

Edge Hill University

The Department of Computer Science

CIS4514 Programming for Data Science and Artificial Intelligence

Level 7

Coursework 1: Task 4

Data-Driven Insights: Analyzing Lancashire Police Stop-and-Search Activities Using Power BI

Data-Driven Policing

Modern policing increasingly relies on data analysis to ensure public safety and accountability. As noted by Afzal and Panagiotopoulos (2024), the integration of data into policing enables a structured approach to crime prevention and decision-making. One key aspect of this approach involves stop-and-search operations, where comprehensive records are maintained and analyzed to identify trends and improve efficiency.

This report examines data from stop-and-search activities conducted by Lancashire Police in September 2024, sourced from the Police Open Data platform (<u>www.data.police.uk</u>). The dataset comprises multiple attributes such as search type, demographic details, legal context, and outcomes, reflecting the multifaceted nature of policing activities in the digital age (Buscariolli, 2023).

Data Preprocessing

To ensure the dataset was ready for analysis, several preprocessing steps were conducted using **Power Query**:

1. Eliminating Redundant Columns:

The following columns were removed as they were deemed irrelevant to the analysis:

- Part of a policing operation
- Policing operation
- Outcome linked to object of search
- *Removal of more than just outer clothing* (duplicated twice in the dataset)
- *Latitude* and *longitude* (location-based analysis was not within the task scope).

2. Handling Missing Data:

Using the filtering feature, it was observed that the *gender* column contained three categories: *Male, Female, and Other*, alongside blank spaces. The *Other* category, represented by just one entry out of 1,419 records, was removed. Additionally, 97 records (6.8% of the total) contained blank spaces across critical columns, such as *age range, self-defined ethnicity, officer-defined ethnicity*, and *object of search*.

- For categorical columns, missing entries were replaced with descriptive placeholders:
 - Age range: Replaced with Unspecified age range.
 - Self-defined ethnicity: Replaced with Unspecified self-defined ethnicity.
 - Officer-defined ethnicity: Replaced with Unspecified officer-defined ethnicity.
 - *Object of search:* Replaced with *Unspecified object*.

• *Outcome:* Replaced with *Unknown outcome*.

The careful handling of missing data aligns with best practices in data policing, emphasizing transparency and accountability when dealing with incomplete records (Jansen, 2022).

3. Column Renaming and Datatype Standardization:

Columns were appropriately renamed for clarity, and datatypes were standardized to ensure seamless analysis.

Data Analysis

The cleaned dataset consisted of **1,321 records** of stop-and-search activities conducted between September 1 and September 30, 2024. Key findings from the analysis are outlined below:



Figure 1: Overview of the Stop and search analysis dashboard

- 1. Gender Distribution:
 - **Over 86%** of searches involved male individuals (1137 males).
 - The majority of male offenders were associated with drug-related crimes, with over half resulting in *no further action* as seen from figure 1. However, **121 arrests** were made for <u>drug</u> offenses.



Figure 2: Dashboard of detailed analysis of male individuals

2. Crime Categories:

• Drug-related searches accounted for **65.56%** of all cases, with males being the predominant offenders as seen in figure 2.



Figure 3: Dashboard showing crime categories proportion

- Despite a smaller number of combined person-and-vehicle searches, these had a higher arrest-to-no-action ratio compared to person-only searches, indicating a higher likelihood of offenses occurring in vehicles. Figure 3 gives a graphical representation of the relationship.
- 3. Age Group Trends:

- Individuals aged 34 and above were the most involved in crimes under legislative categories such as the *Police and Criminal Evidence Act 1984* (Section 1) and the Misuse of Drugs Act 1971 (Section 23). See Figure 1.
- Searches involving 10-17-year-olds were primarily person-only searches, with theft or drug abuse as potential motives, possibly linked to socioeconomic factors. This is shown in figure 4.
- Figure 5 shows young adults aged **18-34** were more evenly distributed across vehicle-related and person-only searches, suggesting varied levels of financial independence influencing crime types.



Figure 4: Dashboard showing relationship between 10–17-year-old category and legislative category



Lancashire Stop-and-Search Police Report for September 2024

Figure 5: Dashboard showing relationship between 18-34-year-old category and legislative category

4. Firearm Offenses:

 Among five individuals apprehended with firearms, only one arrest was made, with the remaining cases resolved through community interventions or no further action. As shown in figure 6, These individuals fell into the 18-24, 34 and above, and unspecified age categories, raising questions about potential leniency or situational discretion.



Figure 6: Dashboard showing relationship between object of search - Firearms and the search outcome

5. Fireworks and Youth Behavior:

• Figure 7 shows that no arrest was made for teenagers found with fireworks, likely linked to seasonal activities such as *Bonfire Night* celebrations.



Figure 7: Dashboard showing relationship between object of search - Fireworks and the search outcome

6. Theft-Related Incidents:

From Figure 8, 416 combined cases involving articles for theft, offensive weapons, and stolen goods predominantly involved individuals under 34 years old, highlighting a correlation between youth crime and possible lack of engagement in employment or education.

How outcomes vary across different age groups





What objects were searched for, and how often were they found



Figure 8: Dashboard showing relationship between Theft related crime and age range

Insights and Recommendations

This analysis highlights several trends and areas for potential intervention:

- **Targeted Interventions:** The high proportion of drug-related offenses among males suggests a need for targeted programs addressing substance misuse, particularly for young adults.
- Youth Engagement: Strategies to reduce theft-related incidents could include community outreach programs focusing on education and employment opportunities for individuals under 34.

• **Policy Review:** The outcomes of firearm-related searches indicate potential inconsistencies in enforcement, warranting a review of policies to ensure uniform application of the law.

Conclusion

The analysis of Lancashire's stop-and-search data for September 2024 highlights the significance of effective data analysis in understanding crime patterns and informing policing strategies. By carefully processing and examining the dataset using Power BI, key findings were identified, including the prevalence of drug-related offenses, the higher involvement of males in criminal activities, and the challenges associated with youth offenders.

These findings emphasize areas where law enforcement efforts can be strengthened, such as addressing youth engagement in crime and improving responses to firearm-related incidents. The report also illustrates the need for transparency and consistency in policing practices to build public trust.

Overall, this study demonstrates how detailed analysis of policing data can provide valuable insights to support evidence-based decision-making and improve community safety.

References

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