A Study of Motor Vehicle Collisions: Hourly and Borough-Wise Variation in Crash Frequencies and Severities

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Crash Dynamics by Time of Day

This section analyzes accident frequencies during rush and non-rush hours across boroughs to identify peak accident times. This analysis reveals that traffic crashes peak during rush hours, with Brooklyn and Queens having the highest counts. Staten Island consistently records the fewest crashes across all periods.
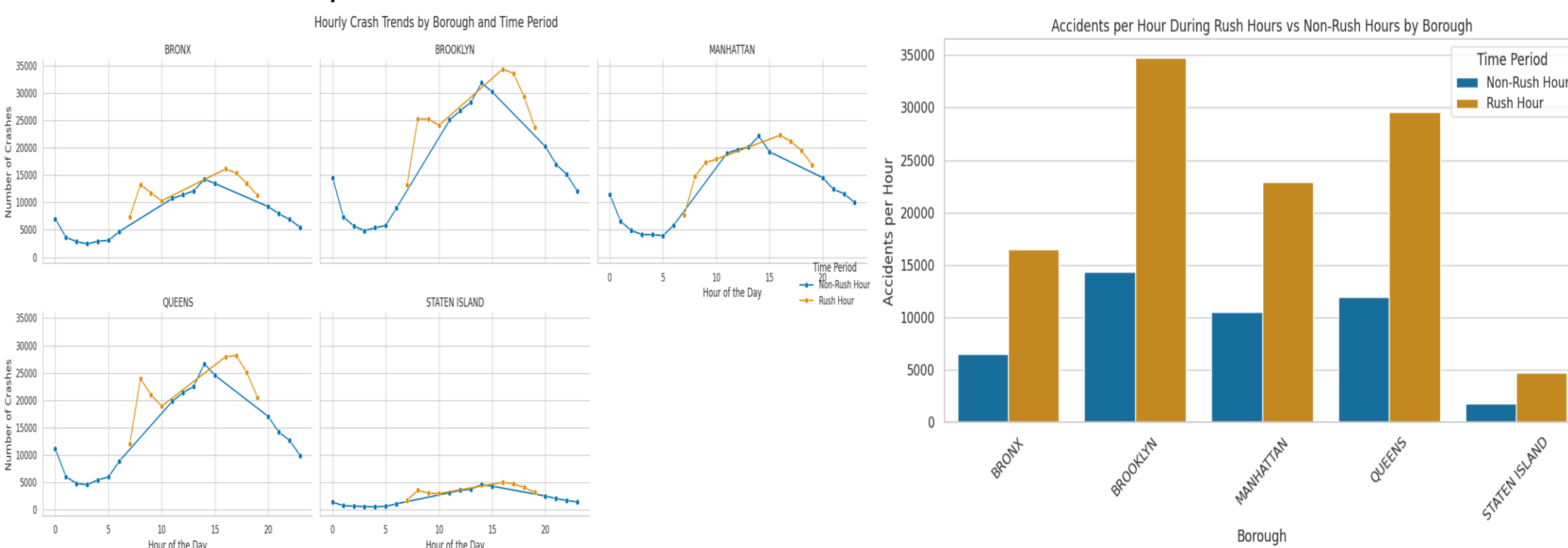

Figure 1. shows hourly rash trends using a line plot and a bar plot comparing accidents per hour during rush and non-rush hour

Exploring Crash Severity Across Boroughs

This section highlights how crash severity (fatal vs. non-fatal) varies across boroughs and time periods. The bar plot shows the distribution of crash severity, while the radar chart compares crash frequencies across boroughs during rush and non-rush hours. These visualizations help identify areas with higher severity, guiding targeted safety interventions.
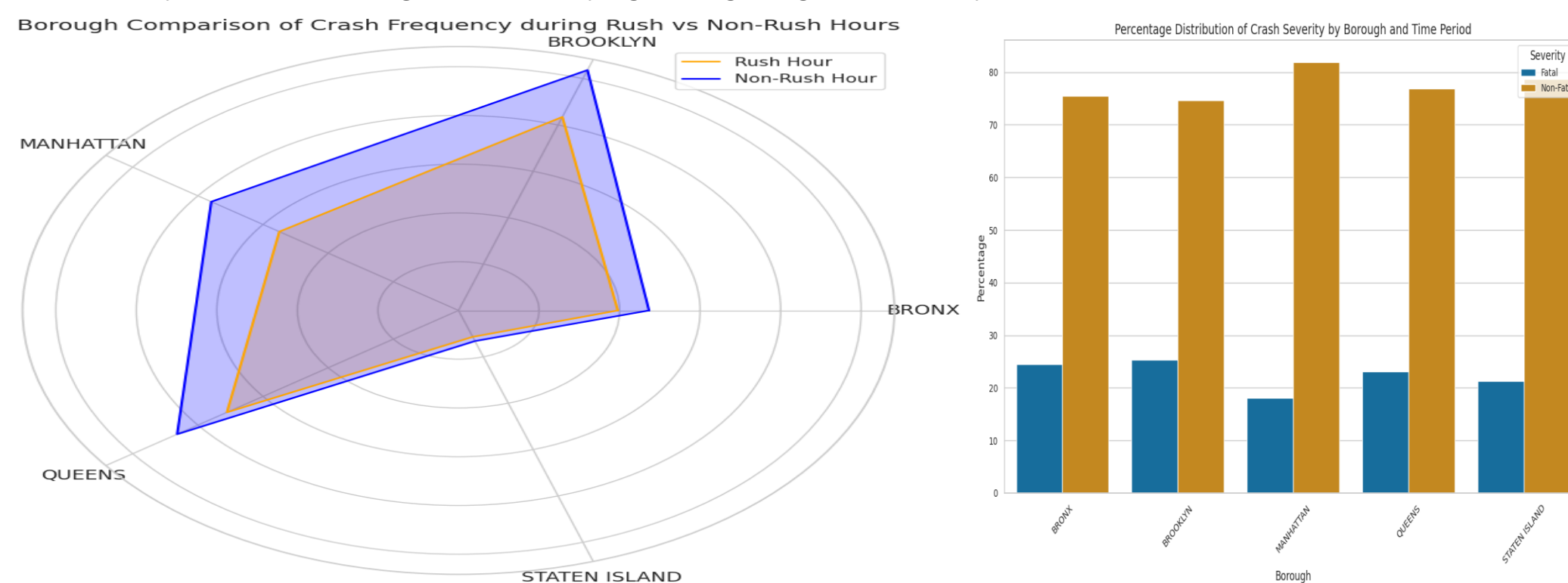

Figure 2.shows the radar chart compares crash frequencies across boroughs during rush and non-rush hours while the bar plot shows crash severity distribution

Statistical Understanding: Crash Patterns

Chi-Square testing reveals statistically significant differences in crash frequencies across boroughs and time periods. The heatmaps compare observed and expected frequencies, helping identify patterns for targeted safety interventions.
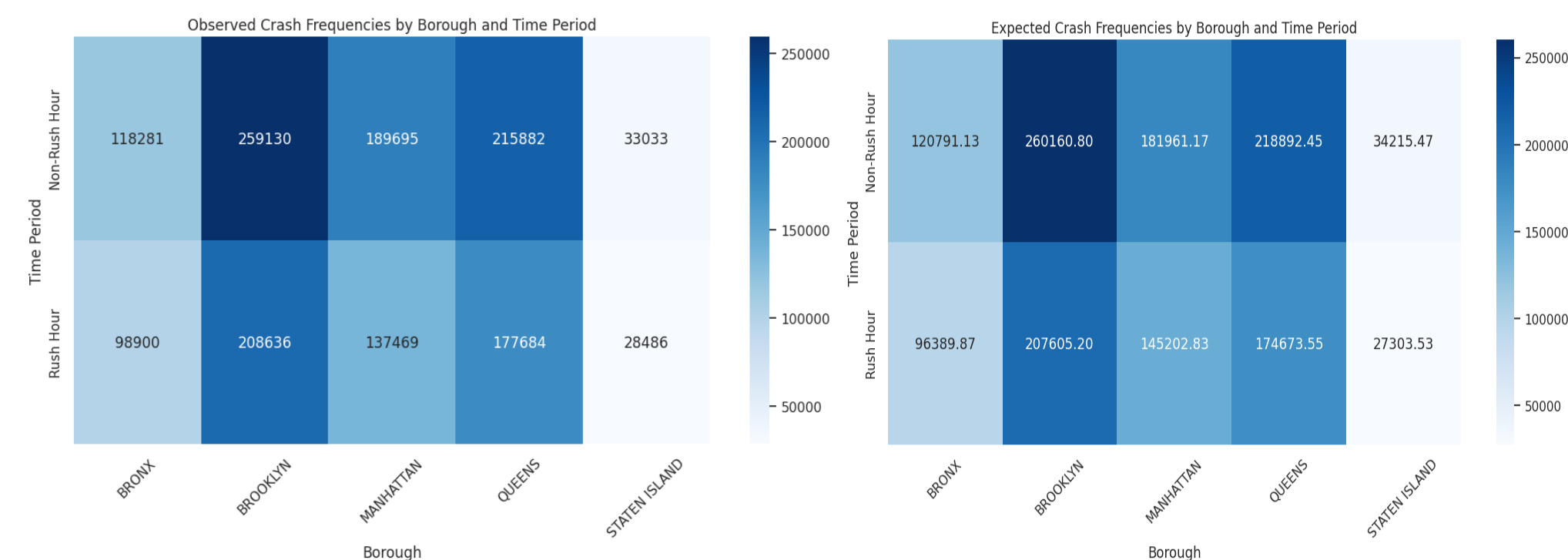

Figure 3. Heatmaps showing observed vs. expected crash frequencies

Conclusion

This analysis uncovers critical patterns in accident frequency and severity across boroughs and time periods, with statistical testing highlighting significant differences. Based on these findings, it is recommended to prioritize safety measures during peak hours and in high-severity areas identified through the analysis. Targeted interventions at these times and locations can effectively reduce accidents and improve overall road safety.

References

1. U.S. Department of Transportation Federal Highway Administration
2. National Student Data Corps.
3. Northeast Big Data Innovation Hub.