

Unearthing NYC Motor-Vehicle Risk: Leading Causes of Crashes in Midtown Manhattan

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Blue values: RGB 2, 33, 105 | CMYK 100, 85, 5, 22

Abstract

Since 2014, the NYC OpenData has documented over two million Motor Vehicle collision and crashes in the New York metropolitan area. With congestion growing around key transportation hubs throughout the city, it's to no surprise that being a pedestrian or operator of a motor vehicle presents a safety threat. Initial analysis of motor vehicle accidents in NYC suggested that Midtown Manhattan had the highest frequency of accidents, which prompted the exploration of "hotspot" accident sites in this specific area. This was done through filtering data by geographical coordinates, which revealed that major interchanges, big transportation hubs, and the nature of 90 degree angle intersections can explain the density of crashes in Midtown.

Results

Upon analysis, "hotspot" accident sites in Midtown were indicated by light green areas, which included the exit and entrance onto the Queensboro bridge, Lincoln Tunnel Bus Ramps, FDR Drive and 35th St., and the 42nd St. Port Authority Bus Terminal. The results show that these areas of Midtown possess similarities, as almost all of them are exists or on-ramps on to heavily used traffic-ways in Midtown. Additionally, top contributing factors to motor-vehicle accidents in Midtown are significantly different than those of the greater NYC area, with driver inattention, failure to yield right-of-way, turning improperly, and following too closely as top contributing factors. The contributing factors to accidents in Midtown corresponds to factors and situations than can frequently occur in cramped traffic-ways, such as the massive interchanges and popular exits identified in the Midtown heat map. Lastly, it can be seen that the 2pm,-5pm hours had the greatest number of crashes, indicating that rush hour could have an effect on motor-vehicle safety.

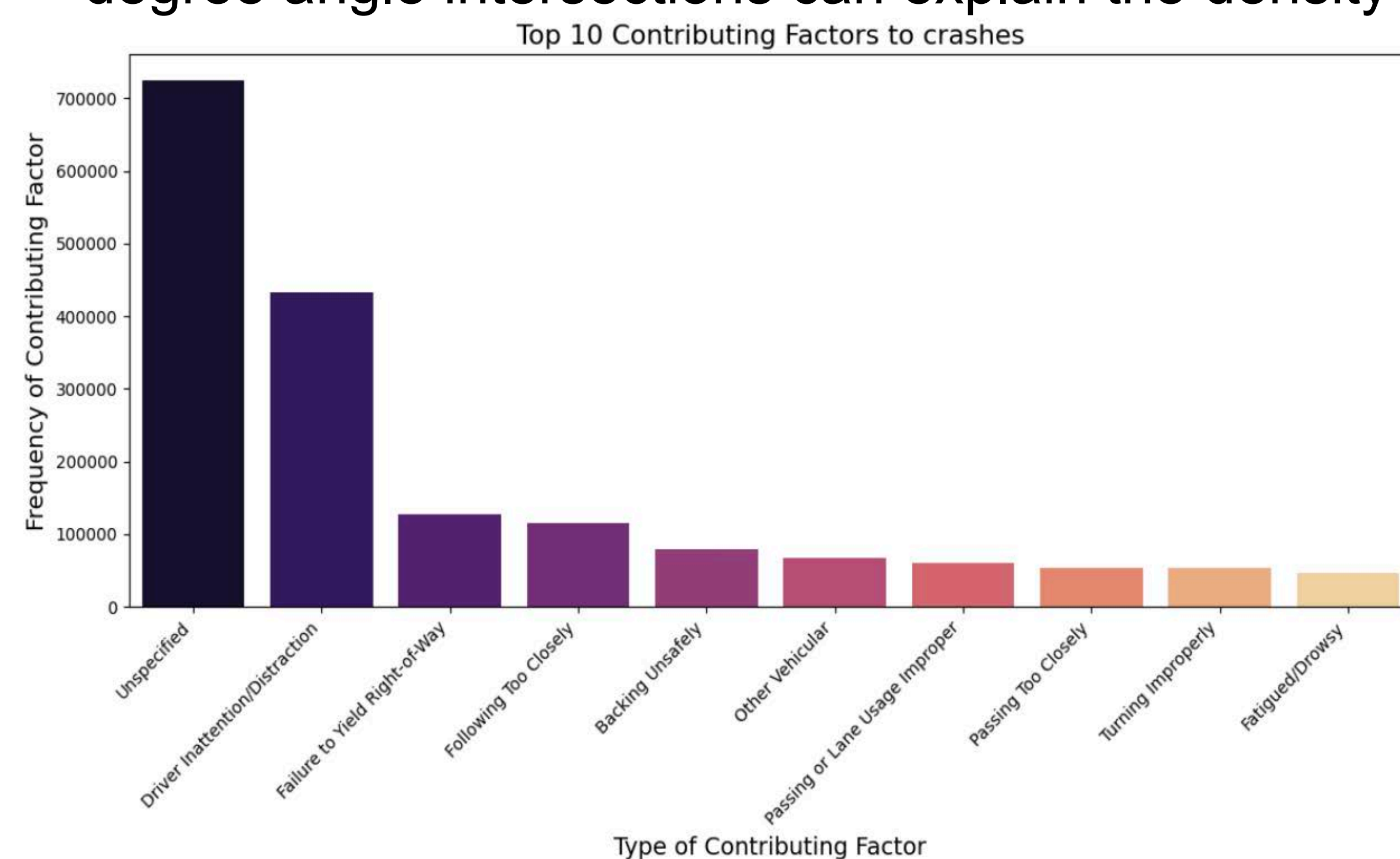


Figure 1. Top 10 Contributing Factors to Motor-vehicle crashes in New York City



Figure 2. Heatmap of the frequency of Motor-Vehicle Accidents in the greater New York City Area

Background and Methodology

NYC OpenData Motor-Vehicle Collisions-Crashes database, initially created in April of 2014 and is updated daily, was downloaded and analyzed through Google Colab, an interface that uses Python to create data visualizations. Upon visualizing a heatmap, Midtown Manhattan was the area in NYC with the most crashes, so the longitude and latitude coordinates were identified for this area. The coordinates were then used to filter the data set and create a heatmap of Midtown using the shapely.geometry package. A GeoDataFrame successfully isolated Midtown data. Lastly, the Midtown data was presented by showing the average number of crashes at different times during the day and top contributing factors.

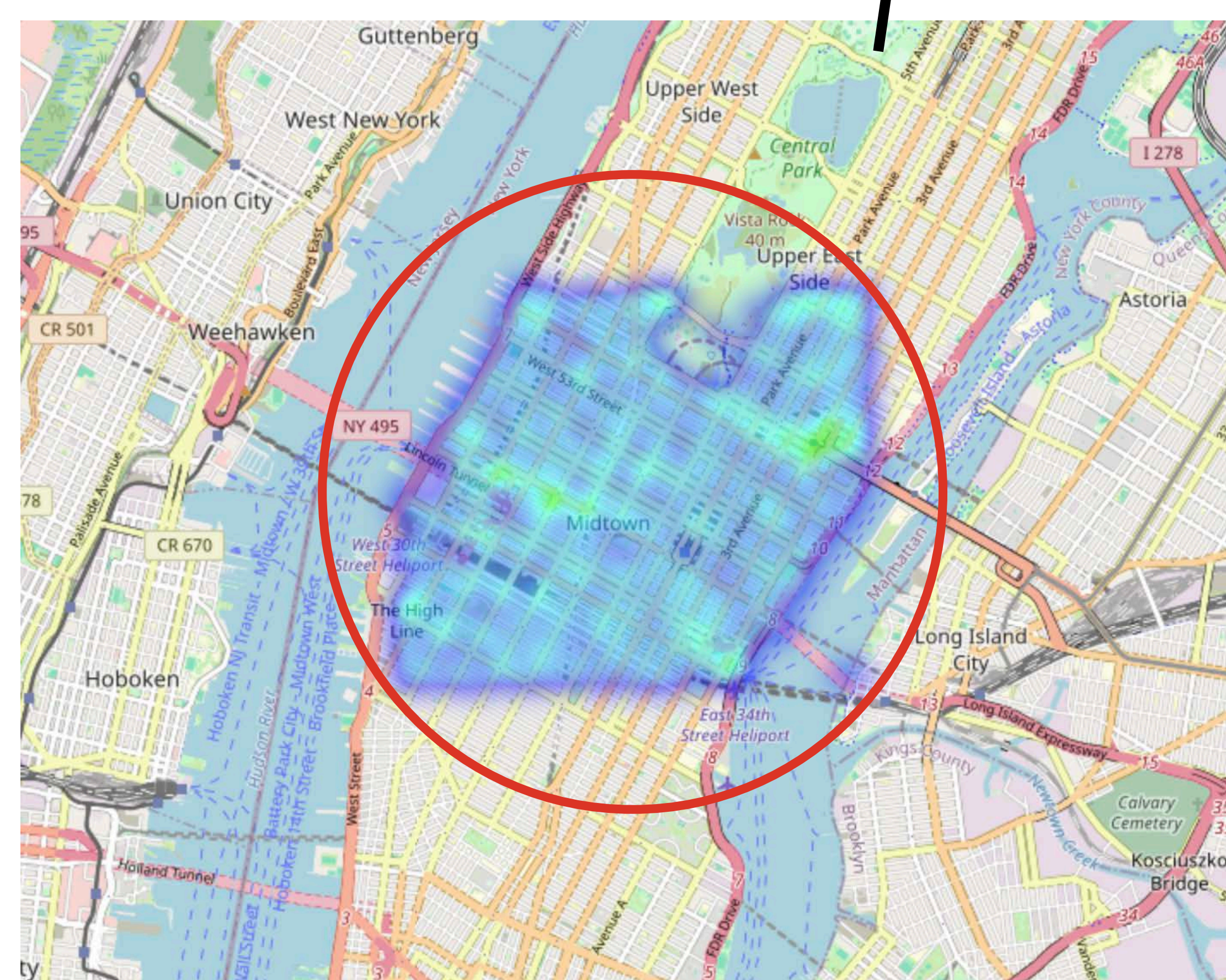


Figure 3. Heatmap of Midtown Manhattan Motor-Vehcile Accidents. Green indicates a higher density of crashes.

Figure 5. Average Number of Crashes per Hour of Day in Midtown Manhattan

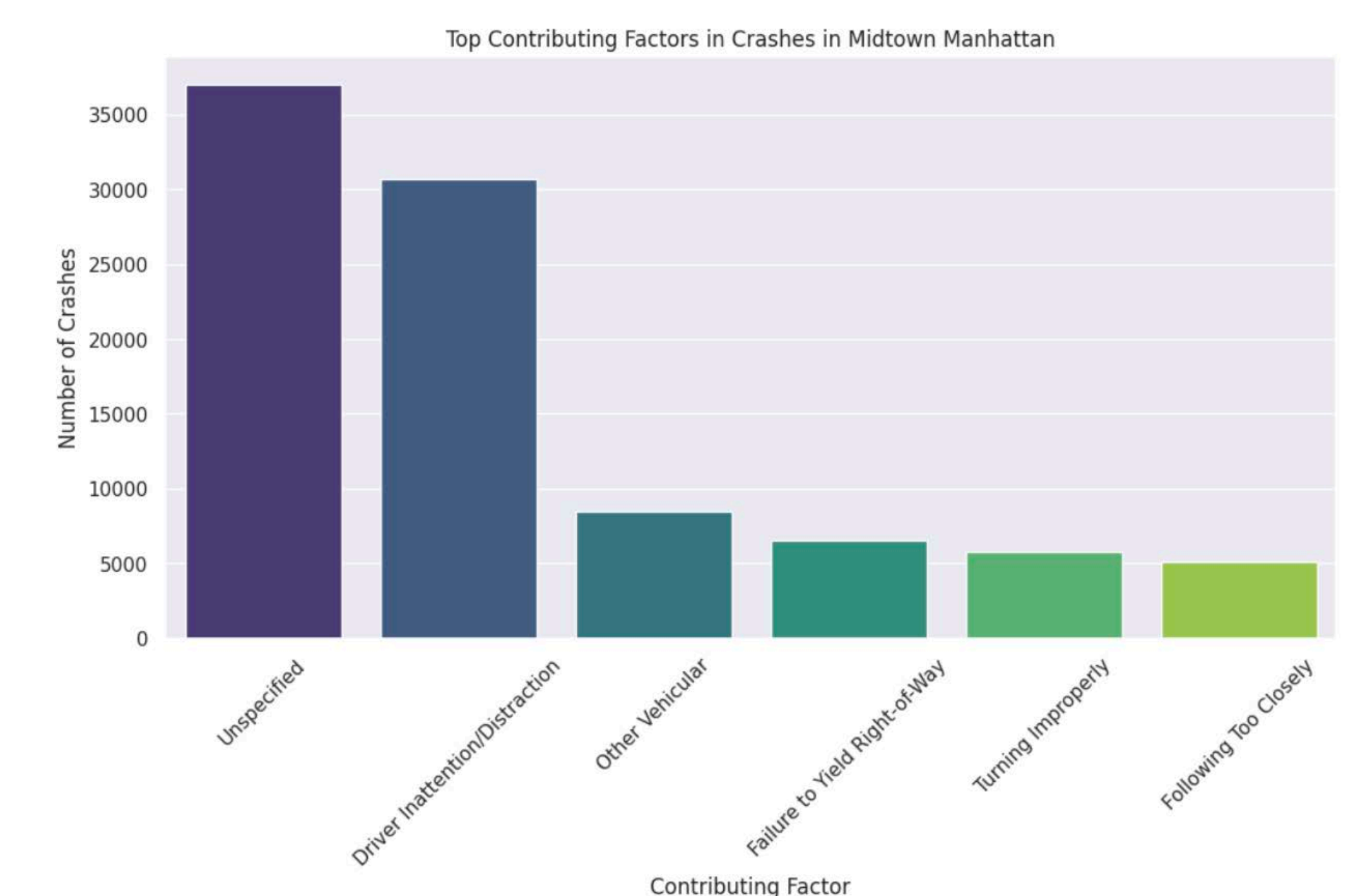
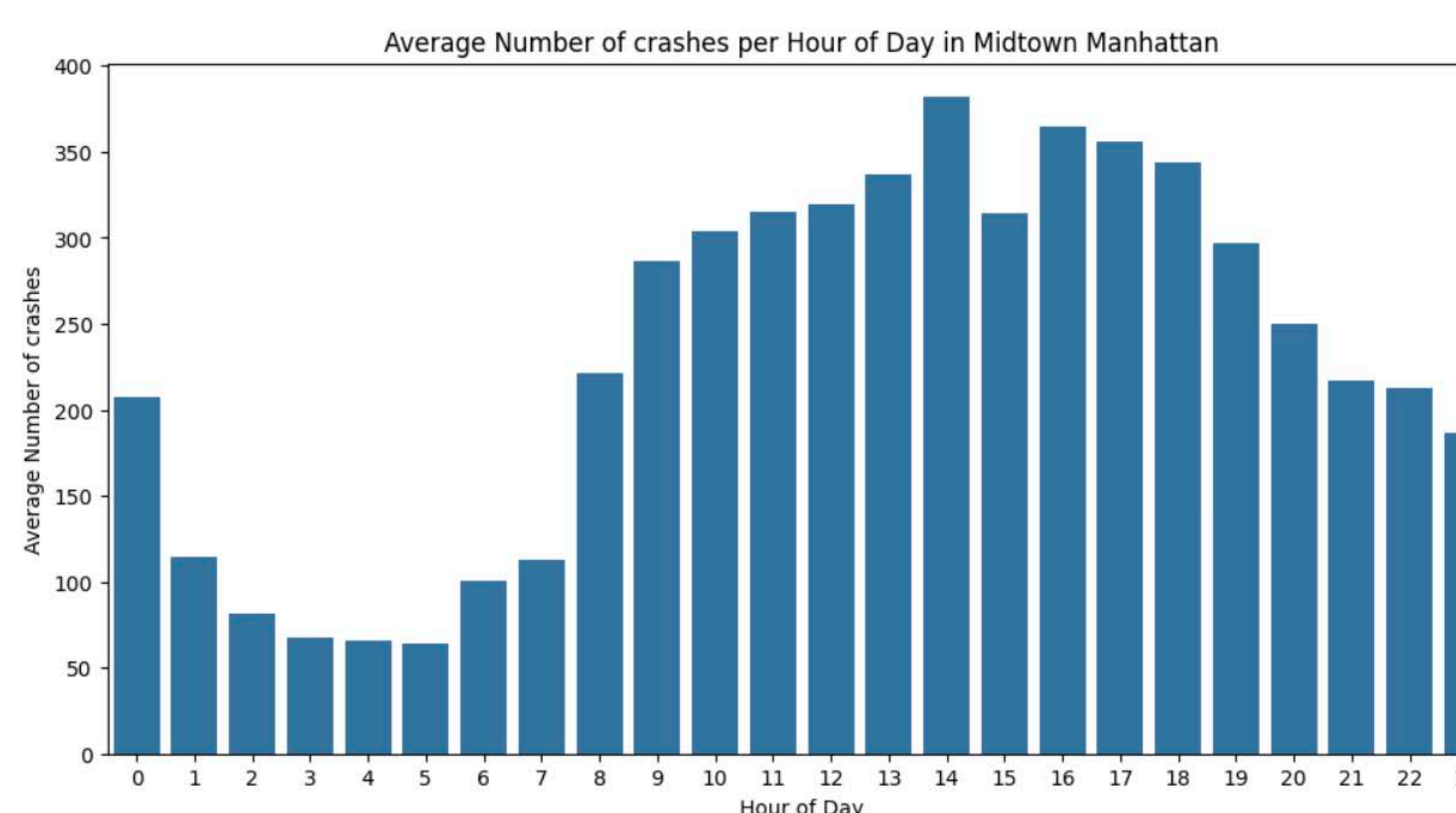


Figure 6. Top 6 Contributing Factors to Motor-vehicle crashes in Midtown Manhattan

Recommendation to Reduce Motor-vehicle Accidents in Midtown Manhattan

It is critical to understand the contributing factors of heightened accidents in Midtown: driver miscalculation during flawed on and off passageways to larger traffic-ways, seen in the data. Therefore, it is possible that the Department of Transportation of New York City can better regulate the merging of both on and off ramps through the use of tiered entry to larger passageways that connect Manhattan to other bourougs. Additionally, to combat rush hour, the use of stoplights on merging roads may be successful in directing the flow of traffic. Lastly, the DoT can put up signs along these areas with higher accident rates that warn drivers to keep a minimum of a regulated distance (100ft) from the car in front of them to mitigate driver-related contributing factors.

Acknowledgments (Arial, 38 points, bold)

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