Road Accident Patterns and Safety Analysis: A Data-Driven Approach to Reducing Accidents

| INTERACTIVE DATA VISUALIZATION PROJECT |

GROUP 15

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Goal

The goal of this project is to analyze road accident data to uncover key patterns and insights related to accident severity, contributing factors, and potential risk zones. Specifically, the project aims to investigate the impact of weather conditions, vehicle types, and urban infrastructure on accident frequency and severity. By leveraging the available dataset, which includes variables such as accident severity, weather conditions, vehicle types, road surface conditions, and urban or rural location, the objective is to:

- 1. Identify patterns in accident severity under different weather conditions, particularly focusing on the effects of mild versus extreme weather anomalies.
- 2. Analyze the relationship between vehicle size/type and the severity of accidents, with an emphasis on understanding whether smaller vehicles are disproportionately involved in fatal or severe accidents compared to larger vehicles.
- 3. Examine the influence of urban infrastructure, such as poorly maintained roads, inadequate lighting, and sudden transitions, on accident occurrence and severity, especially in urban areas.
- By addressing these factors, the project aims to provide data-driven insights that can inform traffic safety measures, infrastructure improvements, and vehicle safety strategies, ultimately contributing to the reduction of severe accidents on the roads.

Context

Road traffic accidents are one of the leading causes of injury and death worldwide, imposing not only human costs but also significant economic burdens. Understanding the factors that contribute to accidents is crucial for developing effective policies, improving traffic safety, and allocating resources where they are most needed. In many cities and regions, there is an increasing emphasis on data-driven decision-making to tackle road safety issues.

This project uses road accident data from the UK, spanning the years 2019 to 2022. The dataset contains detailed information about various factors such as accident severity, weather conditions, vehicle types, road surface conditions, and geographic locations. By analyzing this data, the project aims to uncover patterns and trends that can help identify high-risk areas and conditions where accidents are most likely to occur.

The analysis also explores how different environmental and traffic-related factors influence the severity and frequency of accidents. For example, adverse weather conditions like rain, fog, or snow may contribute to higher accident severity, while the condition of the road surface could play a critical role in accident frequency. Vehicle type is another key factor—larger vehicles such as trucks or buses may be more likely to cause severe accidents compared to smaller vehicles like cars.

Through the creation of an interactive Tableau dashboard, the project will visualize accident data, enabling policymakers and traffic authorities to make more informed decisions. By identifying areas and conditions with higher accident rates, the dashboard will provide actionable insights that could help reduce accidents and improve road safety. Ultimately, the goal is to contribute to the development of targeted interventions aimed at mitigating risks associated with road traffic accidents in the UK.

Dataset Description

The dataset used in this analysis contains a total of **14 fields** and **660,679 rows**. Each field represents a different aspect of the road accidents captured, with a mix of categorical and numerical variables. Below is a description of each field in the dataset:

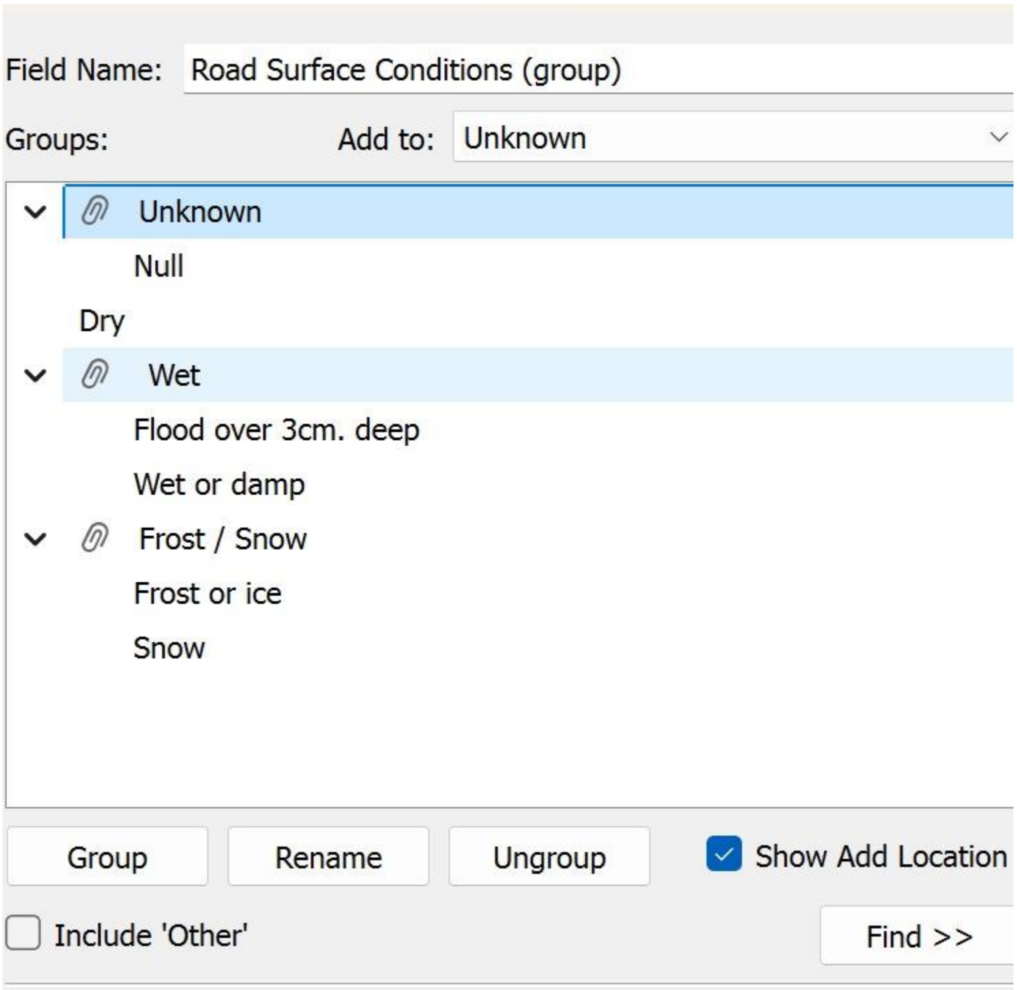
Index	Accident_S	Accident Da	Latitude	Light_Cond	District Are	Longitude	Number_of	Number_of	Road_Surface_	Road_Type	Urban_or_Rural_Ar	Weather_Conditions	Vehicle_Type
200701BS6	Serious	#########	51.50619	Darkness -	Kensington	-0.20908	1	2	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Serious	#########	51.49503	Daylight	Kensington	-0.17365	1	2	Wet or damp	Single carriageway	Urban	Raining no high winds	Car
200701BS6	Serious	#########	51.51772	Darkness -	Kensington	-0.21022	1	3	Dry	Single carriageway	Urban	Fine no high winds	Taxi/Private hire car
200701BS6	Serious	#########	51.49548	Daylight	Kensington	-0.20273	1	4	Dry	Single carriageway	Urban	Fine no high winds	Bus or coach (17 or more pass seats)
200701BS6	Slight	#########	51.48858	Darkness -	Kensington	-0.19249	1	2	Dry	Single carriageway	Urban	Fine no high winds	Other vehicle
200701BS6	Serious	#########	51.49775	Daylight	Kensington	-0.19256	2	3	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Serious	#########	51.50141	Daylight	Kensington	-0.16158	1	2	Dry	Dual carriageway	Urban	Fine no high winds	Van / Goods 3.5 tonnes mgw or under
200701BS6	Fatal	#########	51.48226	Darkness -	Kensington	-0.17949	3	2	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Slight	#########	51.49332	Darkness -	Kensington	-0.17357	1	2	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Slight	#########	51.48454	Daylight	Kensington	-0.17565	1	2	Dry	Single carriageway	Urban	Fine no high winds	Motorcycle over 125cc and up to 500cc
200701BS6	Serious	#########	51.49194	Darkness -	Kensington	-0.1719	1	2	Dry	Single carriageway	Urban	Fine no high winds	Goods 7.5 tonnes mgw and over
200701BS6	Fatal	#########	51.49913	Daylight	Kensington	-0.15965	1	2	Dry	Single carriageway	Urban	Fine no high winds	Bus or coach (17 or more pass seats)
200701BS6	Serious	#########	51.50082	Daylight	Kensington	-0.19359	1	1	Dry	Single carriageway	Urban	Fine no high winds	Motorcycle 125cc and under
200701BS6	Slight	#########	51.509	Darkness -	Kensington	-0.2107	3	2	Wet or damp	Single carriageway	Urban	Other	Car
200701BS6	Slight	#########	51.48513	Darkness -	Kensington	-0.16713	1	1	Dry	One way street	Urban	Fine no high winds	Car
200701BS6	Slight	#########	51.48858	Daylight	Kensington	-0.19249	1	2	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Serious	#########	51.49349	Daylight	Kensington	-0.19042	1	2	Dry	Dual carriageway	Urban	Fine no high winds	Car
200701BS6	Serious	#########	51.50845	Daylight	Kensington	-0.21562	1	1	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Slight	#########	51.49759	Daylight	Kensington	-0.15914	1	2	Wet or damp	Single carriageway	Urban	Raining no high winds	Motorcycle over 125cc and up to 500cc
200701BS6	Serious	#########	51.48299	Daylight	Kensington	-0.17427	1	4	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Fatal	#########	51.506	Daylight	Kensington	-0.21428	1	1	Dry	Single carriageway	Urban	Fine no high winds	Car
200701BS6	Fatal	#########	51.4868	Daylight	Kensington	-0.17038	5	1	Dry	Single carriageway	Urban	Fine no high winds	Car

- **Index:** A unique identifier for each accident record. (Data type: ANSI/MBCS character string)
- **Accident Severity:** Describes the severity of the accident. (Categories: Fatal, Serious, Slight)
- **Accident Date:** The date the accident occurred. (Data type: Date)
- **Latitude:** Geographic latitude of the accident location. (Data type: Double-precision floating-point number)
- **Light Conditions:** Describes the lighting conditions at the time of the accident. (Categories: Darkness - lighting unknown, Darkness - lights lit, Darkness - lights unlit, Darkness - no lighting, Daylight)
- **Longitude:** Geographic longitude of the accident location. (Data type: Double-precision floating-point number)
- **Number of Casualties:** The total number of casualties (injured or killed) in the accident. (Data type: Integer)
- **Number of Vehicles:** The number of vehicles involved in the accident. (Data type: Integer)

- **Road Surface Conditions**: Describes the condition of the road surface during the accident. (Categories: Dry, Flood over 3cm deep, Frost or ice, Snow, Wet or damp, Null)
- **Road Type:** The type of road where the accident occurred. (Categories: Dual carriageway, One way street, Roundabout, Single carriageway, Slip road, Null)
- **Urban or Rural Area**: Indicates whether the accident occurred in an urban or rural area. (Categories: Urban, Rural, Unallocated, Null)
- **Weather Conditions**: Describes the weather conditions at the time of the accident. (Categories: Fine + high winds, Fine no high winds, Fog or mist, Other, Raining + high winds, Raining no high winds, Snowing + high winds, Snowing no high winds, Null)
- **Vehicle Type:** The type of vehicle involved in the accident. (Categories include: Agricultural vehicle, Bus or coach, Car, Motorcycle, Taxi/Private hire car, Van, and several others)
- **District Area**: Specifies the district or area in which the accident occurred. (Data type: Categorical field based on geographic classification)

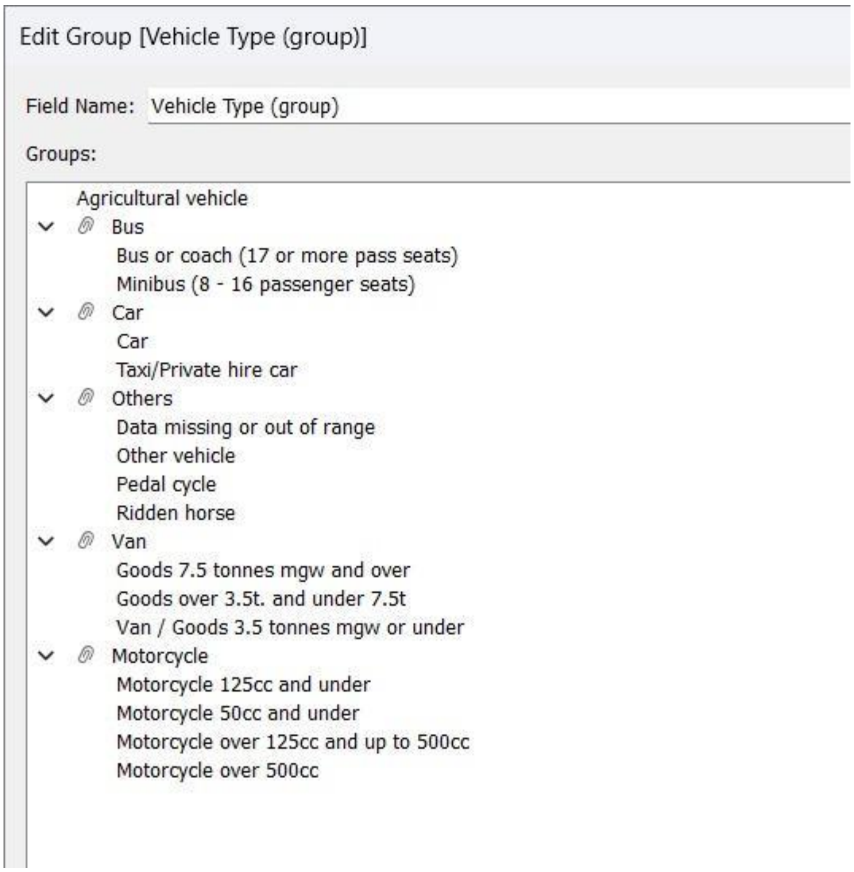
GROUPED FIELDS

1. **Road Surface Conditions (Group)**
    - **Description:** Classifies road surface conditions into four categories: Dry, Frost/Snow, Unknown, Wet.



2. **Vehicle Type (Group)**

   - **Description:** Groups vehicle types into six categories: Agricultural vehicle, Bus, Car, Motorcycle, Others, Van.

   -

3. **Weather Conditions (Group)**
    - **Description:** Groups weather conditions into Fine, Rain, Snow/Fog, and Others.
    - 

CALCULATED FIELDS

1. **Year of Accident Data**
    - **Type:** Calculated Field
    - **Formula:** YEAR([Accident Date])
    - **Description:** Extracts the year of the accident for time-based analysis.
2. **CY (Current Year) Fields**
    - **CY Accidents:** Counts accidents in the current year.
    - **CY Casualties:** Sums casualties in the current year.
    - **CY Fatal Casualties:** Sums fatalities in the current year.
    - **CY Serious Casualties:** Sums serious injuries in the current year.
    - **CY Slight Casualties:** Sums slight injuries in the current year.

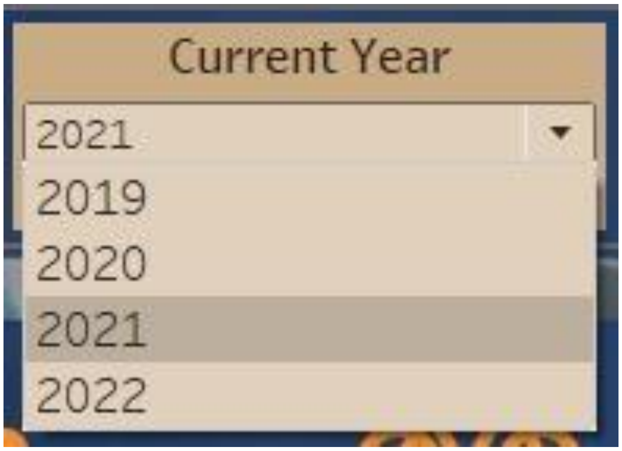
- **Formula (example):**
  - SUM(IF YEAR([Accident Date])=[Current Year] THEN [Number of Casualties] END)

3. **PY (Previous Year) Fields**
   - **PY Accidents:** Counts accidents in the previous year.
   - **PY Casualties:** Sums casualties in the previous year.
   - **PY Fatal Casualties:** Sums fatalities in the previous year.
   - **PY Serious Casualties:** Sums serious injuries in the previous year.
   - **PY Slight Casualties:** Sums slight injuries in the previous year.
   - **Formula (example):**
     - SUM(IF YEAR([Accident Date])=[Previous Year] THEN [Number of Casualties] END)
4. **YoY (Year-over-Year) Fields**
   - **YoY Accidents:** Calculates the percentage change in accidents from last year to this year.
   - **YoY Casualties:** Calculates the percentage change in casualties from last year to this year.
   - **YoY Fatal Casualties:** Calculates the percentage change in fatalities from last year to this year.
   - **YoY Serious Casualties:** Calculates the percentage change in serious injuries from last year to this year.
   - **YoY Slight Casualties:** Calculates the percentage change in slight injuries from last year to this year.
   - **Formula (example):**
     - ([CY Accidents] - [PY Accidents]) / [PY Accidents]
5. **Accident Severity Filter**
   - **Type:** Calculated Field
   - **Description:** Filters accidents by severity (Fatal, Serious, Slight), or includes all severities.

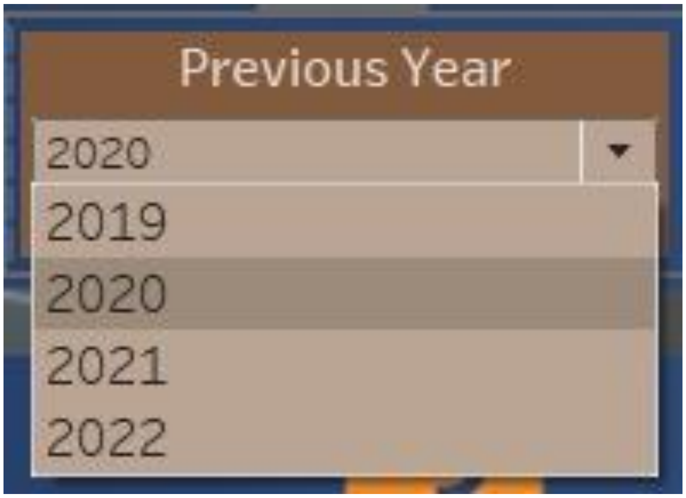
- **Formula:** [Select Accident Severity] = [Accident Severity] OR [Select Accident Severity] = "All"

PARAMETERS

1. **Current Year**
   - **Description:** Defines the current year for analysis. Allowed values are 2019, 2020, 2021, and 2022.
   - **Default Value:** 2022



2. **Previous Year**
   - **Description:** Defines the previous year for comparison in analysis. Allowed values are 2019, 2020, 2021, and 2022.
   - **Default Value:** 2021



3. **Select Accident Severity**
    - **Description:** Allows the selection of accident severity (Fatal, Serious, Slight) or to include all severities in the analysis.
    - **Default Value:** All

Problem Statement

Road accidents continue to be a major public safety concern, with significant social, economic, and health impacts. Despite numerous efforts to reduce accident rates, understanding the underlying factors that contribute to both the frequency and severity of road accidents remains a challenge. Key variables such as location, vehicle type, road conditions, and weather can all influence the likelihood and impact of accidents, but their precise relationships are not always clear.

In many cases, policymakers and traffic authorities lack comprehensive, real-time insights into how these factors interact and contribute to accidents. This makes it difficult to allocate resources effectively, design targeted interventions, or predict high-risk situations. Furthermore, current accident reports are often fragmented, making it hard to uncover trends that could inform proactive safety measures.

This project seeks to address the following key challenges:

1. **Environmental and Road Conditions**: Identifying the specific environmental and road conditions (such as weather, road surface, or lighting) that significantly contribute to severe accidents.

2. **Vehicle Types and Accident Impact**: Understanding how different vehicle types (cars, trucks, buses, etc.) influence the severity of accidents and casualty rates, especially when interacting with various road conditions.
3. **Geographic Hotspots**: Identifying geographic areas with higher accident frequencies and understanding the underlying factors that contribute to these patterns, whether they are related to road design, traffic volume, or other regional factors.

By uncovering these insights, this project will provide actionable recommendations to help policymakers and traffic authorities reduce road accident rates, improve traffic safety measures, and better allocate resources to high-risk areas.

Hypothesis

1. THE WEATHER PARADOX

Hypothesis: Severe accidents are more frequent during **unexpected mild weather events**, such as brief temperature changes or light rain, than during heavy, sustained adverse weather conditions like snow, fog, or torrential rain.

Rationale: Traditionally, it is believed that severe weather conditions like rain, snow, or fog are the main contributors to accidents. However, this hypothesis suggests that **mild weather anomalies**, such as sudden light rain or slight temperature drops, may cause more severe accidents than extreme weather. Drivers often become complacent during "mild" adverse conditions, leading to a false sense of security. This overconfidence in their ability to drive safely in such conditions may cause lapses in judgment, such as driving too fast or failing to adjust to slippery surfaces, ultimately resulting in accidents that are more severe than those in extreme weather, where drivers typically exercise more caution.

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2. THE SIZE-EFFECT ILLUSION

Hypothesis: **Smaller vehicles**, such as compact cars, may contribute to a **higher proportion of fatalities and severe accidents** than larger vehicles, such as trucks or buses, when involved in collisions.

Rationale: The general assumption is that larger vehicles, due to their mass and momentum, are more likely to cause severe accidents. However, this hypothesis proposes a reversal of this thinking, focusing on the **vulnerability of smaller**

vehicles in collisions. When smaller cars collide with larger vehicles, the disproportionate size difference often leads to more catastrophic outcomes for the smaller vehicle, even if larger vehicles are involved in fewer accidents overall. The fatality and injury rates among smaller vehicles are likely much higher in accidents with larger vehicles due to the severity of impact on the lighter, more fragile vehicle. This hypothesis challenges the notion that larger vehicles always carry more risk by focusing on the vulnerability of the smaller vehicle in mixed-vehicle collisions.

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3. URBAN MYOPIA

Hypothesis: **Invisible risk zones** in urban infrastructure—such as sudden road transitions, unmarked zones, and poorly-lit intersections—contribute significantly to accident frequency, more so than **traffic congestion** itself.

Rationale: While urban areas are often seen as high-risk zones due to dense traffic, this hypothesis posits that **it's not just congestion that drives accidents in cities, but the hidden risks embedded in outdated or poorly maintained infrastructure**. Urban environments are full of complex, poorly marked roads, sudden lane transitions, unmarked crosswalks, and intersections with inadequate lighting, all of which increase accident likelihood, especially for drivers unfamiliar with the area. These **invisible risk zones** create hazards that are not immediately obvious to drivers, and can cause accidents even in the absence of heavy traffic. In contrast, rural areas, with simpler road designs and less frequent infrastructure issues, often present fewer challenges to drivers, reducing the frequency and severity of accidents despite lower traffic volumes.

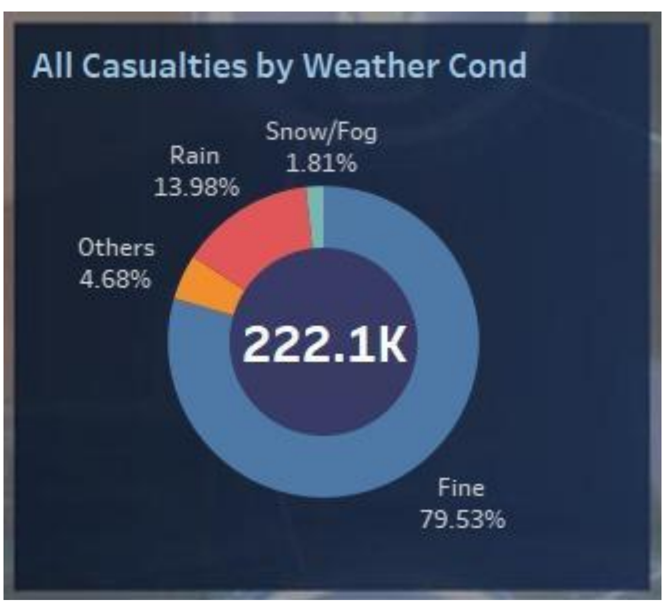
Questions

To guide the analysis and uncover deeper insights into the factors contributing to road accidents, the following key questions will drive the investigation:

1. <u>What are the key environmental and road conditions that contribute to severe accidents?</u>

This question aims to explore how different road conditions—such as wet or icy roads, poor lighting, or poorly maintained infrastructure—affect the severity of accidents. By understanding the relationship between road surface conditions, environmental factors like visibility (fog, rain), and accident outcomes, we can identify which conditions warrant more attention and intervention from traffic authorities.

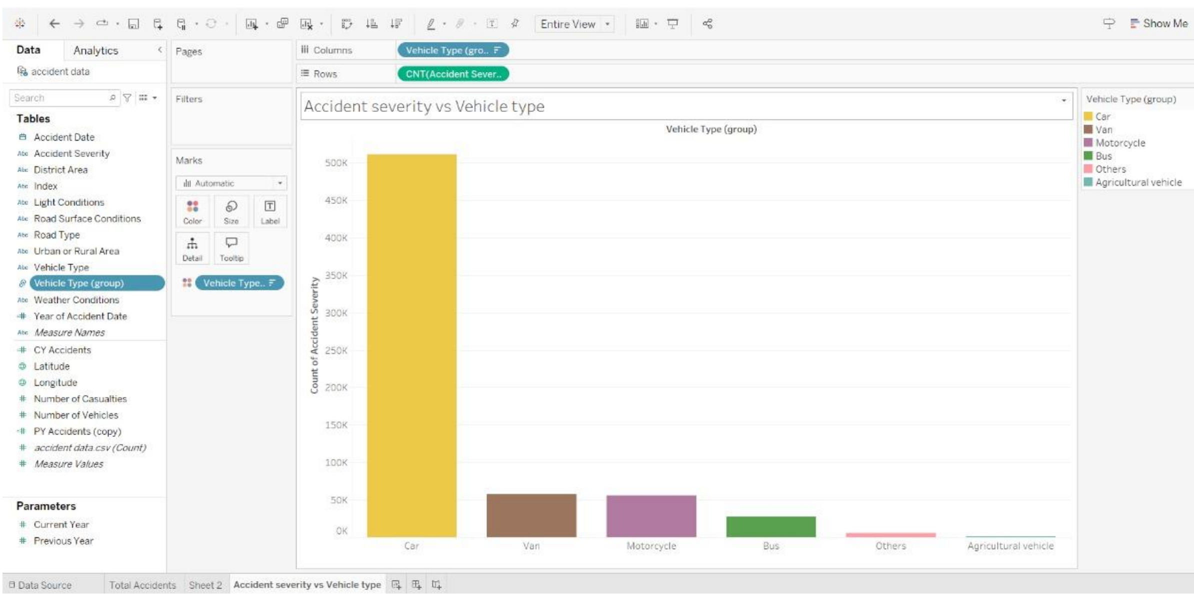
While adverse weather like rain, snow, and fog increases risks, fine weather remains the primary setting for accidents. This insight could suggest that improving driver awareness and safety practices in good weather is as crucial as focusing on adverse weather safety measures.



Most severe accidents occur on dry roads (66.38%), likely due to riskier driving. Wet surfaces, however, account for 29.22% of casualties, highlighting increased risk in wet conditions due to reduced traction. Safety measures should address both dry-road complacency and wet-road hazards.

2. How do different vehicle types (cars, trucks, buses) impact accident severity and casualty rates?

This question examines whether larger vehicles (e.g., trucks, buses) cause more severe accidents or whether smaller vehicles are more likely to be involved in fatal collisions. It will also explore whether certain vehicle types (e.g., trucks) disproportionately contribute to injuries or fatalities.



This bar chart shows accident counts across different vehicle types, with cars accounting for the overwhelming majority—over 450,000 incidents. This high count likely reflects the prevalence of cars on the road, which exposes them to various traffic scenarios and potential collisions more frequently than other vehicle types.

Vans and motorcycles follow but at much lower numbers, while buses, agricultural vehicles, and the "other" category show the fewest accidents. These lower counts may indicate less exposure to risk or fewer such vehicles in regular traffic flow.

However, this visualization doesn't include accident severity by vehicle type, which is crucial to evaluating the "Size-Effect Illusion" hypothesis. For instance, smaller vehicles, like cars and motorcycles, may be more vulnerable in collisions, potentially resulting in higher fatality and serious injury rates despite lower accident frequencies for certain types. Further breakdown by severity would clarify if smaller vehicles, though involved in more accidents, also face disproportionately severe outcomes compared to larger vehicles like buses or trucks. This insight would support or challenge the hypothesis that smaller, lighter vehicles experience more serious impacts in mixed-vehicle collisions.

The bar chart supports the "Size-Effect Illusion" hypothesis by showing that cars, being smaller vehicles, account for the highest number of accidents. This suggests that smaller vehicles might be more vulnerable in collisions with larger ones. However, to fully support the hypothesis, data on accident severity is needed to confirm that these smaller vehicles experience disproportionately higher fatality and injury rates despite their higher accident count.

3. <u>**Which geographic areas (urban vs. rural) experience higher accident frequencies, and what specific factors contribute to these patterns?**</u>

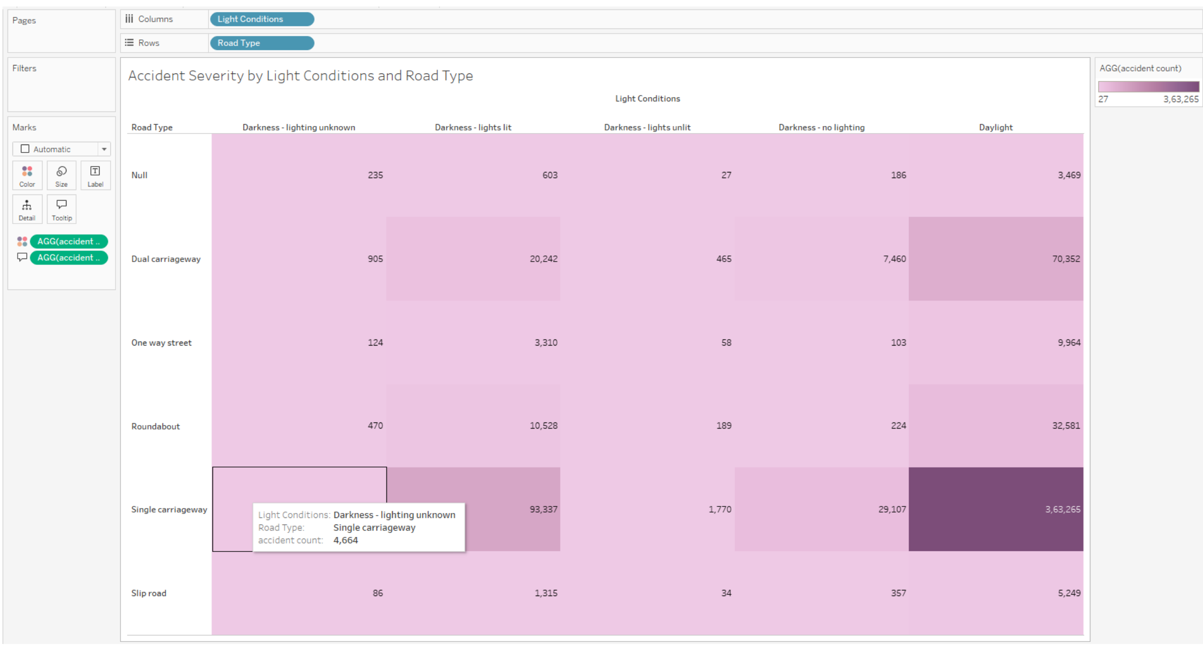
This question seeks to determine whether urban areas, with their dense traffic and complex infrastructure, have higher accident rates than rural areas. It also aims to identify whether specific factors such as road design, lighting, or traffic density contribute to higher accident rates in these areas.

Insight:

- This bar chart shows the frequency of accidents based on road types (e.g., single carriageway, roundabout) and differentiates between urban and rural areas.
- Single carriageways have the highest number of accidents, with a substantial portion occurring in urban areas. The distribution also suggests that certain road types, like dual carriageways and roundabouts, are more common in rural areas but show significant accident occurrences in urban areas.

Relevance to Urban Myopia:

- This supports the hypothesis that urban infrastructure contributes to a higher accident count. The high number of accidents on single carriageways in urban settings could point to hidden road risks such as sudden transitions, inadequate markings, or intersections.

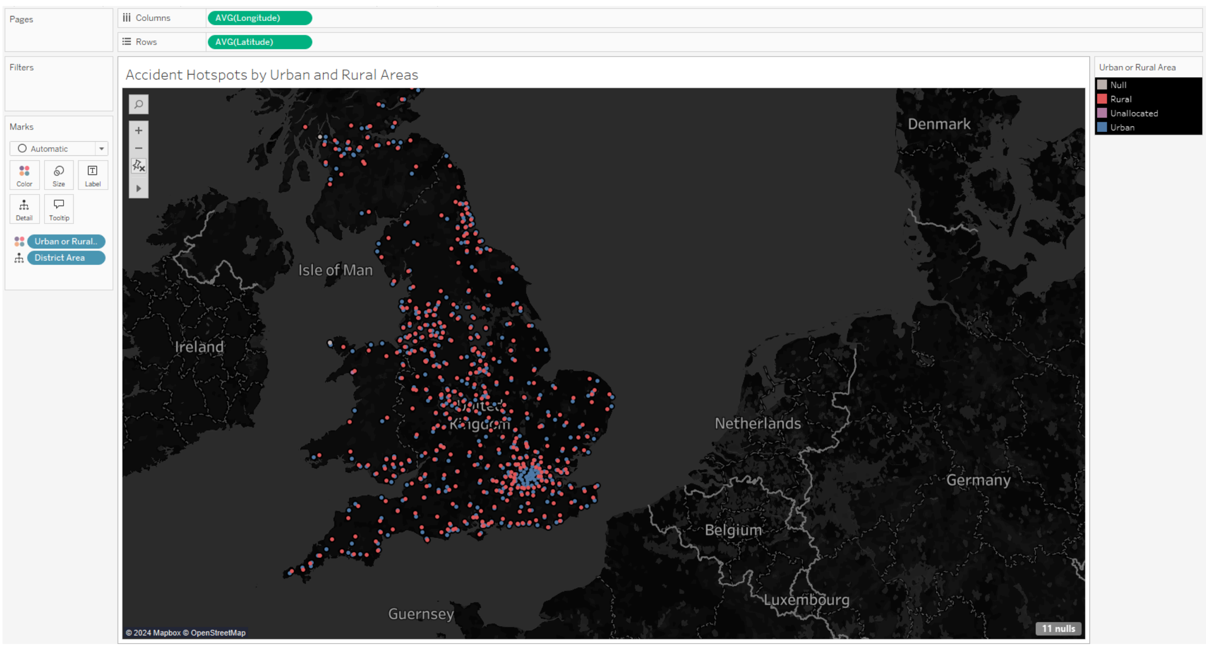


Insight:

- This heatmap shows accident severity under various lighting conditions for different road types. Single carriageways and dual carriageways exhibit the highest accident counts, especially under daylight and lit conditions at night.
- The darker the shade, the more frequent the accidents, indicating that even well-lit roads can pose risks if they are complex or poorly maintained.

Relevance to Urban Myopia:

- Inadequate lighting or poor urban planning might not be the sole contributors to accidents, as even during daylight and under lit conditions, accidents occur frequently on single carriageways. This suggests that invisible risks—like sudden transitions or confusing road layouts—persist regardless of light conditions, especially in urban areas.



Insight:

- The map displays accident hotspots across urban and rural areas, with a concentration of accidents in urban zones (blue) compared to rural ones (red).
- Dense clusters of accidents are visible in urban centers, with fewer but still significant clusters in rural areas.

Relevance to Urban Myopia:

- The visualization supports the hypothesis by highlighting urban areas as major accident hotspots. While rural areas have simpler road designs, the urban clusters suggest that more accidents occur due to complex infrastructure rather than just high traffic volumes. The map indicates that drivers in urban areas encounter more hidden risks (like sudden road transitions or poorly marked intersections).

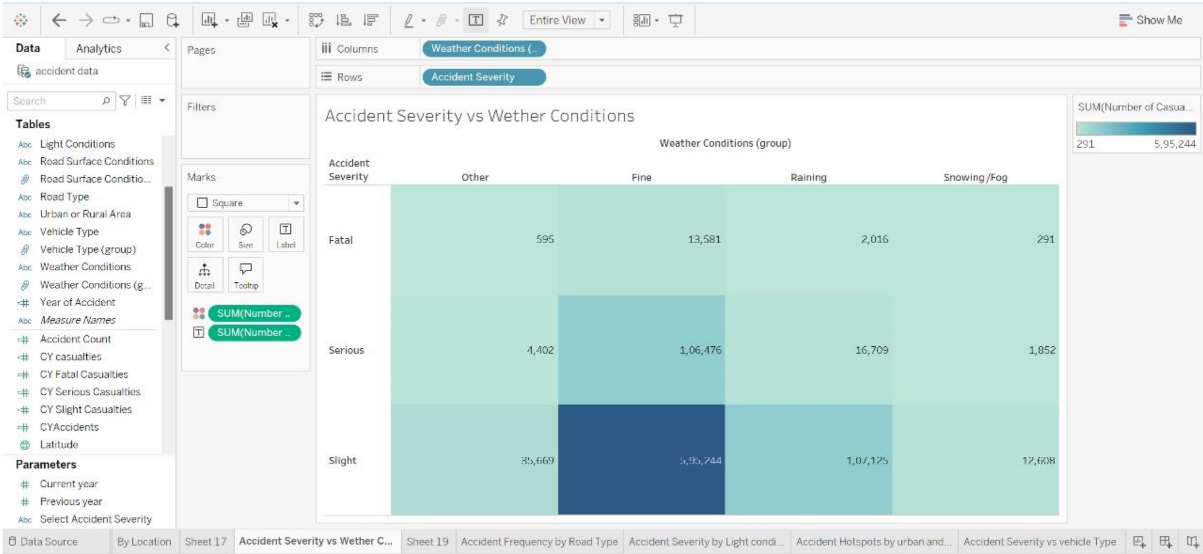
The visualizations lend support to the Urban Myopia hypothesis. Accidents in urban areas occur frequently not just because of congestion but due to hidden risks in the infrastructure:

- The bar chart shows a high accident frequency in urban areas, especially on single carriageways, indicating issues with urban road design.
- The heatmap suggests that lighting is not the sole cause—accidents happen even under daylight, pointing to invisible risks like poor road markings and confusing layouts.
- The map reinforces that urban areas are accident hotspots, suggesting that outdated or poorly maintained infrastructure is a major factor contributing to these accidents.

This indicates that in urban environments, it's not just the traffic density but also the hidden infrastructure risks that cause accidents, validating the Urban Myopia hypothesis.

4. **What trends in weather conditions correlate with higher accident rates, and are there seasonal patterns to consider?**

By analyzing the relationship between weather conditions and accident frequency, this question aims to determine how weather variations (e.g., rain, snow, fog) contribute to accidents. It also seeks to uncover seasonal patterns that may show specific weather-related trends.



Slight Accidents Are Most Frequent: The highest number of accidents are classified as "Slight," regardless of the weather condition, particularly under "Fine" weather with 595,244 cases. This indicates that even in optimal weather, slight accidents are common, potentially due to high traffic volumes or other factors unrelated to weather.

Fine Weather Conditions Have the Highest Accident Rates: Across all severity levels, "Fine" weather conditions show the highest number of accidents. This could suggest that drivers may feel overconfident in good weather, leading to more accidents.

Serious and Slight Accidents Are More Common Than Fatal Accidents: "Fatal" accidents have the lowest frequency across all weather conditions. However, there's still a notable count under "Fine" and "Raining" conditions, indicating that while fatal accidents are less common, they're more likely under these specific conditions compared to snow or fog.

Weather Impact on Accident Severity:

In "Fine" weather, slight accidents dominate, but serious accidents are also significantly higher than in other weather types.

In "Raining" conditions, both slight and serious accidents are still common, suggesting that rain is a moderate risk factor.

"Snowing/Fog" conditions have lower accident counts overall, possibly due to fewer drivers on the road during such conditions, or more cautious driving behavior.

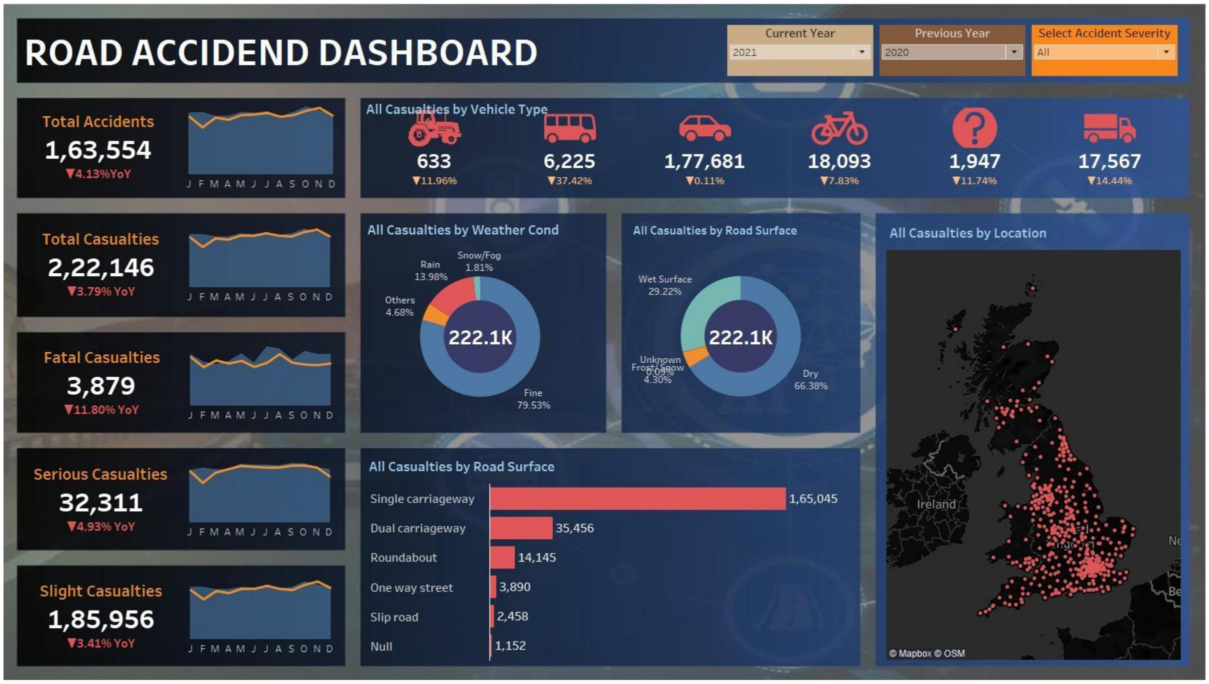
Policy Implications: The data suggests a need for improved safety measures even in fine weather, perhaps focusing on controlling speed and encouraging cautious driving to reduce slight accidents.

These insights could help inform policies to improve road safety, emphasizing both driver education for good-weather conditions and specific safety protocols for adverse weather conditions.

The heatmap supports the hypothesis "The Weather Paradox" to an extent. High numbers of serious and fatal accidents in fine and rainy weather suggest that mild adverse conditions could lead to more severe accidents, potentially due to drivers' overconfidence. Extreme weather conditions like snow/fog seem to have a lower number of severe accidents, supporting the idea that drivers tend to be more cautious during clearly dangerous conditions.

5. <u>How have the factors contributing to road accidents—across different severity levels (fatal, serious, slight)—changed between the current year and the previous year, and what insights can these trends provide to enhance road safety measures?</u>

This question focuses on the development of interactive dashboards that traffic authorities can use to make informed decisions. The aim is to create a tool that enables authorities to explore accident data in real-time and prioritize resources (e.g., road maintenance, law enforcement, infrastructure improvements) based on high-risk areas or times.



- Total accidents: 163,554, a 4.13% decrease year-over-year (YoY).
- Total casualties: 222,146, a 3.79% decrease YoY.
- Fatal casualties: 3,879, an 11.80% decrease YoY.
- Serious casualties: 32,311, a 4.93% decrease YoY.
- Slight casualties: 185,956, a 3.41% decrease YoY.
- Motorcycles had the highest fatal casualties (3,053), with a 9.51% increase YoY.
- Fatalities involving buses increased significantly by 58.58%, totaling 111.
- Fatal casualties in fine weather were 79.61%, while rain accounted for 13.46%.
- Dry road surfaces had 61.36% of fatal casualties, and wet surfaces had 33.98%.
- Single carriageways had the most fatalities, with 2,993 casualties.
- Fatalities are concentrated in urban areas, particularly in the southern UK.
- All severities (fatal, serious, slight) saw decreases, with fatal casualties dropping the most at 11.80% YoY.

These insights indicate the importance of addressing high-risk road types, motorcycle and bus safety, and urban accident hotspots.

Conclusion

Our analysis provided critical insights into road accident patterns and largely supported the hypotheses we proposed.

1. **The Weather Paradox**: This hypothesis was validated by our findings. While traditional thinking suggests extreme weather conditions like snow or fog cause the most severe accidents, we found that mild, unexpected weather (e.g., light rain) leads to more severe accidents. Drivers are more cautious in extreme weather but tend to be overconfident during mild adverse conditions, leading to increased accident severity.

2. **Urban Myopia**: This hypothesis was also supported. The analysis revealed that urban infrastructure plays a significant role in accident frequency. Poorly marked roads, sudden transitions, and inadequate lighting in urban areas contributed more to accidents than congestion itself. These invisible risk zones are especially dangerous to unfamiliar drivers, emphasizing the need for infrastructure improvements in cities.

3. However, the **Size-Effect Illusion** hypothesis, which suggested that smaller vehicles would contribute to more severe accidents, was not fully supported. While smaller vehicles like cars are involved in more accidents, the severity does not disproportionately favor smaller vehicles as initially assumed.

Key insights and recommendations:

- **Driver complacency** during mild weather increases accident severity, highlighting the need for targeted awareness campaigns.

- **Urban infrastructure** risks, including inadequate lighting and unclear road markings, should be prioritized for upgrades in accident-prone areas.

- **Smaller vehicles**, though more frequently involved in accidents, do not show a disproportionate rise in severity; therefore, safety measures should focus on all vehicle types.

Policymakers should focus on improving urban road infrastructure, promoting safe driving in mild weather conditions, and enhancing real-time monitoring systems for quick, targeted interventions to reduce accidents