

# The Battle of Neighbourhoods (Bristol, UK)

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# Introduction / Business Problem

- Different areas in the same city (here: **Bristol, UK**) differ a lot
- Newcomers to a city do not know where they'd like to live, e.g. **which area is perfect for a family with children resp. an individual**
- Careful analysis of neighbourhoods (wards) offers insights on **most suitable wards** in terms of quality of life and available infrastructure
- Not only important for private persons, but also for property management companies, business owners or tourists

# Data acquisition

- **Factors** that determine suitability of neighbourhood (ward)
  - Number of venues
  - Types of venues
  - Quality of life (consisting of safety, children activities, ...)
- Used **data sources**
  - **Foursquare**: information on venues for each ward (location, type, number, ...)
  - **OpenData Bristol**: large datasets on safety, pollution, quality of life, ... acquired through a survey from 2019/2020.  
Also offering GeoJSON data on the borders of the 34 wards of Bristol.

# Data cleaning & preparation

- Data from OpenData Bristol:
  - Dropping of unused columns, cleaning of dataframe
  - One-hot-encoding of answers to survey questions
- **Feature selection:**
  - 17 survey questions on quality of life were reduced to 5 features: *Clean streets and air*, *Accessible public transport*, *Safety*, *Children activities*, *Feeling Home*

	Ward	Latitude	Longitude	Clean Streets and Air	Accessible Public Transport	Safety	Children activities	Feeling Home
0	Ashley	51.468309	-2.582675	6.960	83.65	73.6425	44.990	69.2425
1	Avonmouth & Lawrence Weston	51.507333	-2.676407	20.495	88.52	77.3025	40.620	54.7025
2	Bedminster	51.437159	-2.621875	17.445	93.18	80.1250	51.630	75.7650
3	Bishopston & Ashley Down	51.481452	-2.586465	13.015	90.61	89.0475	74.840	86.4825

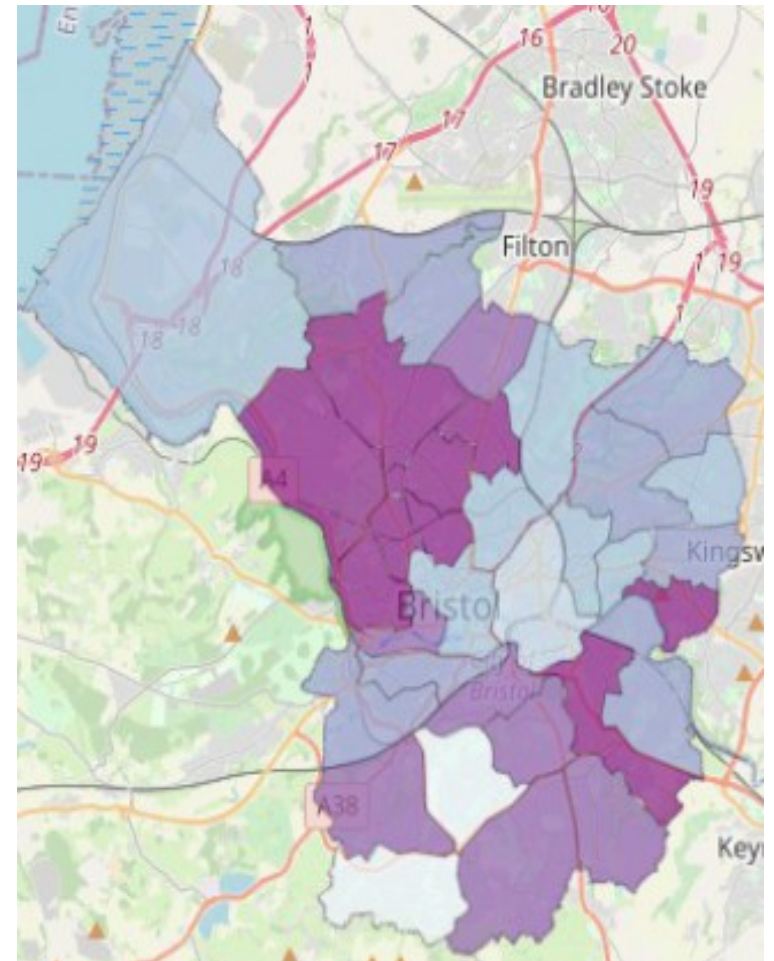
# Data cleaning & preparation

- Data from Foursquare:
  - 818 venues consisting of 140 unique categories.
  - Displaying the top 5 most common venues per ward

	Neighbourhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
0	Ashley	Pub	Café	Bar	Gastropub	Coffee Shop
1	Avonmouth & Lawrence Weston	Go Kart Track	Rental Car Location	Kitchen Supply Store	Bakery	River
2	Bedminster	Pub	Burger Joint	Gym / Fitness Center	Coffee Shop	Supermarket
3	Bishopston & Ashley Down	Café	Pub	Gastropub	Grocery Store	Coffee Shop
4	Bishopsworth	Supermarket	Discount Store	Grocery Store	Bus Stop	Zoo Exhibit

# Methodology

- Use both Foursquare and OpenData Bristol data to determine most suitable ward for families and individuals.
- Cluster wards by venue distribution via **k-means clustering**, decide which clusters are most suited by their types/distribution of venues for either families or individuals
- Check the wards in these clusters for highest quality of life with the five 5 features
- Visualize acquired data with **choropleth maps** of Bristol



percentage of people feeling safe in their ward

## Analysis – “Quality of Life”

- Short overview of distribution of values in the “**Quality of Life**” dataframe from page 4:

	Latitude	Longitude	Clean Streets and Air	Accessible Public Transport	Safety	Children activities	Feeling Home
count	34.000000	34.000000	34.000000	34.000000	34.000000	34.000000	34.000000
mean	51.459534	-2.584273	21.331912	89.586176	81.521029	47.668382	69.582794
std	0.027113	0.035898	9.048538	3.266449	6.882918	13.198921	11.654197
min	51.407702	-2.676407	6.960000	80.680000	63.655000	10.010000	33.897500
25%	51.439392	-2.611560	14.447500	87.572500	77.310000	40.671250	62.394375
50%	51.461127	-2.586423	19.117500	89.990000	82.357500	48.047500	70.606250
75%	51.476879	-2.551928	25.895000	92.097500	87.295000	54.301250	78.838125
max	51.508972	-2.522576	43.845000	94.040000	92.250000	74.840000	87.662500

- Insight: even in the cleanest area of Bristol, only 44% of inhabitants would consider it to be clean. Maximum values for other four features are much higher.



## Analysis – “Quality of Life”

- **Normalisation of features** (not interested in absolute values, but relative ones)
- Use the five features to calculate “Quality of Life” for families and individuals via weighted means

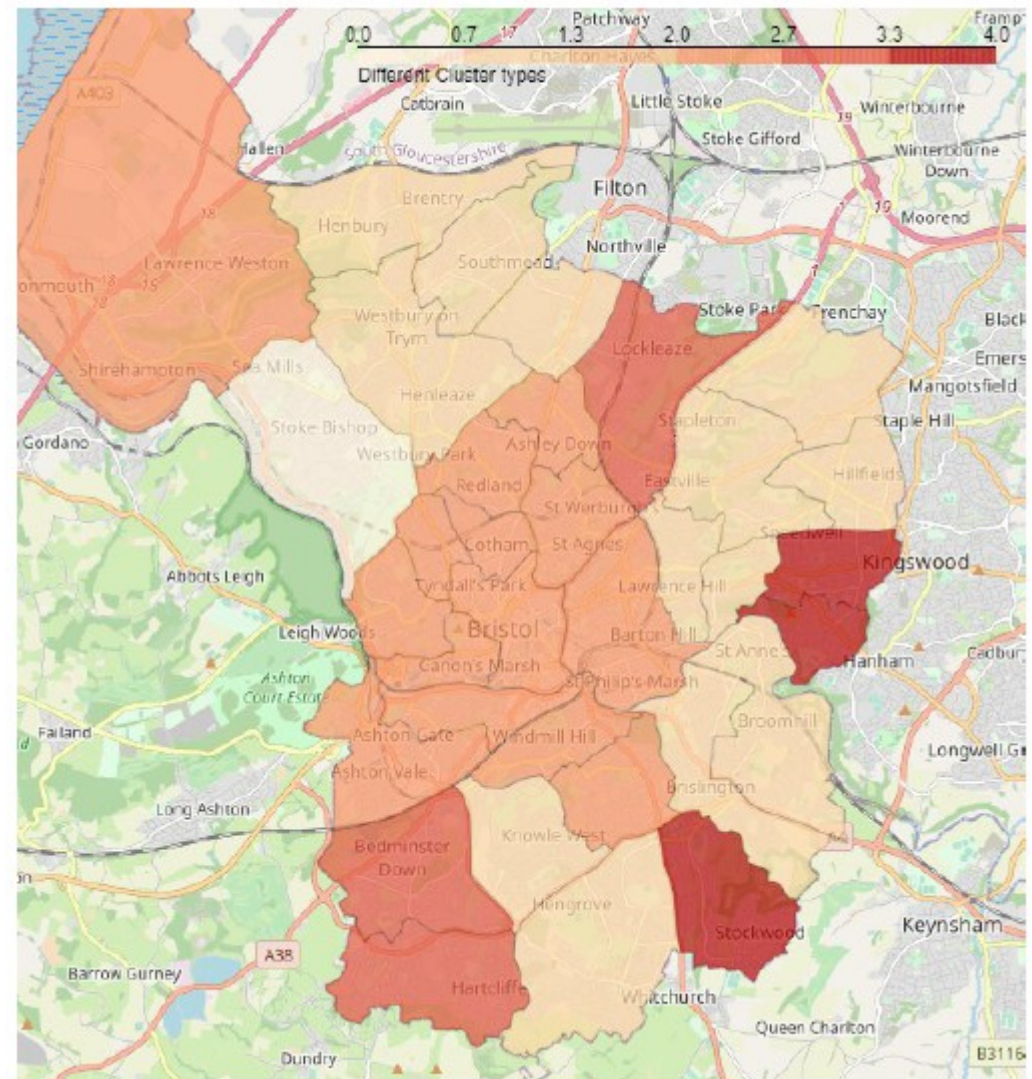
Feature	Weights_Families	Weights_Individuals
Clean Streets and Air	0.2	0.2
Accessible Public Transport	0.1	0.2
Safety	0.2	0.3
Children activities	0.3	0
Feeling Home	0.2	0.3

- Result is a dataframe with “Quality of Life” for each ward, apply this on the most suitable areas according to the Foursquare venue data next



# Analysis – Most suitable wards by venue types

- Determine top 5 most common venues per ward
- Use that information to apply **k-means clustering** ( $k = 5$ )
- Clear difference between central wards of Bristol (cluster #2) and rest of town
- **Cluster #1**: family-friendly, mixed distribution of venues
- **Cluster #2**: typical inner city area full of pubs, cafés and nightlife options, suited for individuals



## Results – Top 5 wards for families

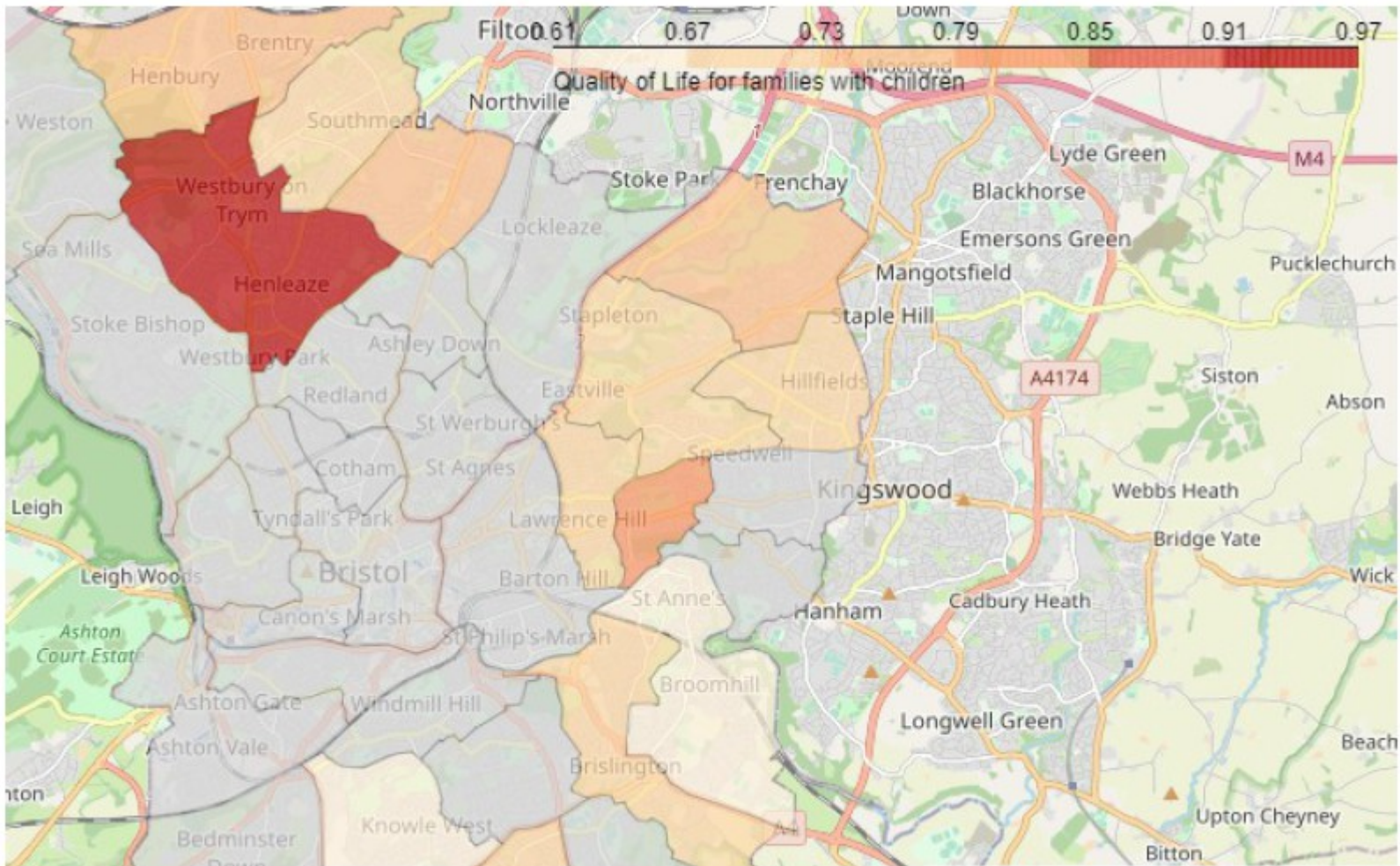
Now applying the “Quality of Life” on clusters #1 (families) and #2 (individuals).

**Top 5 wards for families** with a clear winner here:

	Ward	Longitude	Latitude	Clean Streets and Air	Accessible Public Transport	Safety	Children activities	Feeling Home	Quality of Life
32	Westbury-on-Trym & Henleaze	-2.617485	51.489794	0.200000	0.098947	0.200000	0.269832	0.200000	0.968779
29	St George West	-2.546940	51.460116	0.061391	0.100000	0.173513	0.300000	0.175475	0.810379
16	Henbury & Brentry	-2.621037	51.508972	0.136848	0.092822	0.176592	0.213347	0.171781	0.791391
19	Horfield	-2.586381	51.495083	0.085211	0.094715	0.187003	0.231411	0.187687	0.786027
14	Frome Vale	-2.531200	51.487089	0.110398	0.099766	0.176093	0.213368	0.160902	0.760528



## Results - Top wards for families



Map of Bristol showing the "Quality of Life" for families with children for cluster #1. "Westbury-on-Trym & Henleaze" is the clear winner here.

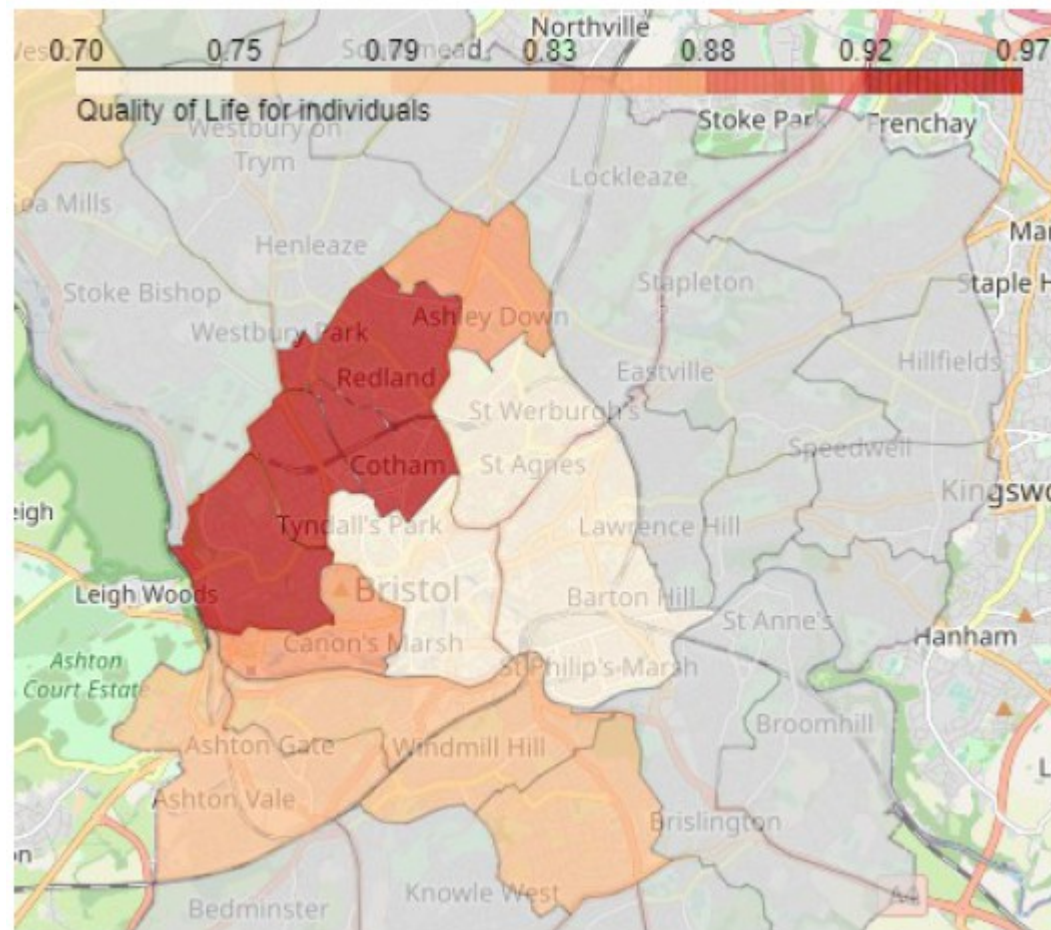
## Results – Top 5 wards for individuals

### Top 5 wards for individuals:

	Ward	Longitude	Latitude	Clean Streets and Air	Accessible Public Transport	Safety	Feeling Home	Quality of Life
9	Clifton Down	-2.612659	51.464968	0.200000	0.185963	0.290659	0.292882	0.969504
24	Redland	-2.601160	51.475244	0.159606	0.196179	0.300000	0.300000	0.955785
10	Cotham	-2.599913	51.465962	0.193054	0.196437	0.287537	0.278397	0.955425
8	Clifton	-2.619966	51.456514	0.184199	0.192230	0.291996	0.275916	0.944341
3	Bishopston & Ashley Down	-2.586465	51.481452	0.081446	0.194484	0.290325	0.295962	0.862216

The first four wards very close to each other, both in terms of the feature "Quality of Life" as well as geographically. Differences are only minute.

## Results - Top wards for individuals



Map of Bristol showing the "Quality of Life" for individuals for cluster #2. The four dark red wards are very close both in "Quality of Life" and geographically.



# Discussion

- Some wards are clearly more suitable for families resp. individuals than others. Large differences both in terms of the number and types of venues as well as when it comes to the perceived quality of life.
- Areas with a high entertainment value (high density of pubs, restaurants, cafés, etc.) are very central in Bristol.
- Just **northwest of the centre of town** are the areas most suitable for individuals due to a very high rating in terms of quality of life.
- The ward with the highest quality of life for families with children - "*Westburyon-Trym & Henleaze*" - is directly neighbouring that area.
- That **whole part of town offers great possibilities** and a high quality of life for its inhabitants, no matter if they are singles or families.

# Discussion

- Analysis is only scratching the surface. Several **issues** to consider:
  - Foursquare venue data might be incomplete and inaccurate
  - OpenData Bristol data gained through surveys (as all qualitative data, susceptible to all sorts of errors (e.g. coverage error, sample size error, etc.))
  - Weights of the “Quality of Life” calculation and other preferences are rather subjective and a matter of taste
  - Factors like rental prices etc. not considered here
- Results should still work as a **rough guide for newcomers** to Bristol



# Conclusion

- Purpose of project: identify most suitable neighbourhoods of Bristol (UK) for both individuals and families with children
- Analysis via Foursquare data allowed to estimate how suitable a ward is, whereas OpenData Bristol data helped to decide on highest quality of life.
- **Best wards** for both target audiences **were determined** and shown in both rankings (tables) as well as on choropleth maps of Bristol.
- In this analysis, our own preferences shaped the outcome but the final decision on where to move in Bristol depends on the individuals or families themselves, their priorities, preferences and financial status, and their idea of what “*Quality of Life*” means in the end ...