Data Analytics

**Traffic Accident Data Analysis Report**

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# Introduction

The objective of this task was to analyze traffic accident data to identify patterns and factors contributing to accidents. The focus was on understanding how variables such as weather conditions, time of day, and road conditions impact the occurrence and severity of traffic accidents.

## Data Overview

The dataset used for the analysis consists of 100 traffic accident records, containing information on:

* **Accident severity** (minor, major, or fatal)
* **Weather conditions** (clear, rainy, foggy, etc.)
* **Time of day** (morning, afternoon, night)
* **Road surface condition** (dry, wet, icy, etc.)
* **Other contributing factors** such as vehicle speed, driver impairment, and road type.

### Key Attributes

* **Accident Severity**
* **Weather Conditions**
* **Vehicle Speed**
* **Driver Age and Gender**
* **Injury and Fatality Counts**

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### Data Cleaning and Preprocessing

* **Handling Missing Values**: Rows with missing data were removed.
* **Duplicate Removal**: Any duplicate entries were eliminated to ensure data integrity.
* **Time Parsing**: The "Time" field was converted to the appropriate time format for analysis.
* **New Feature Extraction**: The "Hour of Day" was derived from the time for further exploration.

**Exploratory Data Analysis (EDA)**

**1.Accident Severity Distribution**

**A count plot was used to visualize the distribution of accident severity across the dataset.**

**Insights:**

* **Most accidents are classified as minor.**
* **Fatal accidents are relatively rare but critical to analyze further.**

**2.Accidents by Weather Conditions**

**The distribution of accidents under different weather conditions was analyzed.**

**Insights:**

* **Clear weather accounted for the majority of accidents.**
* **Accidents during rainy or foggy conditions are fewer but often more severe.**

**3.Accidents by Time of Day**

**A histogram was plotted to show the number of accidents occurring during different hours of the day.**

**Insights:**

* **Most accidents occurred during rush hours (early morning and late afternoon).**
* **Nighttime accidents are less frequent but tend to be more severe.**

**Detailed Analysis**

**1.Impact of Road Surface Conditions on Vehicle Speed and Severity**

**I analyzed the relationship between road surface conditions and accident severity.**

**Insights:**

* **Most accidents are classified as minor.**
* **Fatal accidents are relatively rare but critical to analyze further.**

**2.Correlation Analysis**

**A heatmap was used to show the correlation between numerical features such as vehicle speed, injury count, and fatality count.**

**Insights:**

* **A strong positive correlation was found between vehicle speed and injury count, indicating that higher speeds lead to more injuries.**
* **Fatality counts were higher in cases with impaired drivers.**

## Summary of Findings

### Key Insights:

* **Weather Conditions: Accidents in clear weather are more common, but rainy and foggy conditions contribute to more severe accidents.**
* **Time of Day: Rush hour and nighttime are high-risk periods for accidents.**
* **Road Surface Conditions: Wet and icy roads increase accident severity even at lower speeds.**
* **Vehicle Speed: Higher speeds lead to a greater number of injuries.**

**Conclusion**

**This analysis provided useful insights into the factors contributing to traffic accidents. The findings can help identify high-risk conditions, aiding in the development of safety measures, such as speed regulations and public awareness campaigns, particularly during adverse weather conditions and high-risk hours.**

## Recommendations

1. **Improved Road Safety during Adverse Weather: Implement stricter speed limits and better signage for hazardous conditions like rain and fog.**
2. **Increased Awareness Campaigns: Focus on reducing nighttime and rush hour accidents through public awareness and increased traffic enforcement.**
3. **Road Surface Management: Ensure timely maintenance to reduce accidents on wet or icy roads.**