Manhattan in Motion: Visualizing Delivery Vehicle Crash Density for Safer Urban Mobility

Marylyn Carrillo[1], Sevin Mohammadi[2], Andrew Smyth[2]
Department of Civil and Environmental Engineering, UCLA, Los Angeles, CA
Department of Civil Engineering and Engineering Mechanics, Columbia University, New York, NY

Introduction: Manhattan, New York, is a bustling epicenter of commerce characterized by high delivery truck activity, posing significant challenges concerning traffic safety and congestion. To address these concerns, this study aims to shed light on traffic volume and delivery truck crash density in Manhattan using advanced mapping techniques. By exploring the correlation between traffic volume and crash densities and loading zones, this study seeks to identify critical areas prone to accidents, thus laying the groundwork for implementing effective safety measures and traffic management strategies.

Methods: The study employed a multi-step approach to analyze traffic and crash data in Manhattan. Firstly, relevant datasets were acquired from authoritative sources and filtered to include only records involving delivery vehicles during operational hours. Secondly, data integration and visualization were performed in ArcGIS Pro, where each dataset was imported and layered as point coordinates for comprehensive mapping. To create a crash density heat map, crash densities were normalized by dividing collision counts by the nearest traffic volume count. This normalized data was then utilized to generate a visually informative heat map highlighting areas with higher crash densities. Lastly, high crash density areas were assessed for potential contribution of delivery vehicle loading zones to these critical zones.

Results: The figures enables a deeper understanding of the spatial distribution and potential impact of delivery vehicle activities on crash density in Manhattan.

Conclusions: While definitive evidence regarding the direct impact of Fresh Direct loading zones on collision rates remains elusive due to limited information, it is worth noting that all truck loading zones in the southern region of Manhattan align with areas of heightened crash density. This spatial correlation raises the possibility of loading zones playing a role in the observed collision patterns, underscoring the importance of conducting further investigations to comprehend their potential contribution to road safety challenges.

Figure 1: Loading Zones

Figure 2: Delivery Vehicle Collisions

Figure 3: Traffic Volume Count

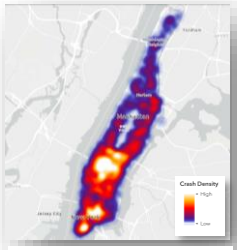

Figure 4: Crash Density

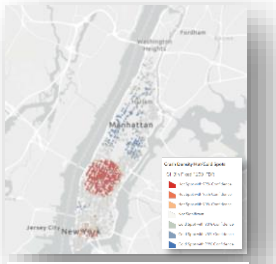

Figure 5: Collision Density Hot and Cold Spots

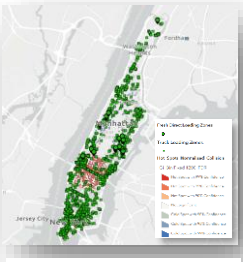

Figure 6: Integrated Map of All Delivery Vehicle Loading Zones and Hot/Cold Spots

References:

1. McDonald, N. et al. JUPD. 2021;147:2.
2. Eisner, A.B. et al. IACS. 2005;12:39.
3. Amer, A. et al. TRPA: 2017;102:51-67.

Acknowledgements: Thank you to the SURE program, Shavonna Hinton, and Tiffany Moore for granting me the opportunity to do research this summer at Columbia University, Dr. Andrew Smyth for allowing me to work under his supervision, Sevin Mohammadi for her guidance, and Thornton Tomasetti for selecting me as a fellow. I acknowledge that this research was conducted at Columbia University on the traditional, ancestral, and unceded territory of the Lenape peoples.