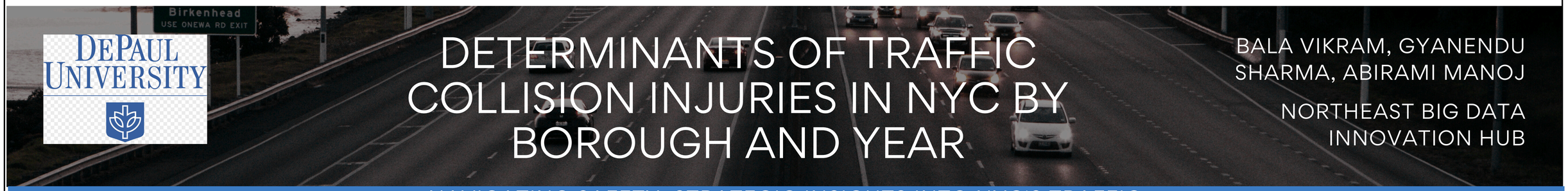

DETERMINANTS OF TRAFFIC COLLISION INJURIES IN NYC BY BOROUGH AND YEAR

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NAVIGATING SAFETY: STRATEGIC INSIGHTS INTO NYC'S TRAFFIC COLLISION TRENDS AND PREVENTION

INTRODUCTION

Traffic collisions in New York City (NYC) present significant challenges to public safety, affecting thousands of residents and visitors each year. Understanding the underlying factors contributing to traffic injuries is crucial for developing effective interventions and policies aimed at reducing these incidents.

OBJECTIVE

The main objective of this research is to identify and analyze the key factors that contribute to the occurrence of injuries in motor vehicle collisions across different boroughs of NYC and to examine how these influences vary over time.

RESEARCH OBJECTIVE

What factors contribute most significantly to the occurrence of injuries in motor vehicle collisions across different boroughs of New York City, and how do these factors vary by year?

METHODOLOGY

- Data Collection & Preprocessing: NYC motor vehicle collision data is cleaned, transformed, and missing values are handled.
- Exploratory Analysis: Injuries and fatality trends are visualized across boroughs, weekdays, months, and years.

- Machine Learning Modeling: Random Forest models are developed for different years to predict injury occurrences based on factors such as crash time, location, vehicle type, and contributing causes.
- Variable Importance Analysis: The most influential predictors are identified using feature importance scores, aiding in risk assessment and policy recommendations.

ANALYSIS

- Descriptive Analysis:
- The study begins with a descriptive analysis where it visualizes injuries and fatalities from traffic collisions across different boroughs and times. This involves summarizing raw data into meaningful charts and graphs to observe trends and patterns, such as the frequency of injuries by borough and the distribution of accidents over time.
- Predictive Analysis:
- Predictive modeling using Random Forest algorithms constitutes the next phase. The objective is to predict the occurrence of injuries based on various factors like crash date, time, location specifics, and vehicle details. This analysis assesses the likelihood of injuries from collisions, identifying critical predictors that influence outcomes.
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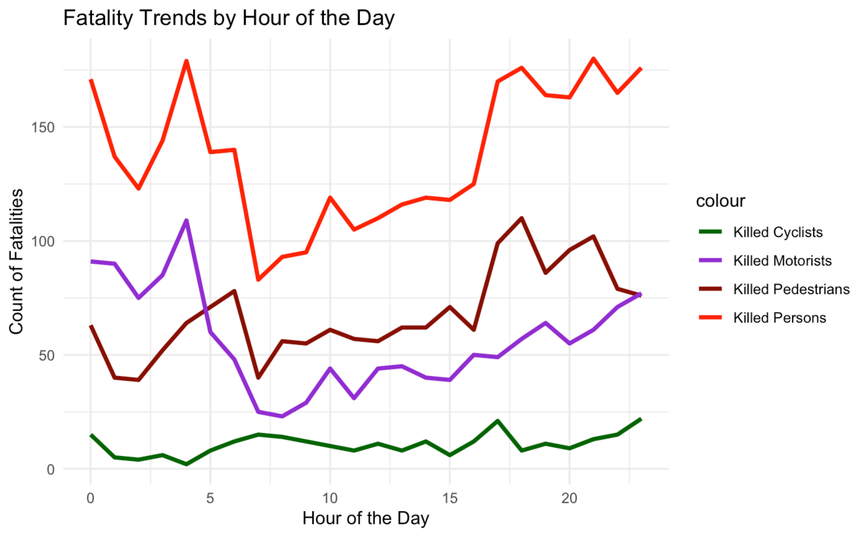
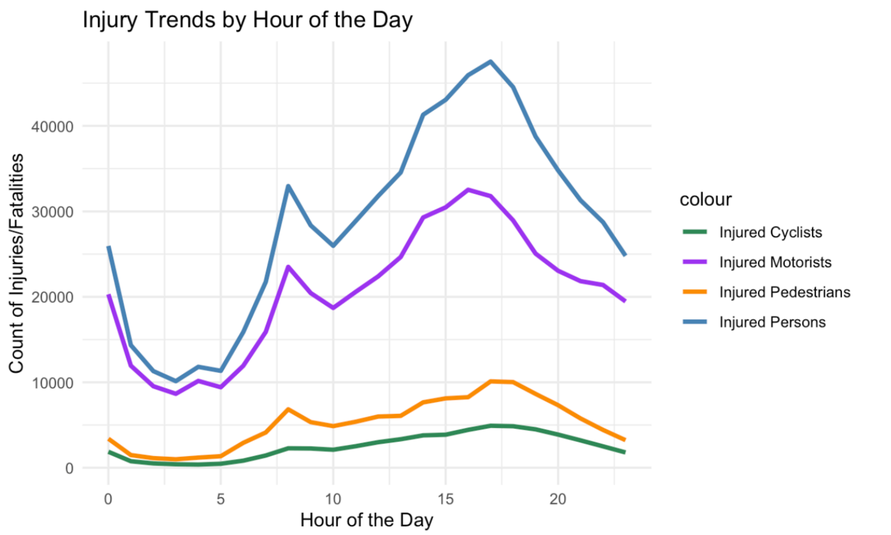
- Prescriptive Analysis:

While the study primarily focuses on descriptive and predictive analysis, the insights gained can inform prescriptive measures. Based on the identified key factors and predictive models' outcomes, recommendations can be made for traffic management, urban planning, and policy interventions to reduce injuries and enhance road safety effectively.

ANALYSIS





YOUR PARAGRAPH TEXT

Injury trends in traffic collisions show a peak during the afternoon rush hours from 15:00 to 18:00, correlating with the busiest road times, while a significant decrease is observed during the early morning hours from 3:00 to 5:00, reflecting the lowest traffic volumes. Meanwhile, fatality trends reveal that the most dangerous times are between 2:00 and 4:00 AM, likely due to poorer driving conditions and possibly impaired drivers. This pattern extends to pedestrians and motorists who experience increased fatalities during late evenings and early mornings, whereas cyclist fatalities, although lower overall, see a slight increase during daylight and early evening hours, suggesting more active cycling during these periods

KEY FINDINGS

- Spatial and Temporal Variation: The analysis revealed significant variations in injury occurrences across different boroughs, with the Bronx consistently showing higher injury and fatality rates. Time-based trends indicated that injuries peak during evening rush hours and are higher during warmer months, suggesting increased vehicular and pedestrian activity.
- Influential Factors: Vehicle type, crash time, and specific locations emerged as critical predictors of injuries. Motorist injuries were predominant in all boroughs, followed by pedestrian and cyclist injuries, indicating varying risks for different road users.
- Model Performance: The predictive models demonstrated good accuracy, with annual models highlighting the shifting significance of factors over time. Variable importance plots underscored that while some factors like crash time remained consistently influential, others varied, reflecting changing urban dynamics and enforcement policies.

CONCLUSION AND KEY RECOMMENDATIONS

The analysis of New York City's traffic collision data revealed critical insights into the factors contributing to road injuries and fatalities. The findings highlighted the Bronx as a high-risk area, with significant disparities in injury occurrences across boroughs and various times of the day and year. Predictive modeling identified key variables influencing the likelihood of injuries, which varied annually, reflecting changes in traffic patterns, enforcement, and urban activities.

Key Recommendations

1. Targeted Safety Measures: Implement enhanced safety protocols and infrastructure improvements in high-risk areas, particularly in the Bronx, to mitigate risk factors leading to high injury rates.
2. Enforcement and Education: Increase enforcement of traffic laws during peak injury times identified in the study, such as evening rush hours and warmer months. Additionally, launch educational campaigns focused on road safety awareness for motorists, cyclists, and pedestrians.
3. Policy Adjustments: Utilize insights from the predictive models to revise traffic and urban planning policies. Ensure these policies adapt to the changing dynamics highlighted by the annual variability in influential factors.
4. Continuous Monitoring and Analysis: Establish a system for ongoing data collection and analysis to monitor the effectiveness of implemented measures and quickly adapt to new trends in traffic-related injuries and fatalities.