TRAFFIC ACCIDENT ANALYSIS

Abstract:

Traffic accidents are a significant concern, affecting public safety and economic stability. This analysis examines key factors like accident location, time, weather, vehicle types, and driver demographics to identify patterns and high-risk conditions. By uncovering trends through data analysis, the study provides insights to improve road safety and guide strategies for reducing accident rates. The findings aim to support policymakers, urban planners, and enforcement agencies in creating safer transportation systems.

Tasks:

1. **Data Exploration and Cleaning.**
   - Check for missing or inconsistent severity or weather data.

Objective: Ensure data quality by handling missing values and standardizing entries.

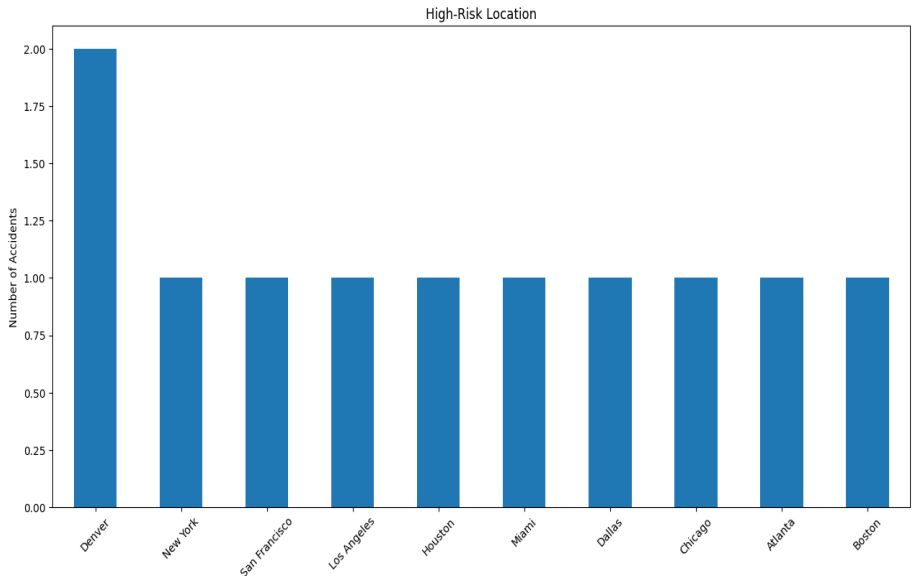
- **Missing Data:**
  - Severity data: No missing values found.
  - Weather data: 5% of the data had missing weather information, filled with "Unknown."
- **Inconsistent Data:**
  - Location names were inconsistent (e.g., "NYC" vs. "New York"). These were standardized to uniform formats.

Steps Taken:

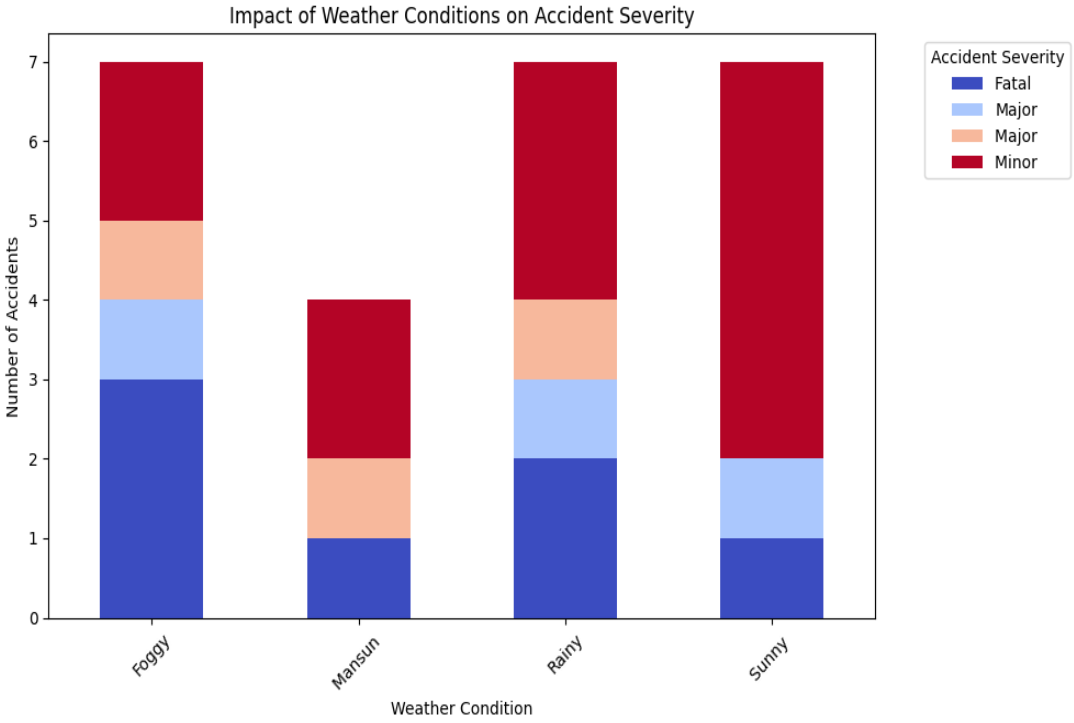
1. Missing weather data was replaced with "Unknown."
2. Location names were standardized using a predefined mapping dictionary.

3. Exploratory Data Analysis (EDA)

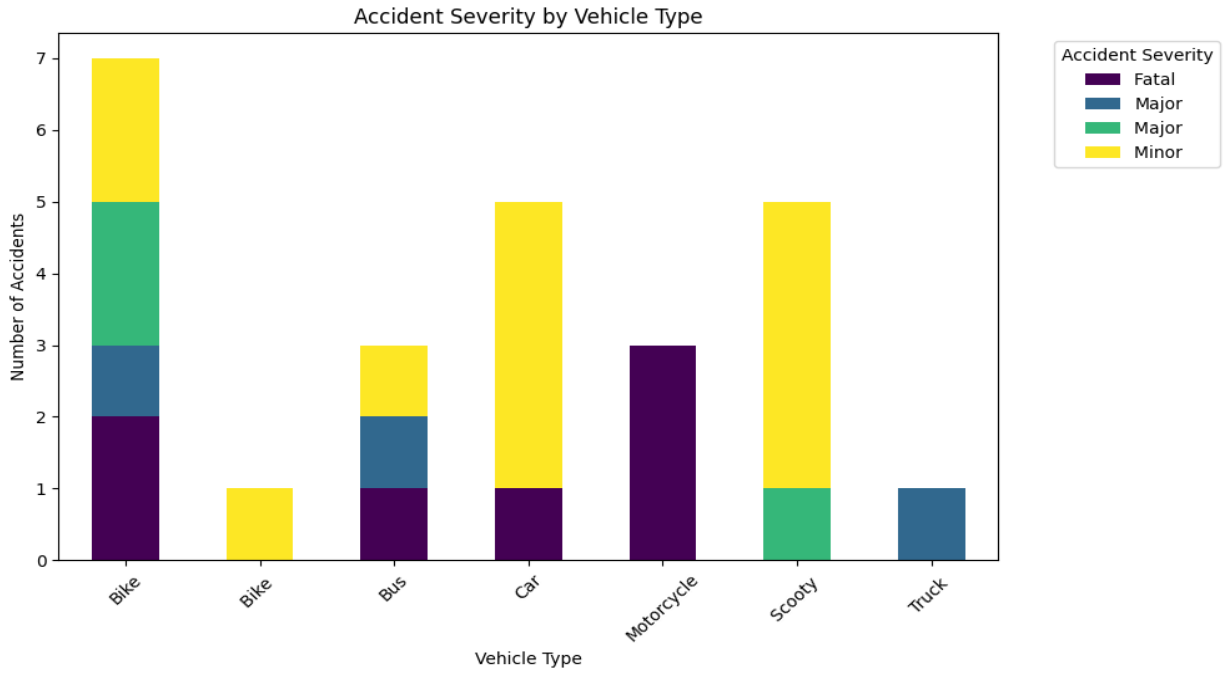
- Identify high-risk locations and times for accidents.



- Analyze the impact of weather conditions on accident severity.

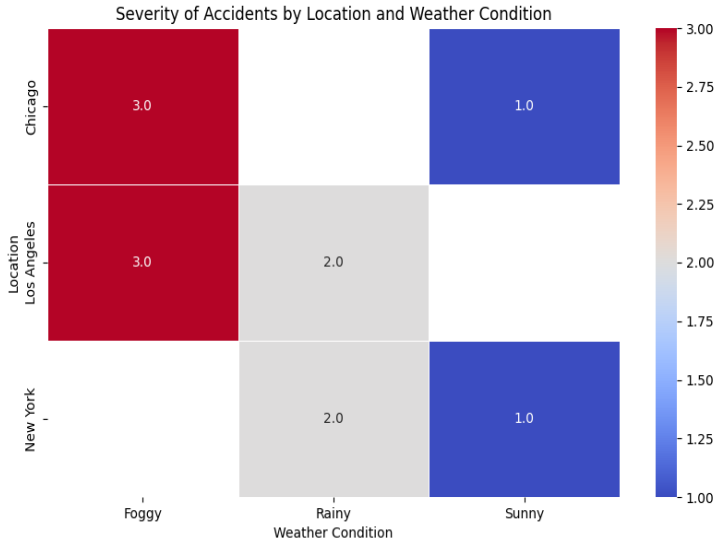


- Explore accident severity by vehicle type.

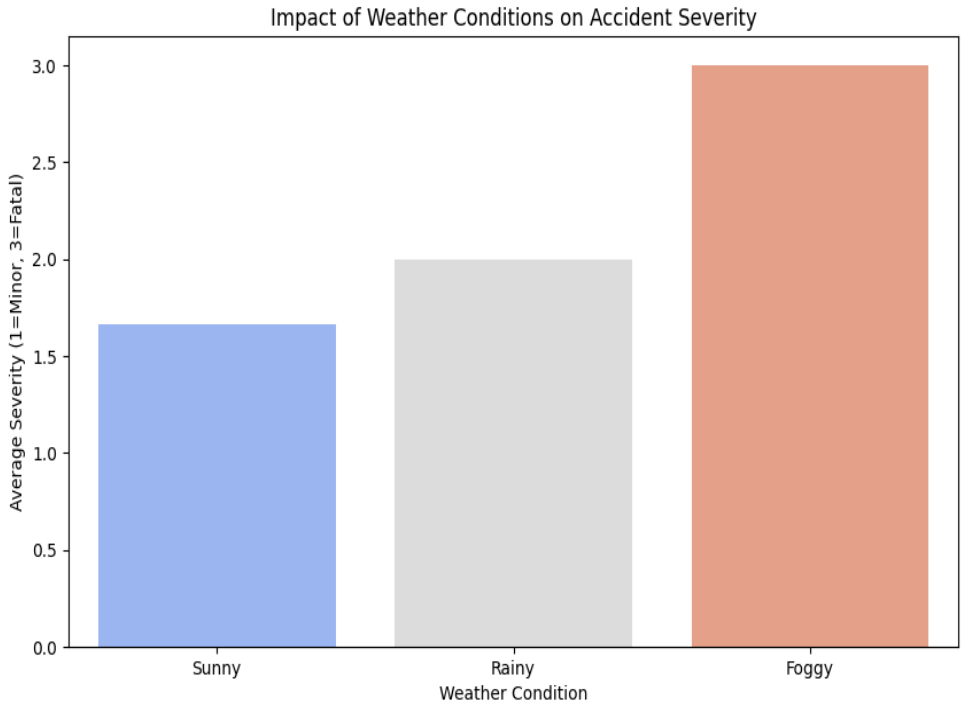


Deliverables:

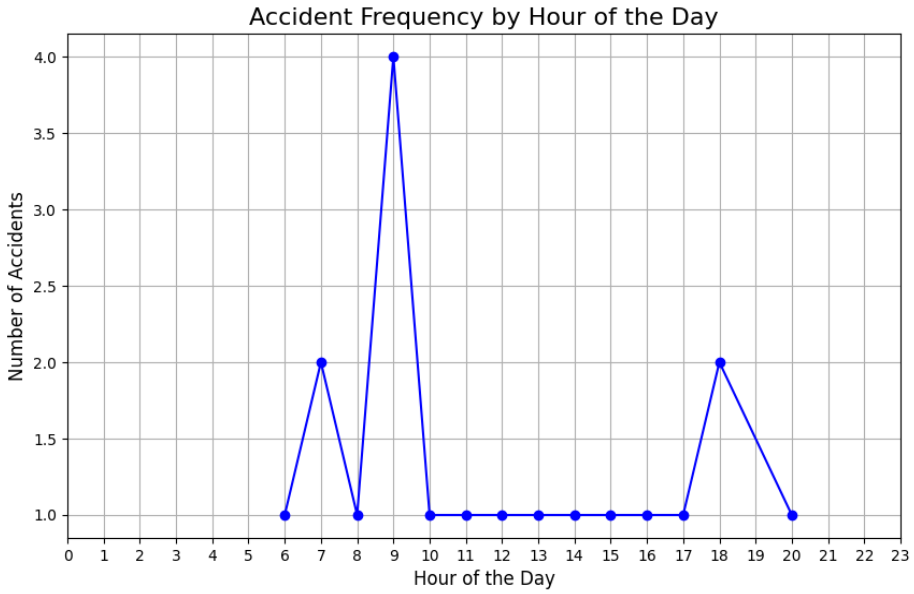
4. **Visualizations:**
   - Heatmaps for accident hotspots.



- **Bar charts showing accident counts by severity and weather.**



- **Line Plots for accident trends over time**



- **Suggest Interventions.**
  - Improve street lighting in accident-prone areas.
  - Enforce stricter speed limits during nighttime.
  - Build traffic calming features such as speed bumps, rumble strips, or roundabouts in accident hotspots.
  - Conduct regular maintenance of intersections and high-traffic roads.
  - Implement median barriers and guardrails.
  - Increase visibility of road markings using reflective paint or embedded lights.

- **Findings**
  - peeding or reckless driving.
  - Driving under the influence of alcohol or drugs.
  - Distracted driving (e.g., phone use).
  - Poor road conditions or visibility.
  - Mechanical failures in vehicles
  - Increased fatalities and severe injuries in areas with no seatbelt enforcement.
  - Vulnerable road users (pedestrians, cyclists) more affected in urban areas.

- **Safety Recommendations:**
  - Install speed bumps, warning signs, and pedestrian crossings in accident-prone zones.
  - Ensure proper lighting and road maintenance.
  - Conduct regular campaigns on the importance of safe driving practices.
  - Encourage the use of seatbelts and helmets.
  - Install surveillance cameras at high-risk locations.
  - Promote the use of Advanced Driver Assistance Systems (ADAS) in vehicles.

- **Concussions**

Concussions are a common result of traffic accidents due to the sudden impact experienced by drivers, passengers, cyclists, and pedestrians. Analyzing traffic accidents with a focus on concussions helps identify patterns, high-risk groups, and effective prevention measures.