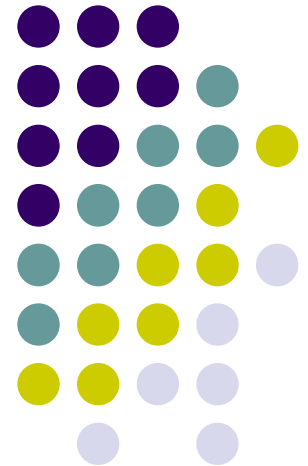


# Road Accident Data 2020 India - In-depth Analysis

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Comprehensive Insights into Accident Causes,  
Outcomes & Trends in Indian Cities

Presented by Aashirwad Mehare





# Project Overview

## **Objective:**

To analyze road accident data from 50 major cities in India for the year 2020. Focus on identifying patterns, key causes of accidents, outcomes, and high-risk cities. Utilize data to make policy recommendations for improving road safety.



# Project Overview

## Dataset Details:

Sourced from the Government of India.9550 records covering cities, cause categories, accident subcategories, outcomes, and count of incidents.

- **Technologies & Tools:**

- **Python:** For data cleaning, analysis, and visualization.

- **SQLite3:** Database used for structured storage and querying.

- **Power BI:** Dashboard creation for interactive, visual data representation.



# Dataset Features

- **Million Plus Cities:** Cities with populations over 1 million, including Delhi, Mumbai, Kolkata, etc.
- **Cause Categories:**
- **Traffic Control** (e.g., traffic signals, police control),
- **Junction** (e.g., roundabouts, intersections),
- **Road Features** (e.g., road curvature, ongoing construction),
- **Impacting Vehicle/Object** (e.g., collisions with other vehicles or objects),
- **Weather Conditions** (e.g., fog, rain).



# Dataset Features

## Outcomes of Accidents:

- **Fatalities (number of people killed),**
- **Grievous Injuries,**
- **Minor Injuries,**
- **Total Injuries.**



# Data Processing Pipeline

## 1. Data Loading:

- Loaded raw accident data into Pandas for initial inspection.
- Dataset included city names, causes of accidents, and outcomes.

## 2. Data Cleaning:

- **Handled Missing Values:** Filled missing data where possible, or dropped rows/columns with insignificant missing values.
- **Data Type Consistency:** Ensured all columns (e.g., Count, Cities, Cause Categories) had the correct data types.

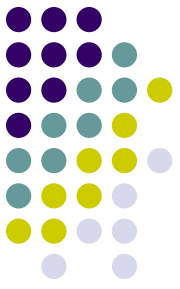


# Data Processing Pipeline

## 3. SQLite Database:

- Created an SQLite database to store and query accident data.
- Efficient querying enabled complex aggregations like accidents by city or cause category.

# Exploratory Data Analysis (EDA) Process



**Purpose of EDA:** To explore the dataset and uncover meaningful patterns in the accidents data.

## **EDA Steps:**

- **Distribution of Accidents Across Cities:** Querying accident counts by city to identify which cities had the highest or lowest accident rates.
- **Visualization:** Bar charts representing city-wise accident distribution.



# Exploratory Data Analysis (EDA) Process



## **Analysis by Cause Categories:**

- Breakdown of accidents based on cause categories such as Traffic Control, Road Features, and Weather Conditions.
- Visualization: Countplots showing the frequency of each cause.

## **Outcomes of Accidents:**

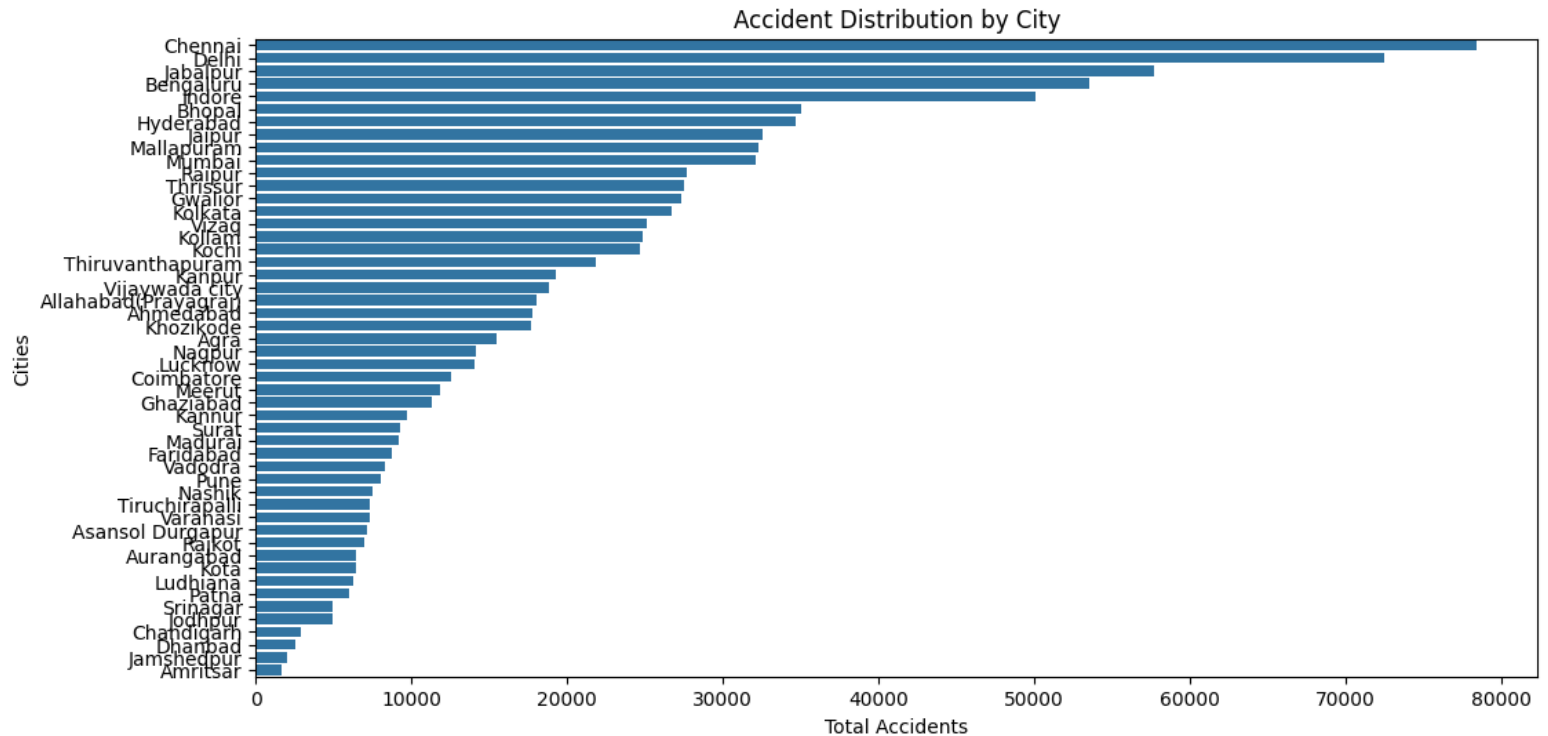
- Identified how many accidents resulted in fatalities, grievous injuries, or minor injuries.
- Visualization: Bar charts of outcomes based on the severity of incidents.



# Visualizations Using Python

- **1. Accident Distribution by City:**
- Created visualizations using **Matplotlib** and **Seaborn**.
- Highlighted cities with the highest accident rates (e.g., Delhi, Mumbai, Bengaluru).
- **Key Findings:** Some cities, especially Delhi, Mumbai, and Chennai, reported a high number of road accidents, with notable peaks during adverse weather conditions.

# Visualizations Using Python

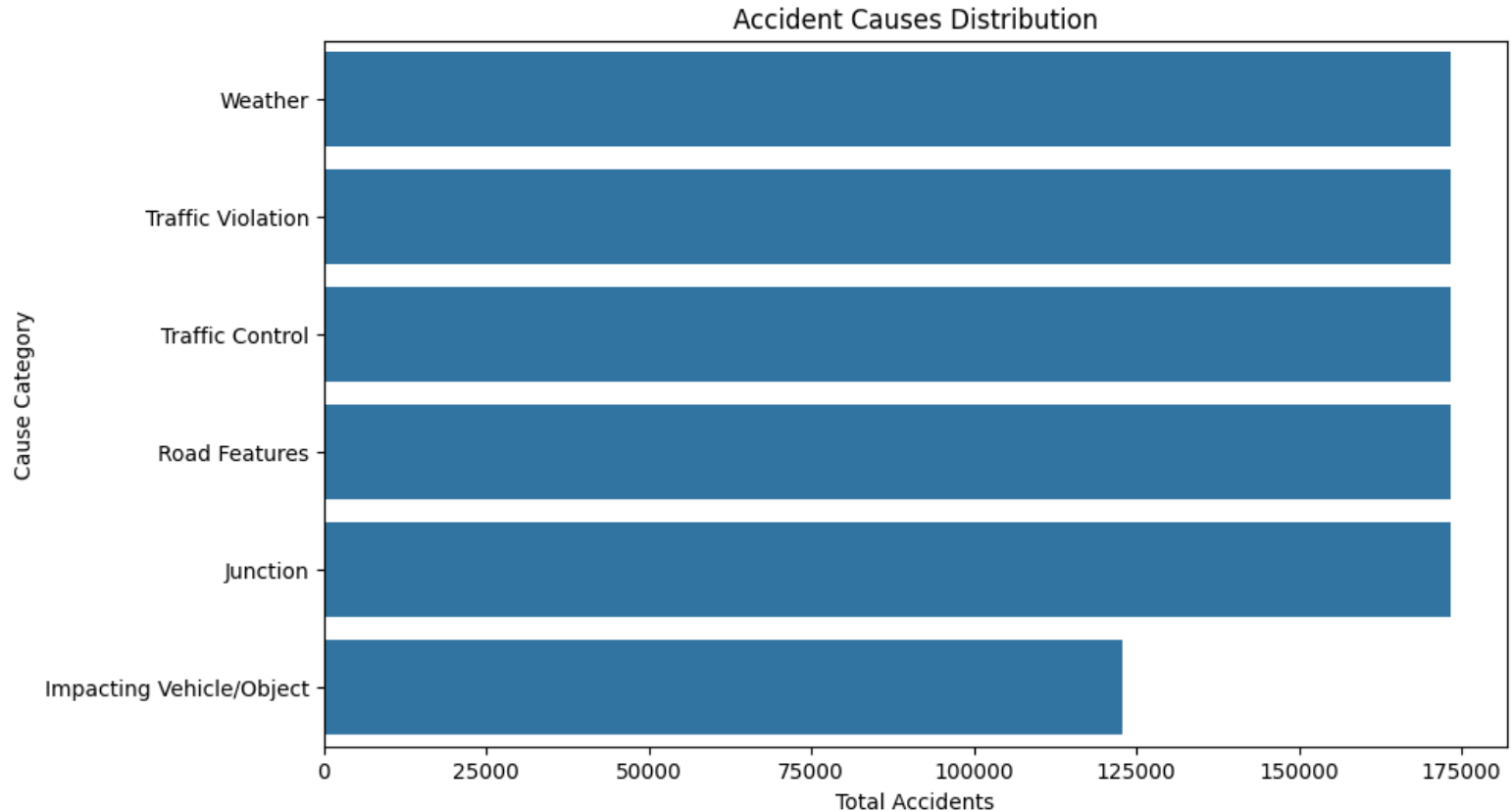


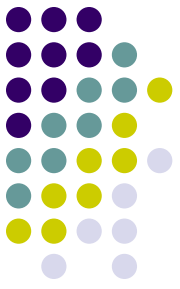


# Visualizations Using Python

- **2. Accident Causes Analysis:** Used **stacked bar charts** to represent accident causes and their correlation to different outcomes like deaths or injuries.
- **Key Insight: Traffic Control failures and Junctions** were primary contributors to severe accidents.

# Visualizations Using Python

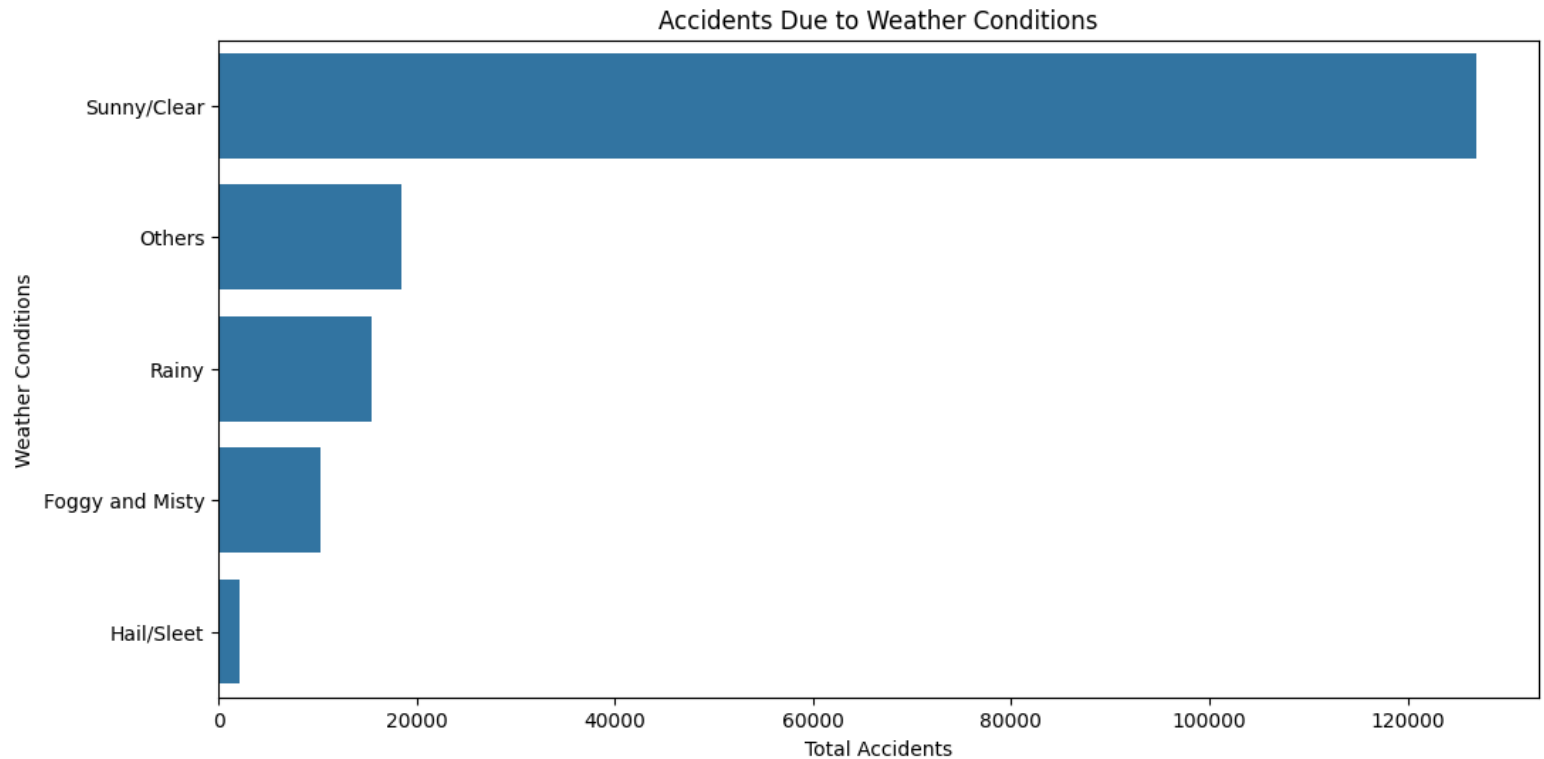




# Visualizations Using Python

- **3. Weather Impact on Accidents:** Analyzed how weather conditions such as **fog**, **rain**, and **clear skies** impacted accident rates.
- **Key Findings:** Accidents increased during **rainy** and **foggy** conditions, while clear weather still saw a significant number of incidents.

# Visualizations Using Python





# Power BI Dashboard Development

**Dashboard Overview:** Built an interactive Power BI dashboard to enable decision-makers to easily explore data.

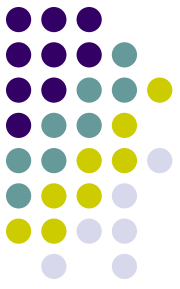
Visualized key metrics such as:

**Accidents by City:** Bar chart showing accident count for each city.

**Accidents by Cause Category:** Filterable view of accidents based on road features, vehicle types, and more.

**Injury & Fatality Analysis:** Focused on understanding which causes led to the most severe outcomes.





# Power BI Dashboard Development

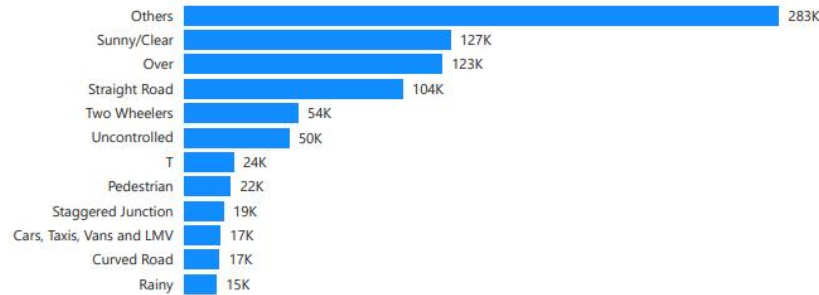
- **Dashboard Interactivity:**
- **Slicers & Filters:** Enabled users to drill down by **cause subcategories**, **outcome types**, and **cities**.
- **Mapping Feature:** Displayed geographic accident data for better location-based analysis.

# Power BI Dashboard Development

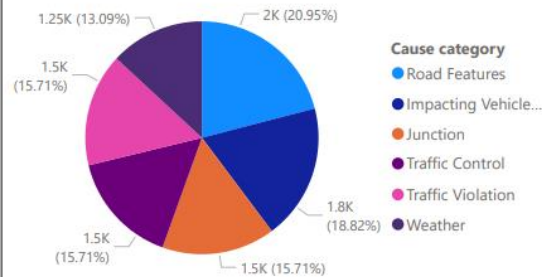


## Regulatory Affairs of Road Accident Data 2020 India

Count by Cause Subcategory



Cause category

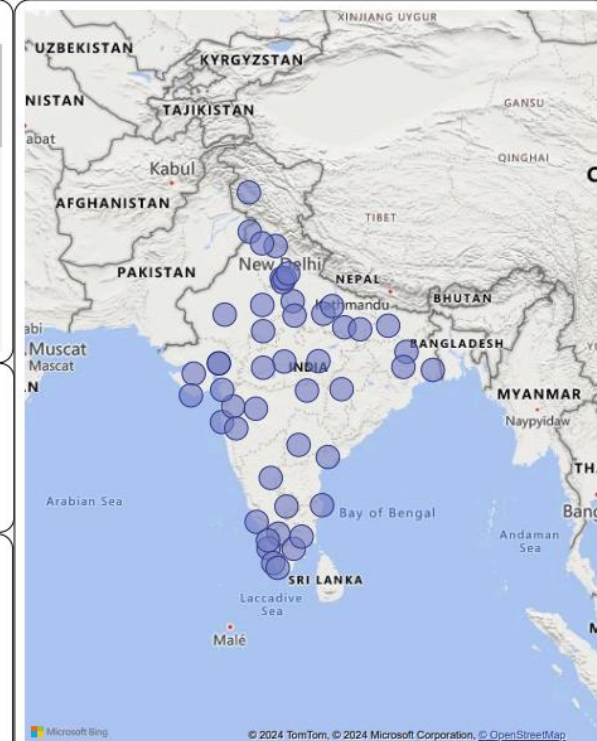


Total Count of Accident

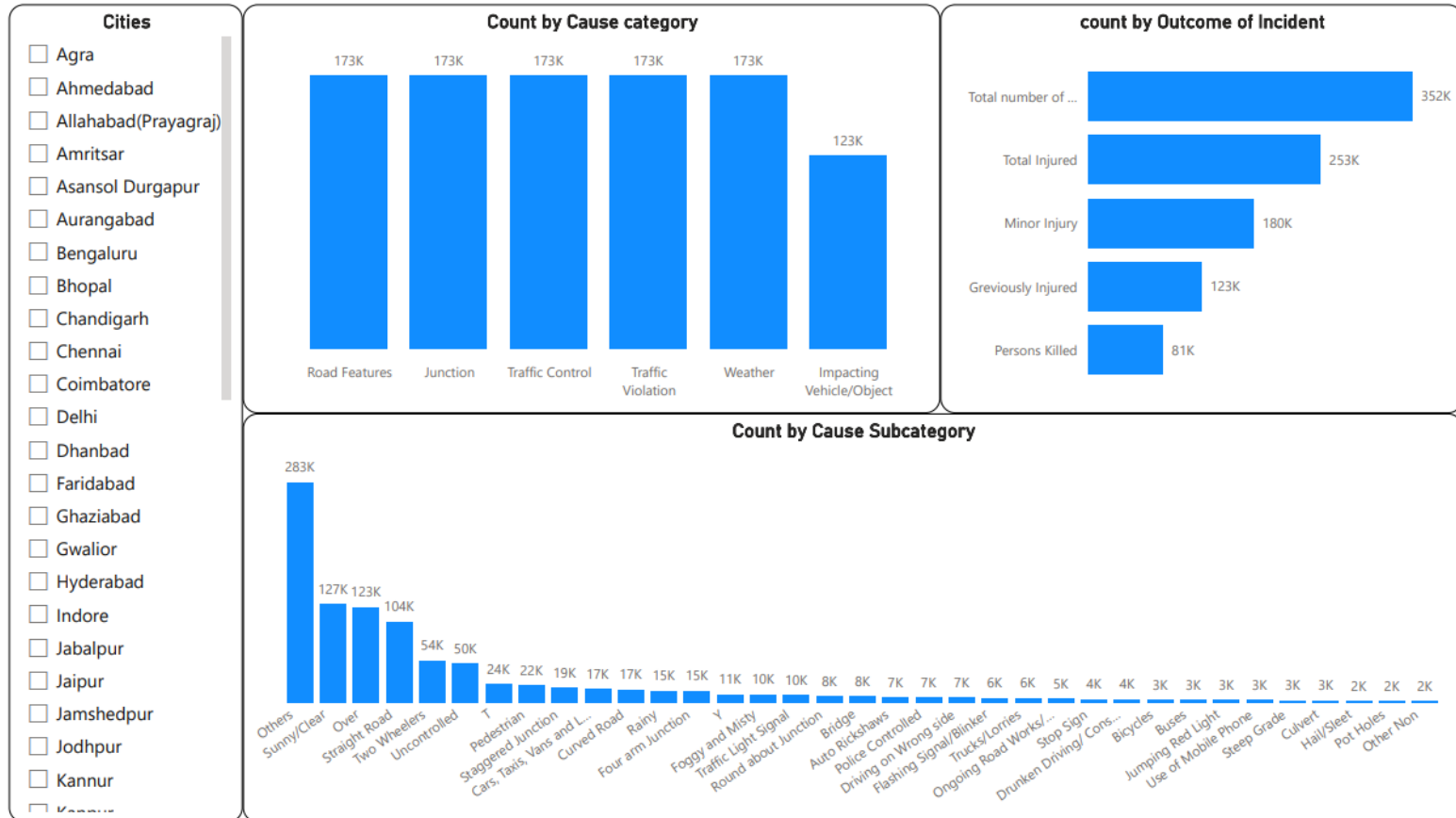
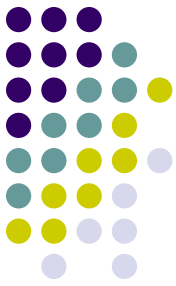
9547

Total Cities

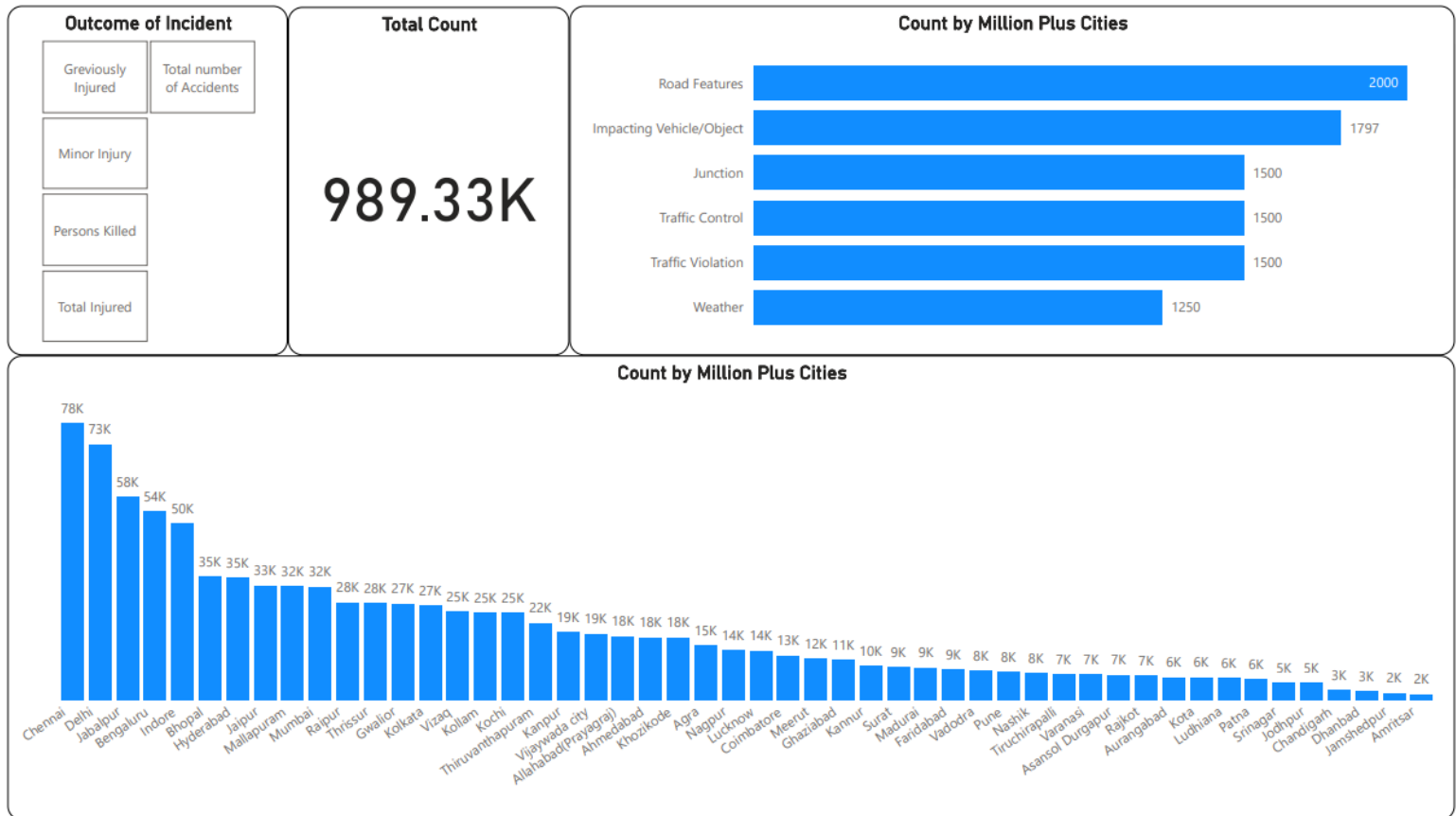
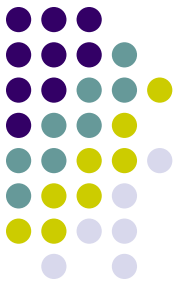
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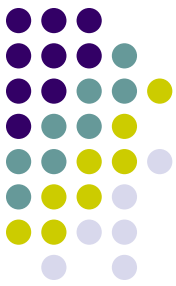


# Power BI Dashboard Development



# Power BI Dashboard Development





# Power BI Dashboard Development

Million Plus Cities	Cause category	Cause Subcategory	Outcome of Incident	Sum of Count
Agra	Impacting Vehicle/Object	Auto Rickshaws	Greviously Injured	20.00
Agra	Impacting Vehicle/Object	Auto Rickshaws	Minor Injury	9.00
Agra	Impacting Vehicle/Object	Auto Rickshaws	Persons Killed	28.00
Agra	Impacting Vehicle/Object	Auto Rickshaws	Total number of Accidents	52.00
Agra	Impacting Vehicle/Object	Bicycles	Greviously Injured	35.00
Agra	Impacting Vehicle/Object	Bicycles	Minor Injury	6.00
Agra	Impacting Vehicle/Object	Bicycles	Persons Killed	26.00
Agra	Impacting Vehicle/Object	Bicycles	Total number of Accidents	58.00
Agra	Impacting Vehicle/Object	Buses	Greviously Injured	10.00
Agra	Impacting Vehicle/Object	Buses	Minor Injury	26.00
Agra	Impacting Vehicle/Object	Buses	Persons Killed	28.00
Agra	Impacting Vehicle/Object	Buses	Total number of Accidents	34.00
Agra	Impacting Vehicle/Object	Cars, Taxis, Vans and LMV	Greviously Injured	47.00
Agra	Impacting Vehicle/Object	Cars, Taxis, Vans and LMV	Minor Injury	40.00
Agra	Impacting Vehicle/Object	Cars, Taxis, Vans and LMV	Persons Killed	85.00
Agra	Impacting Vehicle/Object	Cars, Taxis, Vans and LMV	Total number of Accidents	124.00
Agra	Impacting Vehicle/Object	Other Non	Greviously Injured	13.00
Agra	Impacting Vehicle/Object	Other Non	Minor Injury	16.00
Agra	Impacting Vehicle/Object	Other Non	Persons Killed	73.00
Agra	Impacting Vehicle/Object	Other Non	Total number of Accidents	95.00
Agra	Impacting Vehicle/Object	Others	Greviously Injured	22.00
Agra	Impacting Vehicle/Object	Others	Minor Injury	31.00
Agra	Impacting Vehicle/Object	Others	Persons Killed	28.00
Agra	Impacting Vehicle/Object	Others	Total number of Accidents	63.00
Agra	Impacting Vehicle/Object	Pedestrian	Greviously Injured	47.00
Agra	Impacting Vehicle/Object	Pedestrian	Minor Injury	14.00
Total				989334.00

## Cities

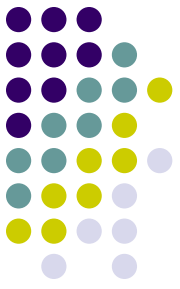
- ☐ Agra
- ☐ Ahmedabad
- ☐ Allahabad(Prayagraj)
- ☐ Amritsar
- ☐ Asansol Durgapur
- ☐ Aurangabad
- ☐ Bengaluru
- ☐ Bhopal
- ☐ Chandigarh
- ☐ Chennai
- ☐ Coimbatore
- ☐ Delhi
- ☐ Dhanbad
- ☐ Faridabad
- ☐ Ghaziabad
- ☐ Gwalior

## Cause Category

- ☐ Impacting Vehicle/...
- ☐ Junction
- ☐ Road Features
- ☐ Traffic Control
- ☐ Traffic Violation
- ☐ Weather

## Cause Subcategory

- ☐ Auto Rickshaws
- ☐ Bicycles
- ☐ Bridge
- ☐ Buses
- ☐ Cars, Taxis, Vans and LMV
- ☐ Culvert
- ☐ Curved Road
- ☐ Driving on Wrong side
- ☐ Drunken Driving/ Consumptio...
- ☐ Flashing Signal/Blinker
- ☐ Foggy and Misty
- ☐ Four arm Junction
- ☐ Hail/Sleet
- ☐ Jumping Red Light
- ☐ Ongoing Road Works/Under C...
- ☐ Other Non
- ☐ Others
- ☐ Over
- ☐ Pedestrian
- ☐ Police Controlled
- ☐ Pot Holes
- ☐ Rainy
- ☐ Round about Junction
- ☐ Staggered Junction



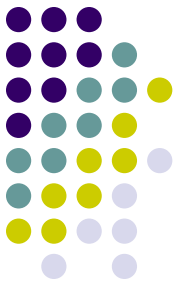
# Key Insights from the Analysis

## Cities with Highest Accidents:

- **Delhi, Mumbai, Chennai** had the highest accident rates.
- Focus on improving traffic regulations and infrastructure in these regions.

## Major Accident Causes:

- **Traffic Violations** (e.g., jumping red lights, driving on the wrong side) and road conditions (e.g., ongoing roadwork, pot-holes) were significant contributors.



# Key Insights from the Analysis

- **3. Weather Impact:**

- Severe weather conditions like **fog** and **rain** significantly increased accident rates, suggesting a need for better visibility measures and road safety protocols.

- **4. Outcome Analysis:**

- A higher percentage of accidents led to **minor injuries**; however, a substantial number still resulted in **fatalities**, particularly in **traffic violation** cases.

# Recommendations for Road Safety



## **Focused Intervention in High-Risk Cities:**

- Prioritize improving infrastructure and enforcement in cities like Delhi, Mumbai, and Chennai.

## **Traffic Control Measures:**

- Implement stricter regulations at high-risk junctions and enforce compliance with traffic signals.



# Recommendations for Road Safety

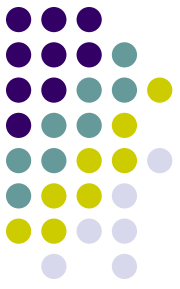


## **Weather-Based Safety Protocols:**

- Introduce road safety measures for foggy and rainy conditions, such as improved street lighting, visibility markers, and weather-alert systems.

## **Educational Campaigns:**

- Increase public awareness regarding safe driving practices, particularly in high-risk weather conditions and junctions.



# Conclusion & Future Work

- **Conclusion:** The analysis provided valuable insights into road accidents across Indian cities, highlighting the need for enhanced traffic management, road infrastructure, and safety protocols.
- The interactive **Power BI dashboard** serves as a powerful tool for policymakers to identify accident-prone areas and causes.



# Conclusion & Future Work

- **Future Work:**

- Extend the dataset to analyze trends over multiple years.
- Develop predictive models to anticipate accident hotspots based on traffic, weather, and road conditions.

# Thank You!

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