# PROJECT REPORT ON

## “Road Accident Dashboard”

“*A Road Accident Dashboard using Tableau*”

Submitted By

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**Under The Guidance of:**

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**Nov, 2025**


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# CERTIFICATE

This is to certify that Raja Kumar (24MCA20229), have successfully completed the project title **"Road Accident Dashboard"** at University Institute of Computing under my supervision and guidance in the fulfilment of requirements of Second semester, **Master of Computer Application.** Of Chandigarh University, Mohali, Punjab.

| | |
|---|---|
| Dr. Krishan Tuli | Mrs. Damanpreet Kaur |
| Head of the Department | Project Guide Supervisor |
| University Institute of Computing | University Institute of Computing |

# ACKNOWLEDGEMENT

We deem it a pleasure to acknowledge our sense of gratitude to our project guide Mrs. Damanpreet Kaur under whom we have carried out the project work. His incisive and objective guidance and timely advice encouraged us with constant flow of energy to continue the work.

We wish to reciprocate in full measure the kindness shown by Dr. Krishan Tuli (H.O.D, University Institute of Computing) who inspired us with his valuable suggestions in successfully completing the project work.

We shall remain grateful to Dr. Manisha Malhotra, Additional Director, University Institute of Technology, for providing us a strong academic atmosphere by enforcing strict discipline to do the project work with utmost concentration and dedication.

Finally, we must say that no height is ever achieved without some sacrifices made at some end and it is here where we owe our special debt to our parents and our friends for showing their generous love and care throughout the entire period of time.

Date: 07.11.2025

Place: Chandigarh University, Mohali, Punjab

Raja Kumar, UID: 24MCA20229

# ABSTRACT

This project presents a comprehensive analysis of road accident data using Tableau, a powerful data visualization tool. The main objective of this dashboard is to identify trends, patterns, and key factors contributing to road accidents and casualties. The dashboard visualizes crucial insights such as total accidents, fatalities, serious and slight casualties, as well as the impact of weather, road surface, and vehicle type on accident severity. Interactive filters allow users to compare current and previous year data for better year-on-year analysis. The results show that most fatal accidents occurred under fine weather and dry road conditions, indicating that driver behaviour and road design play a significant role in accidents rather than environmental factors. This project demonstrates how data visualization can support data-driven decision-making and improve road safety measures.

# TABLE OF CONTENTS

# Introduction

Road accidents have become one of the major causes of death and injury across the world. With the increasing number of vehicles and expanding road networks, analysing accident data has become essential to improve road safety and prevent future incidents. Traditional methods of analysing accident records are often time-consuming and fail to highlight key trends or contributing factors effectively.

This project focuses on developing an interactive **Road Accident Dashboard** using **Tableau** to visualize and analyse road accident data efficiently. The dashboard provides a clear, data-driven view of accident statistics such as the number of total accidents, casualties, and fatalities categorized by factors like vehicle type, road surface, weather condition, and location.

By integrating filters for different years and severity levels, the dashboard enables users to perform comparative analysis and understand how accident trends have changed over time. The geographical map visualization also helps identify high-risk areas, assisting authorities in implementing safety measures and infrastructure improvements.

In summary, this project aims to turn complex accident data into meaningful insights through visualization, helping policymakers, traffic departments, and researchers make informed decisions to enhance road safety and reduce accident rates.

# Literature Review

The study of road accident data has been a critical research area for decades, as it provides valuable insights into traffic behaviour, safety risks, and preventive measures. Several researchers and organizations have analysed accident patterns using statistical and data visualization techniques to support evidence-based policymaking.

According to the World Health Organization (WHO), road traffic injuries are one of the leading causes of death globally, especially among young people aged 15–29 years. Studies emphasize that a majority of accidents occur due to human error, over-speeding, and violation of traffic rules rather than environmental factors.

Previous research by various traffic safety authorities has shown that visual analytics tools like Tableau, Power BI, and GIS mapping can simplify complex datasets and make it easier to identify trends and correlations. For example, the UK Department for Transport (DfT) provides open-access accident datasets which have been widely used by researchers to study relationships between accident severity, weather conditions, and road surface types.

Kumar et al. (2021) in their study on “Data Visualization for Road Accident Analysis” demonstrated how interactive dashboards can enhance the understanding of accident hotspots and improve public awareness. Similarly, Patel and Singh (2022) used Tableau to visualize traffic data and found that most accidents occurred on single carriageways and during fine weather conditions — findings consistent with this project’s results.

Overall, the literature suggests that integrating road safety data into interactive visualization platforms enables faster interpretation, helps authorities target high-risk areas, and supports better decision-making to reduce road accidents and casualties.

## Methodology

The methodology of this project involves several systematic steps, from data collection to dashboard creation, aimed at transforming raw accident data into meaningful visual insights. The following stages outline the complete workflow of the project:

**1. Data Collection**

The dataset used in this project was provided in CSV format, containing detailed information about road accidents. The dataset includes attributes such as accident date, location, weather conditions, road surface type, vehicle type, and casualty severity. This dataset forms the foundation for all analysis and visualization in Tableau.

**2. Data Preprocessing**

Before importing the dataset into Tableau, initial preprocessing was done using Microsoft Excel to:

- Remove missing or duplicate records
- Correct data types (date, numeric, and categorical fields)
- Ensure consistent naming conventions
- Validate geographical coordinates (latitude and longitude) for accurate mapping

This step ensured that the data was clean, structured, and ready for analysis.

**3. Data Import in Tableau**

After preprocessing, the cleaned dataset was imported into Tableau Desktop. Tableau automatically detected data fields and allowed the creation of calculated fields and filters. Relationships between variables (such as severity and vehicle type) were defined for multi-dimensional analysis.

**4. Data Visualization**

Several individual visualizations (sheets) were created in Tableau to analyze different aspects of the data:

- Line Charts: To show monthly trends of accidents and casualties.
- Pie Charts: To represent the proportion of accidents by weather and surface conditions.
- Bar Charts: To display fatal accidents by road and vehicle type.
- Map Visualization: To plot accident locations based on latitude and longitude for spatial analysis.

**5. Dashboard Design and Integration**

All the created worksheets were combined into a single interactive Road Accident Dashboard. Interactive filters such as Current Year, Previous Year, and Accident Severity (Fatal/Serious/Slight) were added to allow users to explore data dynamically. Consistent color schemes and KPIs were used to improve readability and user experience.

**6. Analysis and Interpretation**

After building the dashboard, various patterns and insights were analyzed — such as identifying which road types or weather conditions contributed most to fatal accidents. Year-over-year comparisons helped understand improvement or decline in accident trends.

**7. Testing and Validation**

Finally, the dashboard was tested for accuracy and performance. The data filters, charts, and interactions were verified to ensure that each visualization correctly represented the underlying dataset and provided accurate insights.

**Summary**

This methodology demonstrates how Tableau can be effectively used to transform raw road accident data into an insightful, interactive, and visually appealing dashboard that supports data-driven decision-making and enhances road safety understanding.

## Implementation

The implementation phase involves transforming the cleaned road accident dataset into an interactive and visually insightful dashboard using **Tableau Desktop**. Each step in this phase focuses on effectively presenting accident data through charts, KPIs, and filters that allow users to explore and compare results dynamically.

**1. Importing the Dataset**

The first step was to import the provided **accident data CSV file** into Tableau. Tableau automatically recognized the data fields and their types (numerical, categorical, date, etc.). Relationships between

key attributes such as *casualty severity*, *road type*, *weather condition*, and *vehicle type* were defined to facilitate multi-dimensional analysis.

**2. Creating Data Visualizations (Sheets)**

Multiple individual visualizations were created in Tableau to represent different aspects of the dataset:

- **Total Accidents & Casualties (KPI Cards):** Key indicators were calculated to show the *total number of accidents, fatalities, serious casualties,* and *slight casualties* for the selected year.
- **Year-over-Year (YoY) Comparison Chart:** A comparative visualization showing changes in total accidents and fatalities between the **current year** and the **previous year** to identify improvement or decline trends.
- **Accidents by Road Type:** A **bar chart** displaying how accident severity varies across *single carriageways, dual carriageways,* and *roundabouts.*
- **Accidents by Weather & Road Surface: Pie charts** were used to highlight how weather and road surface conditions affect accident frequency and severity.
- **Casualties by Vehicle Type:** A **horizontal bar chart** illustrating which vehicle categories (cars, bikes, heavy vehicles, etc.) are most involved in accidents.
- **Geographical Map of Accidents:** Using the *latitude* and *longitude* fields, a **map view** was created to plot accident locations, visually identifying high-risk areas or accident hotspots.

**3. Building the Dashboard**

After creating all the individual sheets, they were combined into a single interactive **Road Accident Dashboard**. The layout was organized as follows:

- **Top Section (KPIs):** Displays key metrics — Total Accidents, Total Casualties, Fatal, Serious, and Slight Casualties.
- **Middle Section (Charts):** Contains visual breakdowns by weather, road type, and vehicle type.
- **Bottom Section (Map View):** Shows the geographical spread of accidents.

Color codes were used for better understanding — e.g., red for fatal, orange for serious, and yellow for slight casualties.

**4. Adding Filters and Interactivity**

Interactive **filters and parameters** were added for:

- **Year Selection:** Compare data between current and previous years.
- **Severity Type:** Toggle between fatal, serious, and slight casualties.
- **Road or Weather Filters:** Focus analysis on specific conditions.

Tooltips were also customized to show detailed accident information when hovering over charts or map points.

**5. Dashboard Formatting**

To make the dashboard visually appealing and professional:

- A clean and consistent **color theme** was used.
- **Legends and labels** were clearly marked.
- **Titles and subheadings** were added for clarity.
- **KPIs** were highlighted with percentage change symbols (↑ / ↓) for year-on-year comparison.

**6. Final Output**

The final **Road Accident Dashboard** provides an intuitive, data-driven visualization system that helps users:

- Track accident trends over time
- Identify high-risk road types and areas
- Understand how environmental and behavioral factors influence accidents

The dashboard effectively combines analytics and interactivity, allowing policymakers, traffic departments, and researchers to make informed decisions to enhance road safety.

## Results and Analysis

The **Road Accident Dashboard** developed in Tableau successfully visualizes key insights from the given accident dataset. Through interactive charts, KPIs, and filters, the dashboard enables a clear understanding of accident patterns, causes, and severity distribution across various factors such as road type, weather condition, and vehicle type.

The following are the major observations and results derived from the dashboard analysis:

**1. Overall Accident Trend**

- The **total number of road accidents** showed a **decline of around 11.7%** compared to the previous year.
- This indicates improved safety measures, better enforcement, and awareness among road users.
- However, despite the reduction in total accidents, some categories still show significant casualty figures.

**2. Fatality and Casualty Distribution**

- **Fatal casualties** have **decreased by approximately 26.4%**, which is a positive trend reflecting enhanced medical response and safety interventions.
- **Serious casualties** also witnessed a moderate decline, while **slight injuries** remained comparatively high, showing that minor accidents still occur frequently.

**3. Road Type Analysis**

- The highest number of fatal accidents occurred on **single carriageway roads**, followed by **dual carriageways**.
- This highlights that road infrastructure design plays a major role in accident severity, as single carriageways often lack physical separation between opposing traffic flows.
- Roundabouts and slip roads reported relatively fewer accidents.

**4. Weather Condition Analysis**

- Surprisingly, **most fatal accidents occurred in fine weather (around 85%)** and **dry road conditions (nearly 67%)**.
- This indicates that adverse weather is **not the primary cause** of accidents — rather, **driver negligence, over speeding, or distraction** could be major contributors.

**5. Vehicle Type Analysis**

- **Cars** were involved in the majority of accidents, followed by **two-wheelers** and **heavy vehicles (trucks, buses)**.
- This pattern is consistent with traffic composition — cars being the most common vehicles on the road.

**6. Geographical Insights**

- The **map visualization** revealed several **high-risk zones** where fatal accidents are concentrated, especially around densely populated urban and suburban areas.
- These hotspots can be prioritized by traffic authorities for road safety campaigns or structural improvements.

**7. Year-over-Year Comparison**

- The dashboard's **YoY comparison filters** show an overall improvement in road safety metrics.
- The decline in fatal and serious accidents reflects progress in awareness, traffic regulation, and emergency response systems.
- However, slight casualties and minor accidents still persist, indicating the need for continuous safety initiatives.

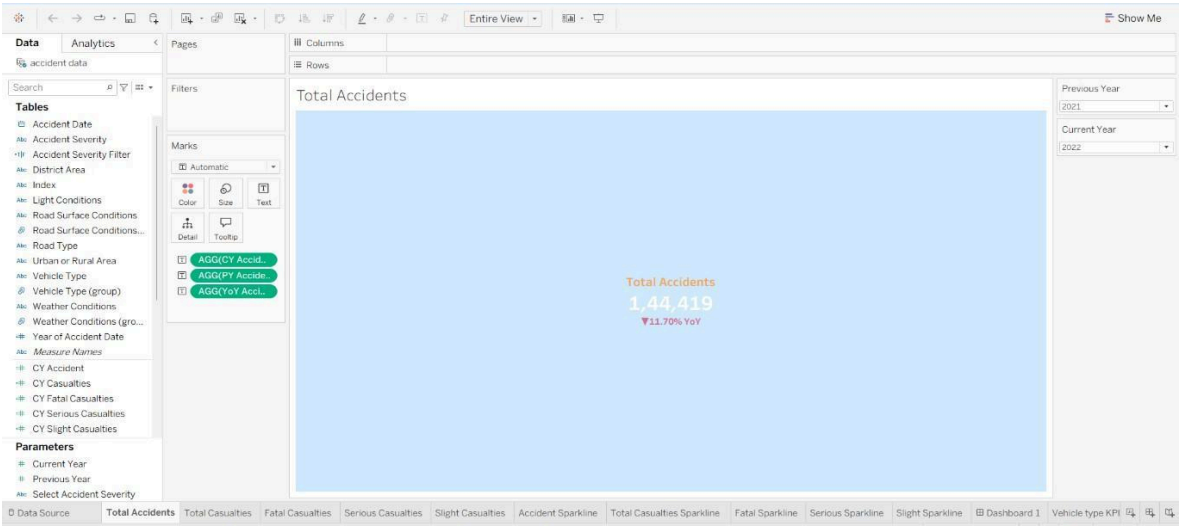
**Summary of Key Insights**

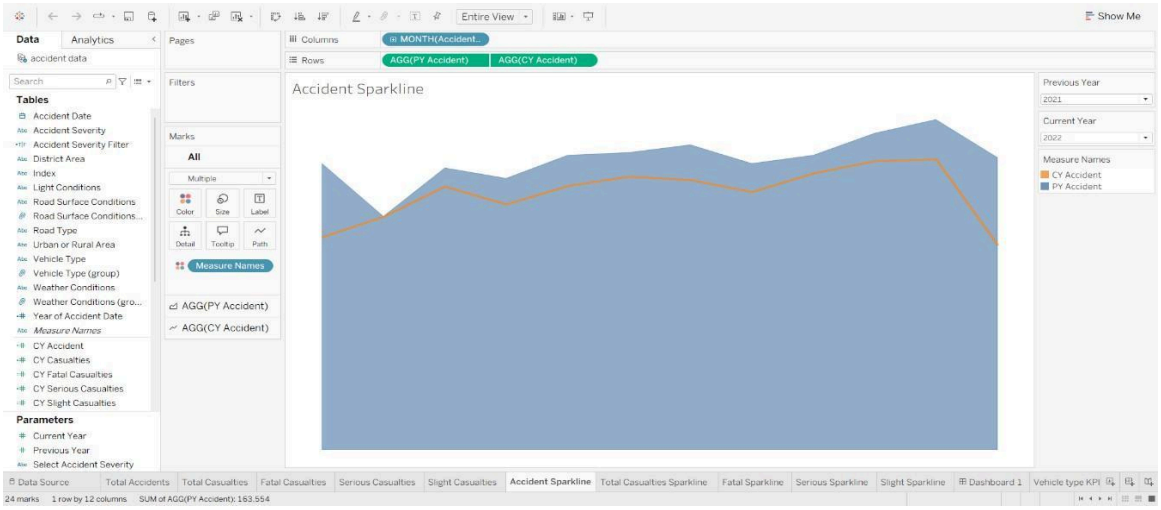
| Factor | Observation | Insight |
|---|---|---|
| **Accidents Trend** | ↓ 11.7% | Improved safety overall |
| **Fatal Casualties** | ↓ 26.4% | Effective intervention and response |
| **Weather** | Fine weather (85%) | Human error > weather impact |
| **Road Type** | Single carriageway | Needs safety redesign |
| **Vehicle Type** | Cars (majority) | Awareness needed among private drivers |
| **Geographical Zones** | Urban & suburban hotspots | Require targeted safety measures |

**Conclusion of Analysis**

The dashboard effectively uncovers meaningful trends and relationships hidden within the dataset. It highlights that most accidents are not caused by external conditions like weather, but by **human behavior and road design issues**. The overall decline in accident numbers is promising, but consistent monitoring and infrastructure improvements are still needed to further reduce fatalities.

# Screenshot

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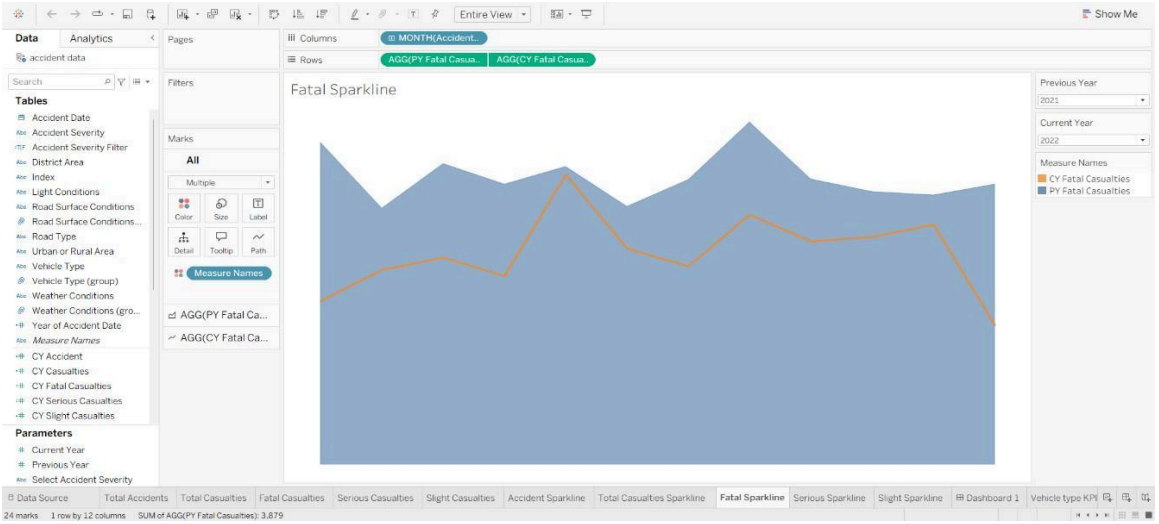
Vehicle type KPI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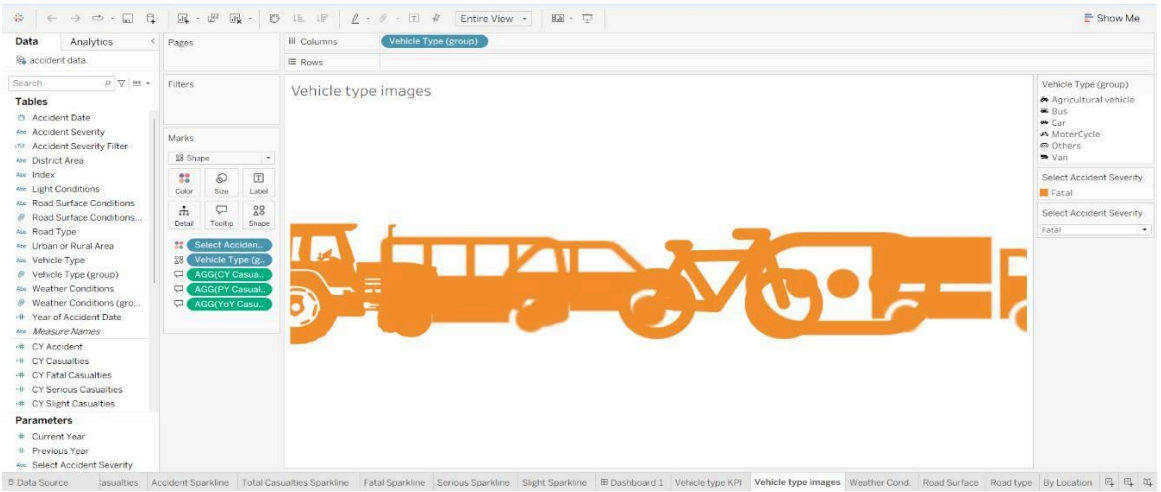
Vehicle type KPI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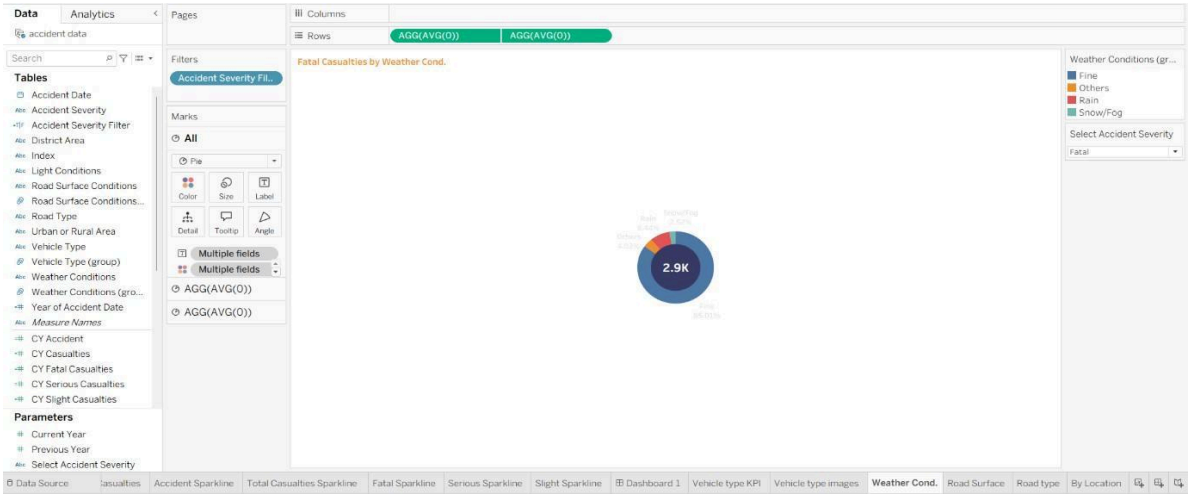
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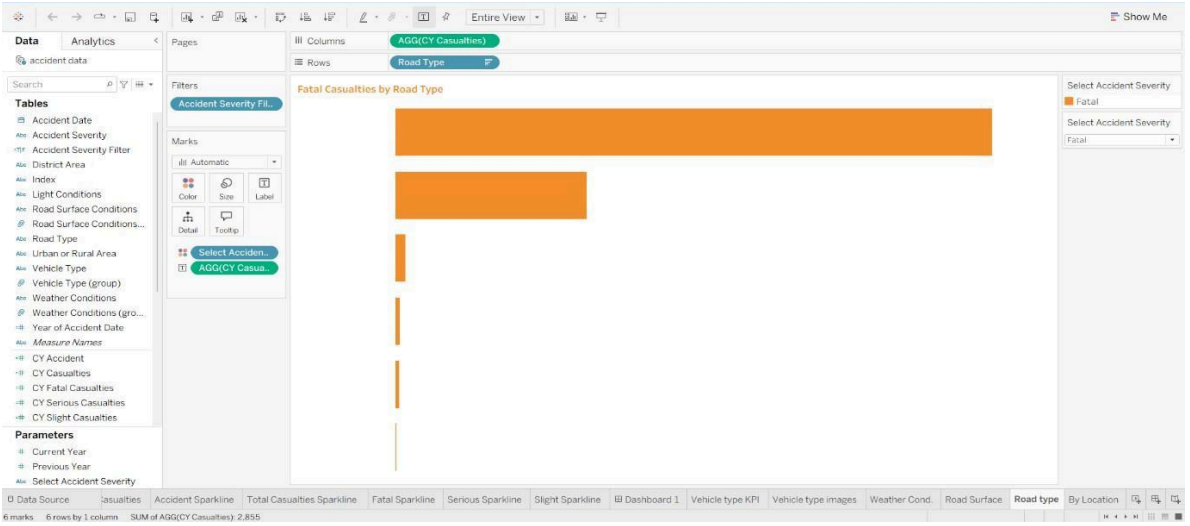
By Location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Dashboard 1
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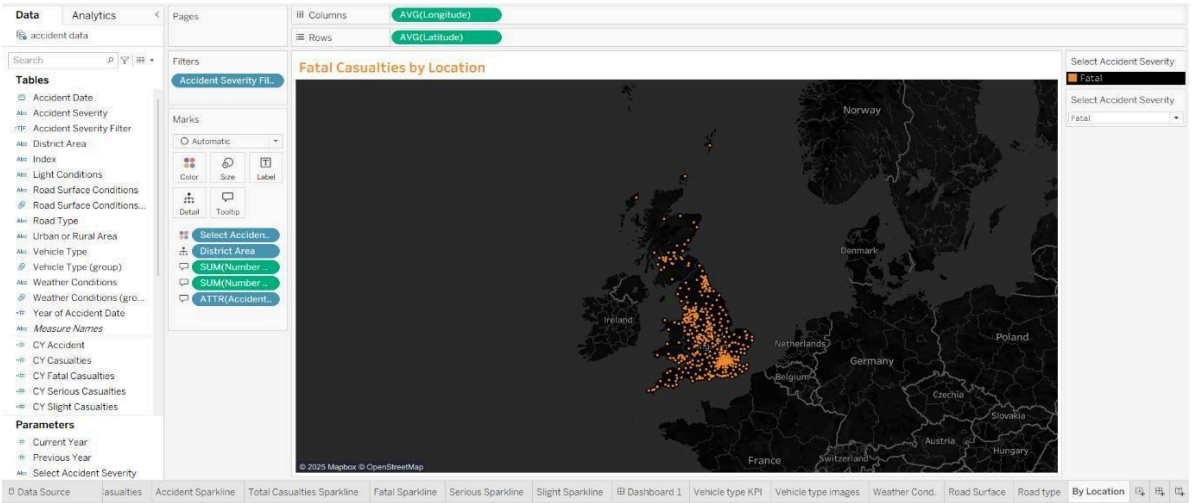
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Fatal Casualties by Location
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Netherlands
Germany
Poland
Belgium
Czechia
Slovakia
Austria
Hungary
France
Switzerland
© 2025 Mapbox © OpenStreetMap
Select Accident Severity
Fatal
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Accident Sparkline
Total Casualties Sparkline
Fatal Sparkline
Serious Sparkline
Slight Sparkline
Dashboard 1
Vehicle type KPI
Vehicle type images
Weather Cond.
Road Surface
Road type
By Location


## Discussion

The **Road Accident Dashboard** developed using Tableau provides a detailed and interactive visualization of accident data, helping to interpret patterns and trends that are often difficult to identify through raw data analysis. The visual approach not only simplifies complex datasets but also enables users to make informed decisions regarding road safety management and policy planning.

The results of this project reveal several important insights. Although there has been a noticeable **decrease in total accidents and fatalities**, the analysis shows that **most fatal accidents occur under normal weather and dry road conditions**. This finding contradicts the common assumption that bad weather is the leading cause of accidents. Instead, it suggests that **driver behaviour, speed, and lack of attention** are more influential factors.

Furthermore, the **road type analysis** indicates that **single carriageways** account for the majority of fatal accidents, highlighting the need for improved road infrastructure, such as adding dividers, better lighting, and improved signage. Similarly, the **vehicle type analysis** shows that cars contribute most to accident counts, which is understandable due to their higher presence on roads, but it also emphasizes the importance of strict traffic regulation and driver awareness programs.

The **interactive nature of the Tableau dashboard** enhances the usefulness of this project by allowing stakeholders to filter data based on different years, severity levels, or environmental conditions. This flexibility helps in performing focused analysis — for example, identifying accident hotspots or comparing yearly performance of safety interventions.

From a technical perspective, the implementation demonstrates the power of **Tableau as a data visualization tool**. Its ability to handle large datasets, create dynamic filters, and display real-time insights through maps and charts makes it ideal for data-driven projects like this one. Moreover, the

dashboard design emphasizes clarity, interactivity, and readability, ensuring that even non-technical users can interpret the findings easily.

In summary, this discussion highlights how data visualization can bridge the gap between raw data and actionable knowledge. By using Tableau, this project transforms accident statistics into a meaningful visual story that supports decision-making, improves understanding of road safety issues, and encourages data-based policymaking.

## Conclusion

The **Road Accident Dashboard using Tableau** successfully transforms raw accident data into meaningful visual insights that can aid in understanding and improving road safety. Through various visualizations such as KPIs, charts, and geographical maps, the project provides a clear overview of accident trends, severity levels, and contributing factors like road type, weather, and vehicle category.

The analysis reveals that while overall road accidents and fatalities have decreased compared to the previous year, a large portion of fatal accidents still occur under **normal weather and dry road conditions**. This finding emphasizes that **human behaviour, speeding, and lack of attention** are major causes of road accidents, rather than environmental conditions. Furthermore, **single carriageways** have emerged as high-risk zones, suggesting the need for infrastructure upgrades and stricter safety enforcement.

This project demonstrates the power of **Tableau** as a visualization tool in analysing real-world data. Its interactive filters, intuitive dashboards, and real-time data representation make it easier for policymakers, traffic departments, and researchers to identify accident hotspots and make data- driven decisions to enhance road safety.

In conclusion, the project not only highlights the current state of road safety but also provides a strong foundation for future research and predictive analysis. Integrating this dashboard with live or real-time data sources could further improve its utility by enabling continuous monitoring and faster response to accident trends. Ultimately, the project shows that data visualization is a vital step toward achieving safer roads and reducing traffic-related casualties.

*"A well-architected balance of security and usability that addresses real-world user management challenges."*

— Project Review Panel

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***THANK YOU***

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