

EXPLORER TRANSPORTATION DATA SCIENCE PROJECT (TDSP)

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INTRODUCTION

TRAFFIC SAFETY REMAINS A CRITICAL ISSUE IN NEW YORK CITY, WHERE THOUSANDS OF VEHICLE COLLISIONS OCCUR EACH YEAR. THIS STUDY ANALYZES CRASH TRENDS, CONTRIBUTING FACTORS, AND BOROUGH-SPECIFIC RISKS USING REAL-WORLD TRAFFIC DATA. BY IDENTIFYING PEAK CRASH TIMES, BEHAVIORAL RISK FACTORS, AND BOROUGH VARIATIONS, WE AIM TO PROVIDE DATA-DRIVEN INSIGHTS FOR URBAN PLANNERS, LAW ENFORCEMENT, AND POLICYMAKERS.

OBJECTIVE

This study aims to:

- Identify peak crash times and high-risk zones.
- Analyze key behavioral factors contributing to crashes.
- Examine the relationship between weather conditions and crash severity.
- Explore the link between traffic volume and incident rates.

METHODOLOGY

- DATA CLEANING & PREPROCESSING
- TIME-SERIES & CORRELATION ANALYSIS
- GEOSPATIAL CRASH CLUSTERING
- STATISTICAL COMPARISONS ACROSS BOROUGH

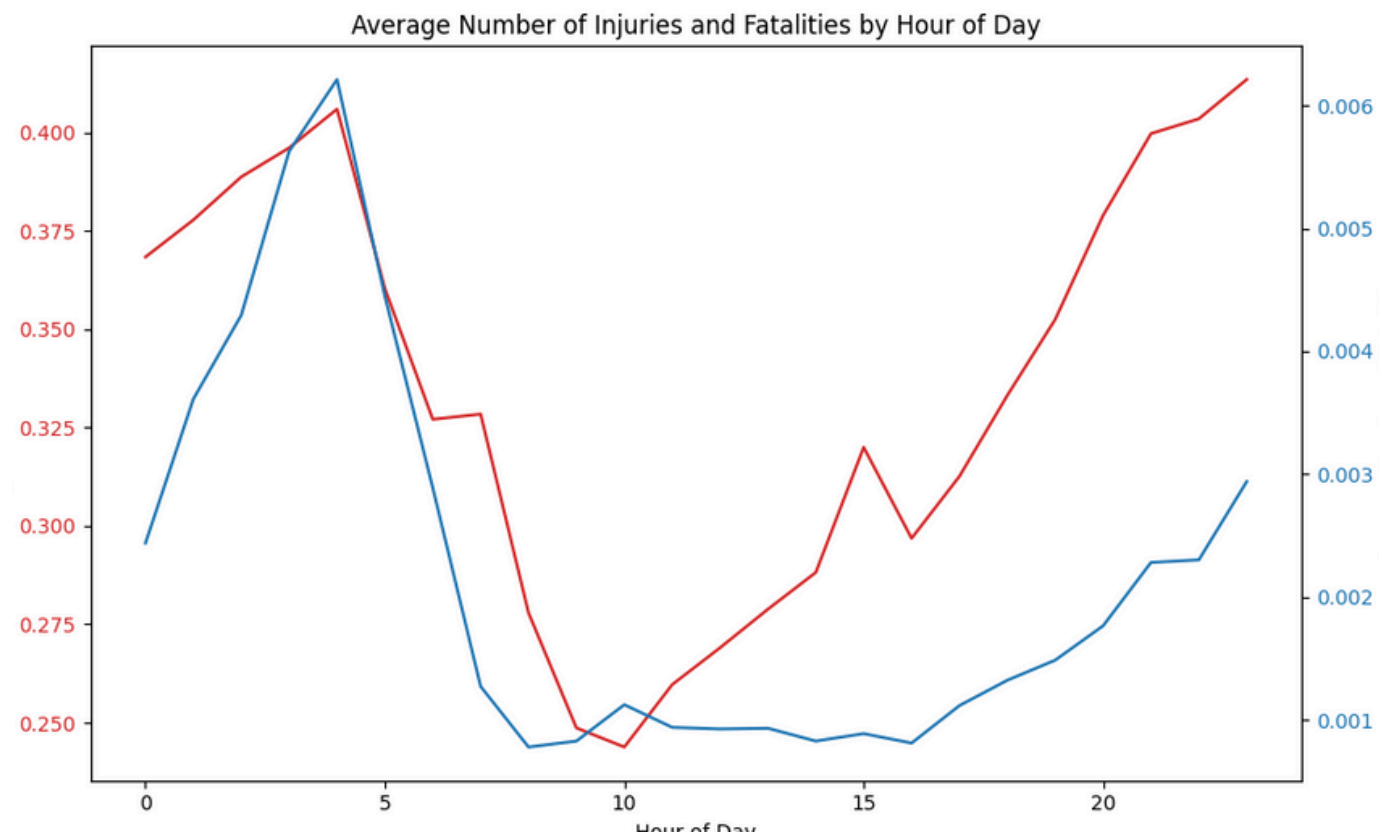
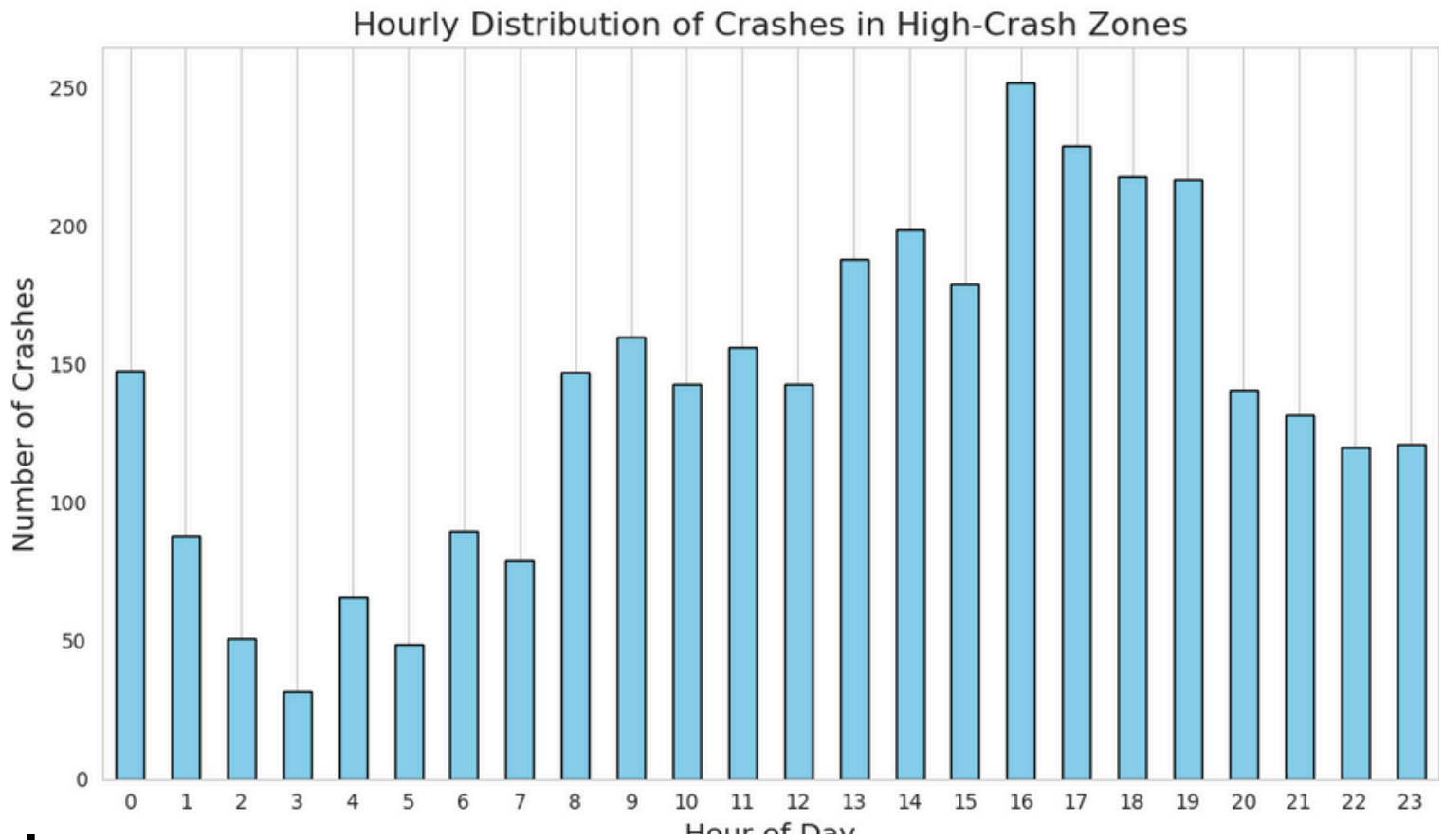
TOOLS USED

PYTHON, PANDAS, MATPLOTLIB, SEABORN, FOLIUM

ANALYSIS & FINDINGS

🚗 Research Question 1: Peak Times for Traffic Incidents

FINDING: CRASHES PEAK BETWEEN 3 PM - 6 PM, ALIGNING WITH RUSH HOUR TRAFFIC. A SECONDARY PEAK OCCURS AT MIDNIGHT, LIKELY DUE TO NIGHTLIFE ACTIVITY AND IMPAIRED DRIVING.

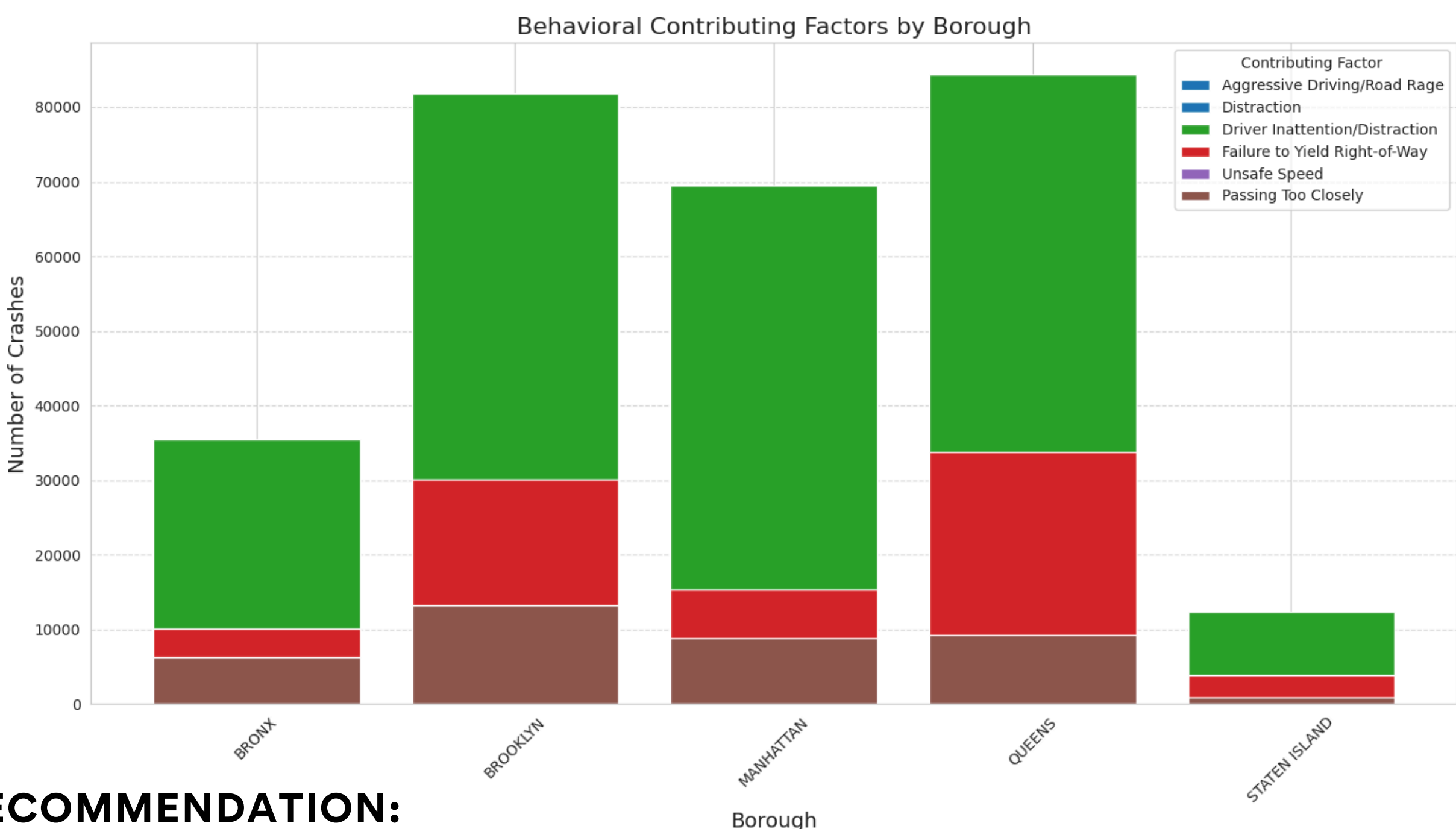


RECOMMENDATION:

- IMPLEMENT REAL-TIME TRAFFIC MONITORING IN HIGH-RISK AREAS DURING PEAK HOURS.
- INCREASE DWI CHECKPOINTS NEAR NIGHTLIFE DISTRICTS.
- IMPROVE PUBLIC TRANSIT OPTIONS TO REDUCE LATE-NIGHT ROAD CONGESTION.

🚦 Research Question 2: Behavioral Contributing Factors

FINDING: DRIVER INATTENTION AND FAILURE TO YIELD ARE THE MOST COMMON BEHAVIORAL FACTORS CONTRIBUTING TO CRASHES.

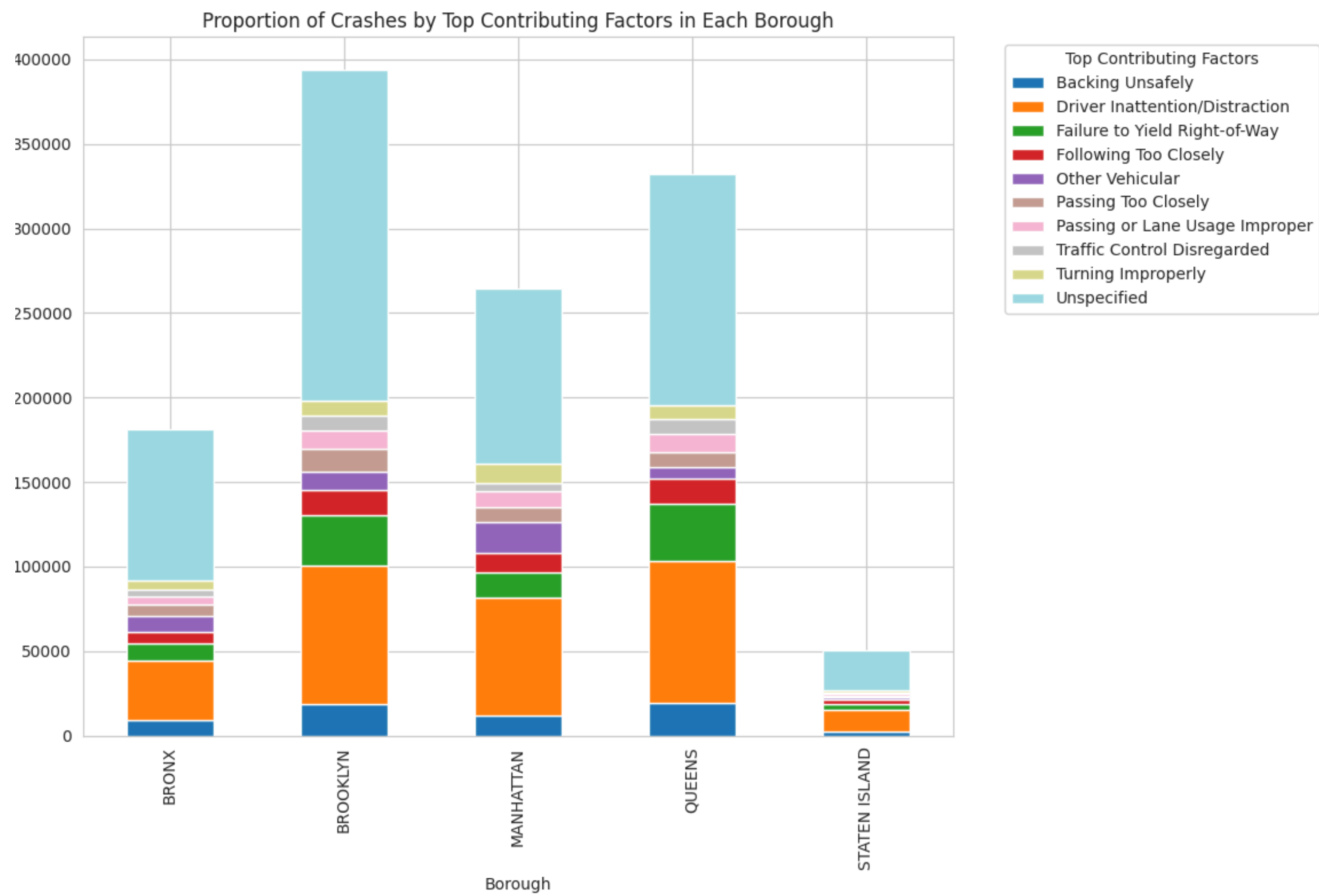


RECOMMENDATION:

- LAUNCH PUBLIC AWARENESS CAMPAIGNS ON DISTRACTED DRIVING.
- ENFORCE STRICTER PENALTIES FOR FAILURE TO YIELD.
- INSTALL SPEED CAMERAS & SIGNAGE IN HIGH-RISK BOROUGH.

📍 RESEARCH QUESTION 3: BOROUGH-SPECIFIC CRASH FACTORS

FINDING: BROOKLYN AND QUEENS HAVE THE HIGHEST NUMBER OF CRASHES LINKED TO FAILURE TO YIELD & DRIVER DISTRACTION. THE BRONX SEES MORE SPEED-RELATED CRASHES.



RECOMMENDATION:

- QUEENS/BROOKLYN → INCREASE CROSSWALK VISIBILITY & RIGHT-OF-WAY ENFORCEMENT.
- BRONX → EXPAND SPEED LIMIT ENFORCEMENT & RADAR CAMERAS.
- CITYWIDE → INTEGRATE AI-DRIVEN PREDICTIVE MODELS FOR PROACTIVE CRASH PREVENTION.

CONCLUSION & NEXT STEPS

THIS ANALYSIS HIGHLIGHTS PEAK CRASH TIMES, KEY BEHAVIORAL FACTORS, AND BOROUGH-SPECIFIC RISKS. FINDINGS SUGGEST TARGETED SAFETY INTERVENTIONS, STRICTER ENFORCEMENT DURING PEAK HOURS, AND INFRASTRUCTURE IMPROVEMENTS IN HIGH-RISK AREAS. FUTURE RESEARCH SHOULD INTEGRATE REAL-TIME TRAFFIC AND WEATHER DATA FOR PREDICTIVE MODELING TO ENHANCE URBAN MOBILITY AND SAFETY.