Traffic Accident Pattern Analysis

Time, Environment & Infrastructure Impact

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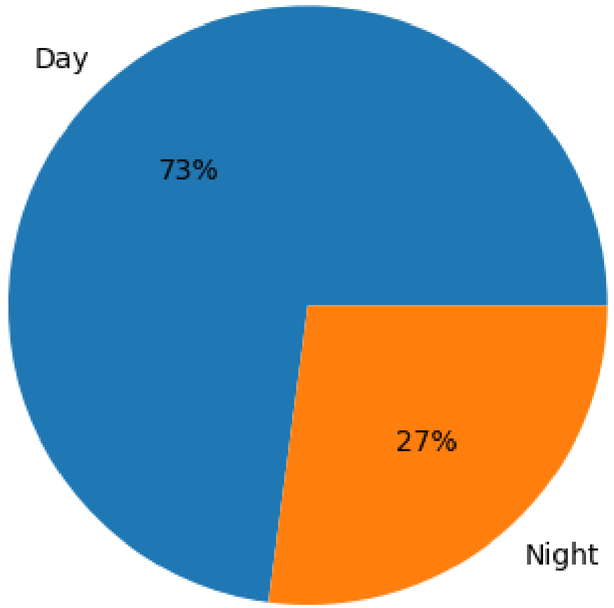
Dataset and Objective

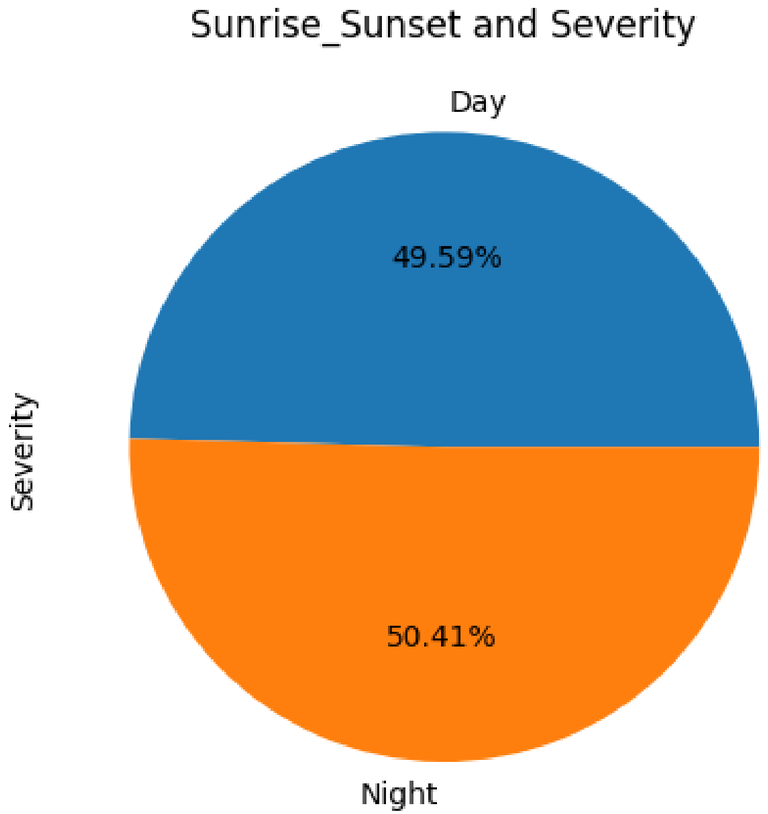
Objective: Analyze traffic accident data to identify patterns related to road conditions, weather, and time of day. Visualize accident hotspots and contributing factors.

1. Identify time-based patterns
2. Analyze environmental & infrastructure risk
3. Visualize geographic hotspots

Dataset:
https://www.kaggle.com/datasets/sobhanmoosavi/us-accidents

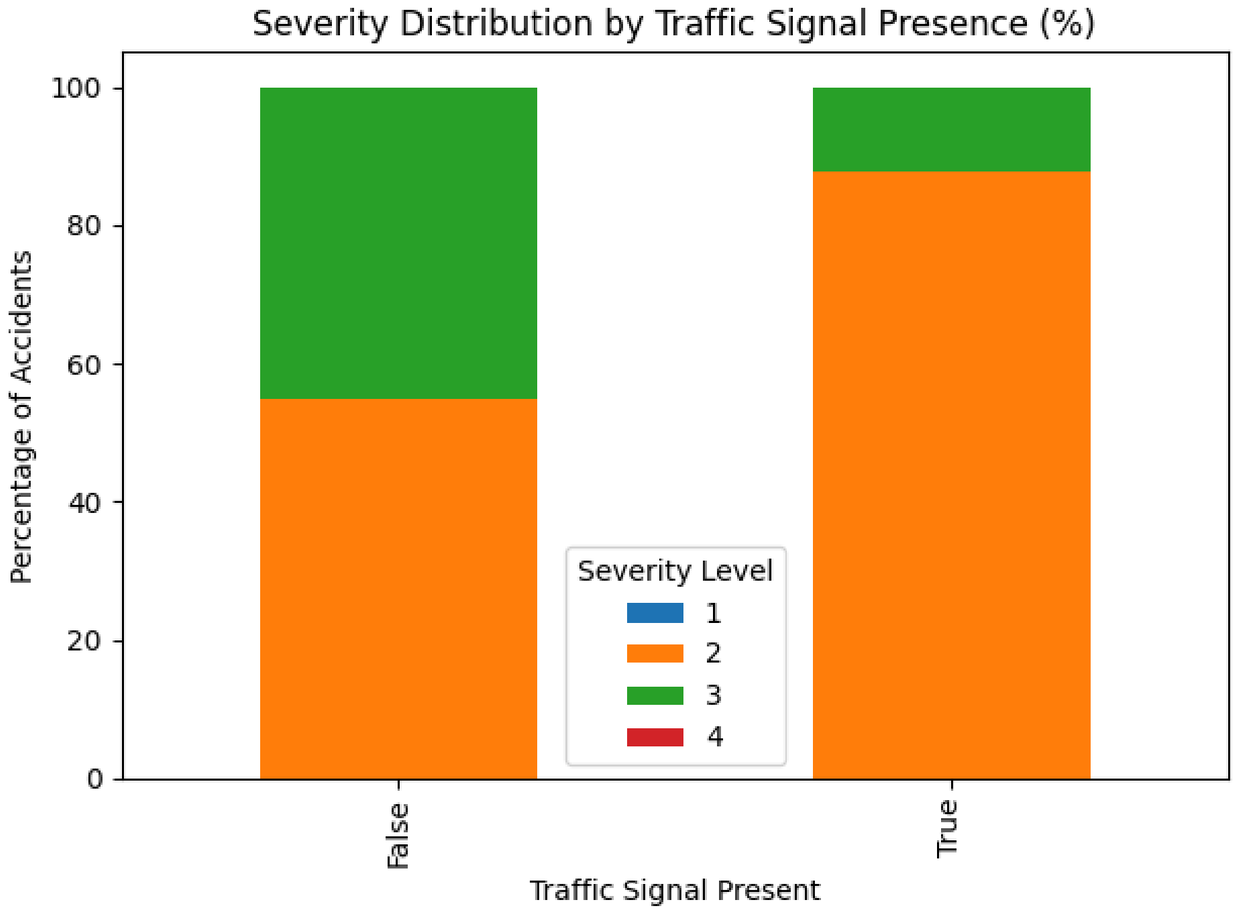
When do accidents happen most vs when are they most severe?

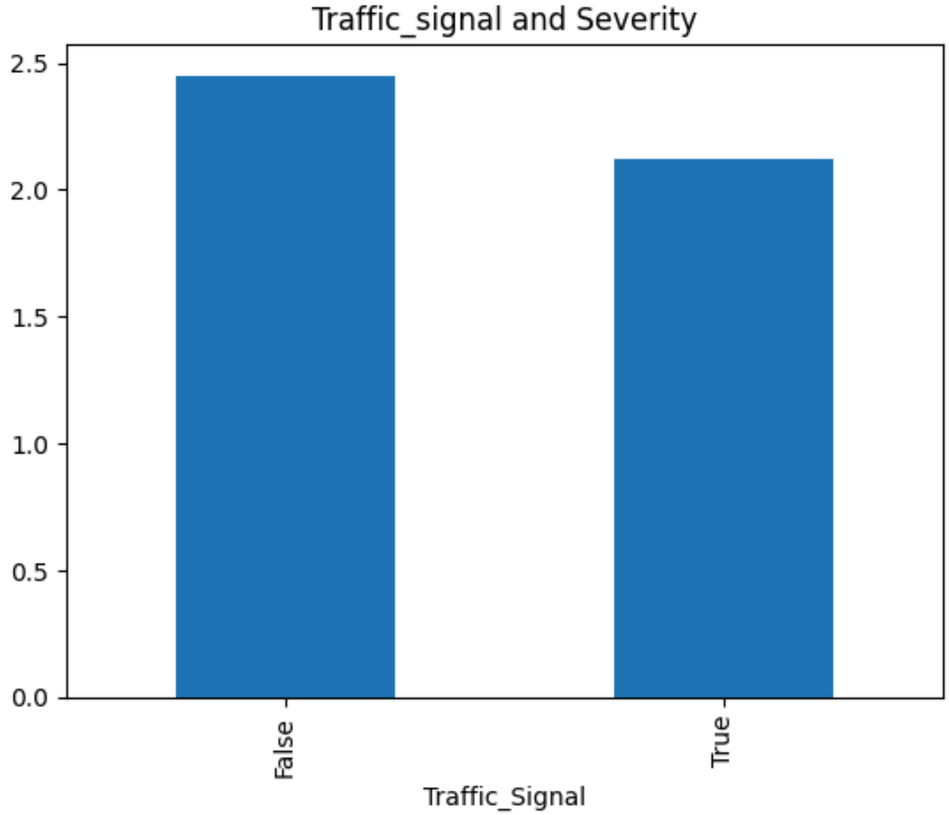




While **most accidents occur** during **daytime** and peak commuting hours, **nighttime accidents show comparable or higher severity**, indicating that *visibility and response time increase risk impact rather than frequency.*

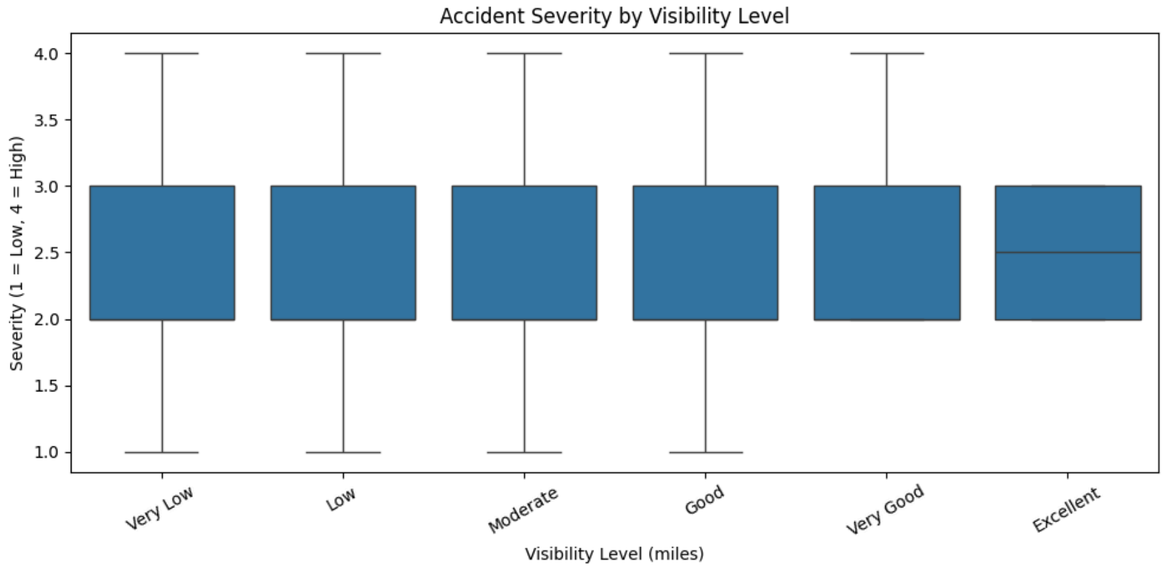
Do traffic signals reduce severity?



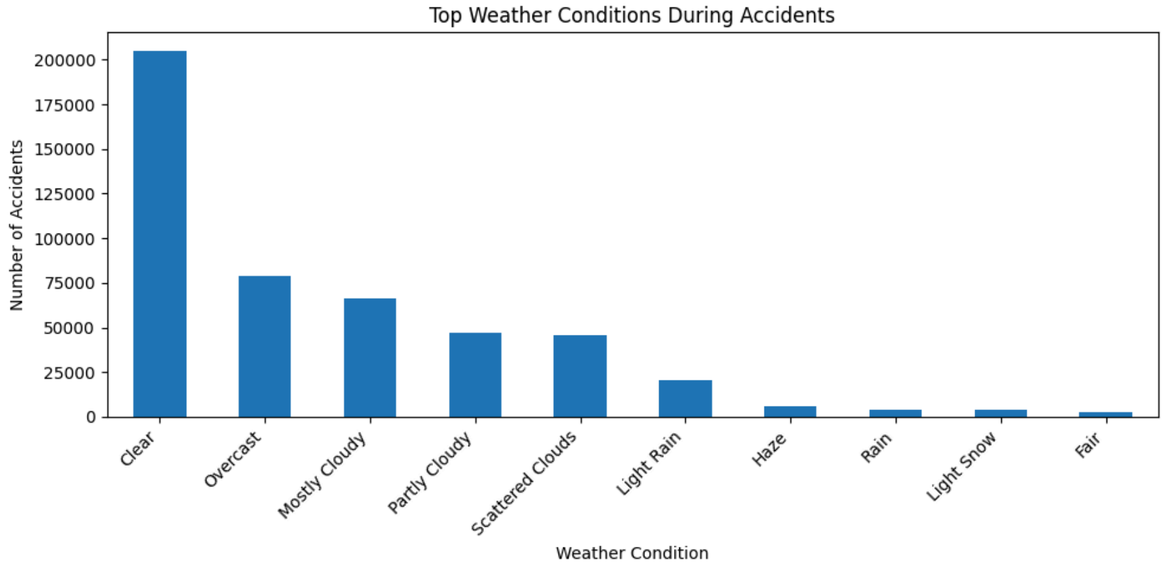


Locations **without traffic signals show** a **higher** proportion of **high-severity** accidents, *suggesting controlled intersections reduce the likelihood of major traffic disruption*

Do weather and visibility amplify accident severity?

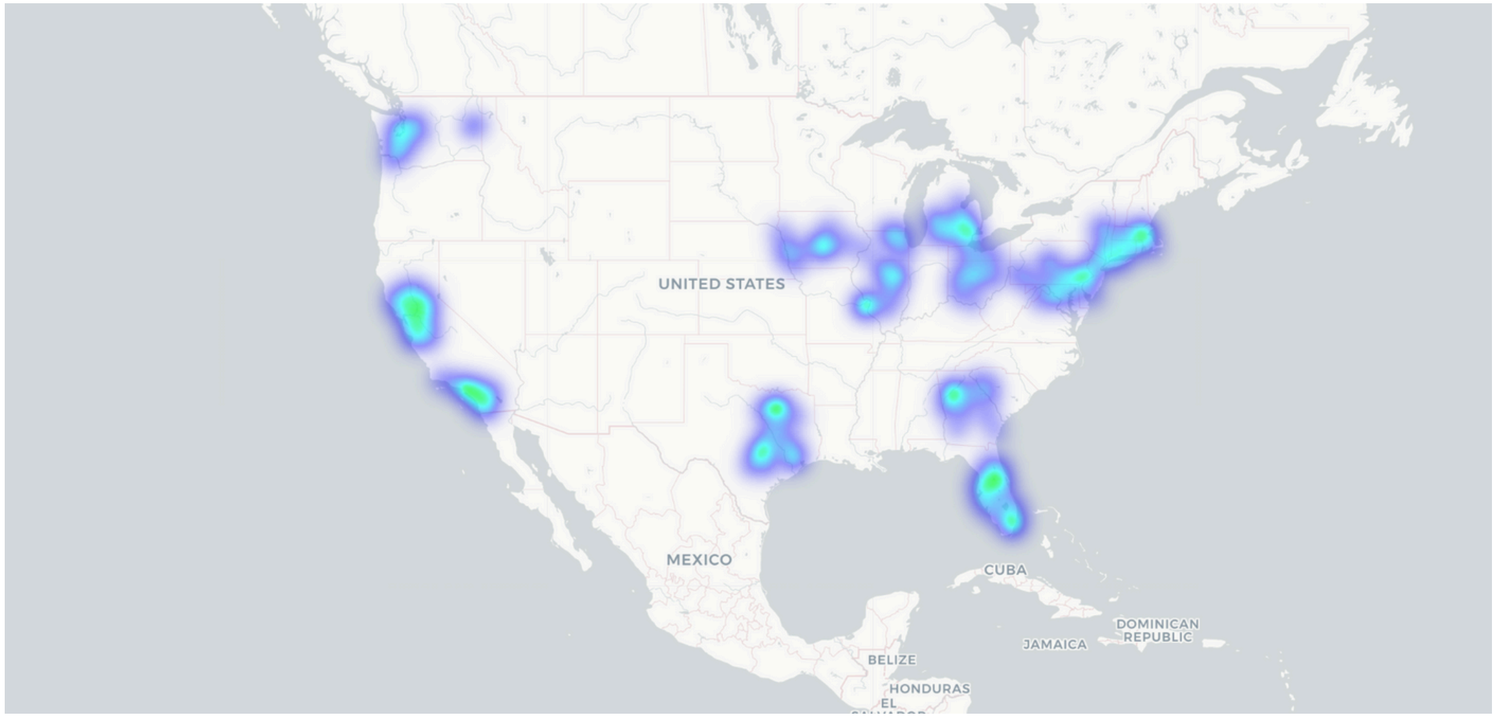


Low **visibility doesn't necessarily increase how often accidents happen — it increases how severe they become** when they do happen.



Weather conditions affect severity more than frequency — adverse **weather is less common** but associated with **higher-impact** accidents.

Where It Happens?



Accident hotspots cluster around major urban corridors and high-density transportation routes, highlighting priority zones for traffic regulation and safety interventions

Link:
https://github.com/bsiddharth18/PRODIGY_DS_01/blob/main/images/accident_hotspots.html

Do complex road features increase severity?

feature	severe_pct_when_true	severe_pct_when_false	risk_ratio
Turning_loop	0.03	0.06	0.40
Station	0.02	0.06	0.36
Junction	0.01	0.06	0.23
Traffic_Signal	0.00	0.06	0.00

Accident **severity increases in locations with multiple complex road** features, especially when **traffic control mechanisms are absent.**
Complexity = Danger

better traffic control mechanisms can be installed there with advanced technology

Key Findings:

- Traffic volume drives frequency, environment drives severity
- Signals and control reduce high-impact accidents
- Complexity and low visibility amplify risk
- Urban corridors are priority intervention zones

Conclusion:

This analysis highlights how targeted traffic control, improved visibility, and infrastructure planning can reduce the severity of high-impact accidents.