**🛑 NYC Traffic Safety Analysis Dashboard**

**📊 Overview**

This project was developed as part of a traffic safety analytics initiative. The goal was to assist the **New York City Police Department (NYPD)** in identifying high-risk areas, times, and causes of traffic collisions to improve public safety through data-driven insights.

**📝 Project Description**

You have just joined the **Analytics Taskforce** of the NYPD to support their **Public Safety Initiative**. Your assignment was to analyse motor vehicle collision data collected in NYC between **January 1, 2021, and April 9, 2023**, with the objective of identifying patterns and trends that can help prevent future accidents.

This project includes:

* Cleaning and preparing raw collision data
* Creating insightful visuals across various dimensions
* Summarizing actionable insights for policy and safety improvements

**📁 Dataset Source**

* **Source**: NYC Open Data Portal - Motor Vehicle Collisions
* **Data range**: January 1, 2021 – April 9, 2023
* **Rows**: ~150,000+ collisions
* **Key columns**:
  + Collision\_ID
  + Date, Time
  + Contributing Factor
  + Location, Borough, Street
  + Injured, Killed
  + Vehicle Type

**🎯 Objectives & Tasks**

**✅ Objective 1: Identify Seasonal Patterns**

**Goal**: Understand how collision frequency changes across months and years.

**Tasks Completed**:

* Counted Collision\_ID by Year-Month.
* Excluded incomplete data for April 2023.
* Used line chart with separate lines for each year.
* Applied formatting for clarity and added insights:
  + **2021**: Peak in October (~2,813 collisions)
  + **2022**: Peak in May (~4,298 collisions)
  + **2023**: Peak in March (~2,172 collisions)

**✅ Objective 2: Visualize Weekly Trends**

**Goal**: Identify time periods (day & hour) with the highest collision risk.

**Tasks Completed**:

* Extracted Weekday and Hour from Date and Time.
* Calculated collision counts by Weekday and Hour.
* Created heatmap using a **white-white-red** color scale:
  + Most dangerous period: **Friday 4 PM – 8 PM**
  + Weekdays (Mon-Fri) see higher volumes compared to weekends
* Insights:
  + Recommend increased patrol during peak hours
  + Improve traffic flow & enforcement in evening time blocks

**✅ Objective 3: Analyze Contributing Factors**

**Goal**: Identify top causes of collisions and their impact severity.

**Tasks Completed**:

* Counted Collision\_ID by Contributing Factor.
* Filtered top 10 causes and sorted by frequency.
* Calculated **% of Dangerous Collisions** (injuries/fatalities involved).
* Visualized with bar charts and data bars.

**Top Contributing Factors**:

| **Factor** | **Total Collisions** | **% Dangerous** |
| --- | --- | --- |
| Failure to Yield Right-of-Way | 6,003 | 62.8% |
| Traffic Control Disregarded | 2,016 | 56.0% |
| Unsafe Speed | 1,650 | 53.6% |
| Following Too Closely | 2,153 | 12.7% |

**Recommendation**:

* Target top 3 causes with policy change, driver education, and traffic law enforcement.

**📍 Location-Based Analysis**

**Total Collisions by Borough**:

* **Brooklyn**: 76,416
* **Queens**: 63,751
* **Bronx**: 41,255

**Recommendations**:

* Allocate more resources and traffic controls to top 3 boroughs contributing to 76.1% of total collisions.

**🚦 Time-Based Risk Insights**

| **Time of Day** | **% of Collisions** |
| --- | --- |
| Evening | 20.72% |
| Night | 24.78% |
| Afternoon | 22.17% |
| Morning | 7.33% |

**Recommendation**:

* Focus interventions in the afternoon and night hours for maximum impact.

**🚗 Vehicle Type Impact**

* **Not Reported**: 717 collisions
* **Motorcycle**: 533 collisions
* **Scooter**: 365 collisions
* **Emergency Services**: 304 collisions

**Recommendation**:

* Enhance monitoring and rules for lesser-documented and high-risk vehicle categories.

**🚧 High-Risk Street Alerts**

**Top 5 Streets by Collisions**:

| **Street** | **Collisions** | **Injuries** | **Fatalities** |
| --- | --- | --- | --- |
| Long Island Expressway | 2,165 | 1,274 | 7 |
| Grand Central Parkway | 1,639 | 1,093 | 10 |
| Cross Island Parkway | 1,157 | 986 | 1 |
| Van Wyck Expressway | 1,126 | 861 | 3 |
| Belt Parkway | 1,112 | 830 | 4 |

**Recommendation**:

* Implement speed enforcement cameras
* Improve road lighting and lane markings
* Review traffic signal timings

**🧰 Tools & Technologies Used**

* **Excel**: Initial data preprocessing, Dashboard creation

**💡 Key Insights**

* Spring months and Friday evenings are the riskiest periods for collisions.
* The majority of injuries are concentrated in Brooklyn and Queens.
* Top causes are related to rule violations rather than mechanical failure.
* High-risk roads are mostly expressways—recommend increased signage and patrols.

**✅ Outcomes**

* Built a dynamic, interactive dashboard enabling:
  + Seasonal trend analysis
  + Hourly risk monitoring
  + Cause-based interventions
  + Location-based prioritization
* Delivered actionable recommendations for NYPD and city planners.

**📌 Dashboard Snapshots**



