CHICAGO TRAFFIC CRASHES

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MOTIVATION

ALLEVIATING HUMAN IMPACT

IMPROVING PUBLIC SAFETY

MITIGATING FINANCIAL TOLL

PROACTIVE PROTECTION

LIFESAVING INTERVENTIONS

GATHERING DATA

- **Sources**:
  - Traffic Crashes data from the City of Chicago Data Portal
  - Weather Data from Visual Crossing
- **Contents**: Detailed incident-level records on all reported motor vehicle crashes in the City of Chicago from 2015 to present
- **Volume**: Over 700,000 crash observations, spanning 49 attributes
- **Key Strengths**:
  - Large in-scope duration - 7 years of data
  - Granular details and insights per incident
  - Tailored to city infrastructure and traffic conditions

DATA OVERVIEW

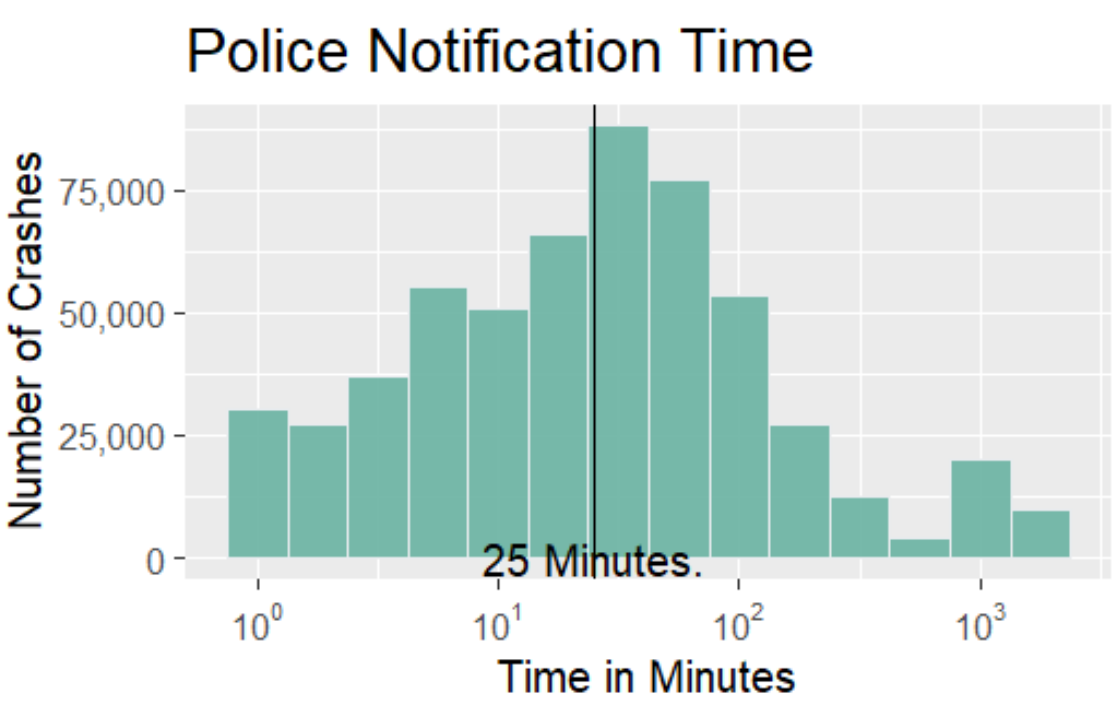
- **Location**: *Latitude and Longitude, Distance to Downtown*
- **Date and Time**: *Hour of day/ day of week/day of month*
- **Injuries**: *Number and type of injuries that occurred*
- **Damages**: *Estimated damage cost of crash*
- **Crash Type**: *Type of crash – no right of way, intersection related etc.*
- **Weather Conditions**: *Weather, Lighting, traffic, traffic control devices, roads etc.*

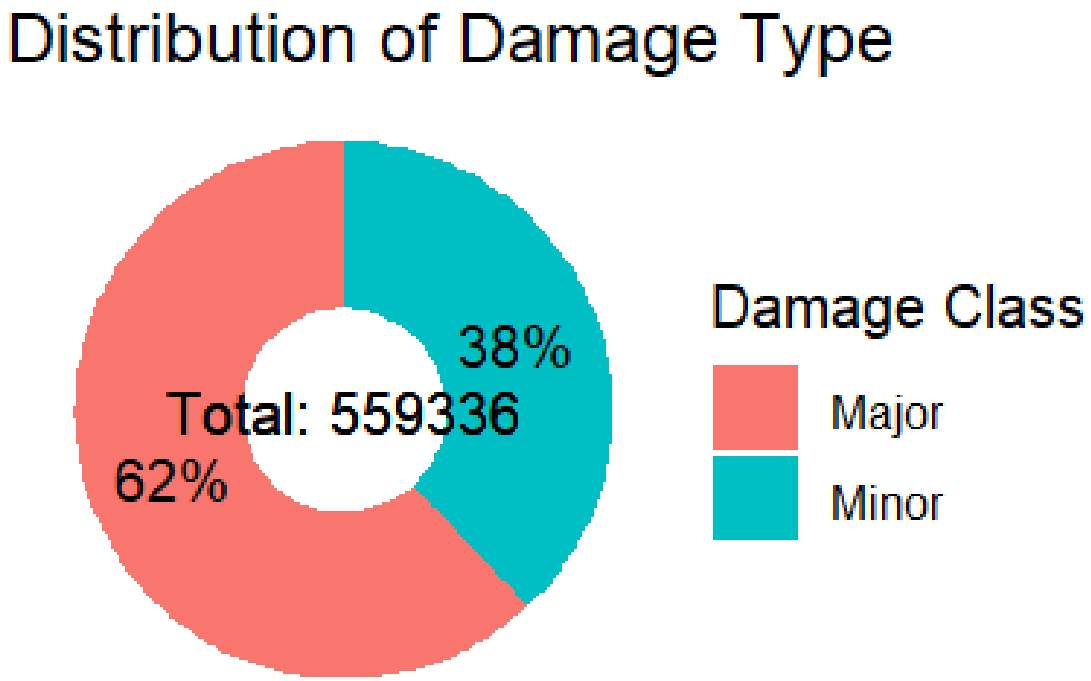
RESEARCH QUESTIONS

How **long** does it take for the **police to be notified** upon accident?

Can we identify **high-impact accidents** based on crash characteristics?

EXPLORATORY DATA ANALYSIS





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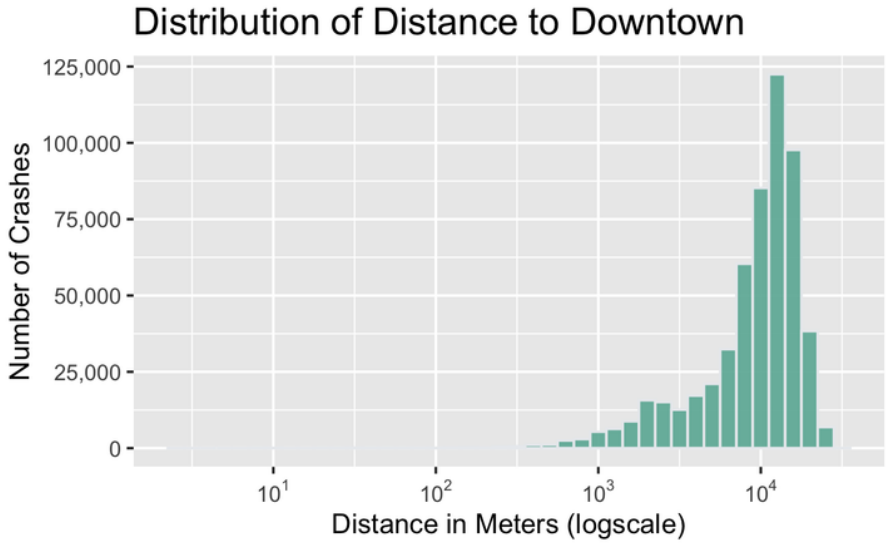
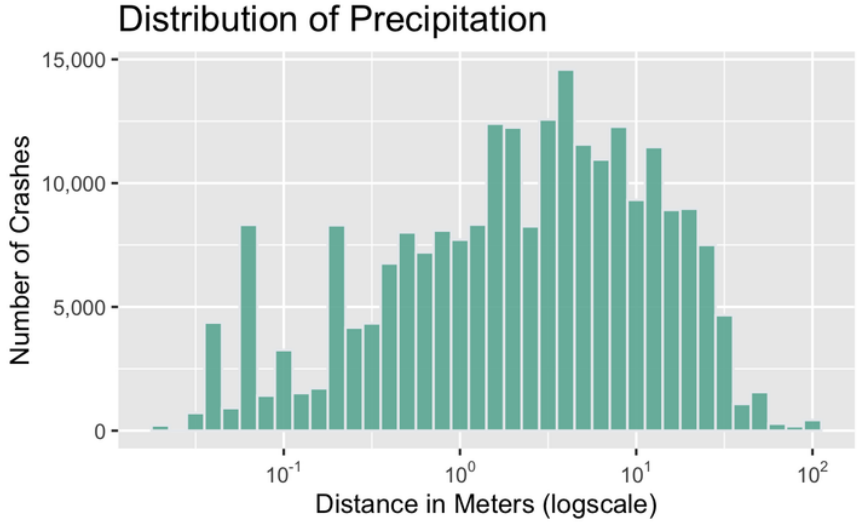
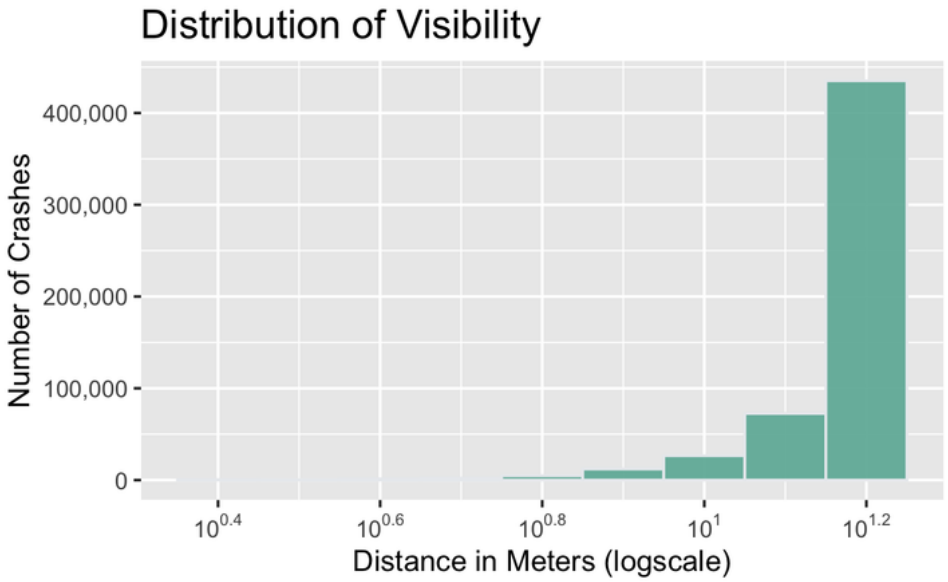
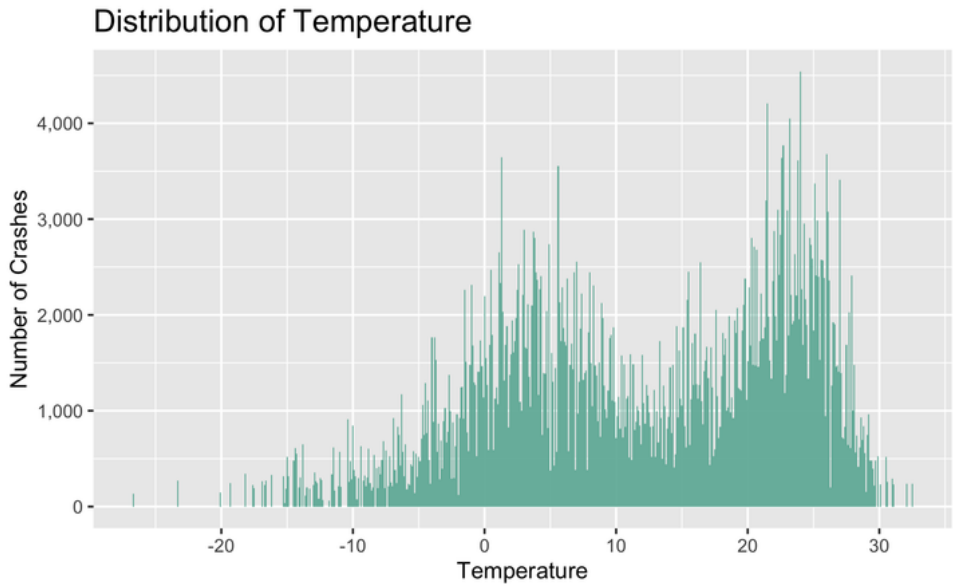






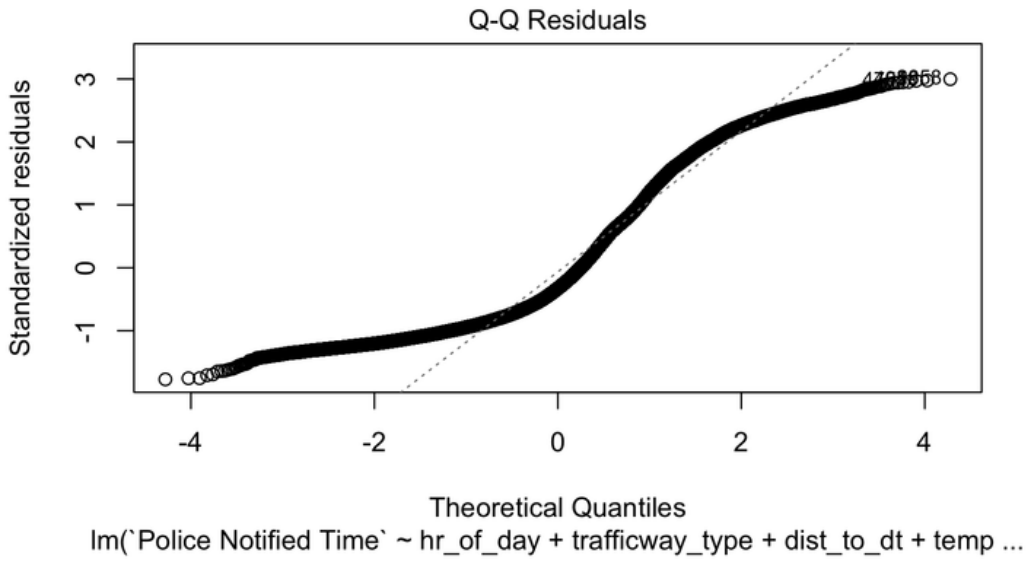


MODEL 1: TIME TO NOTIFY POLICE

Question: How long, in minutes, does it take for the police to be notified upon accident?

Method: Estimate Time to Notify Police

- Time Taken: Continuous (Minutes)
- Method: Linear Regression



Results

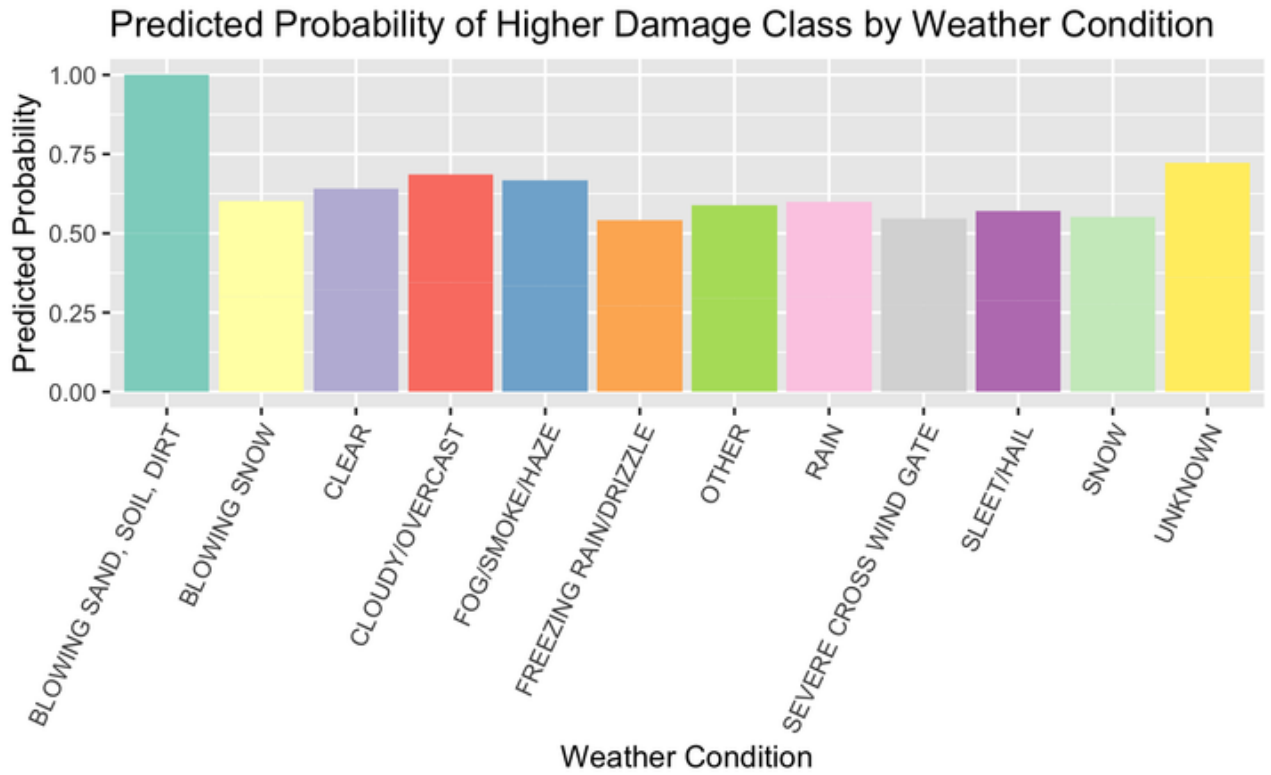
- Time factors had minimal influence in predicting delays; traffic ways was slightly more relevant
- Additional weather/location variables didn't improve model fit, with a 4.5% R2 score
- This hints that time taken to notify is highly complex, and the relation may be better captured through nonlinear techniques
- The Q-Q plot on the left shows significant tail-behavior and indicates possible non-linearity in the data.

MODEL 2: COST IMPACT CLASSIFICATION

Question: Can we identify high-impact accidents based on crash characteristics?

Method: Cost Impact Classification

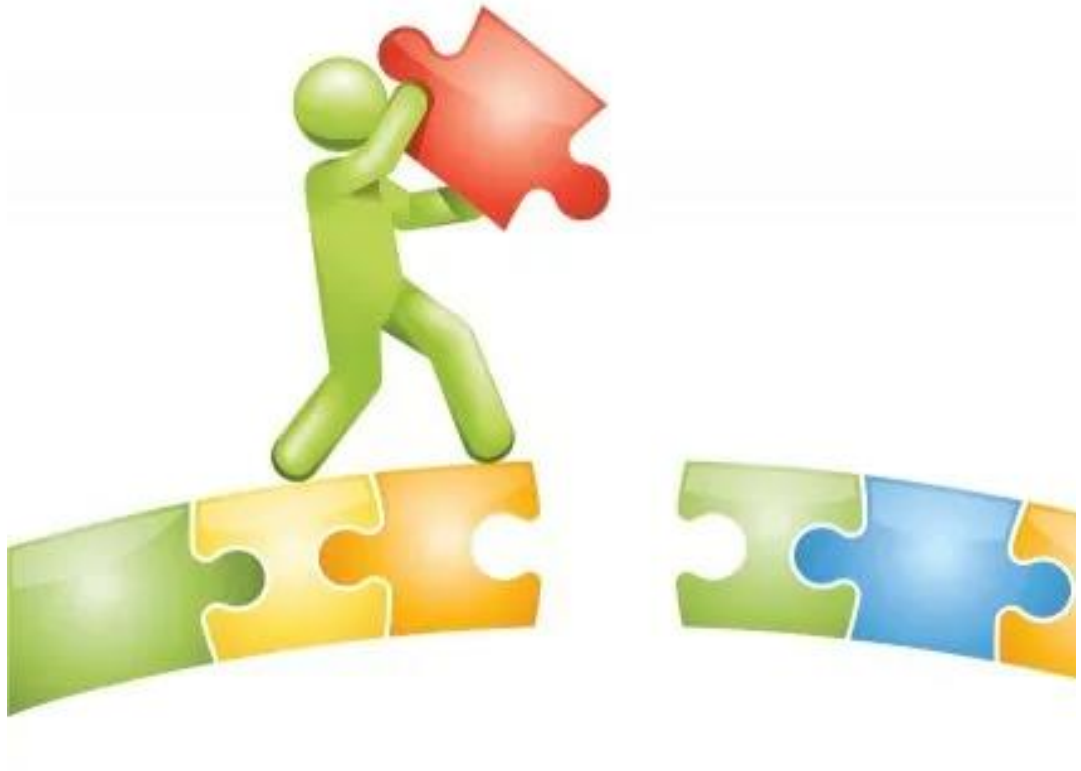
- Damage Size: < $1.5K or > $1.5K
- Method: Logistic Regression



Results

- Even Distribution in Prediction Probability
- Stability Post-Outlier Exclusion
- Mixed Levels of Multicollinearity
- Moderate Accuracy in Severe Accident Prediction (True Positives)

LIMITATIONS AND FUTURE WORK



Limitations

- Challenge: Removed missing values because no information on missing
- Risk: Added external data that may misrepresent the dataset

Potential Improvement

- Address Missing Values: Identify reasons for missing data and perform imputation
- Enhance Dataset: Include additional variables for a comprehensive view
  - Driver-related Variables: Age, gender, years of driving, drinking alcohol
  - Behavioral Variables: Speeding, distracted driving (phone use, etc.), seatbelt usage
- Introduce new models: Decision Trees, Random Forest

THANK YOU