PROJECT TITLE:EXPLORING CRASH DATA AND PREDICTING SEVERITY

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INTRODUCTION

"Exploring Traffic Crash Data and Predicting Severity."

In this project, we delve into a comprehensive analysis of traffic crash data to uncover insights and develop predictive models for crash severity.

The data used was sourced from Chicago Police Department (CPD) within the City of Chicago .

Our aim is to contribute valuable insights to improve road safety and reduce the frequency and impact of traffic accidents.

DATASET OVERVIEW

The dataset consists of information on various attributes related to traffic crashes, including weather conditions, road surface, vehicle types, and injury classifications.

This dataset serves as the foundation for our exploratory analysis and predictive modeling.

RESEARCH QUESTIONS

Our project addresses the following key research questions:

1. **What factors significantly influence the severity of traffic crashes, and can they be used to predict severity levels?**

2. **How does the usage of safety equipment impact crash occurrences and outcomes?**

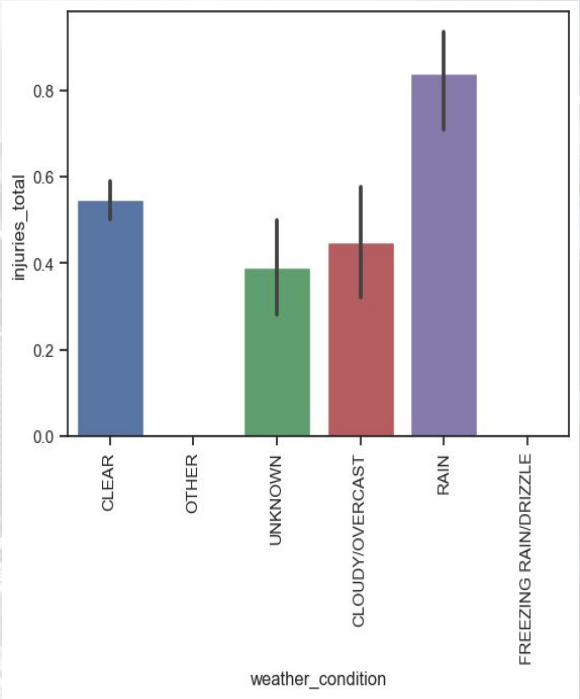
3. **Can we identify geographic hotspots with higher crash frequencies and recommend targeted prevention strategies?**

DATA EXPLORATION

Our initial exploration of the dataset revealed important patterns and insights.

We observed correlations between variables such as weather conditions and crash severity, as well as temporal patterns related to crash occurrences during certain hours and days of the week.

Additionally, we investigated the influence of road surface conditions and defects on crash likelihood and severity.



MODEL APPROACH

Our modeling approach involved a combination of exploratory data analysis, preprocessing, and machine learning techniques.

We employed various models, including Random Forest Classifier, Decision Tree Classifier, Logistic Regression, and K-Nearest Neighbors, to address different research questions and predict outcomes.

In Model 1, we focused on predicting crash severity using features such as speed limit, weather conditions, and age of individuals involved.

The model achieved an accuracy of approximately 90%, with detailed precision, recall, and F1-score metrics provided for each severity class.

Model 2, we explored the impact of safety equipment usage on crash outcomes, such as seatbelt and airbag deployment.

The model demonstrated promising results in predicting injuries based on safety equipment usage, with recall and precision scores reflecting its performance.

Model 3 identified geographic hotspots with higher crash frequencies and recommended prevention strategies.

Logistic Regression was employed to predict crash occurrence in specific locations, enabling targeted safety interventions.

Model Performance Comparison

A comparative analysis of model performance highlighted the strengths and limitations of each approach.

We evaluated accuracy, precision, recall, F1-score, and other relevant metrics to assess the reliability of our predictive models.

Conclusion

1. The predictive model demonstrated a high accuracy rate in determining accident severity, particularly for cases involving incapacitating injuries.

2. Road safety In Chicago Pd is an ongoing concern that requires continuous monitoring and improvement of strategies based on the data and changing circumstances.

Recommendations

- Regularly monitor and maintain road surface conditions to promptly address defects like potholes, cracks, and uneven surfaces.
- Utilize crash data insights to redesign and enhance road layouts in areas with high crash rates.
- Collaborate with the automotive industries and educational institutions to develop technology that enhances vehicle stability and integrate road safety education measures into curriculums, emphasizing safe road use behaviors from a young age .

Next Steps

We suggest the following :

- Incorporate real-time data for more accurate predictions and intervention strategies.
- Expand the analysis to include additional variables, such as road conditions and driver behavior.
- Collaborate with local authorities to implement and assess the effectiveness of recommended strategies.

Thank You

Thank you for your attention and interest in our presentation.

For further discussions, questions, or collaborations, please feel free to reach out to our team for assistance.