UK Accident

By: Ahmed Essam Abdallah

❖ Introduction:

Understanding road traffic accidents is essential to improving safety measures and minimizing casualties. This project focuses on analyzing UK road accident data from 2019 to 2022, with a detailed exploration of factors contributing to these incidents. By examining variables such as Accident Severity, Accident Date, Latitude, Longitude, Light Conditions, District Area, Number of Casualties, Number of Vehicles, Road Surface Conditions, Road Type, Urban or Rural Area, Weather Conditions, and Vehicle Type, the study aims to uncover significant patterns and insights.

The analysis is structured to evaluate the interplay between environmental, geographical, and human factors that influence accident outcomes. For instance, the relationship between light conditions, weather patterns, and accident severity, or how road types and surface conditions correlate with the frequency of multi-vehicle collisions, will be investigated.

The period between 2019 and 2022 provides an especially compelling context, as it encompasses shifts in traffic patterns caused by the COVID-19 pandemic. These unique circumstances offer an opportunity to study their impact on accident trends and severity in various urban and rural settings.

Through data visualization, statistical techniques, and trend analysis, this project aims to provide actionable recommendations for policymakers, road safety organizations, and urban planners. Ultimately, the goal is to support the development of targeted strategies that enhance road safety and reduce the burden of traffic accidents across the UK.

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❖ Data Cleaning Process:

1. Gather:

- File in hand ‘accident data.csv’. You can find the link to download it in the ‘README.md’.

2. Assess:

- Quality Issues:

a. Duplicated Data: I found identical records appear more than once.

b. Missing Data: The data was missing some value.

c. Inconsistent Data: Accident Date column format.

3. Clean:

- Fixing Quality Issues:

a. Duplicated Data: Remove the duplicate records.

b. Missing Data: Because I could not fill in the missing data and the data have many records, so I deleted the records that had missing value.

c. Inconsistent Data: Change Accident Date column format.

4. Storing:

- After gathering, Assessing and Cleaning the data. I stored the clean data. You can find the link to download it in the ‘README.md’.

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❖ Key Insights:

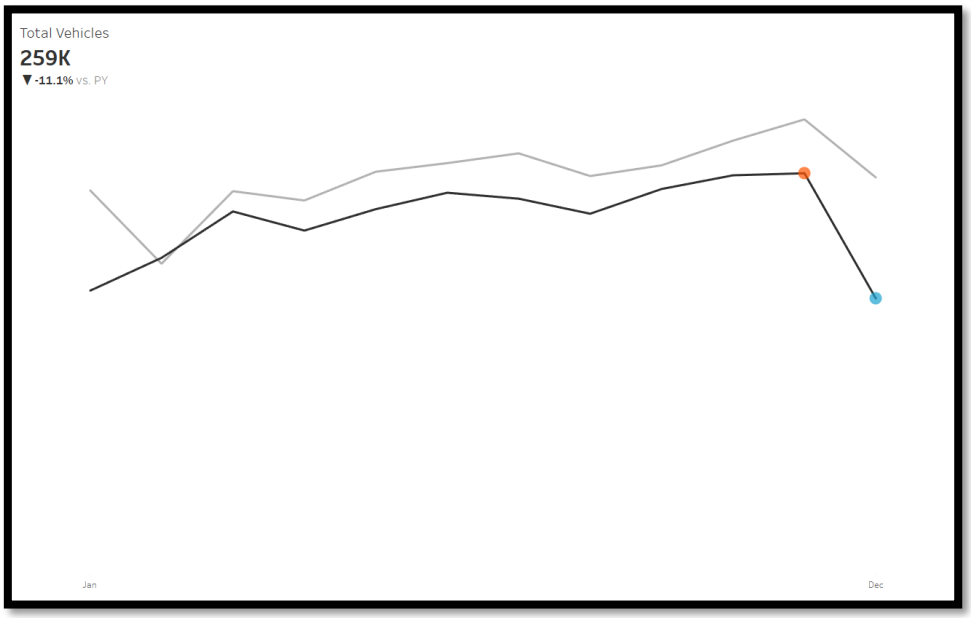

Figure 1: Number of Vehicles in 2022 vs. Number of Vehicles in 2021

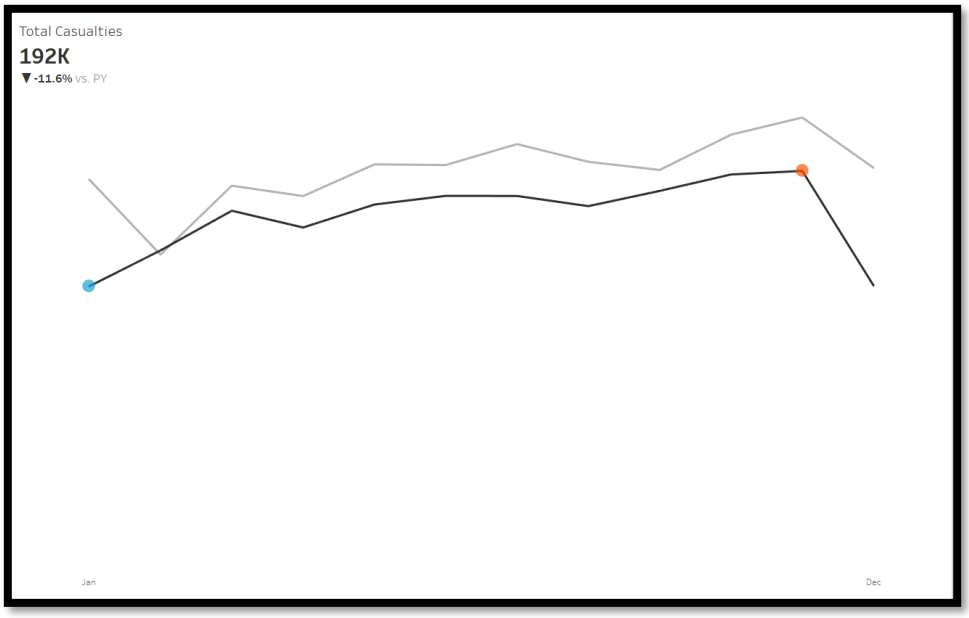

Figure 2: Number of Casualties in 2022 vs. Number of Casualties in 2021

I noticed a decline in the number of vehicles involved in accidents and the number of casualties overtime and I think the reasons for that could be:

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1. **Improved Vehicle Safety Features:** Advancements in automobile technology, such as better braking systems, collision avoidance mechanisms, and enhanced airbags, might have contributed to fewer multi-vehicle accidents.
2. **Road Safety Campaigns and Policies:** Increased public awareness through government and organizational campaigns, stricter enforcement of traffic laws, and penalties for reckless driving may have influenced safer driving habits.
3. **Pandemic Impact (2020 - 2021):** The COVID-19 pandemic drastically reduced traffic volume due to lockdowns, remote work and travel restrictions. This likely led to fewer vehicles on the road and, consequently, fewer accidents.

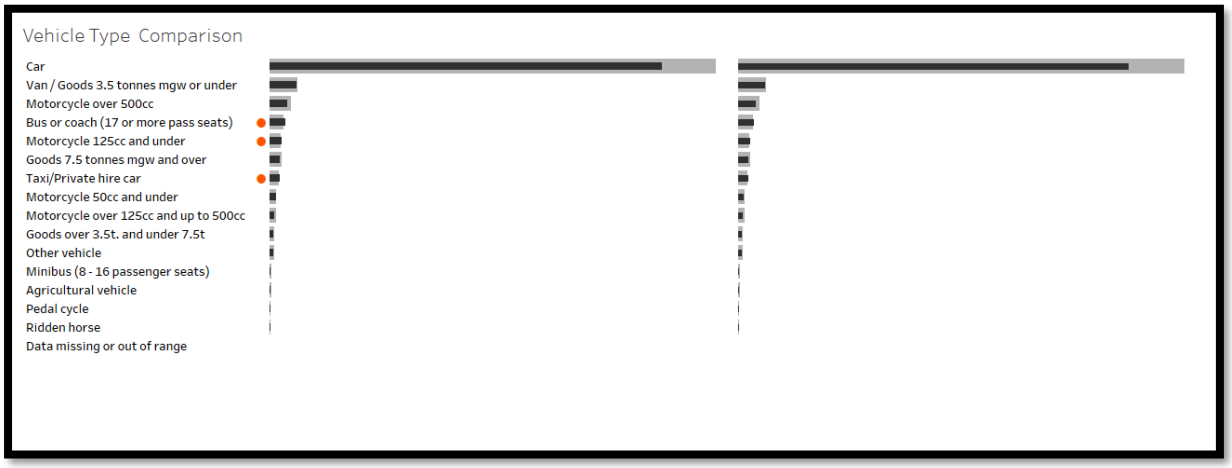

Figure 3: Vehicle Type Comparison (Number of Vehicles and Number of Casualties)

We can notice that Cars have the highest number of vehicles involved in accidents and highest number of casualties, as they are the most popular type of vehicle.

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Figure 4: Number of Vehicles Involved in Accidents by Weather Conditions

I was shocked when I saw that most accidents occur in the fine weather, but after some thought, I concluded that this is perhaps due to:

1. **Increased Traffic Volume:** Fine weather often encourages more people to travel, whether for leisure, commuting, or outdoor activities. This increase in the number of vehicles on the road naturally raises the likelihood of accidents.
2. **Higher Speeds:** Drivers may feel more confident driving in clear weather, leading to higher speeds. Excessive speeding reduces reaction times and increases the severity of collisions.
3. **Longer Journeys:** Fine weather may encourage longer trips, increasing exposure to potential accident risks. For instance, cross-country drives or road trips are more common in good weather.

❖ Some Recommendations to Reduce the Number of Accidents:

1. Strengthening Traffic Regulations and Enforcement:

a. Enforce stricter penalties for reckless driving, speeding and traffic violations.

b. Increase Traffic officers' presence in accident-prone zones to deter risk behavior.

c. Promote the use of seat belts and helmets (for motorcycles) through mandatory laws.

2. Enhance Road Infrastructure:

a. Improve lighting in poorly illuminated areas to ensure visibility, especially at night.

b. Regularly maintain and repair road surfaces to prevent skidding or loss of control.

3. Leverage Technology for Safety:

a. Encourage the adoption of vehicles with advanced safety features like collision detection, lane assistance, and automatic braking.

b. Use traffic cameras and sensors to monitor road conditions and driver behavior in real time.

4. Promote Public Awareness Campaigns:

a. Educate drivers, cyclists, and pedestrians on traffic rules and safe practices.

b. Organize campaigns on the dangers of distracted driving, such as using mobile phones while driving.

Thank You

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