

# UK Road Safety Dashboard

## Task 1: Advanced UK Road Safety Data Analysis with Power BI Introduction

Task 1 uses Power BI to evaluate UK road safety data for 2021, with the goal of extracting insights that may be used to improve road safety. This work focuses on using visualization tools to analyse comprehensive accident data and provide stakeholders with actionable information.

### Background

The UK Road Safety Data, often known as STATS19, is a large dataset that contains a plethora of information about road accidents recorded to the police. It is a valuable resource for studying the dynamics of road safety and designing measures to reduce traffic accidents.

### Data Description

The dataset contains complete data on each reported accident, including:

- **Accident Locations:** Geographic coordinates indicating where accidents happened.
- **Time and date:** Identifying trends over time requires precise information about each accident.
- **Road and weather conditions** at the time of the accident provide context for environmental factors that cause accidents.
- **Casualty and Vehicle Details:** Gives detailed information on individuals and vehicles that were involved in accidents, providing an understanding of both the human and material sides of the incident.

### Methodology Data Preparation

- **Data Import:** Dataset is available online and provided on Blackboard as well. We imported the dataset into our Power BI file using Text/CSV data source import option.
- **Data Cleaning and Transformation:** We used the Power BI's GUI data transformation as well as DAX to transform and clean data. We manually removed null or missing data from the dataset such as -1 values in columns like "road\_type" etc. We also renamed data columns for better representations in visualizations (Ahmed, Hossain, Bhuiyan, & Ray, 2021). DAX was used to make new measures or columns that were not already present in the dataset such as "Total Accidents" or "Fatal Accidents" columns etc. This can also be viewed in the following figures.

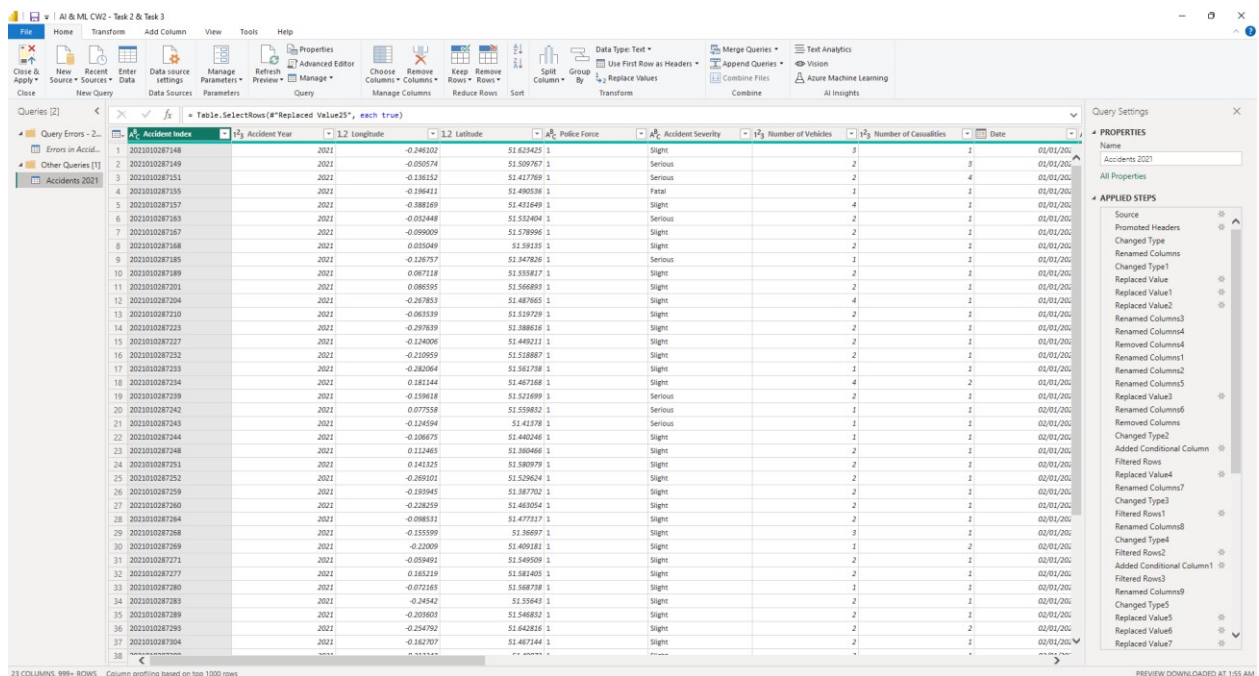


Figure 1: Transforming & Cleaning Data

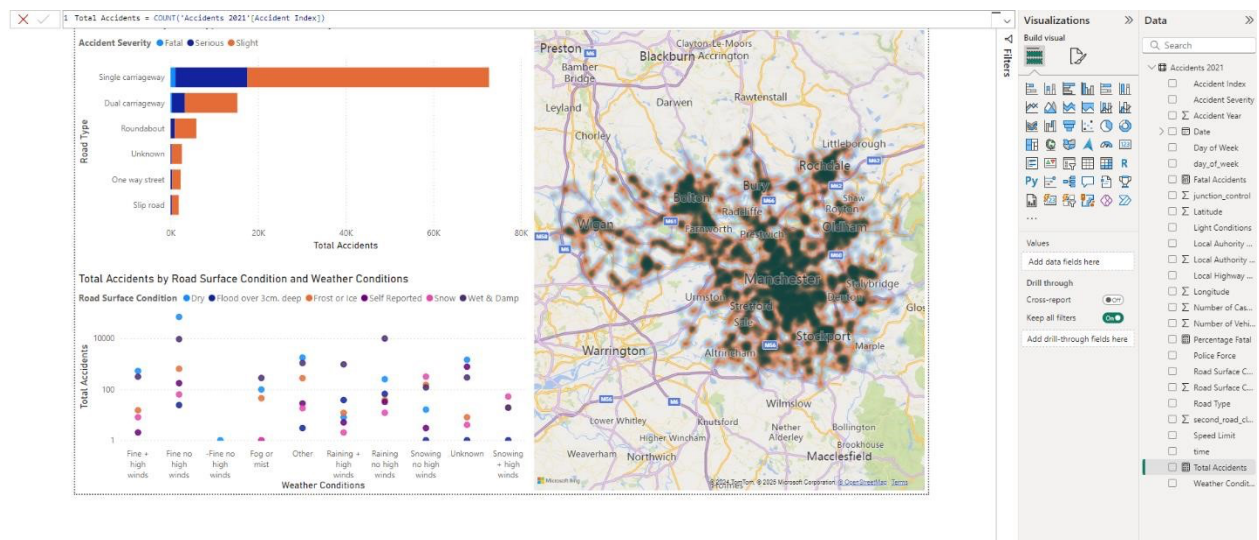


Figure 2: Using DAX query to make Column "Fatal Accidents"

## Visualizations

- Stacked Bar Chart:** It displays the overall number of accidents by severity and road type, providing insights into how varied settings impact accident outcomes. The statistics show that the most incidents happened on single carriageways, whereas the fewest were recorded on slip roads.

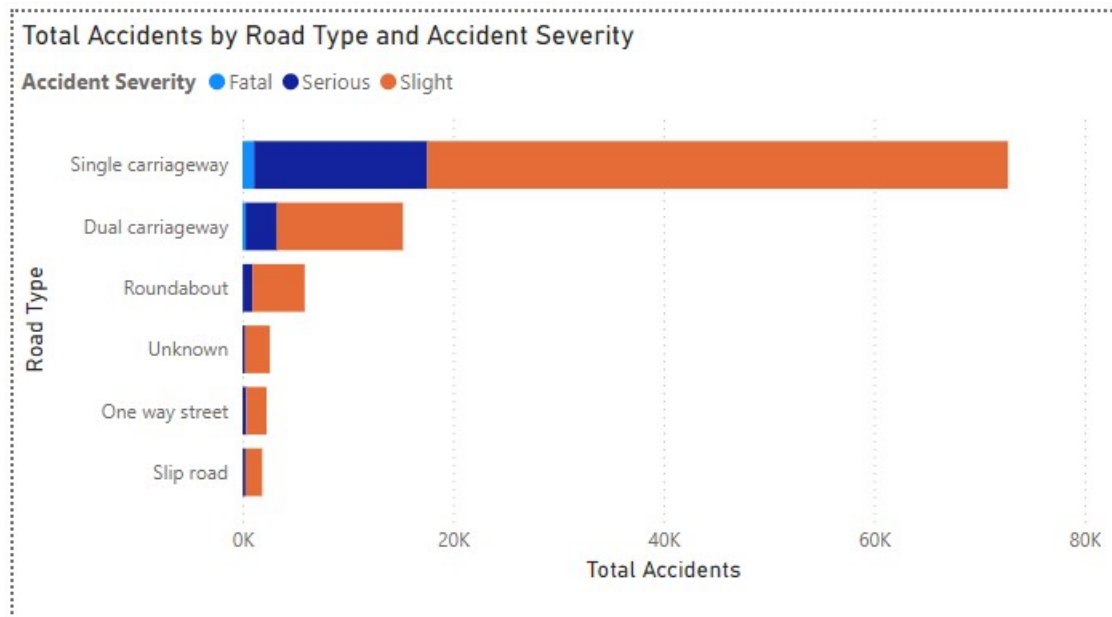


Figure 3: Stacked Bar Chart (Total Accidents by Road Type and Accident Severity)

- **Scatter Plot:** Analyses the relationship between meteorological conditions and accident frequency to identify high-risk weather situations.

#### Total Accidents by Road Surface Condition and Weather Conditions

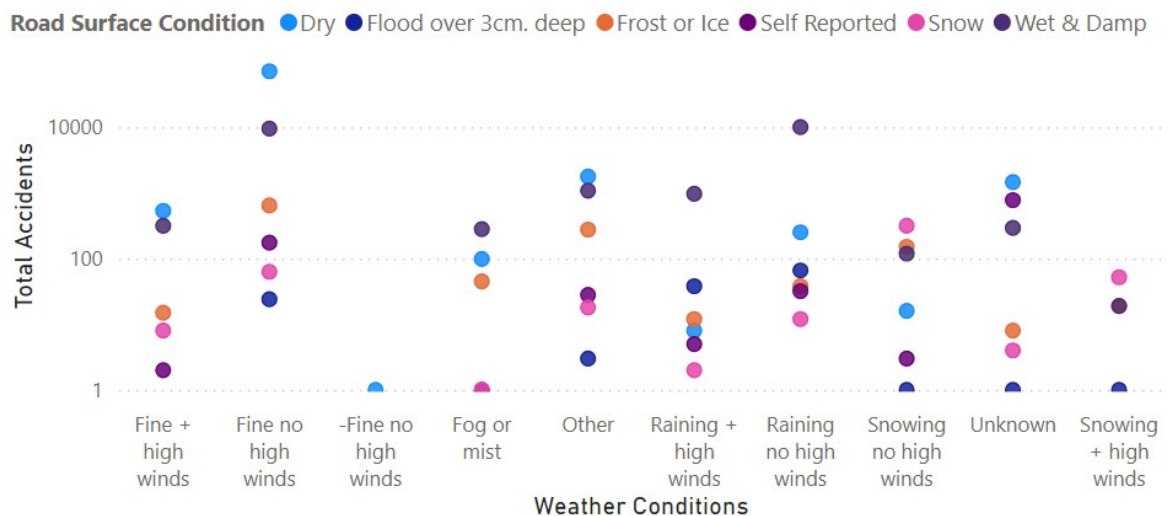


Figure 4: Scatter Plot (Total Accidents by Road Surface Condition and Weather Conditions)

- **Heat Map:** Identifies accident hotspots in Greater Manchester according to longitudes and latitudes to prioritize intervention efforts.

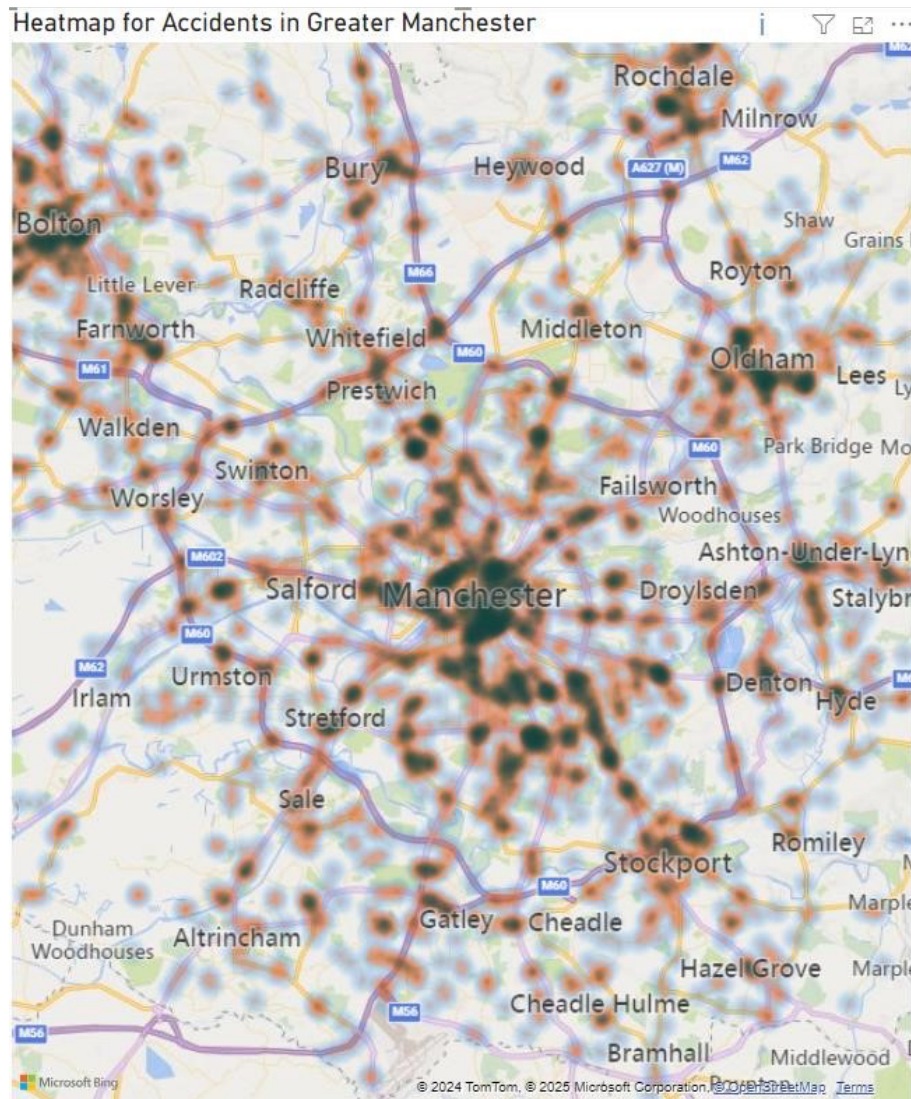


Figure 5: Heatmap for Accidents in Greater Manchester

## Discussion

These visualizations give policymakers an integrated overview of road safety in the UK, combining traditional and advanced data visualizations to improve understanding and drive policy decisions (Ahmed, Hossain, Bhuiyan, & Ray, 2021). **Challenges**

- **Data Complexity:** Managing and visualizing a complex dataset required advanced data manipulation and optimization techniques in Power BI.
- **Performance Optimization:** Optimizing Power BI performance for large datasets and complicated visuals.

## Conclusion

Task 1 effectively showcases Power BI's ability to analyze complex information and transform them into meaningful insights. The enhanced visualizations give an improved comprehension of the dynamics of road safety, which can help develop efficient road safety policies.

## Task 2: Interactive Dashboard for Road Accident Analysis in Power BI Introduction

Building on the insights gained in Task 1 & Task 2 involves creating a dynamic and interactive dashboard in Power BI to give a comprehensive analysis of the UK Road Accident 2021 Dataset (Bachechi, Po, & Rollo, 2022).

## Background

This task leverages the cleaned and organized dataset from task 1 to create a multifunctional dashboard that not only shows data but also enables users to interact with it, which enhances the way decisions are made in public safety and traffic management.

## Dashboard Design and Features Core Features

- **Data Cards:** Data cards provide immediate information into total number and fatal accidents, illustrating the severity of road safety concerns.



Figure 6: Data Cards (Total Accidents & Fatal Accidents)

- **Interactive Slicer:** The Interactive Slicer allows users to filter data by road type, making the dashboard more relevant and tailored to specific questions.

Road Type

- ☐ Dual carriageway
- ☐ One way street
- ☐ Roundabout
- ☐ Single carriageway
- ☐ Slip road
- ☐ Unknown

Figure 7: Interactive Slider based on Road Type



## Core Visualizations

- **Clustered Bar Chart:** It shows the distribution of accidents across different days of the week. We can see most accidents in 2021 happened on Saturday while the least being on Sundays. It helps identify temporal trends in accident occurrences.

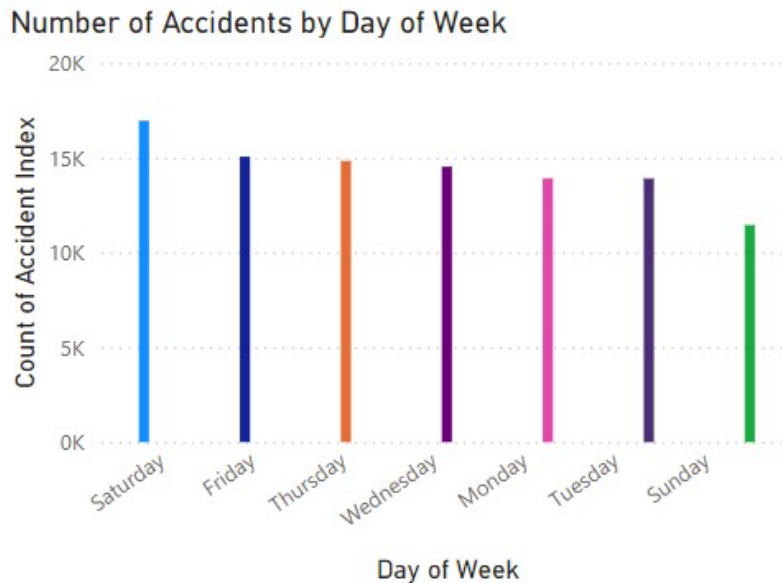


Figure 9: Clustered Bar Chart (Number of Accidents by Day of Week)

- **Stacked Column Chart:** We can see the data represented by reports made to different Police Forces where each level represents different levels of severity. This visualization helps highlight top 10 areas where severe accidents were reported.

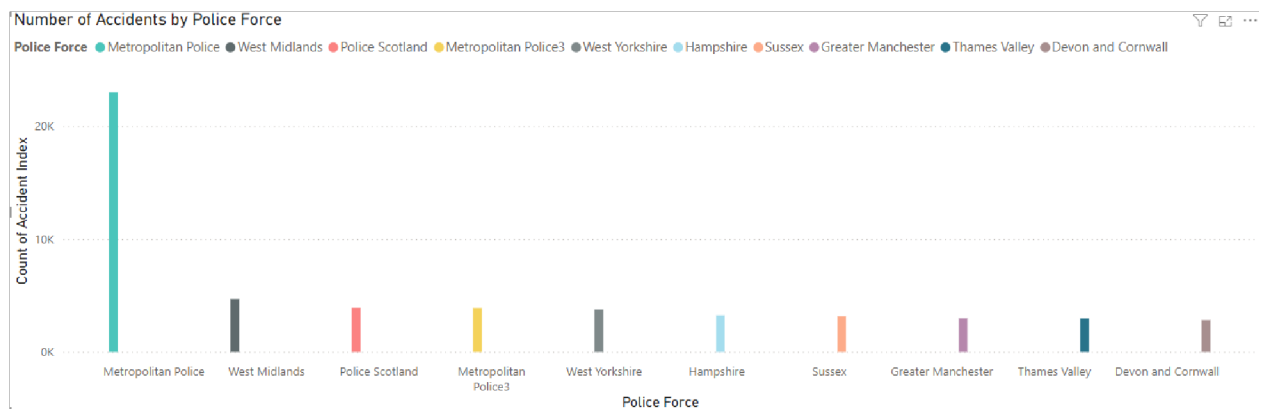


Figure 10: Stacked Column Chart (Number of Accidents by Police Force)

- **Scatter Plot:** It helps identify the link between light conditions and how it effects the accident frequency. It suggests that optimal lighting conditions are best suited for a better and safe road.



Figure 11: Scatter Plot (Number of Accidents by Light Conditions and Speed Limit)

- **Line Chart:** It helps to keep a track of the trend in number of casualties throughout the week. It potentially aids in guiding a plan for better emergency response. The graph represents that most casualties occur on Saturday suggesting that emergency services need to be more active for a response on that day.

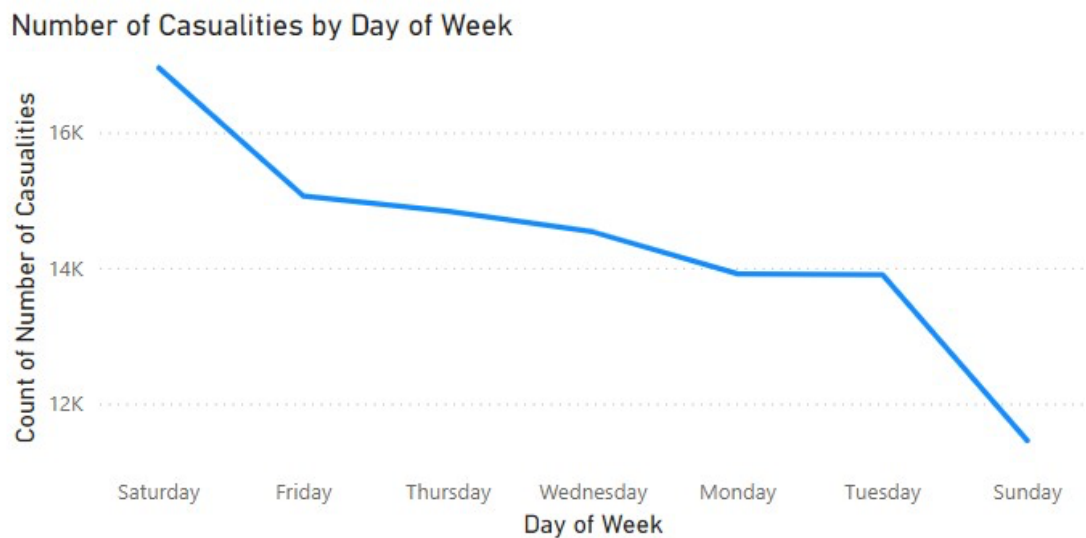


Figure 12: Line Chart (Number of Casualties by Day of Week)

## Discussion

The dashboard's interactive features of Power BI offer an extensive structure for deep analysis, allowing stakeholders to examine data in a user-friendly manner. This study showcases Power BI's outstanding features for generating interactive elements that may dramatically improve public safety measures (Bachechi, Po, & Rollo, 2022; Salehan & Kim, 2016).

## Challenges

- **Data Integration:** Integrating real-time data sources while making sure that interactive visualisation features keep performing optimally.
- **User Interface Design:** It is very important to create a simple and clean dashboard user interface to make sure that the visualization is both informative and intuitive. It should accommodate a wide range of users from decision or policy makers to traffic planners.

## Conclusion

Task 2 demonstrates Power BI's extensive features for generating engaging and informative dashboards. The extensive analysis and strategic planning enabled by this dashboard highlight how modern data visualization techniques may have a significant influence on road safety management and public safety measures.

## Reference list

Ahmed, R., Shaheen, S. and Philbin, S.P. (2022). The Role of Big Data Analytics and decision-making in Achieving Project Success. *Journal of Engineering and Technology Management*, [online] 65, p.101697. doi:<https://doi.org/10.1016/j.jengtecman.2022.101697>.

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