The Effect of Education on Crime Rate in Bristol, UK.

BY RHYS MORGAN

Contents

- Introduction

- Data

- Analysis and Results

- Machine Learning

- Discussion

- References

Introduction

Bristol is a bustling city enveloped in the hills of South West England and straddling the River Avon.

The centuries-old heritage and classical architecture give this place its own unmistakable identity.

Introduction (Contd.)

Bristol grew in population from 535,907 in 2011, to 679,000 in 2019.

It is generally a safe place. However, there is still moderate risk of petty crimes such as pickpocketing and robbery. The average age for an arrest is 33 here.

The more built-up districts of the city have a generally higher rate of crime compared to lesser areas. This is due to many reasons, but my question for this report is:

"Does <u>education</u> directly affect crime rate in Bristol?"

Aims

- Explore each district in Bristol.

- Compare their education systems with their crime rates each year from 2016 to 2020.

- Recommend which districts should have better education systems.

- Try to find connection between education and crime.

Data – How?

Through visualisation techniques, the data can show different trends and patterns that otherwise would be very difficult to see.

When using data science tools such as Python's Pandas, Numpy, and Sci-kit learn packages, the data can be extracted, collated, manipulated and analysed to provide future predictions and recommendations.

Data – What?

- Crime records of every district in Bristol from 2016 - 2020.

- All local schools ranging from nursery to university.

- I will also require geographical coordinates of the districts and crime reports.

Data – Where?

- Crime Data - opendata.bristol.gov.uk

- School Data – Foursquare API

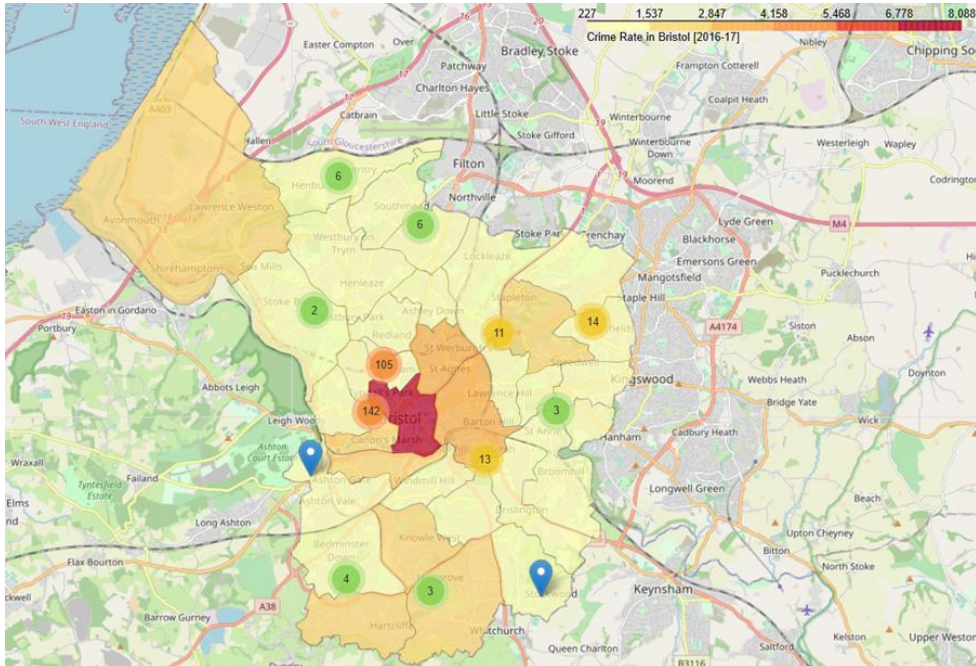- Geographical Data – anywhere online or Python Geocoder library.
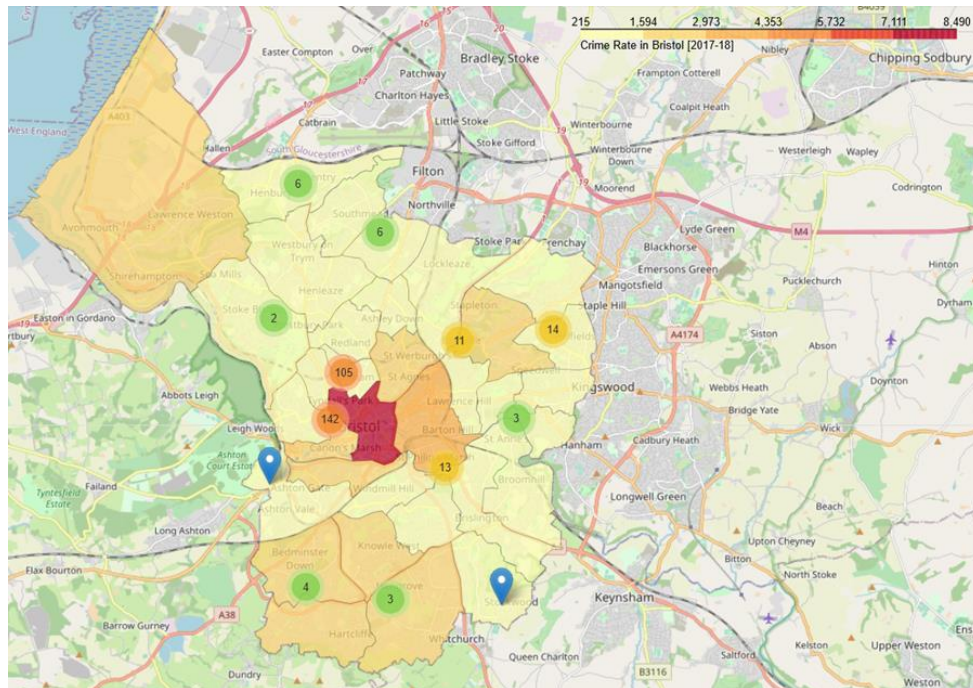
Analysis and Results

Bristol crime rate and education distribution 2016 – 2017.

Choropleth map created with Folium - a Python library.

Clusters show distribution of schools in every area.
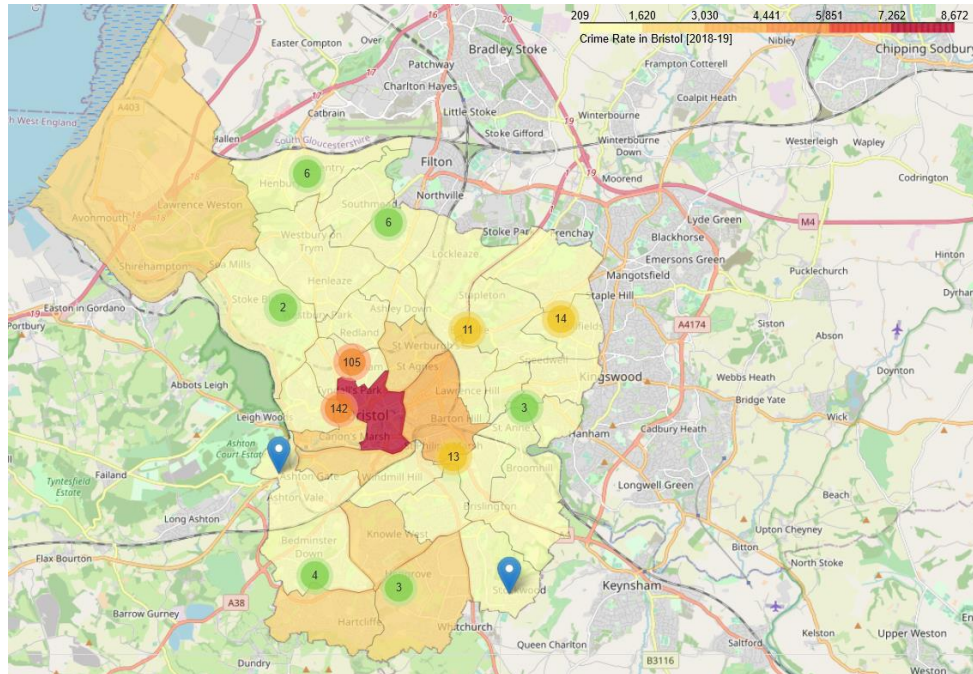
Analysis and Results (Contd.)

Bristol crime rate and education distribution 2017 – 2018.
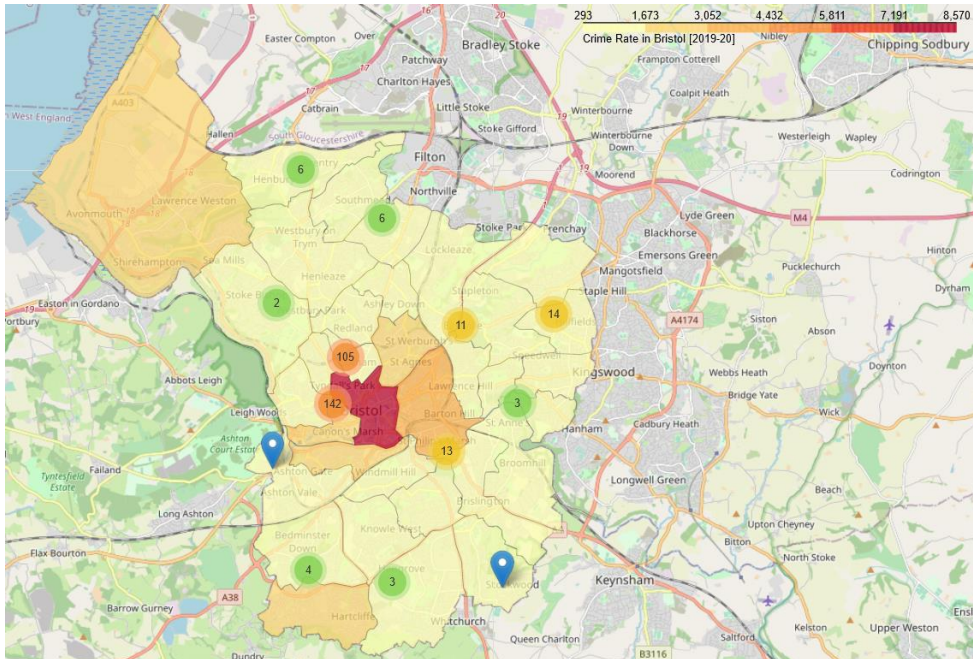
Analysis and Results (Contd.)

Bristol crime rate and education distribution 2018 – 2019.

Analysis and Results (Contd.)

Bristol crime rate and education distribution 2019 – 2020.
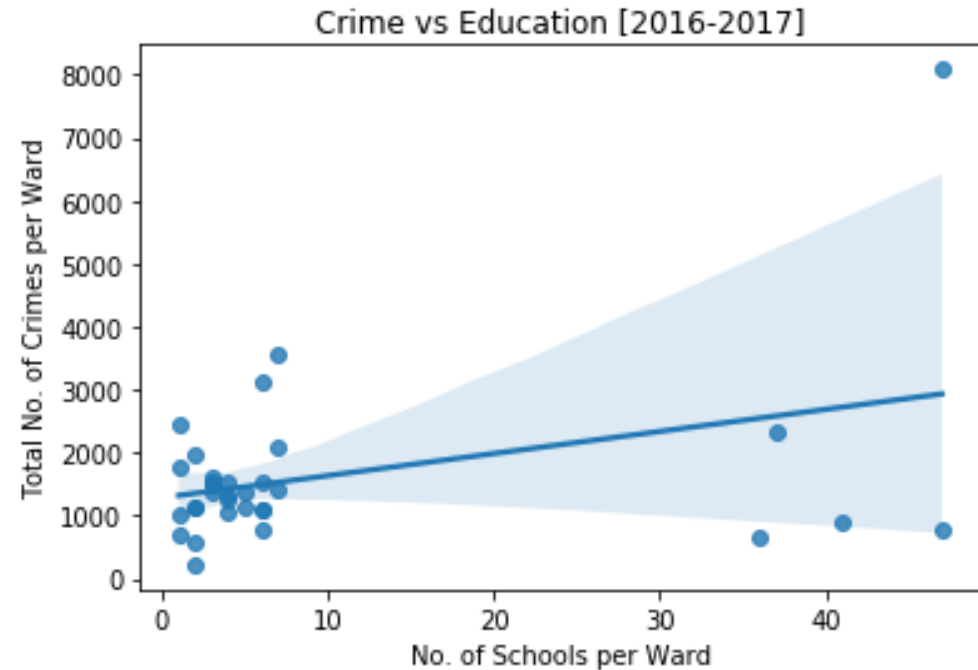
Analysis and Results (Contd.)

Ward	No. of Schools	Total Crimes (2016-17)
Central	47	8088
Lawrence Hill	7	3549
Ashley	6	3119
Hartcliffe & Withywood	1	2453
Hotwells & Harbourside	37	2337

Analysis and Results (Contd.)

- This regression line shows positive correlation.

- Not enough to determine a true connection.

Crime vs Education [2016-2017]

Analysis and Results (Contd.)

```
College Residence Hall             9
College Science Building           6
College Academic Building          4
College Lab                        4
College Administrative Building    3
College Library                    3
General College & University       3
University                         3
Student Center                     3
College Auditorium                 2
College Engineering Building       2
Language School                    1
Community College                  1
College Math Building              1
College Gym                        1
Hospital                           1
Name: School Category, dtype: int64
```

▪ Central is highest-ranking ward for crime.

▪ Its tied with Lawrence Hill for the most schools.

▪ Its only form of education are universities and colleges.

▪ Lawrence Hill mostly shares the same traits.

Analysis and Results (Contd.)

```
School                  2
Language School         1
Middle School           1
Elementary School       1
Name: School Category, dtype: int64
```

◦ Westbury-on-Trym and Henleaze. Low-ranking wards for crime.

◦ Consists of only high schools and elementary schools.

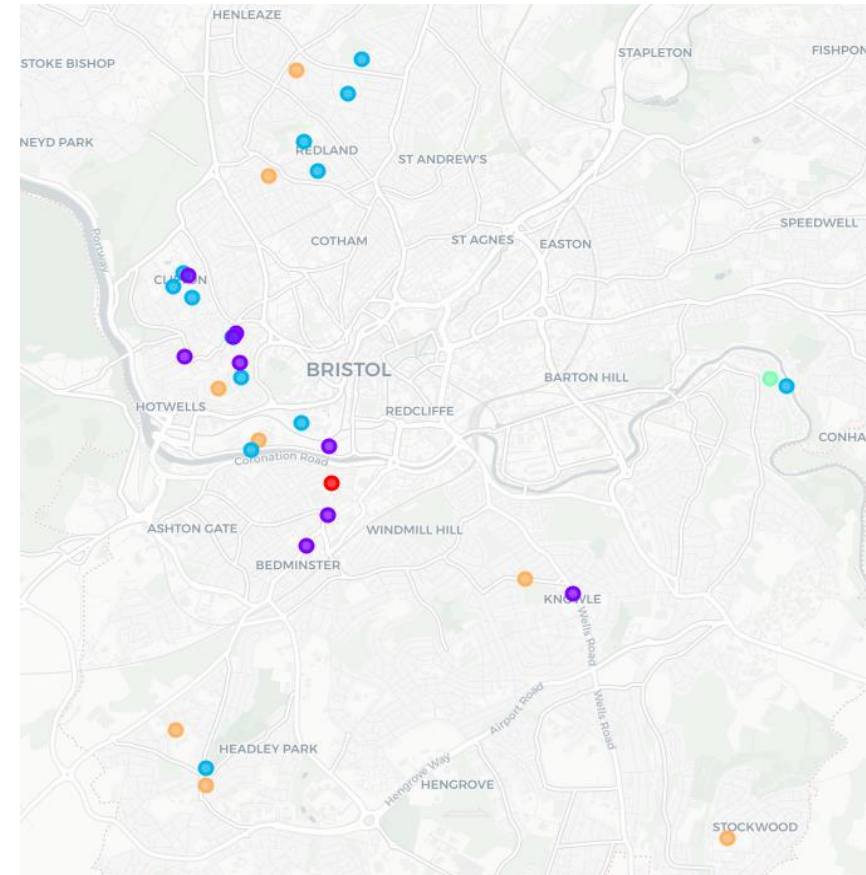◦ Henbury and Brentry. Low-ranking crime wards. Purely low-level schools.

Machine Learning

- The K-Means technique clusters school categories.
- This makes it much easier to see that wards with high crime, have high-level education.
- Each ward was organised by top 5 most common school types.

	Ward	1st Most Common School Category	2nd Most Common School Category	3rd Most Common School Category	4th Most Common School Category	5th Most Common School Category
0	Ashley	University	Community College	College Academic Building	College Quad	High School
1	Bedminster	Elementary School	High School	University	College History Building	College Soccer Field
2	Bishopston & Ashley Down	Elementary School	Community College	School	Music School	College Classroom
3	Bishopsworth	School	College Library	High School	University	College Gym
4	Brislington West	Elementary School	Community College	Music School	General College & University	University

Machine Learning (Contd.)

- Using the K-Means algorithm to cluster each category. This map was created.

- This visualises the clusters so it is easier to see the distribution of school types.

- Notice how the higher-level schools tend to be closer to Central?

- Red = Recreation centres

- Blue = Academic buildings/High Schools.

- Purple = Colleges/Universities.

- Green = Convention centres.

- Gold = Elementary/High Schools.

Discussion

- Wards with high crime have more high-level education. Wards with low crime have low-level education.
- Would it be a good idea to have schools for younger ages closer to higher-crime wards? According to the behaviour of other wards, it could be a viable option.
- Youths that live around Central must travel far to get an education. Thus, more traffic congestion and expenses. Some families may not be able to afford it.
- Bristol traffic has high pollution, hence the diesel ban in 2021.
- Investment in education (money and resources) would outweigh the loss to crime. Businesses would no longer need to have expensive security measures.
- There is still high-demand for working-class people.
- A new high school is opening in Lockleaze in 2021. Lockleaze has very low crime compared to the rest, and already has low-level schools. Was this a good decision?
- However, it is understandable for parents to send their children to safer places, regardless.
- Teaching quality and resources also play a part in the decision of picking a school.

Thank you for listening.

Are there any questions?

References

Baker, H. (2019). *Bristol named the happiest city in Britain.* Available: https://www.bristolpost.co.uk/news/business/bristol-named-happiest-city-britain-2460068. Last accessed 4th Aug 2020.

King, J. (2019). *Construction work begins on Bristol's newest secondary school Trinity Academy.* Available: https://www.bristolpost.co.uk/news/bristol-news/construction-work-begins-bristols-newest-3533734. Last accessed 4th Aug 2020.

Open Data Bristol. (2020). *Crime (recorded by Police) by selected offence groups in Bristol (by Ward).* Available: https://opendata.bristol.gov.uk/explore/dataset/crime-recorded-by-police-by-selected-offence-groups-in-bristol-by-ward/information/?disjunctive.ward_name. Last accessed 4th Aug 2020.

Safer Bristol. (2015). *Safer Bristol Crime and Disorder Strategic Assessment.* Available: https://www.bristol.gov.uk/documents/20182/35136/Crime+%26+Disorder+Strategic+Assessment.pdf/b56afc10-d3fb-49d4-b0c1-9f3521bae2ac#page=20&zoom=page-fit,-124,587. Last accessed 4th Aug 2020.

Sky UK. (2019). *Bristol bans diesel cars from 2021 in bid to improve air quality.* Available: https://news.sky.com/story/bristol-bans-diesel-cars-from-2021-in-bid-to-improve-air-quality-11855120. Last accessed 4th Aug 2020.