most 4km
- Neighborhood should have at most 5 coffee shops within a radius of 2000 meters from the center of the neighborhood

Neighborhood data acquisition and cleaning

- Neighborhood name, post code district, post town, and local authority area data for Bristol is scraped from Wikipedia `https://en.wikipedia.org/wiki/BS_postcode_area`
- Only post town name and local authority area as Bristol is selected.
- local authority area is dropped.
- Addresses created for each neighborhood, and coordinates (latitude, longitude) extracted using geopy.
- Distance from neighborhood to city center is calculated. Only neighborhoods within 4km radius are selected
- Total number of rows is 29 and number of features is 7.

Foursquare venue data acquisition

- Venue data for neighborhoods extracted by making request to the Foursquare API `https://developer.foursquare.com/`
- We extract only the relevant information for our task. This includes the name of venue, category, address, longitude and latitude, distance to center of neighborhood, neighborhood name and postal code.
- We initially process only the Coffee Shop venues

Visualization of coffee venue and neighborhoods

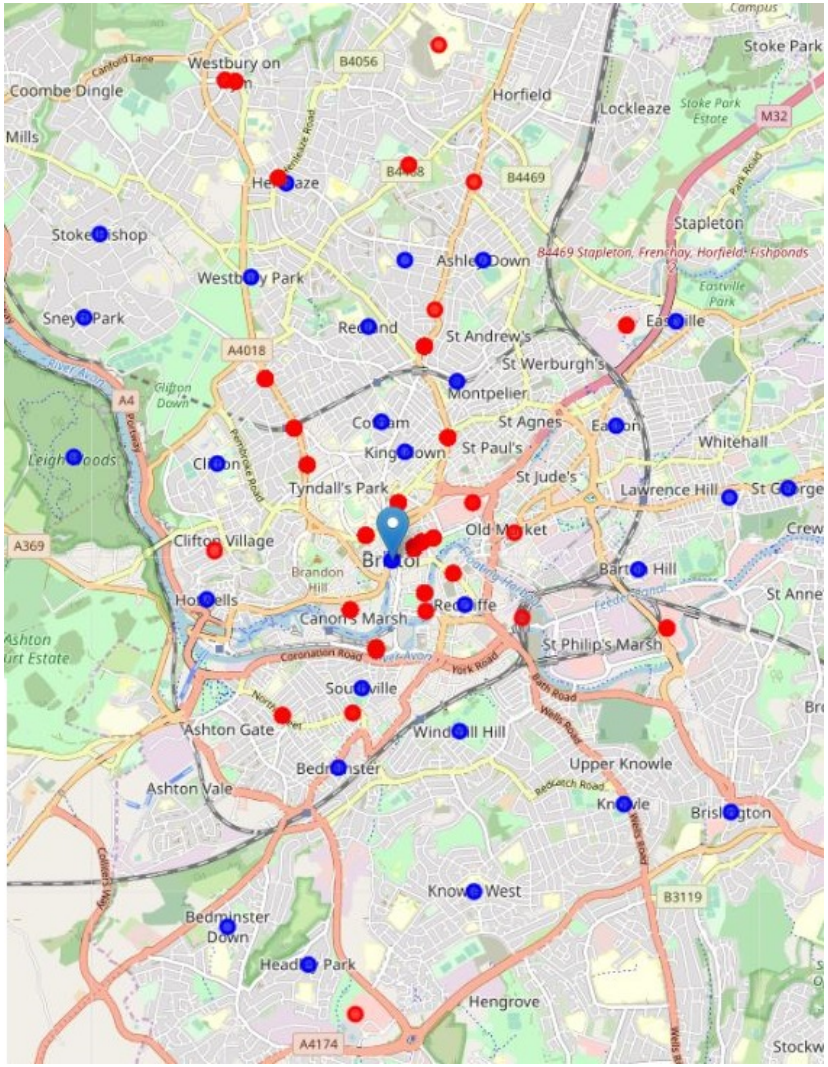

Figure: Map of Bristol with neighborhoods(blue) within 4km from the city center, and venues(red) imposed on the map

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Bar graphs of number of coffee shops in neighborhood

We aim to detect neighborhoods with at most 5 coffee shops, and then select the optimal neighborhood.

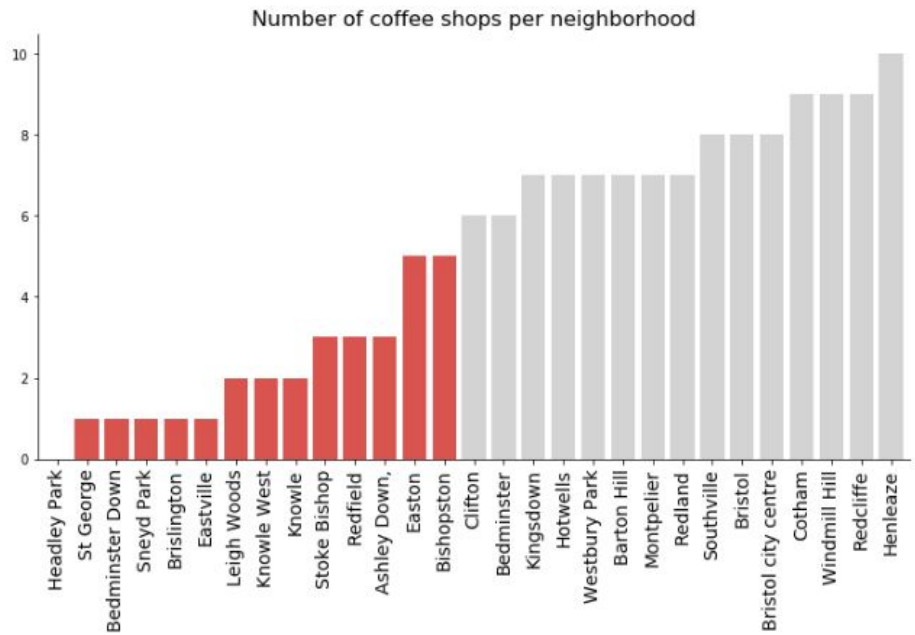
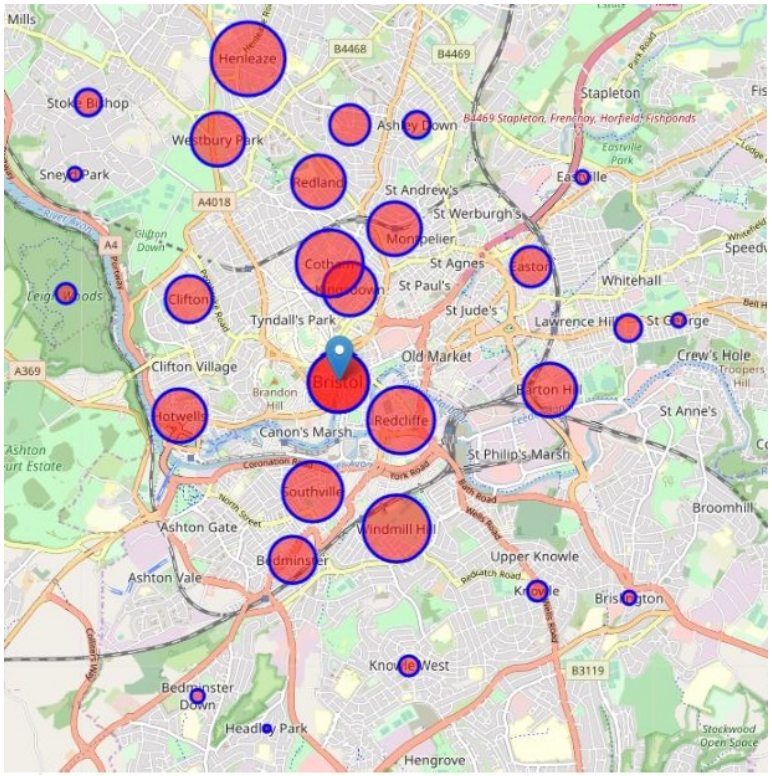


Figure: Number of coffee shops per the 29 neighborhoods. Attention is on neighborhoods with less than 5 coffee shops (highlighted by the red bars)

Bubble map for density of coffee shops in Bristol



- High density of coffee shops around the center of Bristol
- generally spreads from North to South
- Reduces as we move away from the center

Filtering neighborhoods based on high density of coffee shops

From the bar graph and the bubble map, the potential neighborhoods are:

Headley Park	St. George
Bedminster Down	Sneyd Park
Brislington	Eastville
Leigh Woods	Knowle West
Knowle	Stoke Bishop
Redfield	Ashley Down
Easton	Bishopston

Filtering neighborhoods based on residential, woodland areas

Residential and woodland areas are not ideal for business. From the map and other external sources like Wikipedia we can filter.

Headley Park	mostly woodland and residential
Leigh Woods	mostly woodland
Sneyd Park, Bedminster Down	mostly residential

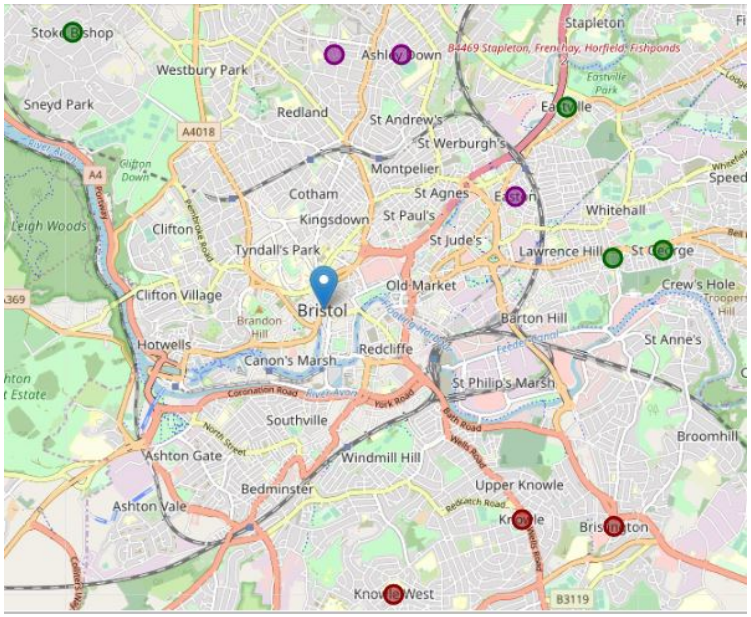
Remaining neighborhoods include:
Eastville, Brislington, St George, Knowle West, Knowle, Redfield, Ashley Down, Stoke Bishop, Easton, Bishopston

K-means to cluster neighborhoods

Cluster neighborhoods on all venue features to filter in batches.

- To filter in batches
- rank neighborhoods with most common venues
- Get information about common venues in a particular vicinity
- Find out the presence and importance of coffee shops/cafes relative to other venues

Neighborhood clusters



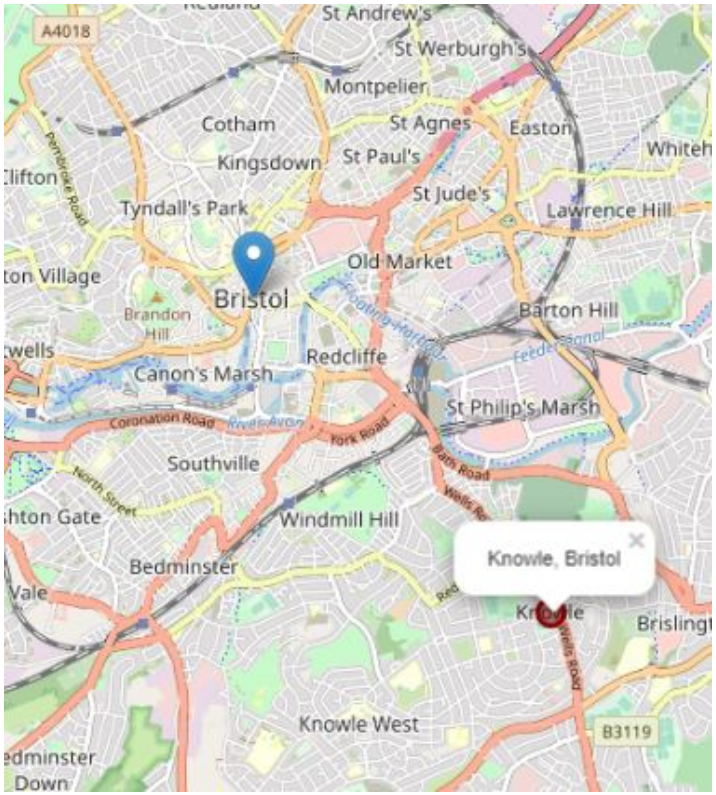
We exclude both cluster 0 and 2

- Cluster 2(Easton, Bishopston, Ashley Down with purple markers) has cafes as 2nd most common venues in the neighborhoods
- Cluster 0(St. George, Redfield, Eastville with green markers) has coffee shop/cafe as 3rd/4th most common venue

Cluster 1

- Cluster 1 (Knowle, Knowle West, Brislington)
  - Brislington has no coffee shop but a cafe as the 8th most common venue
  - Knowle has a coffee shop as the 8th most common venue
  - Knowle West has a coffee shop as the 10th most common venue
  - But Knowle is closer to city center than Knowle West and Brislington, and Knowle West is considered to be a deprived area (Filwood Ward Profile 2008, p. 9)
  - **Knowle is considered to be the best neighborhood for a coffee shop**

Location of Knowle relative to Britol city center



- Knowle is 3km away from city center (within 4km as requested by stakeholder)
- Knowle is next to the A37 motorway, allowing travelers to stop for a cup of coffee

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Conclusion

- Built a bubble map to visualize neighborhoods of high/low density of coffee shops.
- Filter neighborhoods based on density of coffee shops, selecting only those with low density by a threshold (at most 5 coffee shops) agreed with stakeholders
- Preliminary filtering using visual(map) and external information to select only potential neighborhoods.
- K-means clustering to see the presence/importance of coffee shops relative to other venues for batch filtering
- Selecting best neighborhood among Knowle, Knowle West and Brislington using factors such as distance to city center and rank of most common venue with respect to coffe shop/cafe venue.
- Knowle appears to be the optimal neighborhood.

Future directions

Results are based on parameters agreed with stakeholders.

- Future ideas for improvement include;
  - Presence of car parking close to coffee shops
  - increasing the search radius in the neighborhood
  - human traffic flow in the neighborhood (coffee shop located in most commutes)