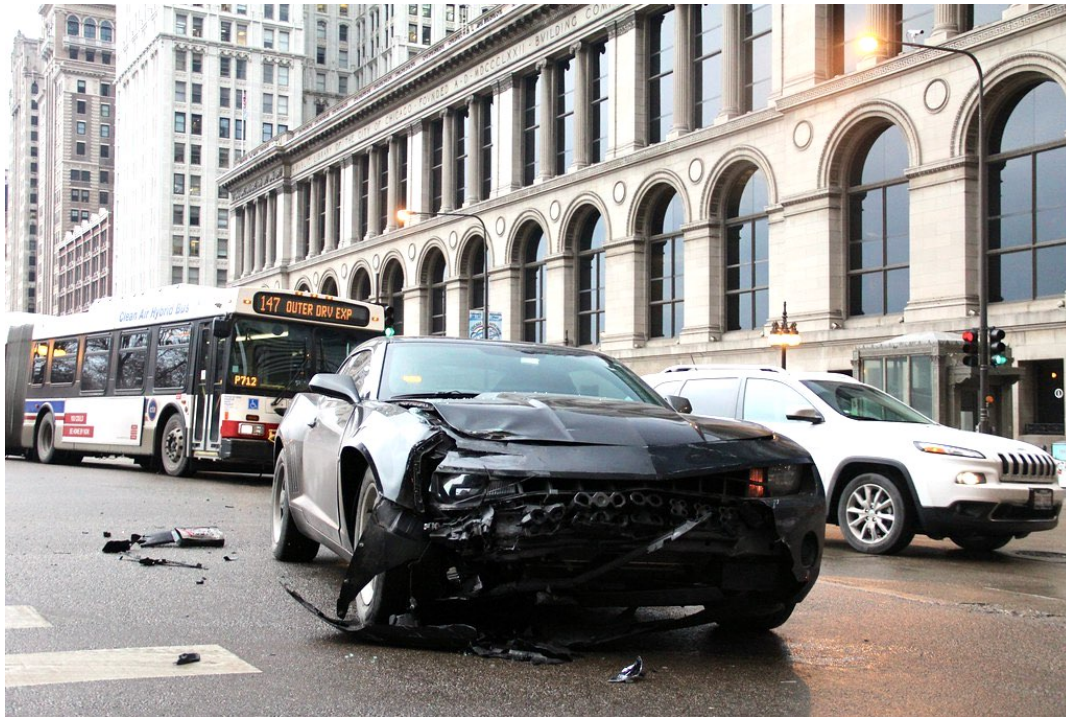


# Understanding Car Crash Trends and Factors in New York: A Data Analysis



## Introduction

In the last decade, New York City witnessed 2,018,890 car accidents. 2,930 of these unfortunate incidents led to fatalities. In this data analysis report, we will analyze a DataFrame called "Motor Vehicle Collisions - Crashes" obtained from [New York City OpenData](#).

This dataset contains details about accident timing, locations, contributing factors, and fatalities from 2012-2022. Our aim is to uncover patterns that could inform traffic system improvements and enhance safety.

The central questions we seek to address are:

1. "What temporal trends and patterns can we observe, and how can we discern factors that significantly influence severity?"
2. "What measures can be undertaken to enhance the safety of pedestrians and motorists in New York, and by extension, in similar areas?"

## Exploratory Data Analysis

### Temporal Trends

In this section, we look for underlying patterns in accident occurrences over the course of a day. Our initial hypothesis was that a significant number of accidents would take place during afternoon rush hour.

A time when commuters may be fatigued from a full day's work, potentially stressed, and hence more prone to accidents. Our findings corroborate this hypothesis. The data supports that the majority of accidents do indeed occur during this late afternoon period.

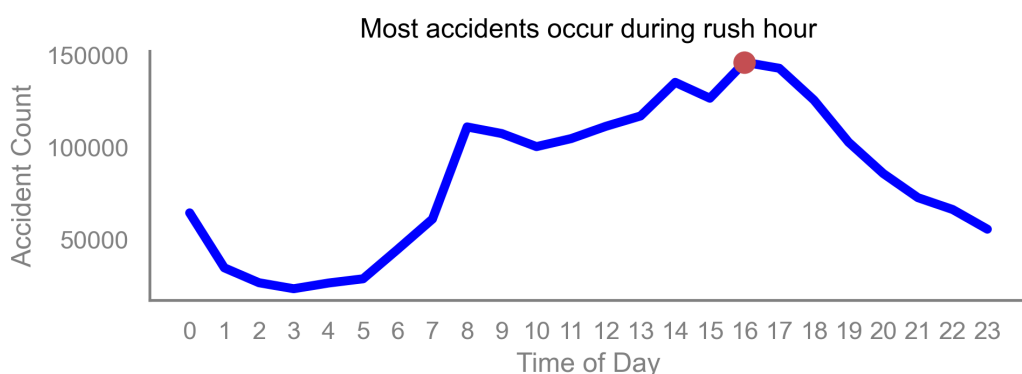


Figure 1: Time of day with highest accidents (2012-2022).

Figure 1 displays the temporal distribution of accidents over the decade from 2012 to 2022, revealing when the most accidents occurred during the day. Source: [Appendix 1](#)

### Seasonal Patterns

At what time of the year do most accidents happen? When we delve into the influence of seasons on accident occurrences, a clear pattern emerges.

The majority of car accidents occur in summer and fall. This can likely be attributed to increased outdoor activities, including biking and leisurely pursuits.



Figure 2: Accidents by month (2012-2022).

Figure 2 displays the temporal distribution of accidents over the decade from 2012 to 2022, revealing when the most accidents occurred during the year. Source: [Appendix 1](#)

The higher incidence in the fall may be attributed to factors such as falling leaves and adverse weather conditions, rendering the environment more hazardous for pedestrians and cyclists.

## Weekly Trends

Is there a specific day of the week when accidents tend to occur at a higher rate? Not surprisingly, the outcome revealed Friday as the standout day with the highest proportion of accidents.

This heightened occurrence during the week's end may be attributed to factors such as driver fatigue from a week of work or reduced focus on the road due to a mental switch toward the weekend.

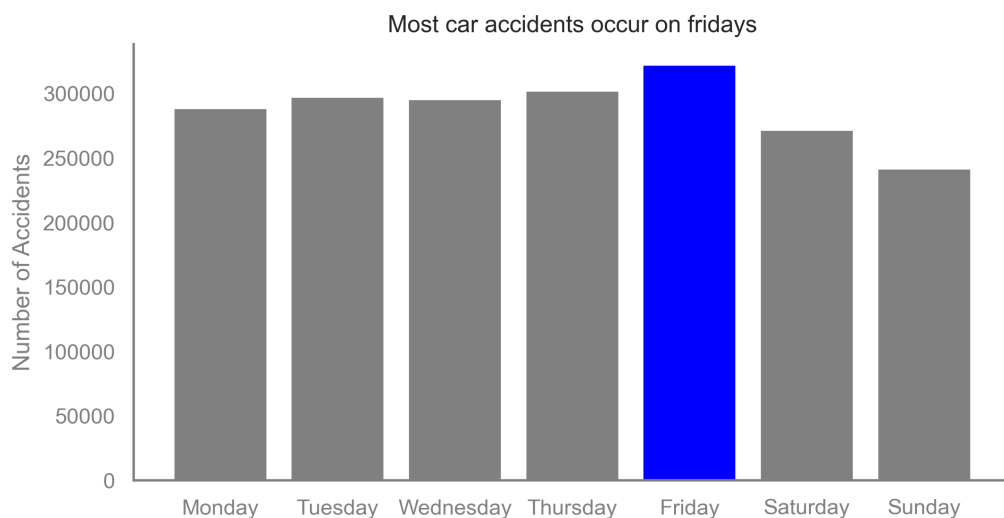


Figure 3: Accidents by weekday (2012-2022).  
Figure 3 shows that most accidents happen during fridays. Source: [Appendix 1](#)

## Contributing factors

Regrettably, the dataset exhibits a substantial number of missing values concerning contributing factors for accidents. Nevertheless, a careful analysis allows us to derive insights.

A significant portion of accidents is attributed to driver inattention and distraction. It simplifies our understanding to classify factors like 'Following Too Closely,' 'Turning

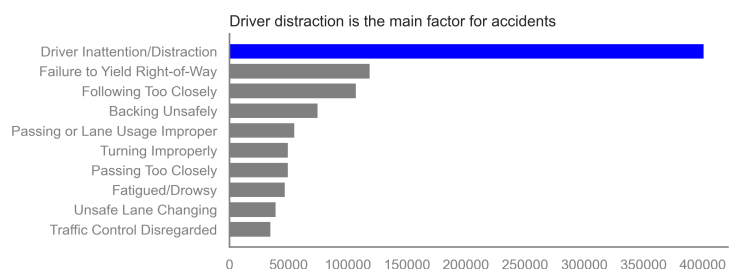


Figure 4: Contributing factors for accidents in New York. Source: [Appendix 1](#)

Improperly,' 'Backing Unsafely,' and 'Unsafe Lane Changing' under the umbrella of driver distraction, assuming that these actions often result from a lapse in driver attention rather than deliberate actions.

While it's tempting to speculate that the prevalent use of mobile phones could be a primary cause of distraction, the available data does not provide explicit evidence to support this claim. Consequently, focusing solely on reducing phone usage as a preventative measure may not be the most effective approach.

## Geospatial Analysis

In an effort to discern patterns and potential factors contributing to accident occurrence, a comprehensive analysis was undertaken to identify streets with the highest incidence of accidents. Such insights can be invaluable for the development of accident prevention strategies. The findings reveal that a select group of five streets consistently report a significantly higher number of accidents compared to others. Chief among them is the renowned Broadway, which stands out as the street with the highest accident rate by a substantial margin.

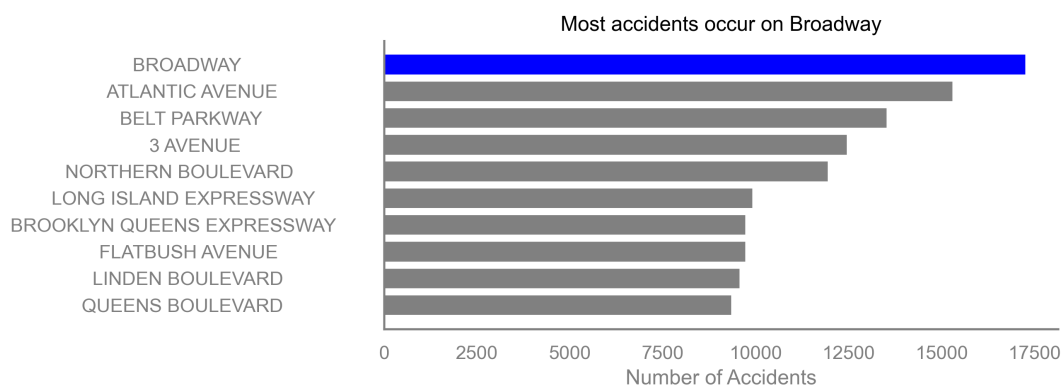


Figure 4: Accidents by streets (2012-2022).  
Figure 4 shows that most accidents happen on Broadway. Source: [Appendix 1](#)

## Conclusion

The analysis reveals a noteworthy trend, with the majority of accidents occurring during the late afternoons of Thursdays and Fridays, particularly during the warmer months of summer and fall. Understanding and addressing this specific pattern provides an opportunity to enhance safety for both pedestrians and motorists.

In the quest for accident prevention and improved road safety, targeted interventions should focus on mitigating the risks associated with these high-incidence periods. The central question revolves around how to effectively minimize accidents during these peak

hours and seasons. This requires a strategic approach that may encompass a range of measures, including enhanced traffic management, public awareness campaigns, and infrastructure enhancements tailored to these specific conditions.

## **Recommendations**

To enhance accident prevention based on this dataset, we must consider alternative strategies. Implementing prominent signage, strategically placed bumpers, and other attention-grabbing measures could redirect drivers' focus and mitigate the risks associated with distracted driving. This multi-faceted approach to road safety can play a vital role in accident prevention and underscores the importance of addressing driver distraction through various means.

The issue of distracted driving is a significant concern for road safety. While it's commonly associated with mobile phone use, it's important to recognize that distraction can arise from various sources. Addressing this issue requires a holistic approach, which may include public awareness campaigns, stricter enforcement of existing laws, and the development of new technologies designed to reduce distractions in vehicles. Additionally, road infrastructure improvements, such as well-designed signage and traffic management systems, can play a crucial role in enhancing safety and preventing accidents. Based on our findings, we recommend enhanced road maintenance during summer months, targeted awareness campaigns for high-accident areas, and safe driving initiatives during peak accident times.

Various strategic interventions can be considered to address the pressing issue of traffic congestion and road safety. Among these, political incentives, such as the implementation of discounted metro tickets during peak hours, have the potential to incentivize individuals to opt for public transportation over personal vehicles. This measure, if carefully designed, could alleviate the overall burden on road networks. Complementing this, the imposition of speed limitations in accident-prone zones can contribute significantly to accident prevention.

These proactive steps not only enhance road safety but also underscore the importance of a comprehensive approach that encompasses infrastructure improvements, policy changes, and public awareness initiatives.

## **Appendix 1**

For those interested in the technical details, I have included code snippets of data cleaning and visualization in the appendix.