



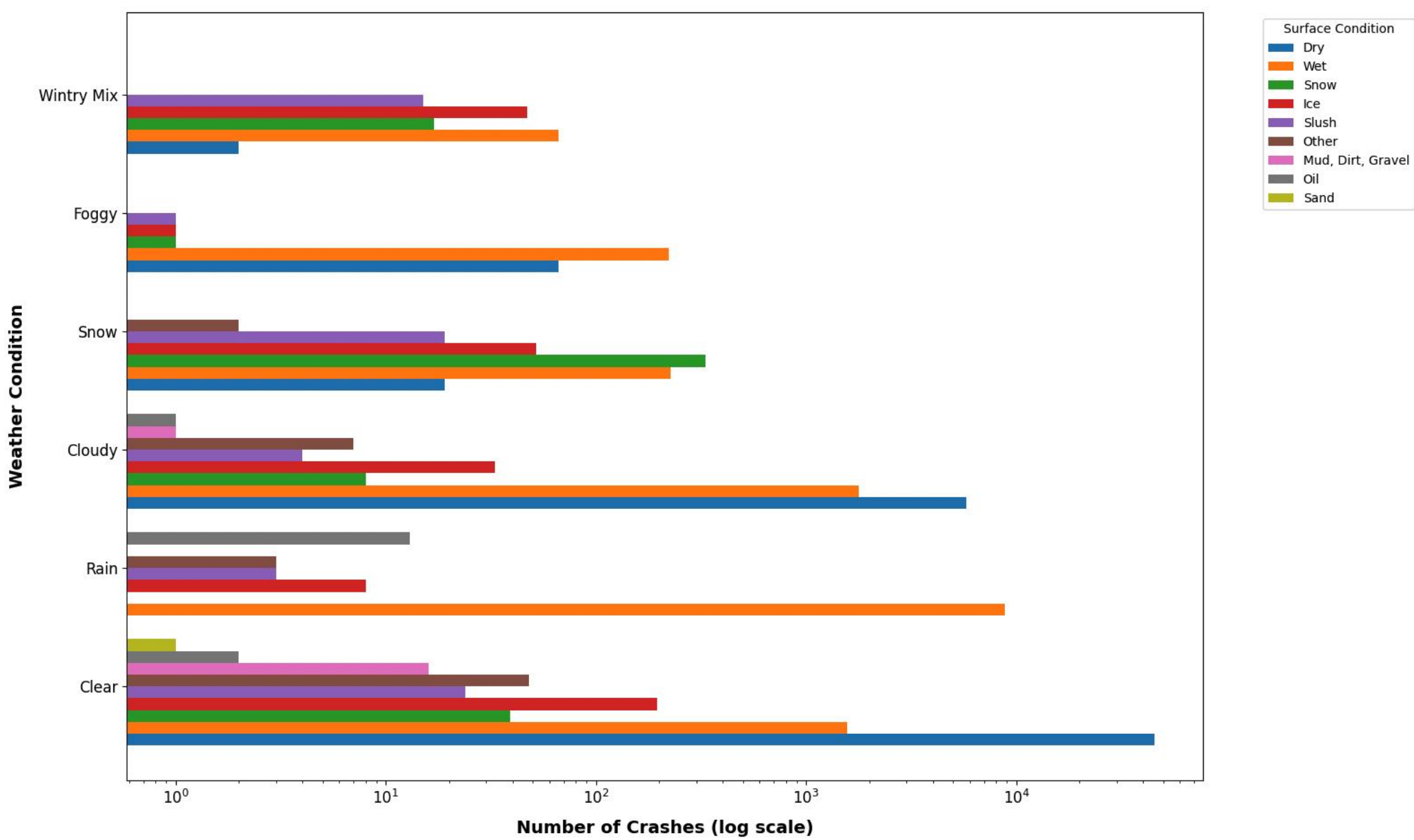
Introduction

This project analyzed crash data from Montgomery County, Maryland using 83,360 records from the Maryland State Police's Automated Crash Reporting System (ACRS). By examining environmental conditions, driver behavior, vehicle attributes, and crash outcomes, we aim to identify key risk factors that contribute to traffic collisions. We hope that insights into the impact on driver demographics, weather, vehicle type, and crash timing guide policymakers, transportation agencies, and public safety organizations in developing targeted interventions and evidence-based strategies to enhance roadway safety.

Environmental Impact on Traffic Crashes

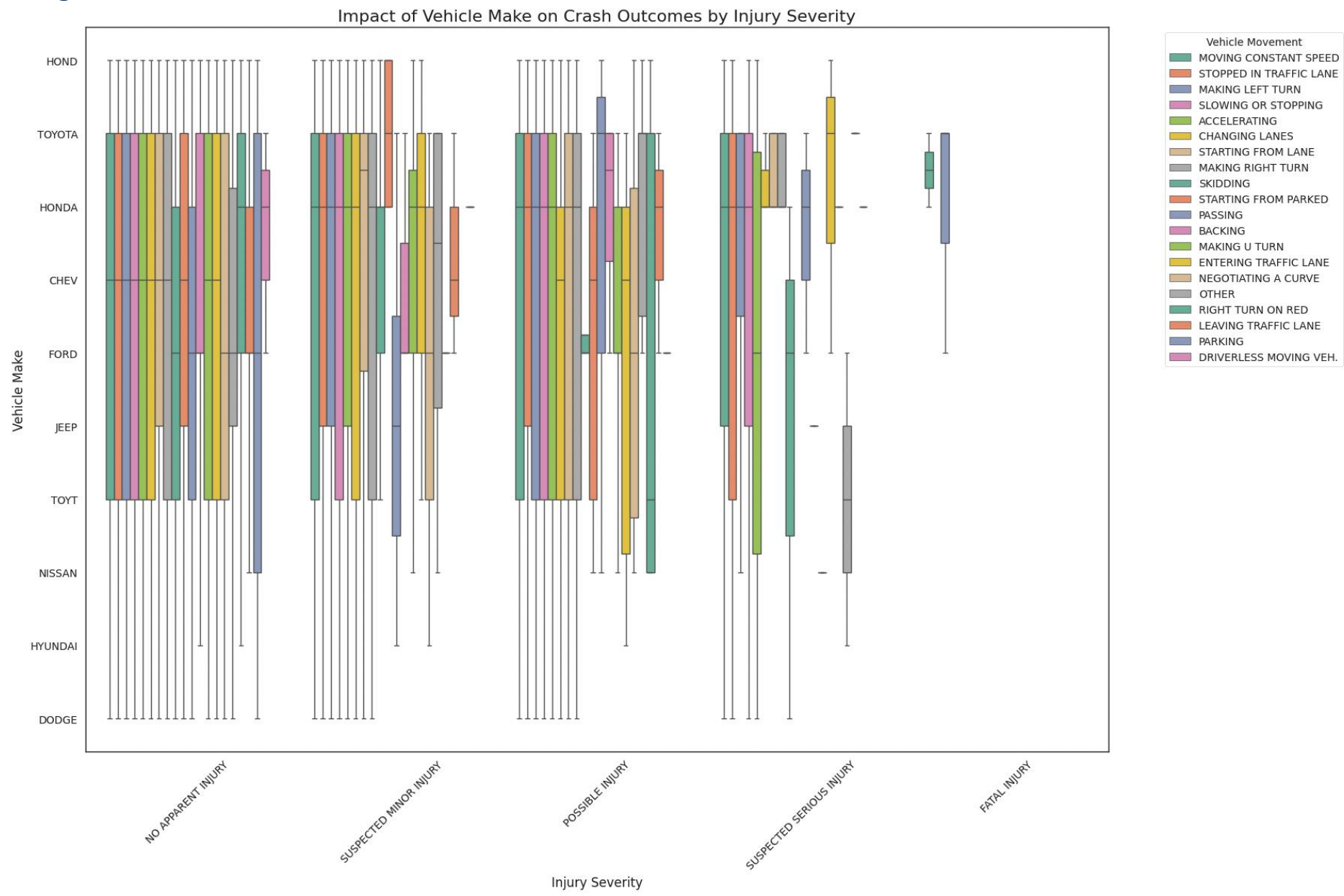
We analyzed how weather and road conditions impact crashes. Clear weather causes the most crashes on dry and wet roads due to high traffic. Rainy weather increases crashes on wet roads, while snowy conditions drive crashes on icy surfaces. Wet and icy roads pose the highest risks.

Impact of Weather and Surface Conditions on Traffic Crashes



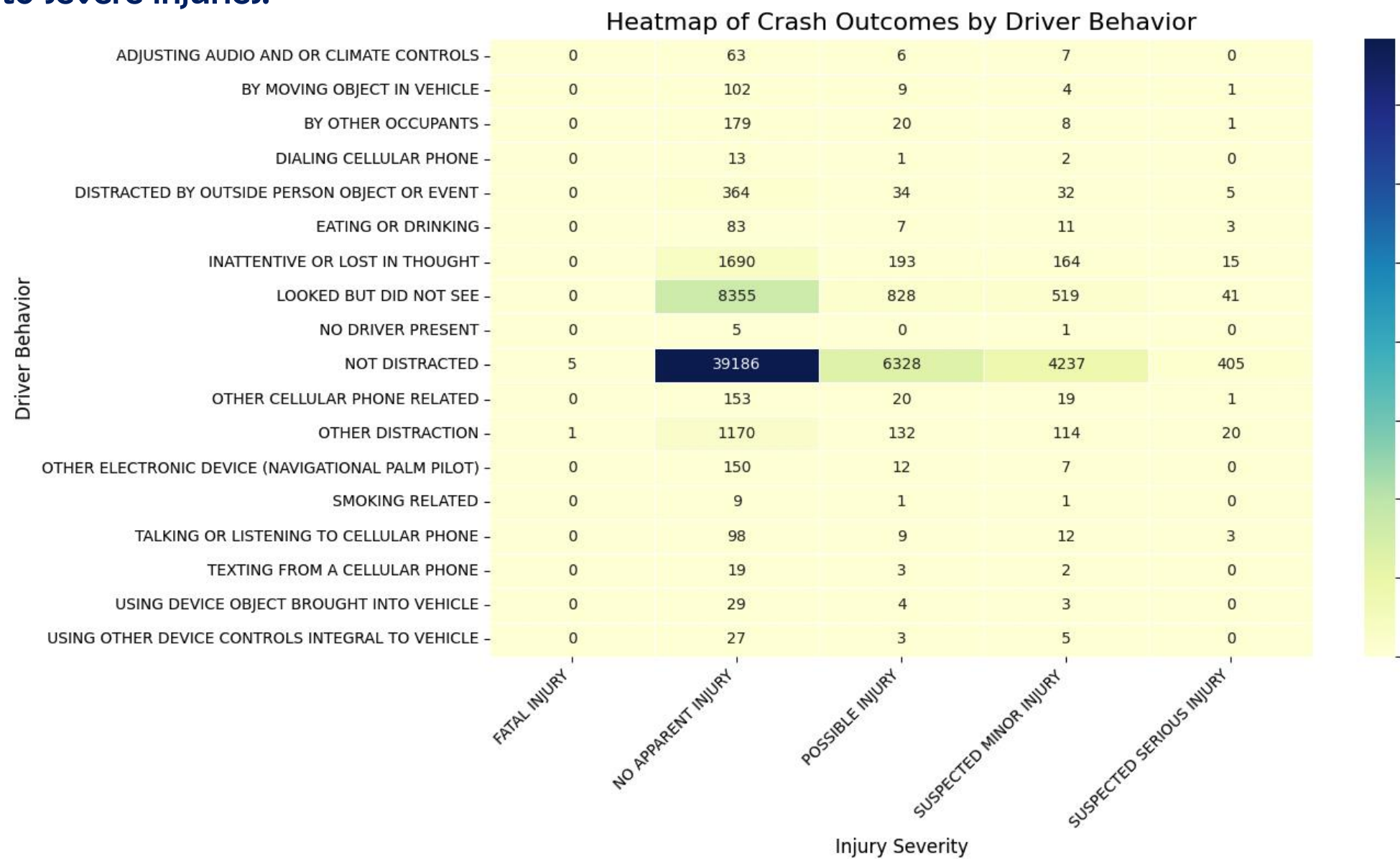
Vehicle Features and Crash Outcomes

TOYOTA, HONDA, and FORD are prominent across all injury severities. Severe injuries like "Fatal Injury" show greater variation, influenced by actions such as "Accelerating" and "Making Left Turn."



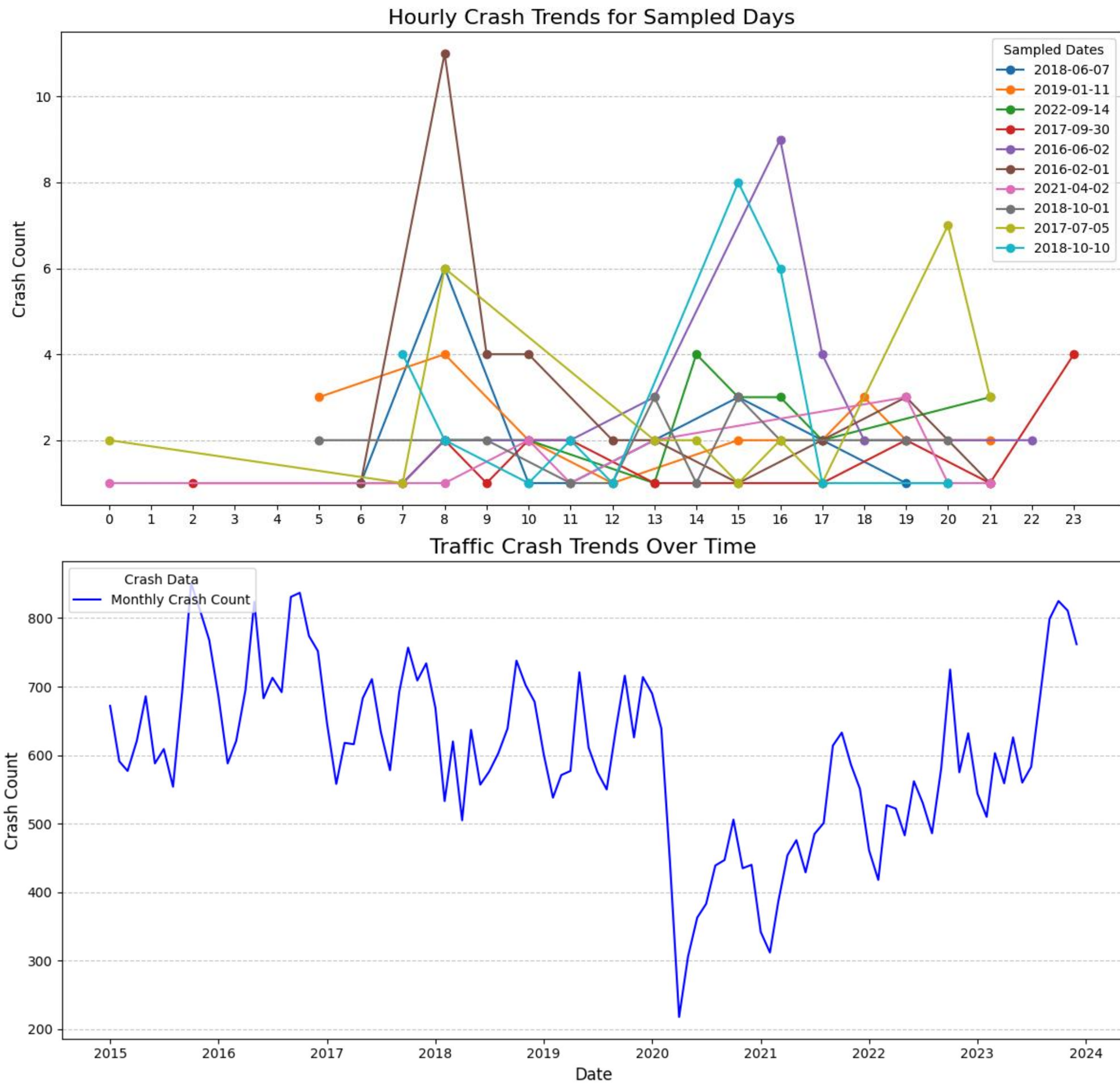
Driver Behavior and Crash Outcomes

Most crashes involve "Not Distracted" drivers with low injury severity, while "Looked But Did Not See" is a major contributor across all severities. Rare distractions, like "Texting," are linked to severe injuries.



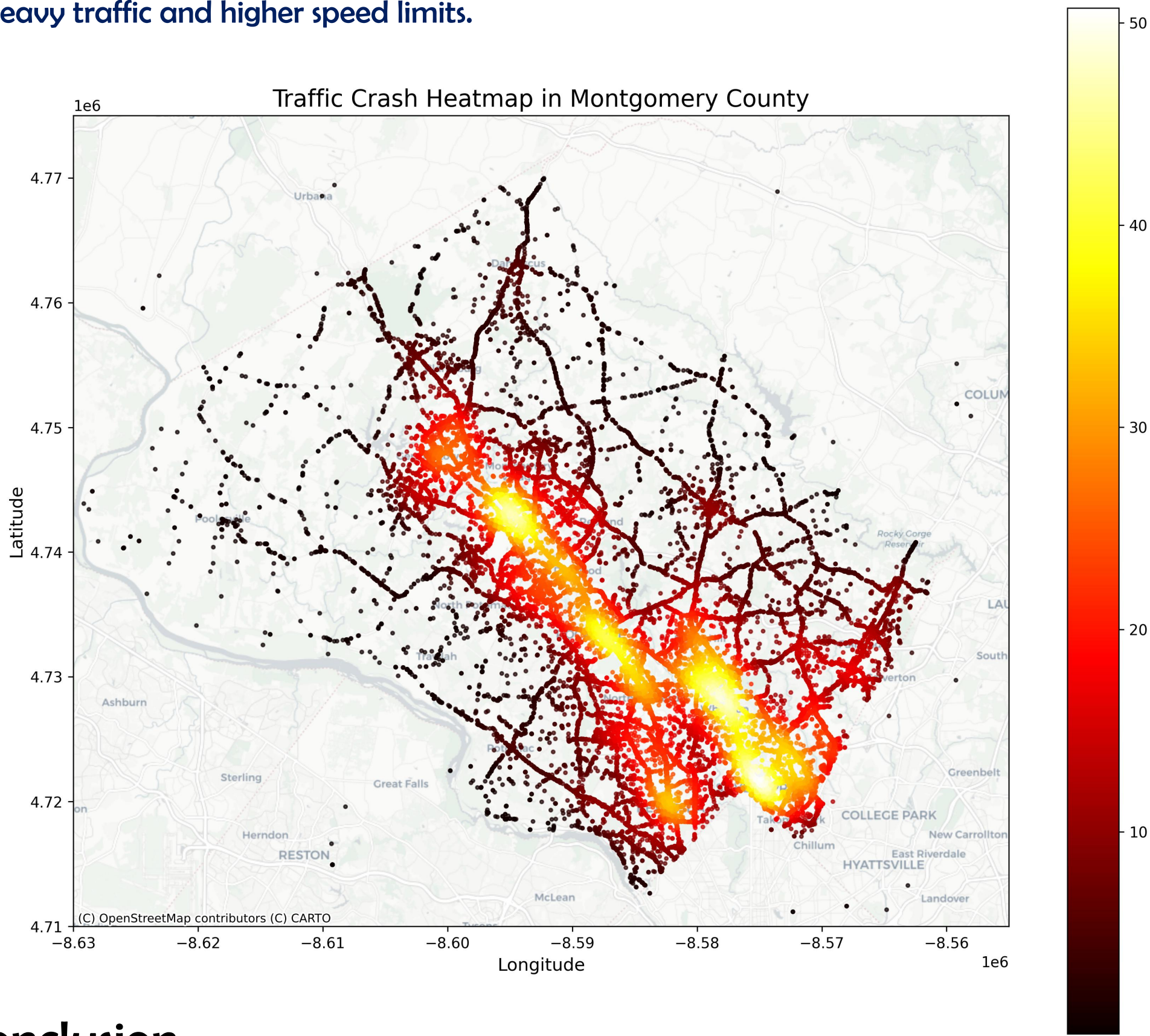
Temporal Patterns in Traffic Crashes

Crash occurrences exhibit clear seasonal trends, with a significant decrease during the pandemic in 2020, followed by a gradual rise in 2021 as traffic activity resumed. Peak crash hours are concentrated during the morning (7-9 AM) and evening (4-6 PM) rush hours, closely aligning with commuter traffic patterns.



Geographic Hotspots for Traffic Crashes

The heatmap indicates that crashes are concentrated along major roadways, particularly in central and southern Montgomery County. These areas experience higher crash densities due to heavy traffic and higher speed limits.



Conclusion

Our analysis identifies key patterns and factors contributing to traffic crashes across Montgomery County, Maryland. Temporal trends reveal a significant decline in crashes during the 2020 pandemic due to reduced traffic activity, followed by a gradual rise in 2021 as normal patterns resumed. Peak crash times are concentrated during morning (7-9 AM) and evening (4-6 PM) rush hours, aligning with commuter traffic. Environmental conditions play a crucial role, with rainy or icy roads increasing crash severity and clear weather accounting for the highest overall crash counts due to heavier traffic volumes. High-density crash zones are concentrated along major roadways in central and southern areas, driven by heavy traffic and higher speed limits.

Vehicle attributes, including make, model, and movement type, significantly influence crash outcomes. Severe injuries, such as "Fatal Injuries," are often linked to high-risk behaviors like "Accelerating" and "Making a Left Turn." Driver distractions, particularly "Looked But Did Not See," also contribute to severe outcomes. These findings underscore the need for targeted interventions to enhance road safety. Strategies include improving road conditions, strengthening infrastructure, addressing driver distractions, and promoting modern vehicles equipped with advanced safety features. By addressing these factors, policymakers and transportation agencies can implement data-driven solutions to reduce crashes and improve roadway safety.