Road Accidents Analysis: Discovering Trends and Insights

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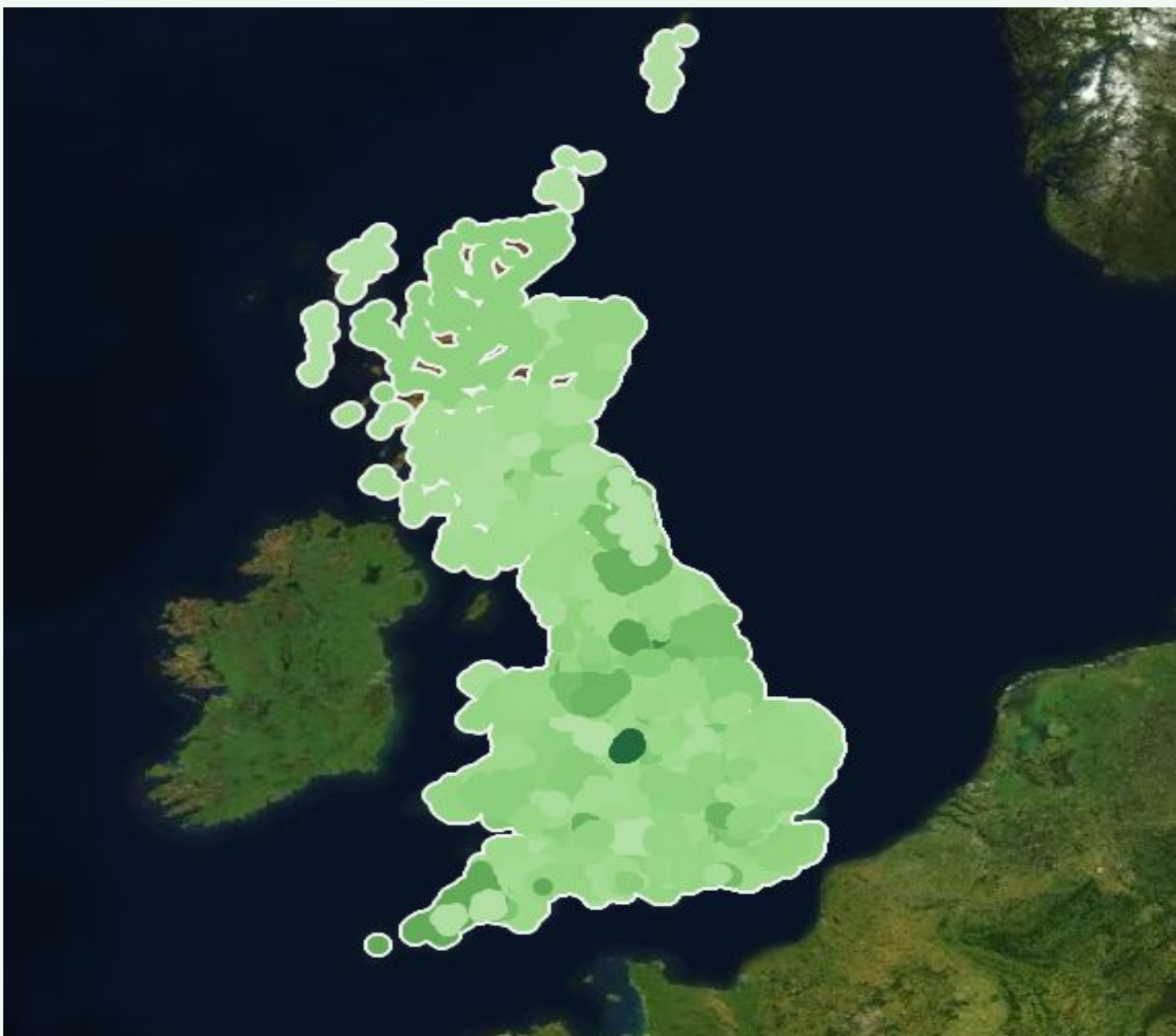| Total Accidents	Total Casualties	Slight Accidents	Serious Accidents	Fatal Accidents	Total Vehicles
307,973	714,883	263,283	40,740	3,953	563,302

Highlights

- Accident rates peak on Fridays and during afternoon rush hours (4 PM - 6 PM).
- Single carriageways have the highest accident rates—targeted safety measures recommended.
- December 2022 saw a notable decline in accidents, suggesting replicable safety strategies.
- Speed limits of 30-40 km/h are associated with the highest accident frequency.

Background

Road accidents are a big problem in the UK, causing many injuries and deaths every year. Even though there are traffic rules, crashes still happen a lot, especially in busy areas and during rush hours. It's not always clear what's causing them—speeding, bad roads, weather, or something else. This project looks at accident data in the UK to find out the main reasons behind crashes and suggest simple ways to make roads safer.

Data

This dataset contains detailed records of road accidents from 2021 and 2022, with 307,974 rows and 21 columns. It includes information such as accident date, day of the week, junction control, severity, weather conditions, lighting, vehicle type, and casualties, providing a comprehensive view of factors contributing to road accidents.
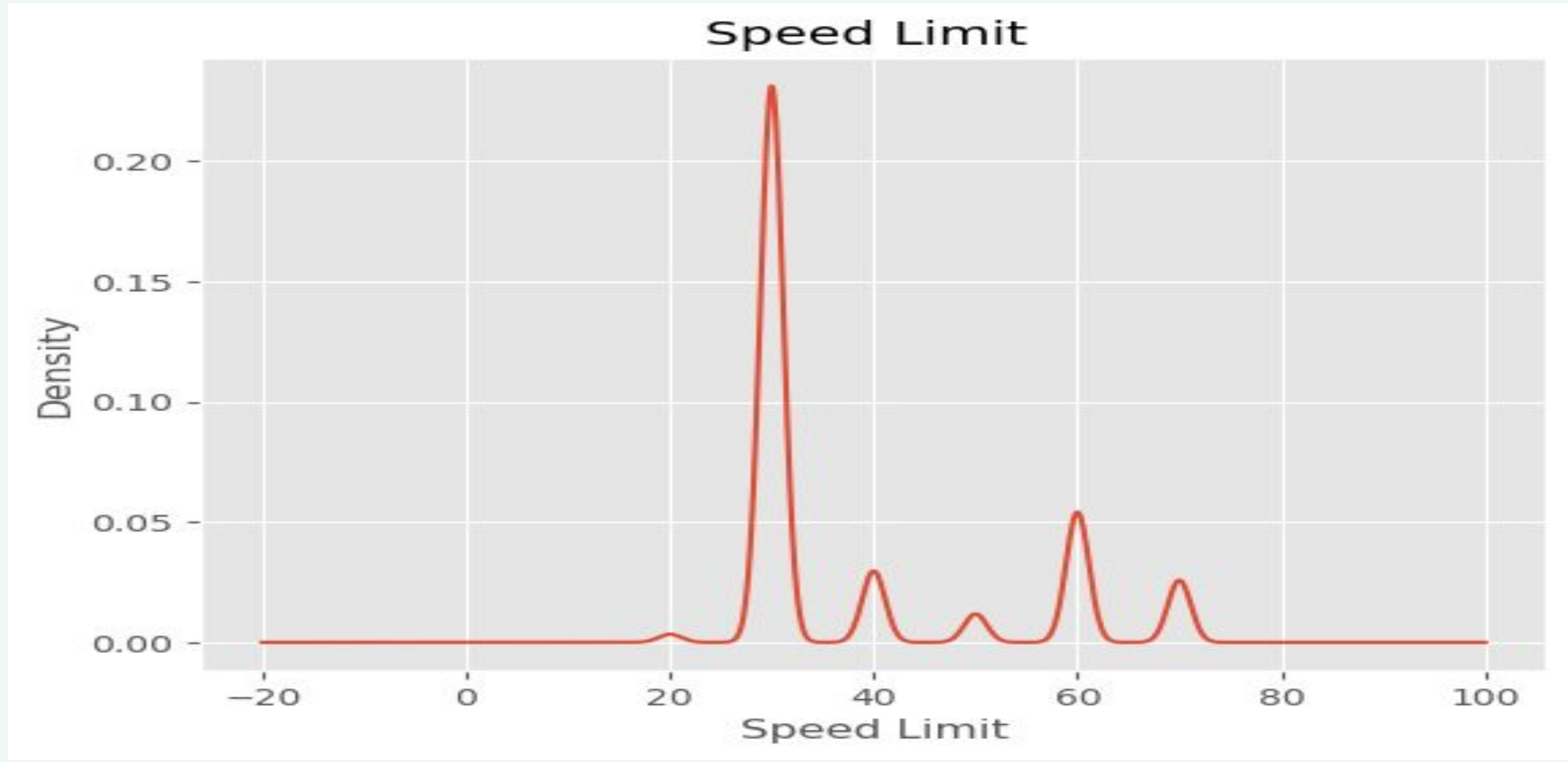
Exploratory Data Analysis

Figure 1: Accidents distribution over speed limit
The density plot shows that most accidents occur at speed limits around 40, with smaller peaks near 60. This suggests that these speed zones may be more prone to accidents. The low density at very low and high speeds could indicate fewer accidents in those areas, possibly due to reduced traffic or stricter speed control.
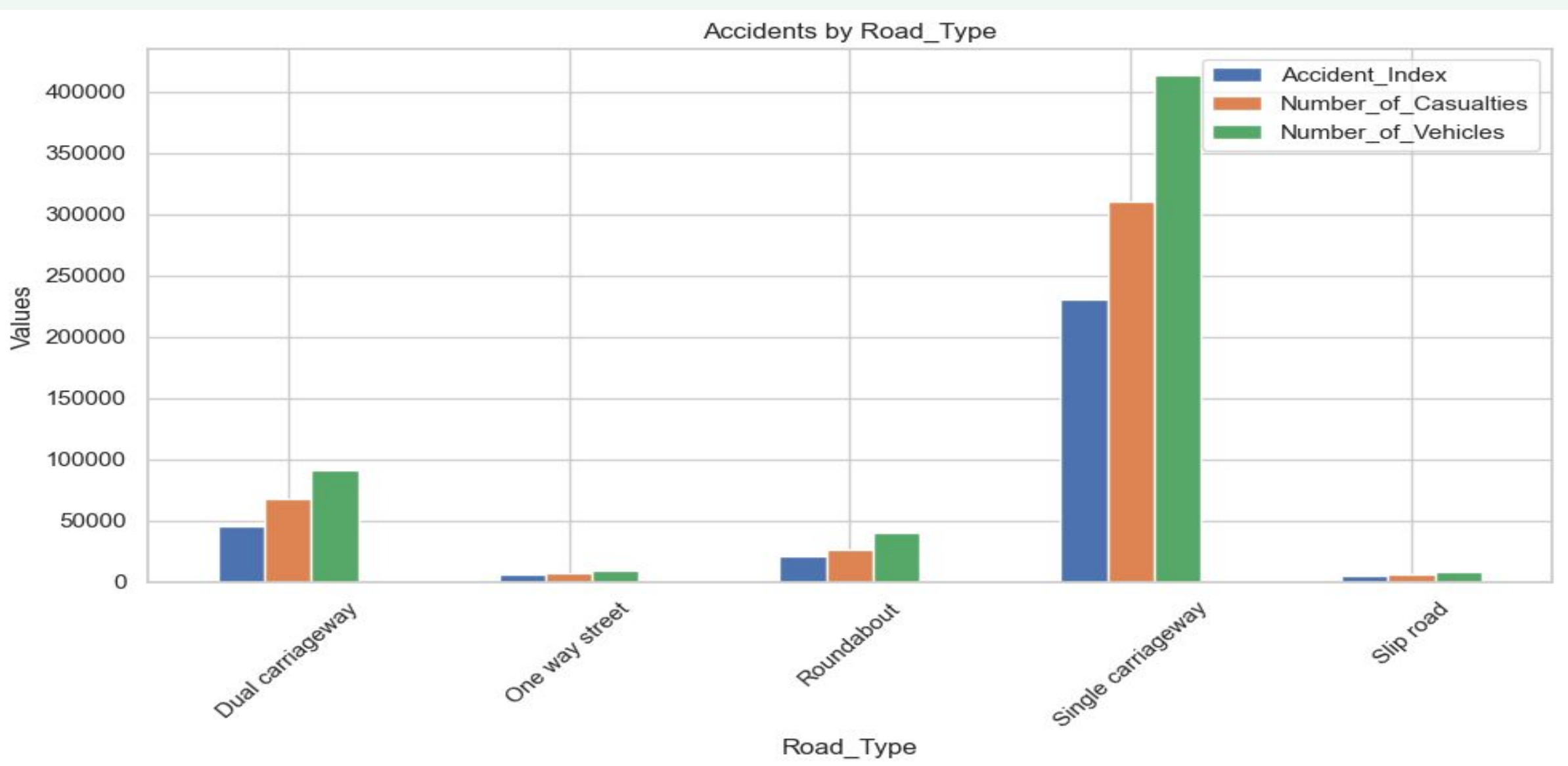
Figure 2: Accidents by Road Type
Most accidents occur on dry roads, likely due to higher traffic volume rather than hazards. Wet or damp conditions rank second, posing a significant risk. Frost, ice, and snow contribute to fewer accidents, while flooded roads see the least incidents, likely due to driver avoidance.
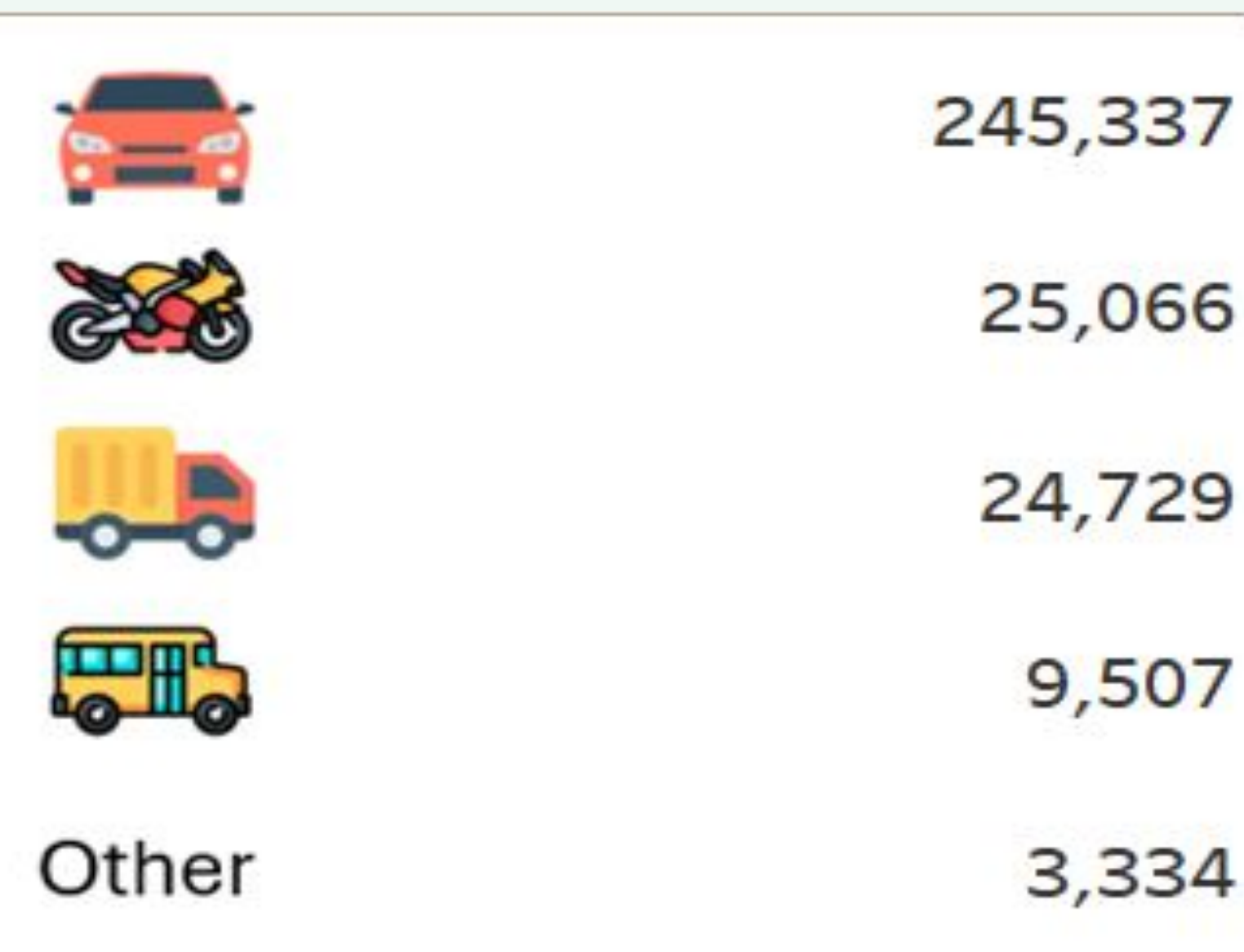
Figure 3: Number of Accidents by Vehicle Type

🚗	245,337
🏍️	25,066
🚚	24,729
🚌	9,507
Other	3,334

Cars account for the majority of accidents at 245,337. Motorcycles and trucks follow with 25,066 and 24,729 accidents, respectively. Buses have 9,507
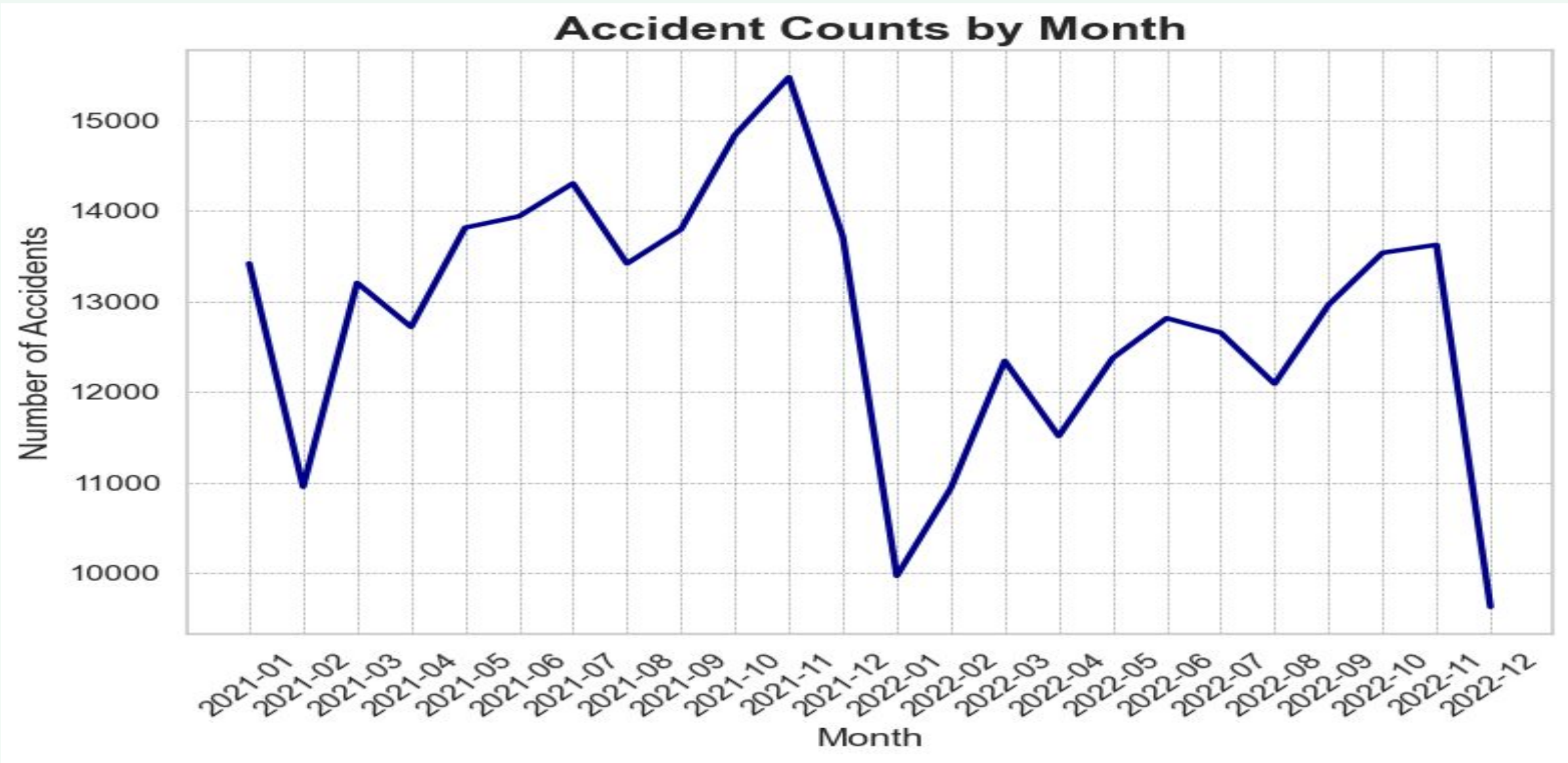
Figure 4: Accidents Over Time

Accident numbers fluctuate but peak at 15,473 before a sharp decline in December 2021. Another drop is observed in December 2022, reaching 9,625, possibly due to seasonal factors or reporting delays.
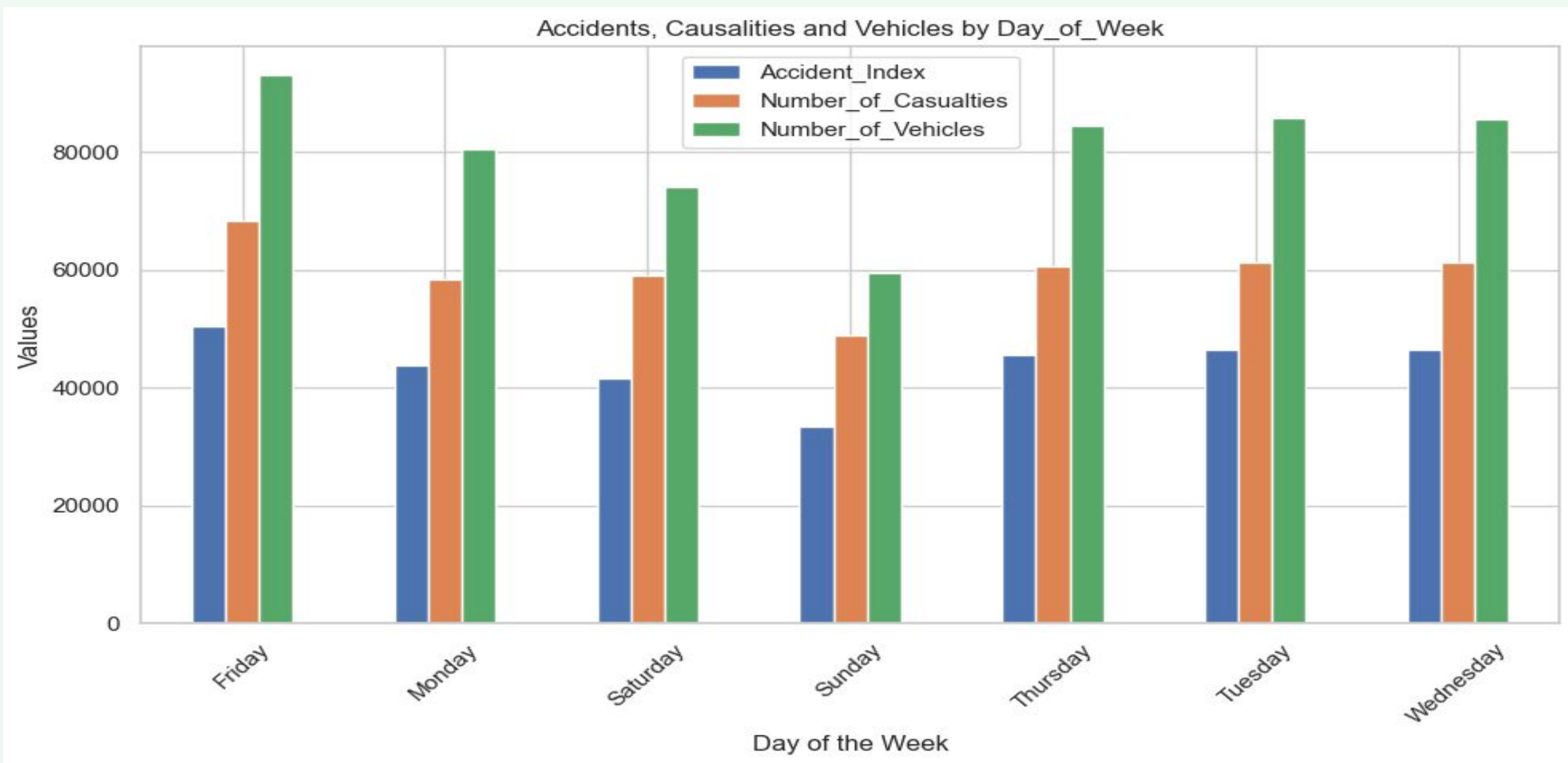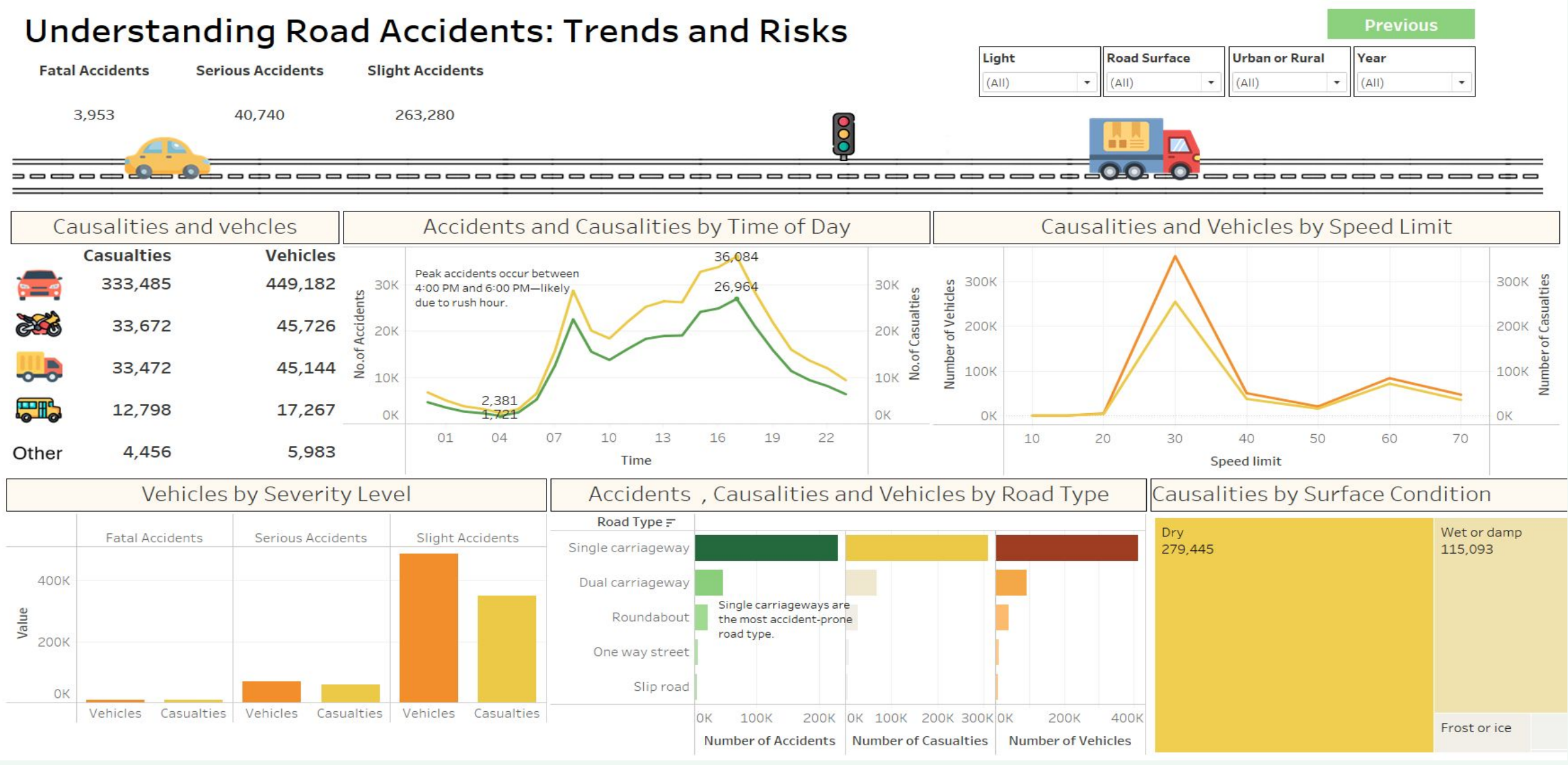
Figure5: Accidents,Causalities and Vehicles by Day of the Week

The chart shows that Friday has the highest number of accidents, casualties, and vehicles involved, likely due to increased traffic before the weekend. Sunday has the lowest figures, possibly due to reduced commuting. Weekdays, especially Tuesday to Thursday, show consistent accident trends, reflecting regular traffic patterns. These insights suggest that Fridays are the riskiest for road incidents, while Sundays are the safest.

Dashboard

The interactive dashboard provides a comprehensive view of accident trends, allowing users to explore key factors such as accident severity, time patterns, weather conditions, and road types. It enables dynamic filtering to identify high-risk periods and locations, offering insights that can help improve road safety measures.

Dashboard Link

Conclusion

Slight accidents are the most frequent, while fatal accidents remain minimal, with private cars contributing the most to accidents and casualties. Fridays and the afternoon rush hours (4:00 PM to 6:00 PM) witness the highest accident rates, whereas Sundays and early mornings record fewer incidents. Single carriageways account for the highest number of accidents, with most incidents occurring at speed limits between 30 to 40 km/h. Notably, December 2022 saw a decline in accidents, suggesting factors worth replicating. These findings highlight the need to enhance safety measures on single carriageways and urban roads during peak traffic hours.