A Project Synopsis On

Road Accident Analysis

EXCEL DASHBOARD

Submitted by

Mayuri Dashrath Khatpe

Batch Code: ANP-C8639

Student ID: AF0414028

Introduction

The project titled "Road Accident Analysis and Dashboard Report (2021-2022)" focuses on analyzing road accident data from the UK over the years 2021 and 2022. Road accidents pose significant risks, resulting in numerous casualties and substantial economic losses. Understanding the causes and patterns of accidents is crucial for improving road safety, reducing casualties, and implementing preventive measures.

This report outlines the approach used for analyzing the road accident dataset, the methodologies followed, key findings, and how the dynamic dashboard facilitates data exploration. The project's deliverables aim to provide stakeholders, such as the Ministry of Transport and Traffic Management Agencies, with actionable insights to develop more effective road safety programs. By using Excel for data cleaning, transformation, and visualization, the project highlights the importance of a data-driven approach in mitigating road accidents.

Objective

The objective of this project is to analyze the UK road accident data from 2021 to 2022, using Excel for data manipulation and dashboard creation. The aim is to identify accident patterns, assess casualty severity, and examine the conditions under which accidents occurred. The project seeks to produce a dynamic dashboard that stakeholders can use to filter data and gain insights into various aspects of road safety, such as accident severity, vehicle type involvement, road surface conditions, and monthly trends.

Through this analysis, the goal is to provide a clearer understanding of which factors contribute most to road accidents and how these insights can drive more effective safety initiatives.

Data Source

The data used in this project was sourced from **Kaggle**, a well-known platform for datasets. The dataset provides road accident information from the UK, covering the years 2021 and 2022. The data includes details such as accident location, type of vehicle involved, road surface conditions, weather, lighting conditions, and the severity of the casualties.

Key attributes of the dataset:

- **Location:** UK (2021-2022)
- **Vehicle Types:** Cars, bikes, heavy vehicles, etc.
- **Accident Details:** Date, road surface, weather conditions, lighting, casualty severity.
- **Data Manipulation:** The dataset was cleaned, structured, and transformed for analysis purposes.

The dataset was first pre-processed to remove any incomplete or irrelevant entries, and it was normalized to ensure consistency in format and content across all fields.

Methodology

The methodology followed in this project involves several key steps, each critical to ensuring that the data is analyzed accurately and that meaningful insights are derived. The process included:

4.1. Data Cleaning

- **Eliminating Duplicate Entries:** To avoid misleading results, duplicate data entries were removed from the dataset.
- **Handling Missing Data:** Blank or incomplete rows were either filled with relevant values or discarded to ensure the integrity of the analysis.
- **Correcting Data Types:** Data types were checked and adjusted to ensure consistency (e.g., dates formatted correctly, numeric fields standardized).

4.2. Data Processing

- **Creating New Variables:** Formulas were used to generate additional fields that allowed for a deeper analysis. For example, casualty percentages were calculated based on severity and time trends were added to assess changes over months.
- **Aggregation:** Pivot tables were created to structure the data in a way that allowed for easy analysis and visualization of key trends.

4.3. Data Analysis

- **Trends & Patterns:** Patterns such as the increase or decrease in accidents by month, vehicle type, and severity were identified.
- **Key Insights:** Insights into accident causes, severity distribution, and vehicle type involvement were derived from pivot tables and Excel functions.
- **Use of KPIs:** The analysis was guided by key performance indicators (KPIs) relevant to stakeholders, ensuring the focus remained on actionable data.

4.4. Data Visualization

- **Charts and Graphs:** Various types of charts, including bar graphs, pie charts, and line graphs, were created to visually represent the findings. These visuals help to summarize complex datasets in a manner that is easy to interpret.
- **Customization:** The charts were customized for clarity and ease of understanding, emphasizing important findings.

4.5. Dashboard Creation

- **Interactive Dashboard:** An Excel-based interactive dashboard was created. The dashboard provides the user with filters to view data specific to their requirements (e.g., year, vehicle type, road condition). This allows stakeholders to explore different perspectives and gain insights relevant to their particular needs.
- **User-Friendly Design:** The dashboard is designed for ease of use, enabling non-technical users to interact with the data and derive meaningful conclusions.

Key Performance Indicators (KPIs)

The analysis was structured around several Key Performance Indicators (KPIs), which were identified as critical to the needs of the project stakeholders. The KPIs are as follows:

- **Total Casualties:** This measures the total number of casualties following accidents, categorized by severity (slight, serious, fatal).
- **Casualties by Vehicle Type:** The number and percentage of casualties based on the type of vehicle involved in the accidents (e.g., cars, bikes, buses).
- **Monthly Trend Analysis:** A comparison of casualty data between 2021 and 2022, helping to identify any seasonal or monthly variations in accident severity or frequency.
- **Casualties by Road Type & Surface:** Analysis of how different road types (single-carriageways, dual-carriageways) and road surface conditions (dry, wet, icy) influence the likelihood of casualties.
- **Distribution Analysis:** The examination of casualty distribution based on environmental factors, including weather conditions (e.g., rain, fog) and lighting (e.g., daylight, night).

These KPIs helped focus the analysis on the most important metrics and provided stakeholders with the information necessary to evaluate road safety.

Stakeholders

The project delivers insights that are useful for multiple stakeholders in road safety management and public welfare, including:

- **Ministry of Transport:** For policy development and road safety regulations.
- **Road Transport Department:** To identify areas needing improved infrastructure or better road safety features.
- **Police Force:** To aid in accident investigation and implementing safety measures.
- **Traffic Management Agencies:** For real-time traffic management and implementing preventive strategies.
- **Public and Media:** Raising awareness of road safety issues and sharing preventive measures to the wider public.

Each stakeholder can utilize the dashboard to explore data points relevant to their responsibilities.

Key Insights

Several key insights emerged from the analysis of road accident data, providing valuable information on accident trends and contributing factors:

- **Casualty Severity:** The majority of casualties in both 2021 and 2022 were classified as "slight," while fatal accidents remained the least frequent. This indicates that most accidents result in minor injuries, but also highlights the need to address the conditions that lead to more severe accidents.
- **Vehicle Type Involvement:** Cars and bikes were found to be the vehicles most frequently involved in accidents, suggesting that these modes of transport should be a focus of road safety campaigns. Targeted measures, such as better road safety education for bikers and car drivers, could help reduce casualty rates.
- **Monthly Trends:** January consistently recorded the highest number of casualties in both years. The high accident rate could be due to adverse weather conditions, which are common in winter months, or increased travel following holiday periods.
- **Road Type and Surface:** Single-carriageways accounted for the highest number of accidents, particularly on dry surfaces. This suggests that while certain road types are inherently more dangerous, better awareness and control measures could mitigate accident rates.
- **Environmental Conditions:** Urban areas reported almost double the number of accidents compared to rural areas, likely due to higher traffic density. Interestingly, more accidents occurred during fine weather and daylight conditions, suggesting that factors such as driver complacency might play a role.

Dashboard Features

The dashboard is the centerpiece of the project, offering a range of interactive features that allow stakeholders to engage with the data:

- **Dynamic Filters:** Users can filter the data by year, vehicle type, road condition, and accident severity. This enables stakeholders to focus on specific subsets of the data that are most relevant to their interests.
- **Visual Representation:** The dashboard includes key graphs and charts that visually represent accident trends, severity, and other factors. These visuals simplify complex datasets, making it easier to communicate findings to stakeholders.
- **Customization Options:** The dashboard provides the flexibility for stakeholders to explore various dimensions of the data, helping them derive insights that are most relevant to their needs.

Conclusion

The Road Accident Analysis and Dashboard project offers critical insights into the factors contributing to road accidents in the UK from 2021 to 2022. The analysis identifies key patterns in casualty severity, vehicle involvement, and road surface conditions, allowing stakeholders to implement targeted safety measures. The interactive dashboard serves as a powerful tool for exploring the data, enabling stakeholders to make data-driven decisions aimed at improving road safety and reducing accidents.

This report demonstrates the value of a systematic and data-driven approach to analyzing road accident data, providing a foundation for further research and policy-making efforts aimed at making roads safer for everyone.