REPORT

Qlik Analysis Of Road Safety And Accident Patterns In India

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1.Abstract

This report presents a comprehensive analysis of road safety and accident patterns in India using Qlik, a robust data visualization and business intelligence tool. Road accidents in India are a significant public health concern, with high rates of fatalities and injuries. The study utilizes a detailed dataset encompassing various parameters such as the number of accidents, fatalities, types of vehicles involved, causes, time of occurrence, and geographical distribution.

The objective is to uncover critical insights into the underlying patterns and trends associated with road accidents, thereby aiding policymakers and stakeholders in formulating effective strategies to mitigate road traffic incidents. Through the deployment of Qlik's advanced data analytics capabilities, we perform an in-depth exploration and visualization of the data to identify key factors contributing to road accidents.

2.Introduction

Road safety is a critical issue in India, with the country experiencing a high rate of road accidents, fatalities, and injuries annually. According to the World Health Organization (WHO), road traffic injuries are a leading cause of death globally, and India is no exception, contributing significantly to this global burden. The rapid urbanization, increasing vehicular population, and diverse traffic conditions in India exacerbate the road safety challenge, necessitating comprehensive analysis and intervention strategies.

This report aims to analyze road safety and accident patterns in India using Qlik, a leading data visualization and business intelligence tool. The primary objective is to identify key trends, risk factors, and critical insights that can inform effective policy-making and strategic initiatives to enhance road safety.

By leveraging Qlik's powerful data analytics and visualization capabilities, this study seeks to present a clear and actionable understanding of the complex dynamics of road accidents in India. The analysis will uncover critical insights that can aid policymakers, traffic authorities, and other stakeholders in developing targeted interventions to reduce road traffic accidents and enhance overall road safety.

3.Setup and Installation

1.Creating an Account and Downloading Qlik Sense Desktop

Login and Account Creation:

1. Access the Qlik Sense website(https://www.qlik.com/us/try-or-buy/download-qlik-sense) and create a new account.

2. Download the Qlik Sense Desktop unlock file.

2.File Placement:

1. Navigate to the directory

3.Launching Qlik Sense Desktop:

1. Open the Qlik Sense Desktop application.

2. App Creation and Data Upload

4.App Creation and Data Upload:

1.Create a New App:

1. Click on the "Create App" button to start a new project.

2.Upload the Data File:

1. Go to Skill Wallet and download the project flow data set.

2. In Qlik Sense, upload this data set into the new app.Ensure the dataset is embedded correctly to use the

first row as headers if it is not done automatically.

5.Data Preparation

1.Removing Duplicates and Null Values

Data Load Editor:

1. Go to the 'Prepare' tab and open the Data Load Editor.

2. Modify the default Qlik script to handle duplicates and null values as per the requirements.

2.Sample Code

```
Set dataManagerTables =
','RA2019_A24','RA2019_A25','RA2019_A26','RA2019_A29','RA2019_A29c','RA2019_
A29a','RA2019_A32','RA2019_A33','RA2019_A35';

//This block renames script tables from non generated section which conflict with the
names of managed tables
```

```
For each name in $(dataManagerTables)
    Let index = 0;
    Let currentName = name;
    Let tableNumber = TableNumber(name);
    Let matches = 0;
    Do while not IsNull(tableNumber) or (index > 0 and matches > 0)
        index = index + 1;
        currentName = name & '-' & index;
        tableNumber = TableNumber(currentName)
        matches = Match('$(currentName)', $(dataManagerTables));
    Loop
    If index > 0 then
            Rename Table '$(name)' to '$(currentName)';
    EndIf;
Next;
Set dataManagerTables = ;



Unqualify *;


[RA2019_A24]:
LOAD
            [States/UTs] AS [State-Uts-States-Uts],
            [Traffic Light Signal - Total number of Accidents],
            [Traffic Light Signal - Persons Killed],
```

[Traffic Light Signal - Persons Injured - Greviously Injured],

[Traffic Light Signal - Persons Injured - Minor Injury],

[Traffic Light Signal - Persons Injured - Total Injured],

[Police Controlled - Total number of Accidents],

[Police Controlled - Persons Killed],

[Police Controlled - Persons Injured - Greviously Injured],

[Police Controlled - Persons Injured - Minor Injury],

[Police Controlled - Persons Injured - Total Injured],

[Stop Sign - Total number of Accidents],

[Stop Sign - Persons Killed],

[Stop Sign - Persons Injured - Greviously Injured],

[Stop Sign - Persons Injured - Minor Injury],

[Stop Sign - Persons Injured - Total Injured],

[Flashing Signal/Blinker - Total number of Accidents],

[Flashing Signal/Blinker - Persons Killed],

[Flashing Signal/Blinker - Persons Injured - Greviously Injured],

[Flashing Signal/Blinker - Persons Injured - Minor Injury],

[Flashing Signal/Blinker - Persons Injured - Total Injured],

[Uncontrolled - Total number of Accidents - Number],

[Uncontrolled - Total number of Accidents - Rank],

[Uncontrolled - Persons Killed - Number],

[Uncontrolled - Persons Killed - Rank],

[Uncontrolled - Persons Injured - Greviously Injured],

[Uncontrolled - Persons Injured - Minor Injury],

[Uncontrolled - Persons Injured - Total Injured],

```
    [Others - Total number of Accidents],
    [Others - Persons Killed],
    [Others - Persons Injured - Greviously Injured],
    [Others - Persons Injured - Minor Injury],
    [Others - Persons Injured - Total Injured]
 FROM [lib://DataFiles/RA2019_A24.csv]
(txt, codepage is 28591, embedded labels, delimiter is ',', msq);

[RA2019_A25]:
LOAD
    [States/UTs] AS [State-Uts-States-Uts],
    [Sunny/Clear - Total Accidents - Number],
    [Sunny/Clear - Total Accidents - Rank],
    [Sunny/Clear - Persons Killed - Number],
    [Sunny/Clear - Persons Killed - Rank],
    [Sunny/Clear - Persons Injured - Greviously Injured],
    [Sunny/Clear - Persons Injured - Minor Injury],
    [Sunny/Clear - Persons Injured - Total Injured],
    [Rainy - Total Accidents],
    [Rainy - Persons Killed],
    [Rainy - Persons Injured - Greviously Injured],
    [Rainy - Persons Injured - Minor Injury],
    [Rainy - Persons Injured - Total Injured],
    [Foggy and Misty - Total Accidents],
    [Foggy and Misty - Persons Killed],
```

[Foggy and Misty - Persons Injured - Greviously Injured],

[Foggy and Misty - Persons Injured - Minor Injury],

[Foggy and Misty - Persons Injured - Total Injured],

[Hail/Sleet - Total Accidents],

[Hail/Sleet - Persons Killed],

[Hail/Sleet - Persons Injured - Greviously Injured],

[Hail/Sleet - Persons Injured - Minor Injury],

[Hail/Sleet - Persons Injured - Total Injured],

[Others - Total Accidents],

[Others - Persons Killed] AS [RA2019_A25.Others - Persons Killed],

[Others - Persons Injured - Greviously Injured] AS [RA2019_A25.Others - Persons Injured - Greviously Injured],

[Others - Persons Injured - Minor Injury] AS [RA2019_A25.Others - Persons Injured - Minor Injury],

[Others - Persons Injured - Total Injured] AS [RA2019_A25.Others - Persons Injured - Total Injured]

FROM [lib://DataFiles/RA2019_A25.csv]

(txt, codepage is 28591, embedded labels, delimiter is ',', msq);

[RA2019_A26]:

LOAD

[States/UTs] AS [State-Uts-States-Uts],

[Pedestrian - Number of Road Accidents],

[Pedestrian - Number of Persons - Killed],

[Pedestrian - Number of Persons - Greviously Injured],

[Pedestrian - Number of Persons - Minor Injured],

[Bicycles - Number of Road Accidents],

[Bicycles - Number of Persons - Killed],

[Bicycles - Number of Persons - Greviously Injured],

[Bicycles - Number of Persons - Minor Injured],

[Two Wheelers - Number of Road Accidents],

[Two Wheelers - Number of Persons - Killed],

[Two Wheelers - Number of Persons - Greviously Injured],

[Two Wheelers - Number of Persons - Minor Injured],

[Auto Rickshaws - Number of Road Accidents],

[Auto Rickshaws - Number of Persons - Killed],

[Auto Rickshaws - Number of Persons - Greviously Injured],

[Auto Rickshaws - Number of Persons - Minor Injured],

[Cars, Taxis, Vans and LMV - Number of Road Accidents],

[Cars, Taxis, Vans and LMV - Number of Persons - Killed],

[Cars, Taxis, Vans and LMV - Number of Persons - Greviously Injured],

[Cars, Taxis, Vans and LMV - Number of Persons - Minor Injured],

[Trucks/Lorries - Number of Road Accidents],

[Trucks/Lorries - Number of Persons - Killed],

[Trucks/Lorries - Number of Persons - Greviously Injured],

[Trucks/Lorries - Number of Persons - Minor Injured],

[Buses - Number of Road Accidents],

[Buses - Number of Persons - Killed],

[Buses - Number of Persons - Greviously Injured],

[Buses - Number of Persons - Minor Injured],

[Other Non-motorized vehicle (E-rickshaw etc.) - Number of Road Accidents],

[Other Non-motorized vehicle (E-rickshaw etc.) - Number of Persons - Killed],

[Other Non-motorized vehicle (E-rickshaw etc.) - Number of Persons - Greviously Injured],

[Other Non-motorized vehicle (E-rickshaw etc.) - Number of Persons - Minor Injured],

[Others - Number of Road Accidents],

[Others - Number of Persons - Killed],

[Others - Number of Persons - Greviously Injured],

[Others - Number of Persons - Minor Injured],

[Total - Number of Road Accidents],

[Total - Number of Persons - Killed],

[Total - Number of Persons - Greviously Injured],

[Total - Number of Persons - Minor Injured]

FROM [lib://DataFiles/RA2019_A26.csv]

(txt, codepage is 28591, embedded labels, delimiter is ',', msq);

[RA2019_A29]:

LOAD

[States/Uts] AS [State-Uts-States-Uts],

[Pedestrian - Male],

[Pedestrian - Female],

[Pedestrian - Total],

[Bicycles - Male],

[Bicycles - Female],

[Bicycles - Total],

[Two Wheelers - Male],

```
        [Two Wheelers - Female],
        [Two Wheelers - Total],
        [Two Wheelers - Rank],
        [Auto Rickshaws - Male],
        [Auto Rickshaws - Female],
        [Auto Rickshaws - Total],
        [Cars, taxies Vans andLMV - Male],
        [Cars, taxies Vans andLMV - Female],
        [Cars, taxies Vans andLMV - Total],
        [Trucks/Lorries - Male],
        [Trucks/Lorries - Female],
        [Trucks/Lorries - Total],
        [Buses - Male],
        [Buses - Female],
        [Buses - Total],
        [Other non  Motor vehicles(E-Rickshaw) - Male],
        [Other non  Motor vehicles(E-Rickshaw) - Female],
        [Other non  Motor vehicles(E-Rickshaw) - Total],
        [Others - Male],
        [Others - Female],
        [Others - Total]
 FROM [lib://DataFiles/RA2019_A29.csv]
(txt, codepage is 28591, embedded labels, delimiter is ',', msq);

[RA2019_A29c]:
```

```
LOAD

        [State/Uts] AS [State-Uts-States-Uts],

        [Bicycles] AS [RA2019_A29c.Bicycles],

        [Two Wheelers] AS [RA2019_A29c.Two Wheelers],

        [Auto Rickshaws] AS [RA2019_A29c.Auto Rickshaws],

        [Cars, Taxis, Vans and LMV] AS [RA2019_A29c.Cars, Taxis, Vans and LMV],

        [Trucks/Lorries] AS [RA2019_A29c.Trucks/Lorries],

        [Buses] AS [RA2019_A29c.Buses],

        [Other Non-Motorizd Vehicles(E-rickshaw etc.)] AS [RA2019_A29c.Other
Non-Motorizd Vehicles(E-rickshaw etc.)],

        [Others] AS [RA2019_A29c.Others],

        [Total] AS [RA2019_A29c.Total]

 FROM [lib://DataFiles/RA2019_A29c.csv]

(txt, codepage is 28591, embedded labels, delimiter is ',', msq);


[RA2019_A29a]:

LOAD

        [State/Uts] AS [State-Uts-States-Uts],

        [Bicycles] AS [RA2019_A29a.Bicycles],

        [Two Wheelers] AS [RA2019_A29a.Two Wheelers],

        [Auto Rickshaws] AS [RA2019_A29a.Auto Rickshaws],

        [Cars, Taxis, Vans and LMV] AS [RA2019_A29a.Cars, Taxis, Vans and LMV],

        [Trucks/Lorries] AS [RA2019_A29a.Trucks/Lorries],

        [Buses] AS [RA2019_A29a.Buses],

        [Other Non-Motorizd Vehicles(E-rickshaw etc.)] AS [RA2019_A29a.Other
Non-Motorizd Vehicles(E-rickshaw etc.)],
```

```
    [Others] AS [RA2019_A29a.Others],
    [Total] AS [RA2019_A29a.Total]
 FROM [lib://DataFiles/RA2019_A29a.csv]
(txt, codepage is 28591, embedded labels, delimiter is ',', msq);

[RA2019_A32]:
LOAD
    [State/UT] AS [State-Uts-States-Uts],
    [Less than 18 years - Male],
    [Less than 18 years - Female],
    [18-25 Years - Male],
    [18-25 Years - Female],
    [25-35 Years - Male],
    [25-35 Years - Female],
    [35-45 Years - Male],
    [35-45 Years - Female],
    [45-60 Years - Male],
    [45-60 Years - Female],
    [60 and Above - Male],
    [60 and Above - Female],
    [Age not known - Male],
    [Age not known - Female]
 FROM [lib://DataFiles/RA2019_A32.csv]
(txt, codepage is 28591, embedded labels, delimiter is ',', msq);
```

```
[RA2019_A33]:
LOAD
        [State/UT] AS [State-Uts-States-Uts],
        [Less than 18 years - Killed - Male],
        [Less than 18 years - Killed - Female],
        [18-25 Years - Killed - Male],
        [18-25 Years - Killed - Female],
        [25-35 Years - Killed - Male],
        [25-35 Years - Killed - Female],
        [35-45 Years - Killed - Male],
        [35-45 Years - Killed - Female],
        [45-60 Years - Killed - Male],
        [45-60 Years - Killed - Female],
        [60 and Above - Killed - Male],
        [60 and Above - Killed - Female],
        [Age not known - Killed - Male],
        [Age not known - Killed - Female]
 FROM [lib://DataFiles/RA2019_A33.csv]
(txt, codepage is 28591, embedded labels, delimiter is ',', msq);

[RA2019_A35]:
LOAD
        [States/UTs] AS [State-Uts-States-Uts],
        [Over-Speeding - Number of Accidents - Number],
        [Over-Speeding - Number of Accidents - Rank],
```

[Over-Speeding - Persons Killed - Number],

[Over-Speeding - Persons Killed - Rank],

[Over-Speeding - Persons Injured - Greviously Injured],

[Over-Speeding - Persons Injured - Minor Injury],

[Over-Speeding - Persons Injured - Total Injured],

[Drunken Driving/ Consumption of alcohol and drug - Number of Accidents],

[Drunken Driving/ Consumption of alcohol and drug - Persons Killed],

[Drunken Driving/ Consumption of alcohol and drug - Persons Injured - Greviously Injured],

[Drunken Driving/ Consumption of alcohol and drug - Persons Injured - Minor Injury],

[Drunken Driving/ Consumption of alcohol and drug - Persons Injured - Total Injured],

[Driving on Wrong side - Number of Accidents],

[Driving on Wrong side - Persons Killed],

[Driving on Wrong side - Persons Injured - Greviously Injured],

[Driving on Wrong side - Persons Injured - Minor Injury],

[Driving on Wrong side - Persons Injured - Total Injured],

[Jumping Red Light - Number of Accidents],

[Jumping Red Light - Persons Killed],

[Jumping Red Light - Persons Injured - Greviously Injured],

[Jumping Red Light - Persons Injured - Minor Injury],

[Jumping Red Light - Persons Injured - Total Injured],

[Use of Mobile Phone - Number of Accidents],

[Use of Mobile Phone - Persons Killed],

[Use of Mobile Phone - Persons Injured - Greviously Injured],

[Use of Mobile Phone - Persons Injured - Minor Injury],

[Use of Mobile Phone - Persons Injured - Total Injured],

[Others - Number of Accidents],

[Others - Persons Killed] AS [RA2019_A35.Others - Persons Killed],

[Others - Persons Injured - Greviously Injured] AS [RA2019_A35.Others - Persons Injured - Greviously Injured],

[Others - Persons Injured - Minor Injury] AS [RA2019_A35.Others - Persons Injured - Minor Injury],

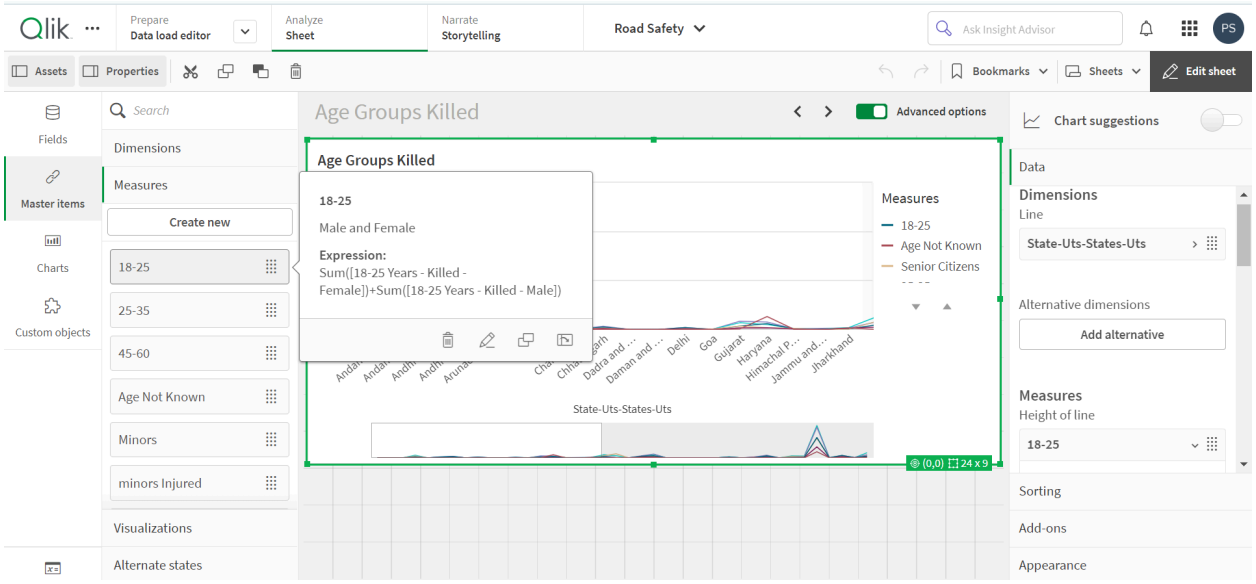
[Others - Persons Injured - Total Injured] AS [RA2019_A35.Others - Persons Injured - Total Injured]

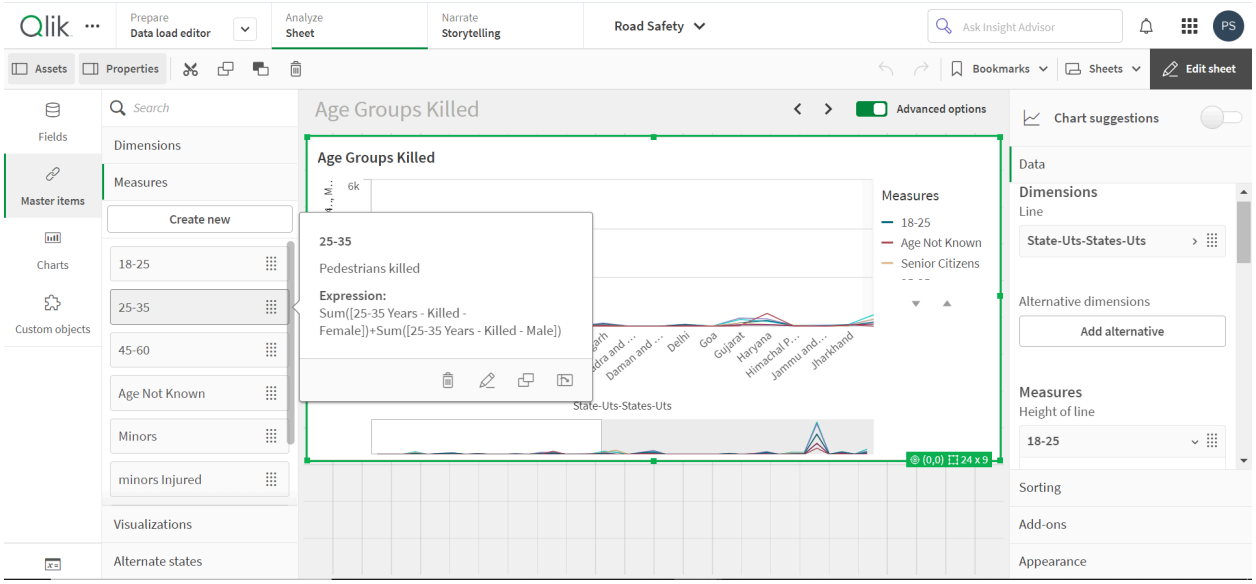
FROM [lib://DataFiles/RA2019_A35.csv]

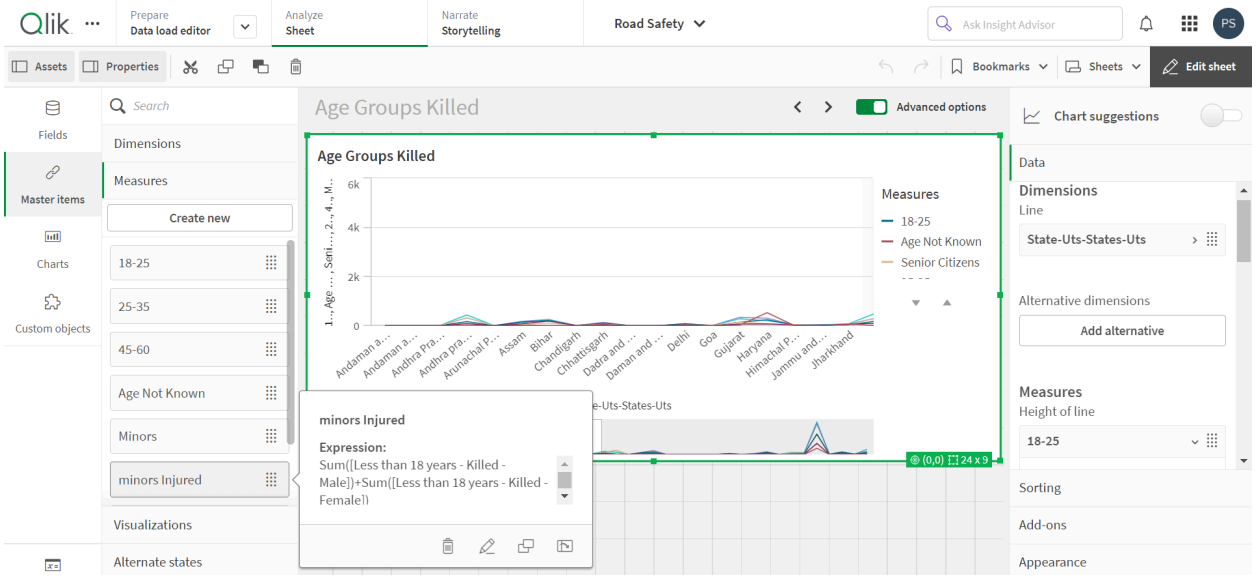
(txt, codepage is 28591, embedded labels, delimiter is ',', msq);

6.Visualization Creation

1,Key Performance Indicators







2.State-wise Age Group Killed Status

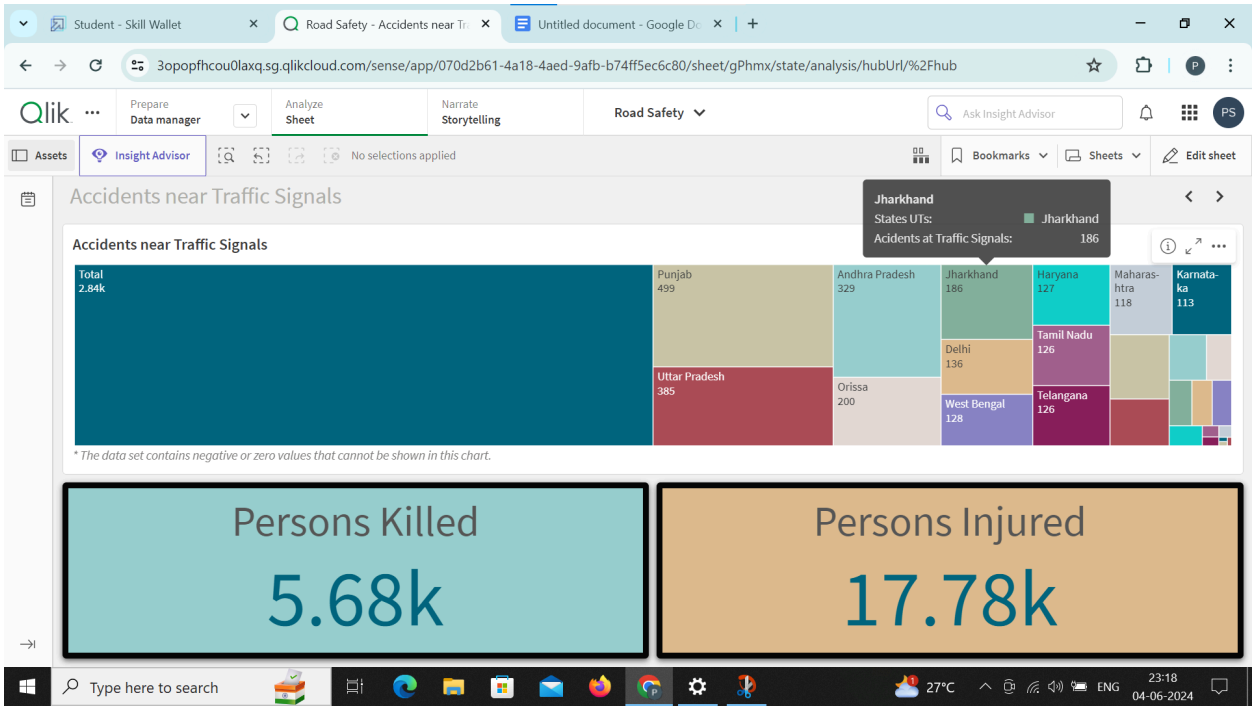
Visualization: Line chart

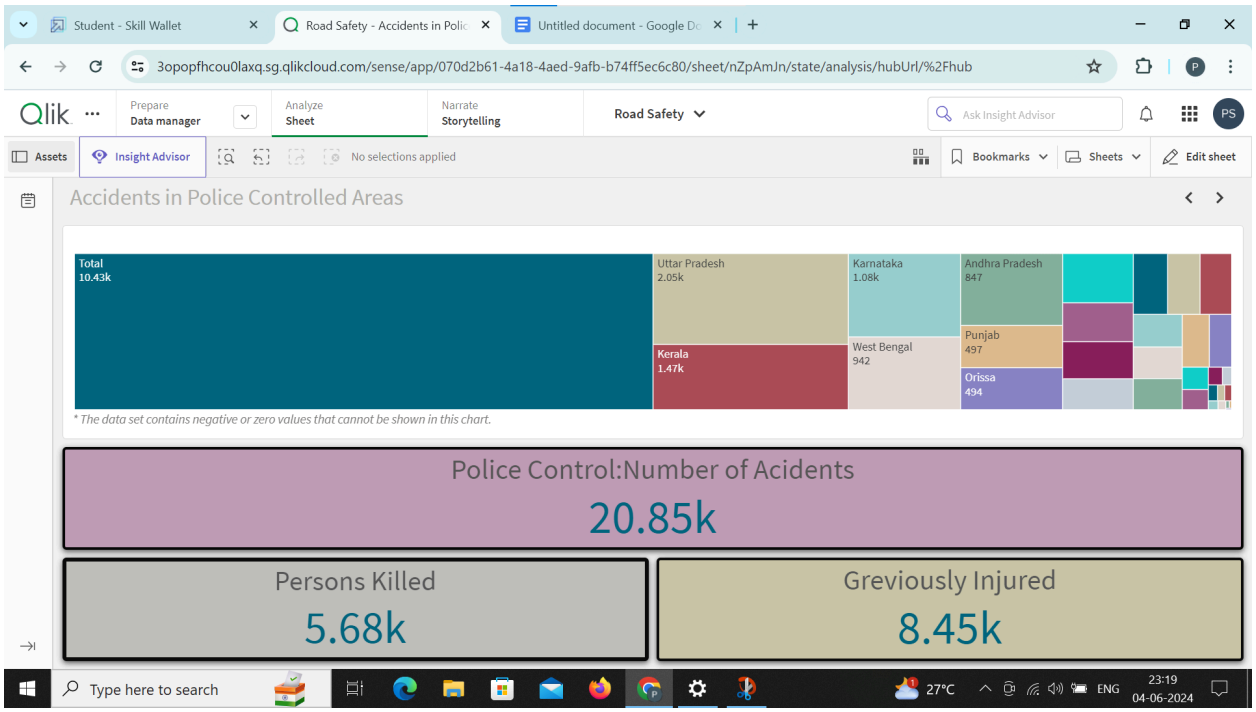
Dimension: `States-UTs-States-UTs`

Measure:Through Master Items

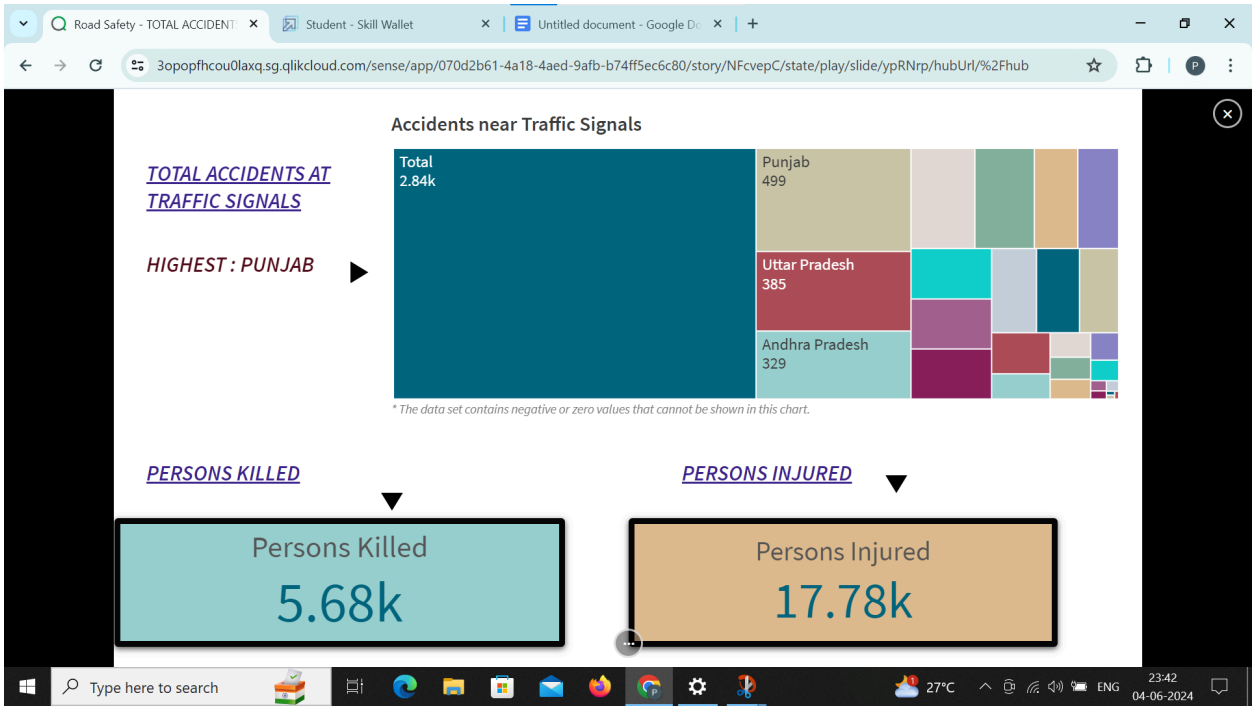
7. Dashboard and Storytelling

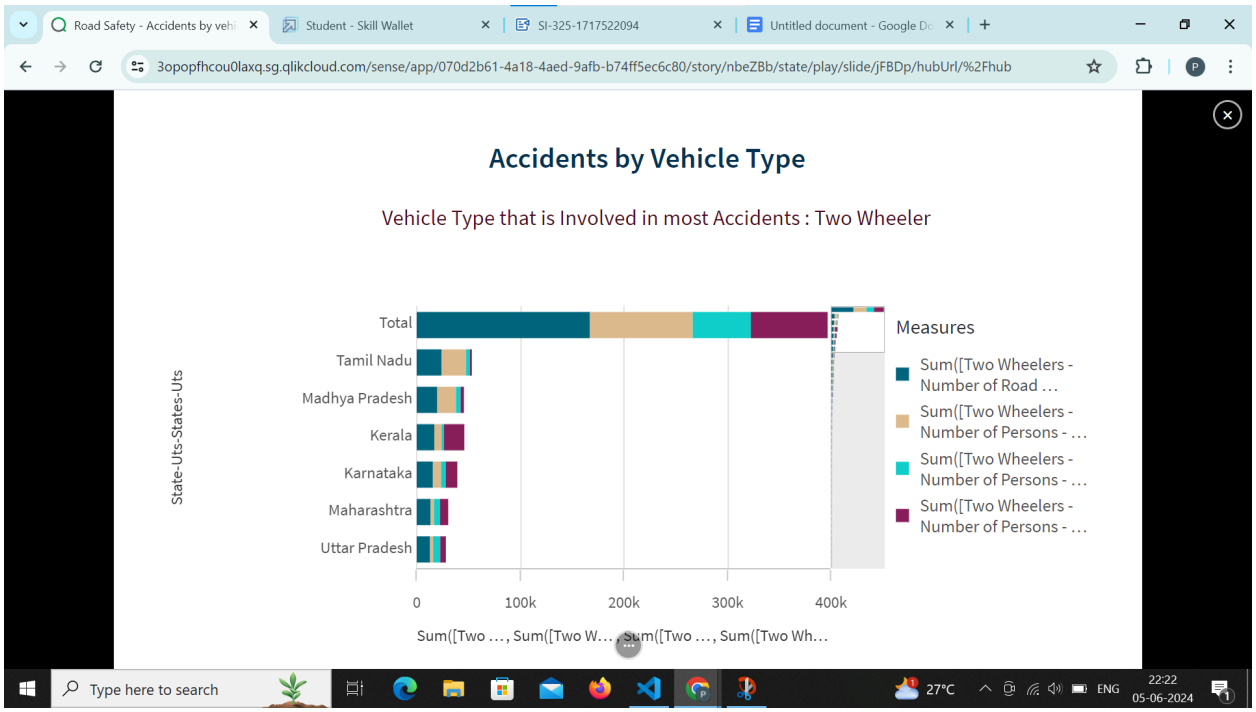
1.Dashboard Creation





2,StoryTelling





8.Project Analysis and Scope

1.Project Analysis

The analysis of road safety and accident patterns in India is structured around the comprehensive examination of a rich dataset using Qlik. The project involves several

key analytical steps to ensure a thorough understanding of the factors influencing road accidents and their outcomes.

1. Data Collection and Preparation:
    - Sources: Collecting data from reliable sources such as government reports, traffic police records, and publicly available datasets.
    - Parameters: Gathering data on the number of accidents, fatalities, injuries, types of vehicles involved, causes, time of occurrence, and geographical distribution.
    - Cleaning and Preprocessing: Ensuring data quality by handling missing values, removing duplicates, and standardizing data formats for consistency.
2. Exploratory Data Analysis (EDA):
    - Descriptive Statistics: Summarizing key statistics to understand the distribution and central tendencies of the data.
    - Visualization: Using Qlik to create interactive dashboards and visualizations that highlight trends, correlations, and patterns in the data.
    - Trend Analysis: Identifying year-over-year changes and long-term trends in accident statistics.
3. Identification of High-Risk Factors:
    - Geospatial Analysis: Mapping accident data to identify hotspots and high-risk areas.
    - Temporal Analysis: Analyzing time-of-day, day-of-week, and seasonal variations in accident occurrences.
    - Categorical Analysis: Examining the impact of vehicle type, driver behavior, and road conditions on accident severity.
4. Correlation and Causation:
    - Correlation Analysis: Determining relationships between different variables (e.g., speed limits and accident rates, weather conditions and accident severity).
    - Causal Inference: Using statistical methods to infer potential causal relationships between factors contributing to accidents.
5. Predictive Modelling (Optional):
    - Risk Prediction: Developing models to predict high-risk periods and locations for accidents based on historical data.
    - Scenario Analysis: Simulating the impact of different road safety interventions on accident reduction.

2.Project Scope

The scope of this project encompasses several critical aspects to ensure a comprehensive analysis of road safety and accident patterns in India. The scope is defined as follows:

1. Geographical Coverage:
    - National Level: Analysis includes data from all states and union territories of India.

    - Urban vs. Rural: Comparative analysis of accident patterns in urban and rural areas to highlight differences in risk factors and accident outcomes.
2. Temporal Coverage:
    - Historical Data: Utilization of historical data spanning multiple years to identify trends and changes over time.
    - Recent Data: Inclusion of the most recent data available to ensure current relevance of findings.
3. Data Dimensions:
    - Accident Characteristics: Analysis of accident types, causes, and severity.
    - Demographic Factors: Examination of age, gender, and other demographic factors of those involved in accidents.
    - Environmental Factors: Consideration of weather conditions, road infrastructure, and lighting conditions at the time of accidents.
4. Stakeholder Focus:
    - Policy Makers: Providing insights to help formulate and implement effective road safety policies.
    - Traffic Authorities: Assisting in the development of targeted enforcement strategies.
    - Urban Planners: Informing infrastructure planning and improvements.
    - Public Health Officials: Highlighting public health impacts and necessary interventions.
5. Outcome Objectives:
    - Insight Generation: Delivering actionable insights through detailed visualizations and analysis.
    - Risk Mitigation: Identifying high-risk areas and periods to focus preventive measures.
    - Strategic Planning: Supporting strategic planning and decision-making for road safety initiatives.
    - Awareness and Education: Raising awareness about critical road safety issues and promoting education campaigns.

By defining a clear analysis process and scope, this project aims to provide a comprehensive and insightful understanding of road safety and accident patterns in India, ultimately contributing to the reduction of road traffic accidents and enhancing road safety across the country.

9.Conclusion

This report on the analysis of road safety and accident patterns in India using Qlik has provided a comprehensive examination of the factors contributing to road traffic incidents and their outcomes. Through the deployment of advanced data visualization and business intelligence techniques, we have identified critical insights that are essential for improving road safety in India.

Key Findings:

1. High-Risk Zones and Periods:

    - Urban Hotspots: Major cities and urban areas have higher accident rates, primarily due to dense traffic and increased pedestrian activity.
    - Rural Severity: Accidents in rural areas tend to be more severe, often involving high-speed collisions and inadequate emergency response.
    - Peak Times: Certain times of the day, such as late nights and early mornings, and specific days of the week exhibit higher accident frequencies.
2. Influence of Vehicle Type:
    - Two-Wheelers: Motorcycles and scooters are disproportionately involved in accidents, highlighting the need for targeted safety measures for two-wheeler riders.
    - Commercial Vehicles: Trucks and buses are often involved in severe accidents, necessitating stricter regulations and enforcement.
3. Driver Behavior and Environmental Factors:
    - Human Error: Over-speeding, drunken driving, and non-adherence to traffic rules are major causes of accidents, indicating the need for enhanced driver education and stricter enforcement of traffic laws.
    - Road Conditions: Poor road infrastructure, inadequate signage, and lack of proper lighting contribute significantly to accident occurrences and severity.
4. Temporal and Seasonal Variations:
    - Time of Day: Analysis indicates that accidents are more frequent during night-time and early morning hours, suggesting the need for better road lighting and increased vigilance during these periods.
    - Seasonal Trends: Certain seasons, particularly monsoons, see a spike in accidents due to adverse weather conditions, underlining the importance of weather-specific safety measures.

Recommendations:

1. Policy and Enforcement:
    - Strengthen Traffic Laws: Implement and enforce stricter traffic regulations to curb over-speeding, drunken driving, and other risky behaviors.
    - Targeted Interventions: Focus on high-risk areas and periods for deploying traffic police and safety campaigns.
2. Infrastructure Improvements:
    - Road Upgrades: Invest in improving road infrastructure, including better lighting, signage, and road surface quality.
    - Safety Features: Incorporate safety features such as speed bumps, pedestrian crossings, and guardrails in high-risk zones.
3. Public Awareness and Education:
    - Driver Training: Enhance driver training programs to emphasize the importance of road safety and adherence to traffic laws.
    - Awareness Campaigns: Conduct public awareness campaigns to educate the public about safe driving practices and the risks of negligent behavior.
4. Technological Integration:
    - Advanced Analytics: Continuously use data analytics and visualization

tools like Qlik to monitor and analyze road safety trends.
- Smart Infrastructure: Implement smart traffic management systems and surveillance to improve real-time monitoring and response.

1.Conclusion:

The application of Qlik in analyzing road safety and accident patterns in India has demonstrated its efficacy in uncovering valuable insights that can inform policy-making and strategic interventions. By understanding the underlying patterns and risk factors, stakeholders can develop targeted measures to reduce road traffic accidents and enhance overall road safety.

This report underscores the importance of a data-driven approach in addressing road safety issues. Continued efforts in data collection, analysis, and the implementation of recommended strategies are crucial for creating safer roads and reducing the burden of road traffic accidents in India. Through collaborative efforts involving policymakers, traffic authorities, urban planners, and the public, significant progress can be made towards achieving the goal of safer roads and a reduction in road traffic fatalities and injuries.

GITHUB LINK:

https://github.com/prithikasathivel/Qlik-Analysis-Of-Road-Safety-And-Accident-Patterns-In-India.git

PROJECT WORKSPACE

Qlik Analysis Of Road Safety And Accident Patterns In India

1. Define Problem / Problem Understanding

Business Problem Statement:

India faces a significant challenge with road safety due to the high frequency of road accidents, leading to substantial loss of life, serious injuries, and considerable economic costs. Despite advances in transportation infrastructure and technology, there is an urgent need for a comprehensive analysis to understand and address the factors contributing to road accidents effectively. The current measures are often reactive rather than proactive, and the lack of detailed, data-driven insights hampers the implementation of targeted interventions.

Primary Business Problem: "The need to comprehensively analyze road safety and accident patterns in India to reduce fatalities, injuries, and economic losses

associated with road accidents through data-driven insights and targeted interventions."

Key Components of the Business Problem:

1. High Incidence of Road Accidents:

- India experiences a high rate of road accidents, resulting in significant fatalities and injuries each year.

2. Lack of Comprehensive Analysis:

- Insufficient detailed analysis and understanding of accident patterns, causes, and contributing factors hinder effective intervention.

3. Ineffective Safety Measures:

- Existing road safety measures are not adequately addressing the underlying causes of road accidents, leading to repeated incidents.

4. Economic Impact:

- Road accidents impose a significant economic burden through medical costs, loss of productivity, and damage to infrastructure.

Implications of the Business Problem:

1. Public Safety Concerns:

- The high frequency of accidents poses a continuous threat to public safety, causing fear and anxiety among road users.

2. Healthcare System Strain:

- Road accident-related injuries strain the healthcare system, increasing demand for emergency and long-term medical care.

3. Economic Costs:

- The economic impact includes direct costs such as healthcare expenses and property damage, and indirect costs like lost productivity and income.

4. **Social Consequences:**

   - Road accidents lead to long-term social issues, including disabilities, loss of livelihoods, and psychological trauma for victims and their families.

Objectives of Addressing the Business Problem:

1. **Reduce Road Fatalities and Injuries:**

   - Implement targeted interventions to decrease the number of fatalities and serious injuries resulting from road accidents.

2. **Enhance Road Safety Measures:**

   - Utilize data-driven insights to improve road safety measures, including infrastructure enhancements, traffic management, and enforcement of regulations.

3. **Optimize Resource Allocation:**

   - Allocate resources effectively by identifying and addressing high-risk areas and periods, ensuring maximum impact from safety initiatives.

4. **Increase Public Awareness:**

   - Promote public awareness and education campaigns focused on road safety, encouraging responsible driving behaviors and compliance with traffic laws.

Proposed Solution Approach:

The solution involves leveraging Qlik Sense, a powerful data analytics platform, to conduct a comprehensive analysis of road safety and accident patterns in India. This will include:

- **Data Integration:** Collecting and integrating diverse data sources, such as traffic data, accident reports, weather conditions, road infrastructure details, and demographic information.
- **Hotspot Identification:** Using geospatial analysis to identify accident hotspots and understand the contributing factors.

- **Trend Analysis:** Analyzing historical accident data to identify trends and recurring factors, including seasonal variations and driver behaviors.
- **Predictive Modeling:** Developing predictive models to forecast potential accident scenarios and inform proactive safety measures.
- **Visualization and Reporting:** Creating interactive dashboards and automated reports to visualize data and insights, making them accessible to stakeholders for informed decision-making.

By implementing this data-driven approach, the project aims to provide actionable insights to stakeholders, enabling them to develop and implement effective strategies to improve road safety, reduce accidents, and save lives in India.

Business Requirements for Analyzing Road Safety and Accident Patterns in India

1. Data Requirements

1. **Data Sources**:

   - **Traffic Data**: Traffic volume, speed, and flow data from sensors, cameras, and traffic management systems.
   - **Accident Reports**: Detailed records of road accidents including date, time, location, type, severity, and cause.
   - **Weather Conditions**: Historical and real-time weather data from meteorological departments.
   - **Road Infrastructure Details**: Information on road types, conditions, signage, and lighting.
   - **Demographic Information**: Population density, age distribution, vehicle ownership, and socio-economic data.

2. **Data Integration**:

   - **Unified Data Model**: Develop a unified data model to integrate data from various sources ensuring consistency and accuracy.
   - **Real-time Data Feeds**: Set up real-time data feeds where possible, particularly for traffic and weather data.

3. **Data Quality**:

   - **Data Cleaning and Validation**: Implement procedures for cleaning and validating data to ensure accuracy and reliability.
   - **Data Privacy and Security**: Ensure compliance with data protection regulations and implement security measures to protect sensitive information.

2. Analytical Requirements

1. **Hotspot Identification**:

   - **Geospatial Analysis**: Use GIS tools to identify accident hotspots by mapping accident locations and correlating them with traffic volume and road conditions.
   - **Cluster Analysis**: Apply statistical clustering techniques to detect areas with high accident frequencies.

2. **Trend Analysis**:

   - **Temporal Patterns**: Analyze historical accident data to identify trends over time, including seasonal variations and time-of-day patterns.
   - **Behavioral Analysis**: Examine driver behavior patterns such as speeding, distracted driving, and adherence to traffic rules.

3. **Predictive Modeling**:

   - **Predictive Analytics**: Develop predictive models to forecast potential accident scenarios based on variables such as weather forecasts, traffic flow patterns, and historical accident trends.
   - **Risk Assessment**: Conduct risk assessments to identify high-risk areas and times for targeted interventions.

3. Visualization and Reporting Requirements

1. **Dashboards**:

   - **Interactive Dashboards**: Create interactive dashboards in Qlik Sense to visualize accident data, hotspots, trends, and predictive analytics.

- **Customizable Views**: Allow users to customize views based on parameters such as location, time period, and accident type.

2. **Reports**:

   - **Automated Reporting**: Set up automated reporting mechanisms to generate regular reports for stakeholders, highlighting key findings and trends.

   - **Ad-hoc Reporting**: Provide tools for ad-hoc report generation to address specific queries and requirements from stakeholders.

3. **User Accessibility**:

   - **User-Friendly Interface**: Ensure the Qlik Sense interface is intuitive and user-friendly for all stakeholders, including non-technical users.

   - **Mobile Access**: Enable mobile access to dashboards and reports for stakeholders who need information on-the-go.

4. Stakeholder Requirements

1. **Government Authorities**:

   - **Policy Development**: Provide insights and recommendations for developing road safety policies and regulations.

   - **Resource Allocation**: Guide resource allocation for infrastructure improvements, traffic management, and enforcement activities.

2. **Transportation Agencies**:

   - **Traffic Management**: Offer data-driven insights for improving traffic flow and reducing congestion.

   - **Infrastructure Planning**: Support infrastructure planning and development based on accident hotspot analysis and predictive models.

3. **Road Safety Organizations**:

   - **Awareness Campaigns**: Identify target areas and groups for road safety awareness campaigns and educational programs.

- **Driver Training Programs**: Develop training programs focused on identified risky behaviors and trends.

4. **Public and Community Groups**:
    - **Community Safety**: Provide information to communities on local accident trends and safety measures.
    - **Public Engagement**: Engage the public through interactive platforms to raise awareness and encourage safe driving practices.

5. Technical Requirements

1. **System Integration**:
    - **Data Integration Tools**: Use ETL (Extract, Transform, Load) tools to integrate data from various sources into Qlik Sense.
    - **API Integration**: Implement APIs for real-time data integration from traffic management systems and weather services.
2. **Performance and Scalability**:
    - **High Performance**: Ensure the system can handle large volumes of data and perform complex analyses quickly.
    - **Scalability**: Design the system to be scalable to accommodate increasing data volumes and additional data sources.
3. **Security**:
    - **Data Security**: Implement robust data security measures to protect sensitive information from unauthorized access.
    - **User Authentication**: Ensure secure user authentication and access control mechanisms.

6. Implementation Requirements

1. **Project Planning**:
    - **Timeline**: Develop a detailed project timeline with milestones for data collection, integration, analysis, and reporting.

- **Budget**: Allocate budget for data acquisition, technology infrastructure, and personnel.

2. **Team and Resources**:
   - **Data Analysts**: Hire skilled data analysts with experience in geospatial analysis, predictive modeling, and data visualization.
   - **Technical Support**: Ensure technical support for Qlik Sense setup, data integration, and system maintenance.
3. **Training and Support**:
   - **User Training**: Provide training sessions for stakeholders to effectively use Qlik Sense dashboards and reports.
   - **Ongoing Support**: Offer ongoing technical support and updates to ensure the system remains effective and up-to-date.

These business requirements provide a comprehensive framework for the successful implementation of the project, ensuring that all aspects from data collection to stakeholder engagement are carefully considered and addressed.

Literature Survey: Qlik Analysis of Road Safety and Accident Patterns in India

Introduction

The study of road safety and accident patterns is crucial in a country like India, where road traffic accidents are a leading cause of fatalities. Utilizing data analytics tools such as Qlik can provide valuable insights into these patterns and help in formulating effective safety measures. This literature survey explores various studies, reports, and articles related to road safety, accident analysis, and the use of data analytics in this domain.

Road Safety and Accident Patterns in India

1. National Crime Records Bureau (NCRB) Reports: The NCRB publishes annual reports on road accidents in India, detailing the number of accidents, fatalities, and injuries, along with various factors contributing to these accidents. These reports are essential for understanding the scale and nature of road accidents in India (NCRB, 2022).
2. World Health Organization (WHO) Reports: WHO's Global Status Report on Road Safety highlights the global and regional road safety status, including data

from India. The report underscores the risk factors, such as speeding, non-use of helmets, seat belts, and child restraints, which are prevalent in India (WHO, 2018).
3. Ministry of Road Transport and Highways (MoRTH) Reports: MoRTH regularly publishes reports on road accidents in India, providing detailed statistics and analysis on various parameters such as road conditions, vehicle types, and demographics of accident victims (MoRTH, 2021).

Data Analytics in Road Safety

1. Big Data and Road Safety: A study by Yadav and Yadav (2018) highlights the application of big data analytics in road safety. The research emphasizes how big data can help identify high-risk zones, patterns in accident occurrence, and the effectiveness of safety measures.
2. Machine Learning in Accident Prediction: A research paper by Singh et al. (2019) explores the use of machine learning algorithms to predict road accidents. The study demonstrates how predictive modeling can be used to forecast accident hotspots and suggest preventive measures.
3. Qlik in Data Analytics: Qlik is a powerful tool for data visualization and analysis. It allows users to integrate various data sources, create interactive dashboards, and perform complex data analysis. Its application in road safety can provide insights into accident trends, high-risk areas, and the effectiveness of implemented safety measures (Qlik, 2020).

Case Studies and Applications

1. Hyderabad Traffic Police Analysis: A case study by Reddy (2020) on the Hyderabad Traffic Police's use of Qlik for road safety analysis demonstrates how real-time data analytics can help in monitoring and improving traffic conditions. The study shows how Qlik's dashboards were used to analyze accident data, identify hotspots, and deploy resources effectively.
2. Road Accident Analysis in Tamil Nadu: Another study conducted in Tamil Nadu used Qlik to analyze accident data over five years. The analysis helped in identifying patterns related to time, location, and causes of accidents, leading to targeted interventions to reduce accidents (Kumar et al., 2021).
3. Urban Road Safety in Delhi: Research by Sharma and Gupta (2019) on urban road safety in Delhi used Qlik to integrate data from various sources, including traffic cameras, police reports, and hospital records. The comprehensive analysis provided insights into the correlation between traffic density, road conditions, and accident rates.

Conclusion

The integration of data analytics tools like Qlik in studying road safety and accident patterns in India has shown significant potential in improving road safety measures. By leveraging these tools, policymakers and law enforcement agencies can gain deeper insights into accident trends and devise more effective interventions. Continued research and application of advanced analytics are essential for making India's roads safer.

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3. MoRTH. (2021). Road Accidents in India. Ministry of Road Transport and Highways. Retrieved from MoRTH Website
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6. Qlik. (2020). Qlik Sense: Modern Data Analytics Platform. Qlik. Retrieved from Qlik Website
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8. Kumar, S., Gupta, A., & Rajan, P. (2021). Road Accident Analysis in Tamil Nadu Using Qlik. International Journal of Data Science.
9. Sharma, N., & Gupta, R. (2019). Urban Road Safety Analysis in Delhi Using Data Integration Techniques. Journal of Urban Planning and Development.

Social and Business Impact of Qlik Analysis of Road Safety and Accident Patterns in India

Social Impact

1. **Improved Public Safety:**
    - Reduction in Fatalities and Injuries: By identifying accident hotspots and high-risk behaviors, authorities can implement targeted interventions such as speed limits, better signage, and increased law enforcement, leading to a reduction in road accidents and associated casualties.

- Enhanced Emergency Response: Real-time data analysis can improve emergency response times by pinpointing accident locations quickly, thereby reducing the time taken to provide medical assistance to accident victims.

2. **Increased Public Awareness:**
    - Educational Campaigns: Insights derived from data analysis can be used to inform public awareness campaigns, educating citizens on safe driving practices, the importance of seat belts, helmets, and adherence to traffic laws.
    - Community Engagement: Local communities can be engaged through data-driven insights about accident trends in their areas, fostering a collaborative effort in promoting road safety.
3. **Policy Formulation and Implementation:**
    - Data-Driven Policies: Policymakers can use the insights from Qlik analysis to formulate evidence-based policies that address specific road safety issues, ensuring that resources are allocated efficiently and effectively.
    - Legislation and Regulation: Accurate data on accident patterns can lead to the development of stricter traffic laws and regulations, and their effective enforcement, resulting in safer roads.

Business Impact

1. **Insurance Industry:**
    - Risk Assessment and Premium Calculation: Insurance companies can use accident data to better assess risks and set premiums more accurately. High-risk areas or behaviors can be identified, leading to more tailored insurance products.
    - Fraud Detection: Detailed analysis of accident data can help in detecting fraudulent claims by identifying unusual patterns or inconsistencies in reported accidents.
2. **Automotive Industry:**
    - Safety Features Development: Automakers can use insights from accident patterns to develop and integrate advanced safety features in vehicles, such as automatic braking systems, lane departure warnings, and other driver assistance technologies.
    - Market Positioning: Companies can market their vehicles based on safety records and features, attracting safety-conscious consumers.
3. **Transportation and Logistics:**

- Optimized Route Planning: Logistics companies can use accident data to optimize routes for their fleets, avoiding accident-prone areas and ensuring timely deliveries.
- Driver Training Programs: By understanding common causes of accidents, companies can develop better training programs for their drivers, reducing the likelihood of accidents and associated costs.

4. **Urban Planning and Infrastructure Development:**
    - Infrastructure Improvements: Insights from accident data can guide urban planners and developers in designing safer roads and infrastructure, such as better lighting, improved road surfaces, and safer pedestrian crossings.
    - Investment in Technology: Governments and businesses can invest in smart traffic management systems that utilize real-time data to manage traffic flow and reduce congestion, leading to safer and more efficient transportation networks.

Conclusion

The integration of Qlik analysis in the study of road safety and accident patterns in India holds significant social and business benefits. Socially, it can lead to safer roads, better public awareness, and more informed policy-making. From a business perspective, it can enhance risk management for insurance companies, drive innovation in the automotive industry, optimize operations in transportation and logistics, and guide infrastructure development. Overall, the application of advanced data analytics fosters a collaborative effort towards reducing road accidents and improving safety standards in India.

2.Data Collection & Extraction From Database

Downloading the Dataset

Dataset has been downloaded from the kaggle by the link

https://www.kaggle.com/datasets/aryakittukrishnasai/road-accidents-in-india

Understanding the Data

The dataset "Road Accidents in India" on Kaggle provides detailed information on road accidents across various states and cities in India. It includes variables such as:

- State/UT: The state or union territory where the accident occurred.
- City: The specific city within the state/UT.
- Year: The year when the accident data was recorded.
- Total Accidents: The total number of accidents reported.
- Total Fatal Accidents: The number of accidents resulting in fatalities.
- Total Persons Killed: The total number of individuals killed in these accidents.
- Total Persons Injured: The total number of individuals injured in these accidents.

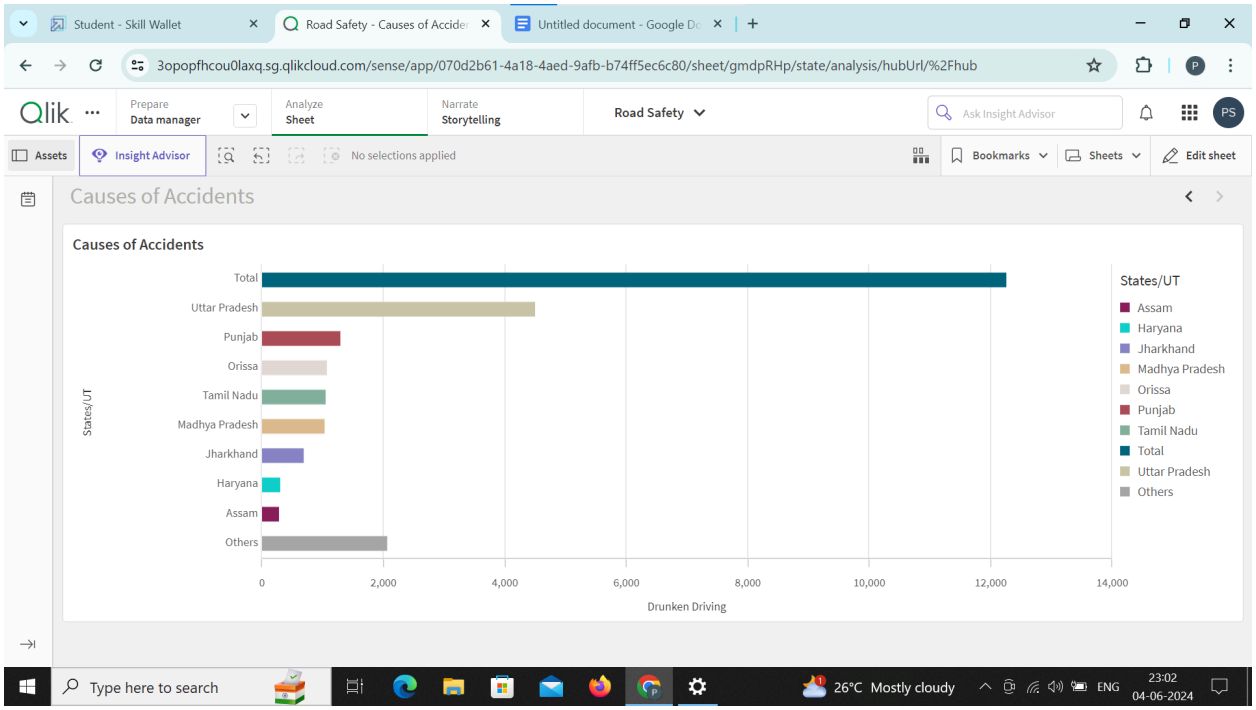
These variables can help in analyzing trends, identifying hotspots, and understanding the severity and frequency of road accidents in different regions of India.

Data Preparation

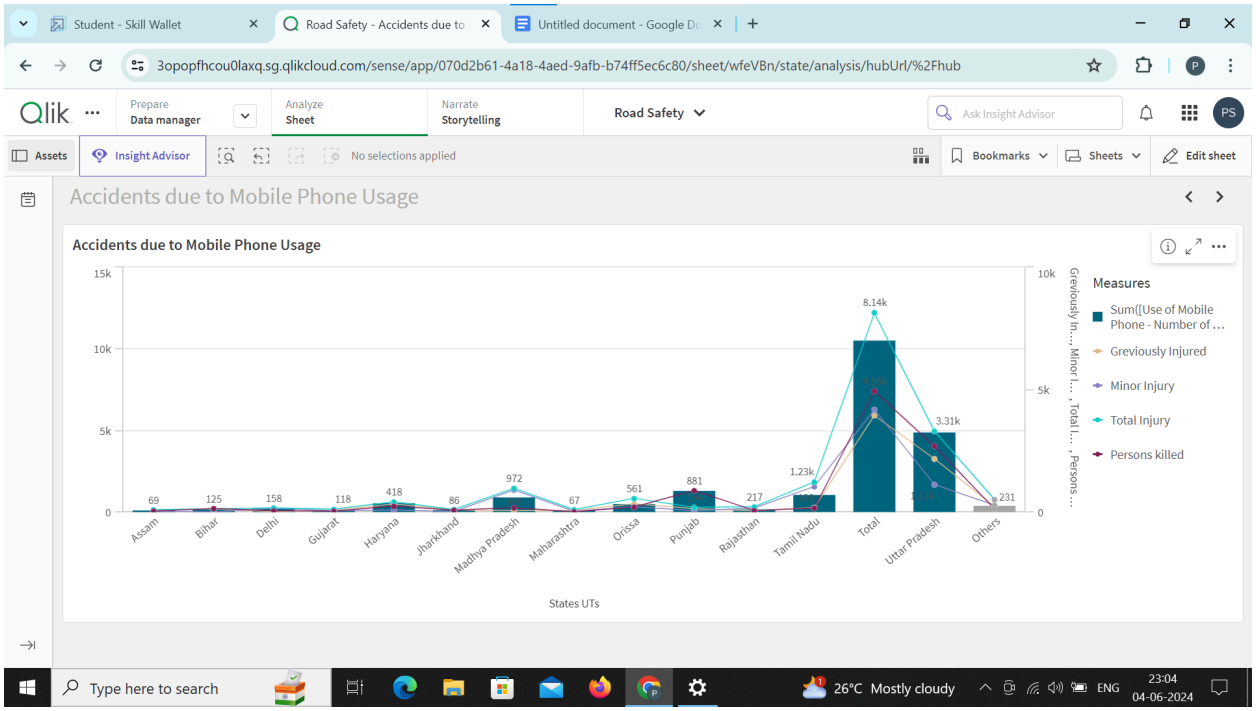
Data has been prepared in Qlik Sense

Data Visualization

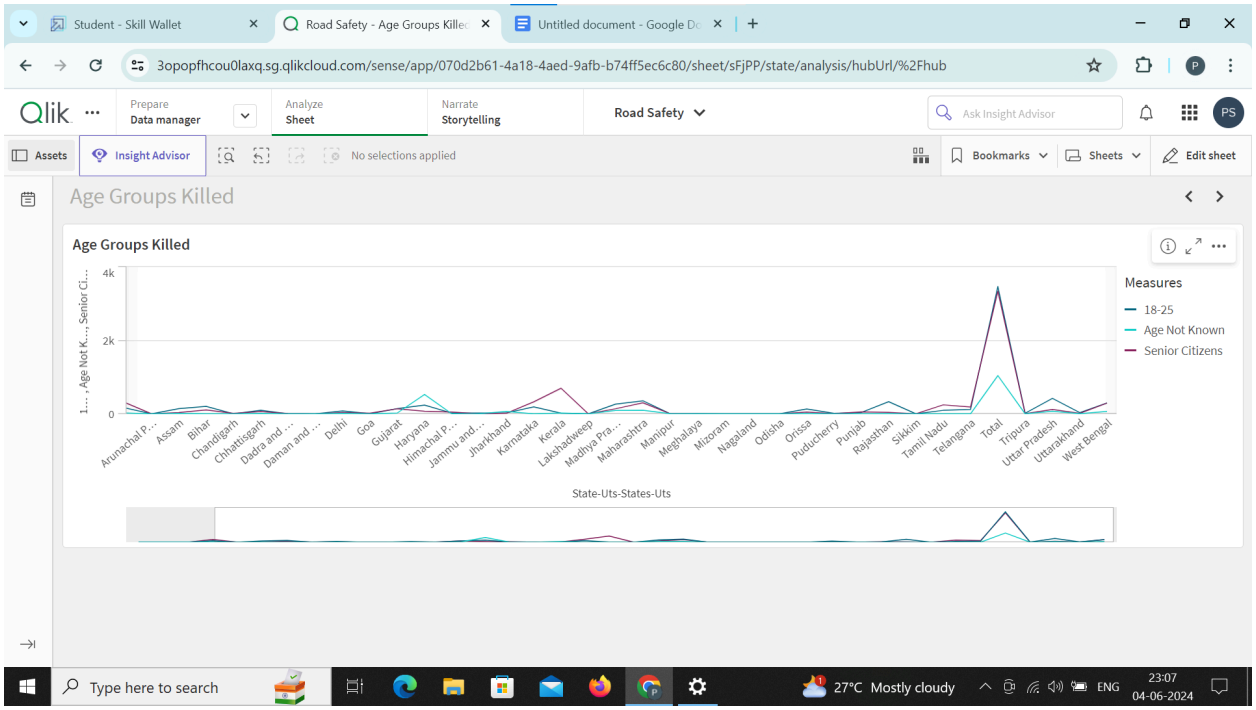
1.1 Accidents due to Drunken Driving



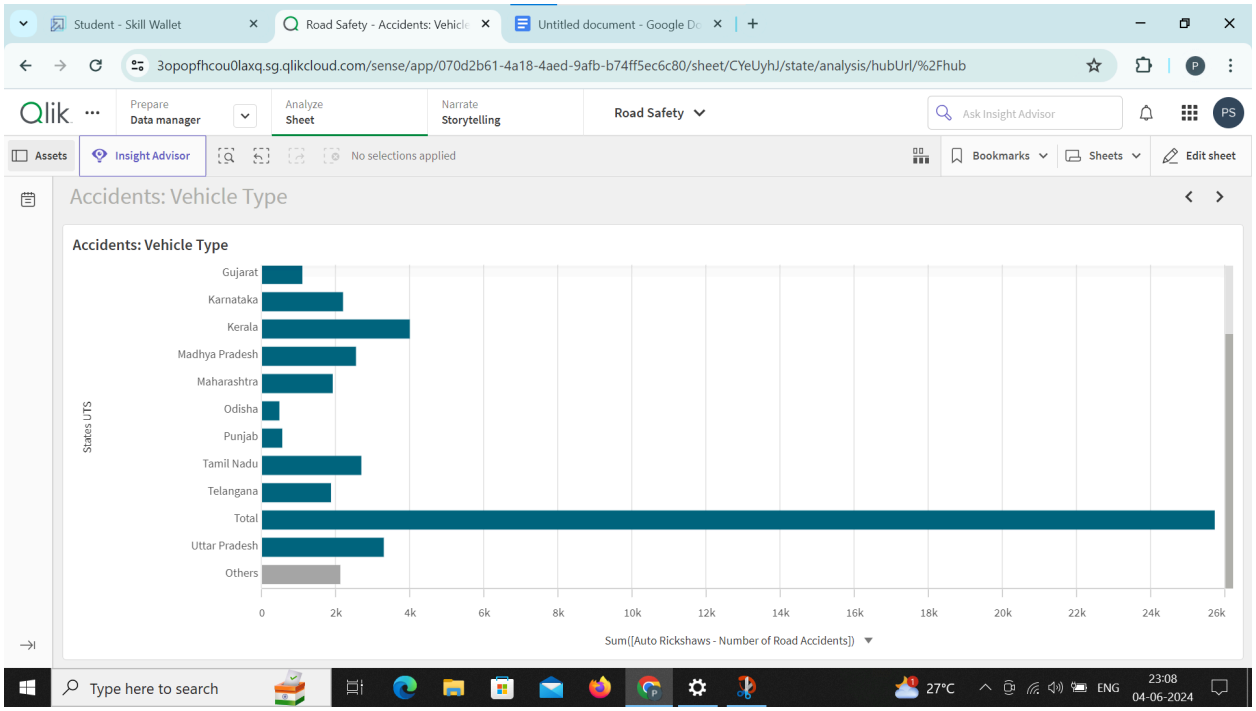
1.2: State-wise Mobile Phone Usage



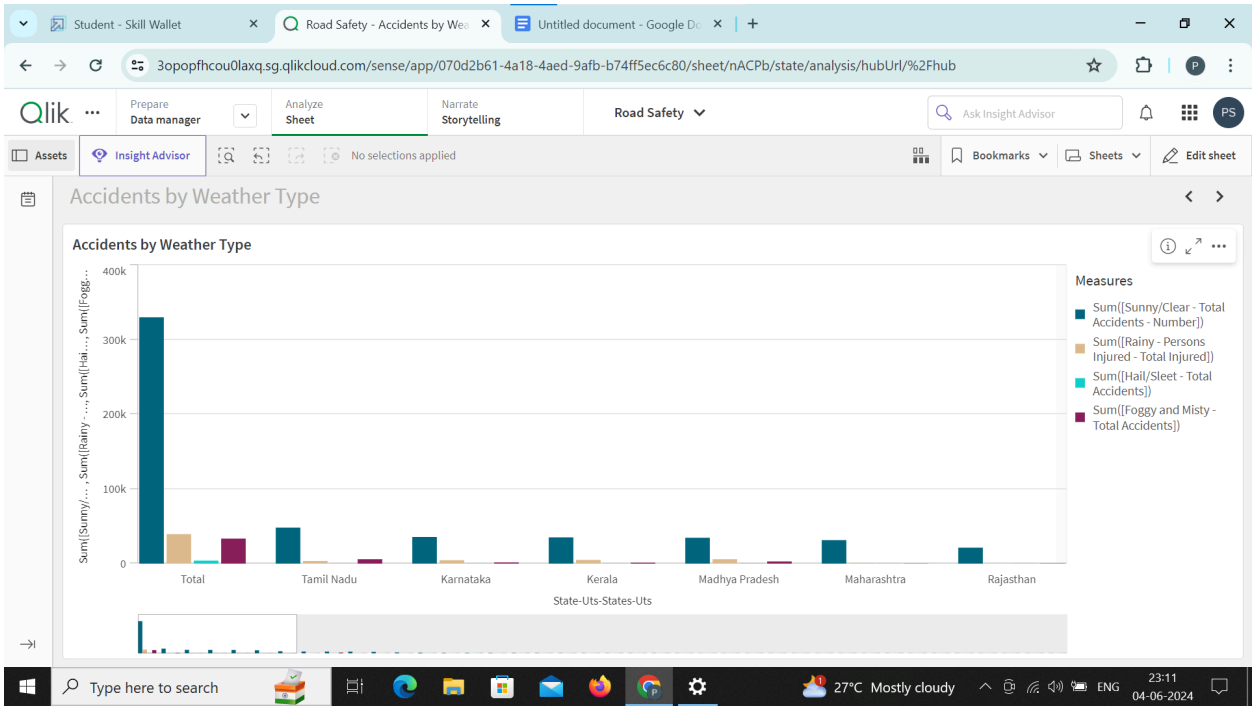
1.3: Pedestrians Killed: Age groups



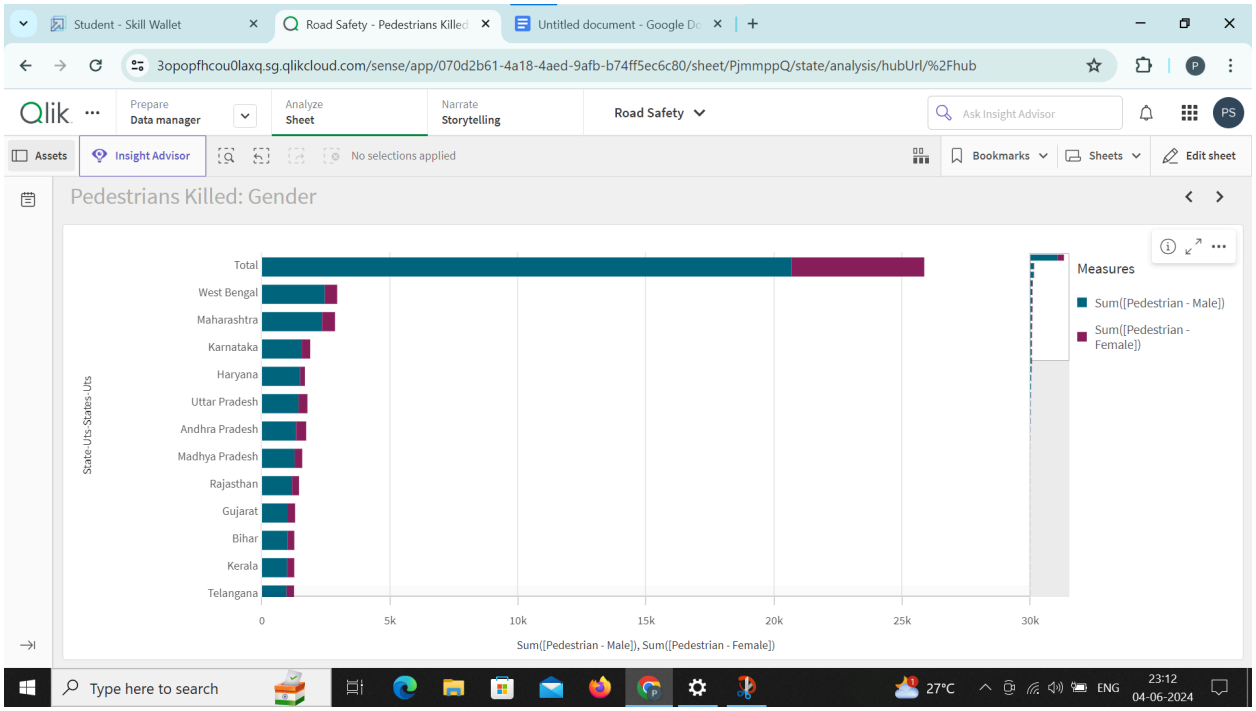
1.4: Vehicle Contribution towards Total Accidents



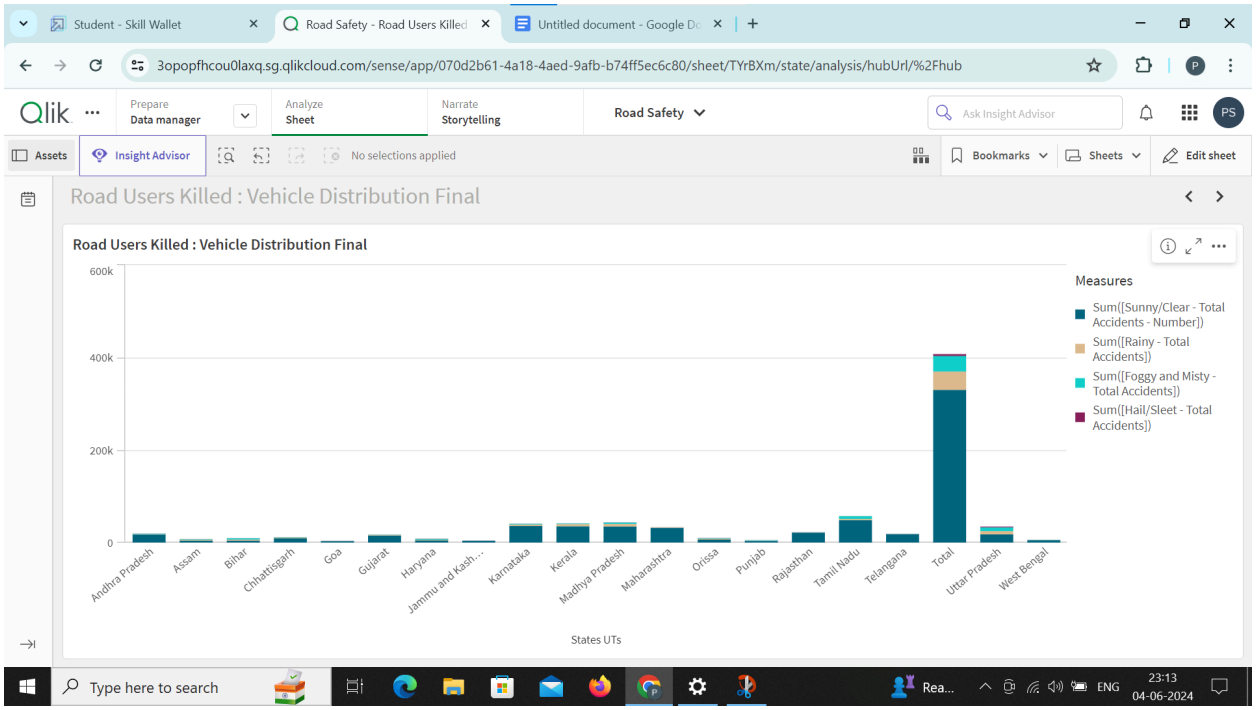
1.5: Accidents by Weather Type



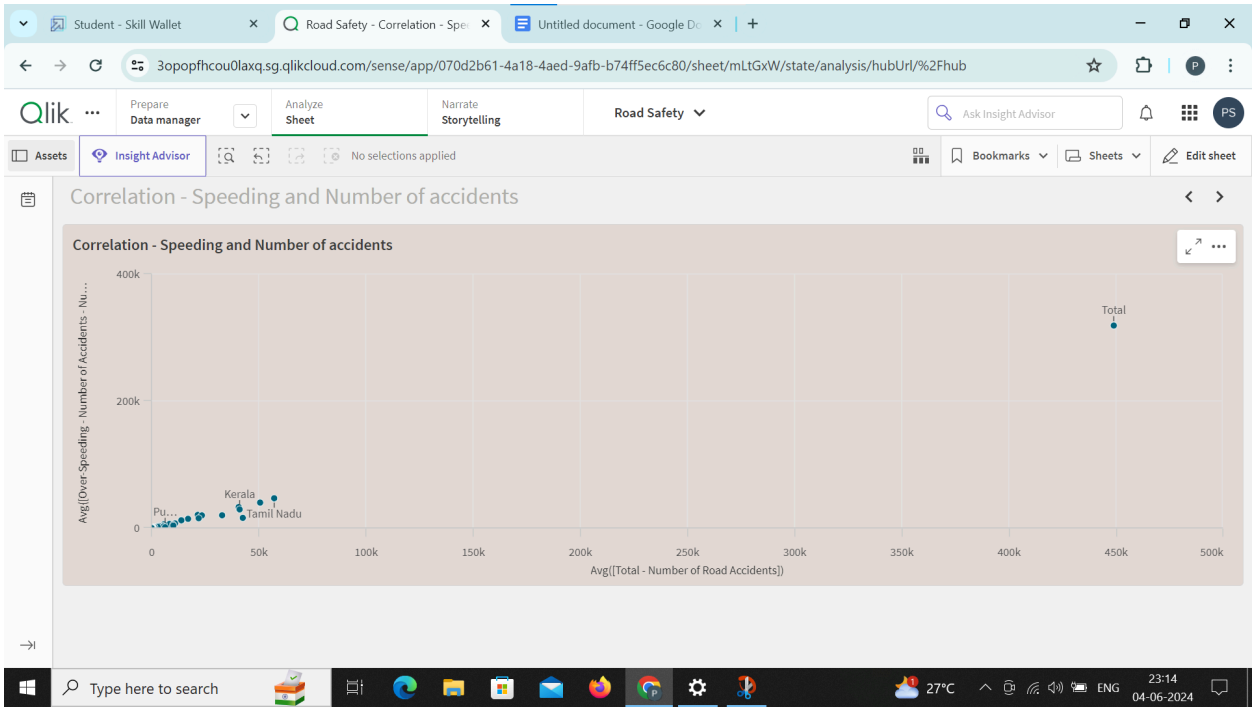
1.6: Pedestrians Killed: Gender



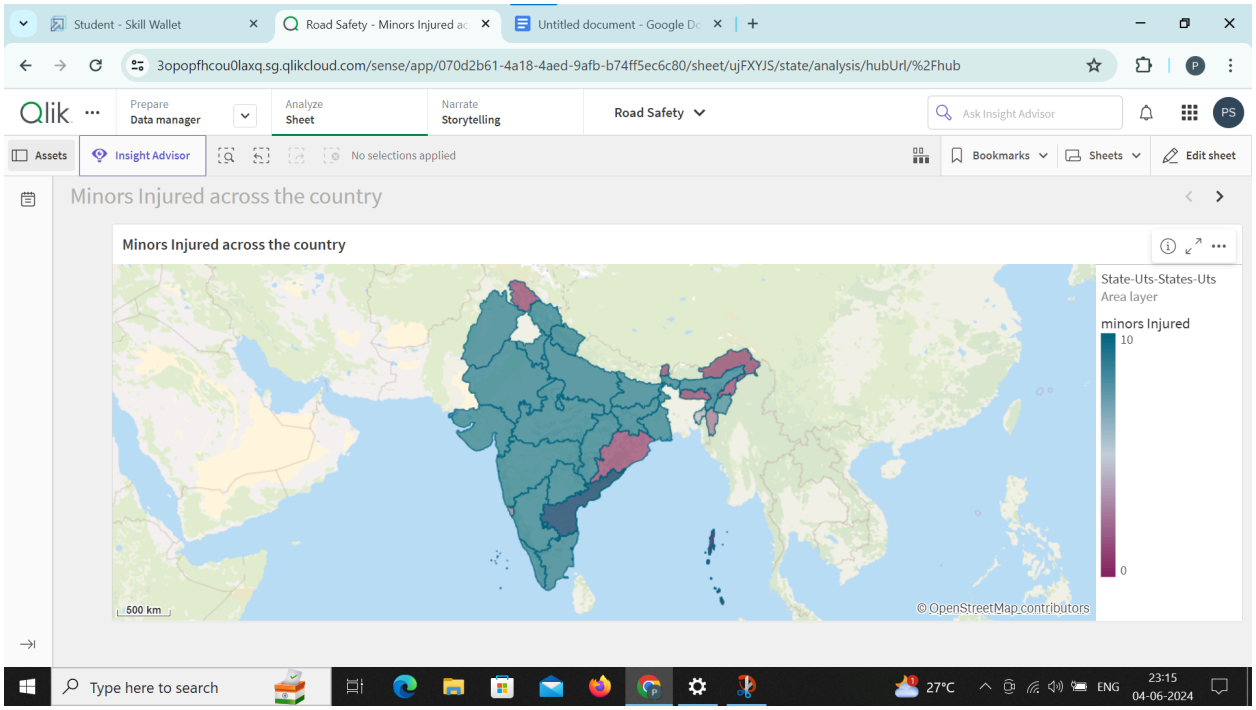
1.7: Road Users Killed: Vehicle Distribution



1.8: Correlation - Speeding and Number of accidents



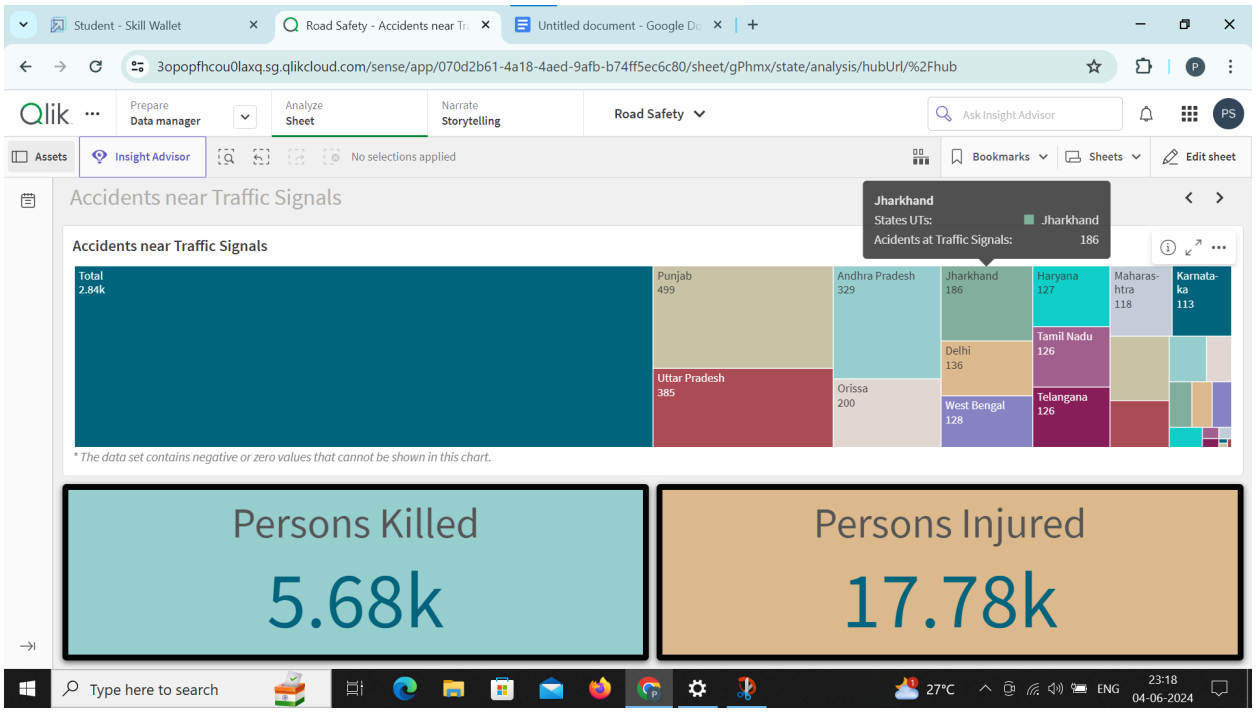
1.9: Minors Injured across the country



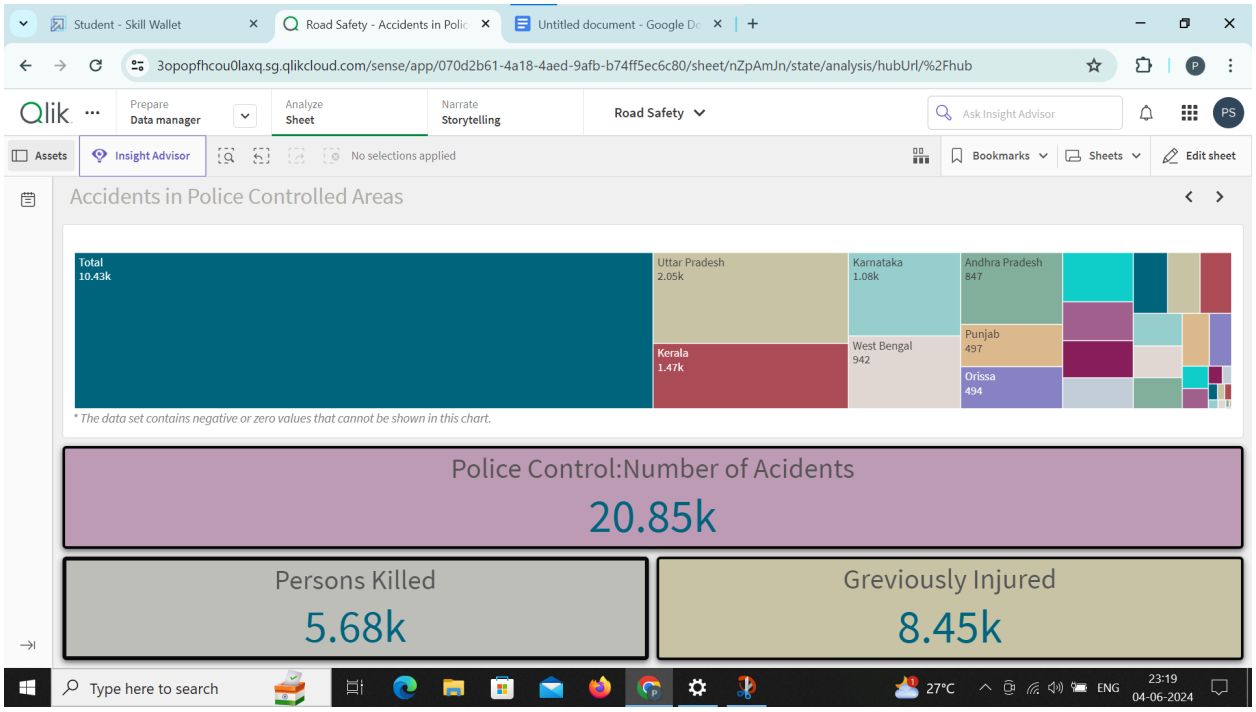
Dashboard

Responsive And Design Of Dashboard

Dashboard: Accidents near Traffic Signals

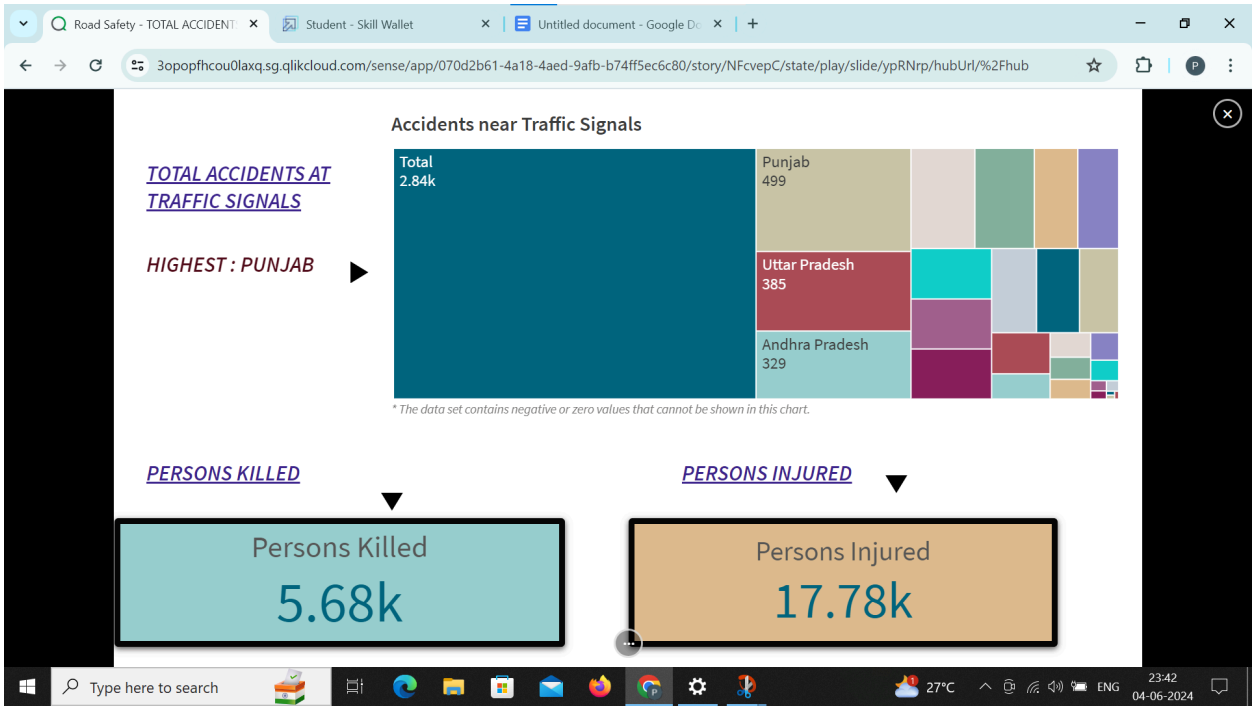


Dashboard: Accidents in Police Controlled Areas



Storytelling

Design Of Story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Student - Skill Wallet
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Accidents near Traffic Signals
TOTAL ACCIDENTS AT TRAFFIC SIGNALS
HIGHEST : PUNJAB
Total 2.84k
Punjab 499
Uttar Pradesh 385
Andhra Pradesh 329
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PERSONS KILLED
PERSONS INJURED
Persons Killed
5.68k
Persons Injured
17.78k
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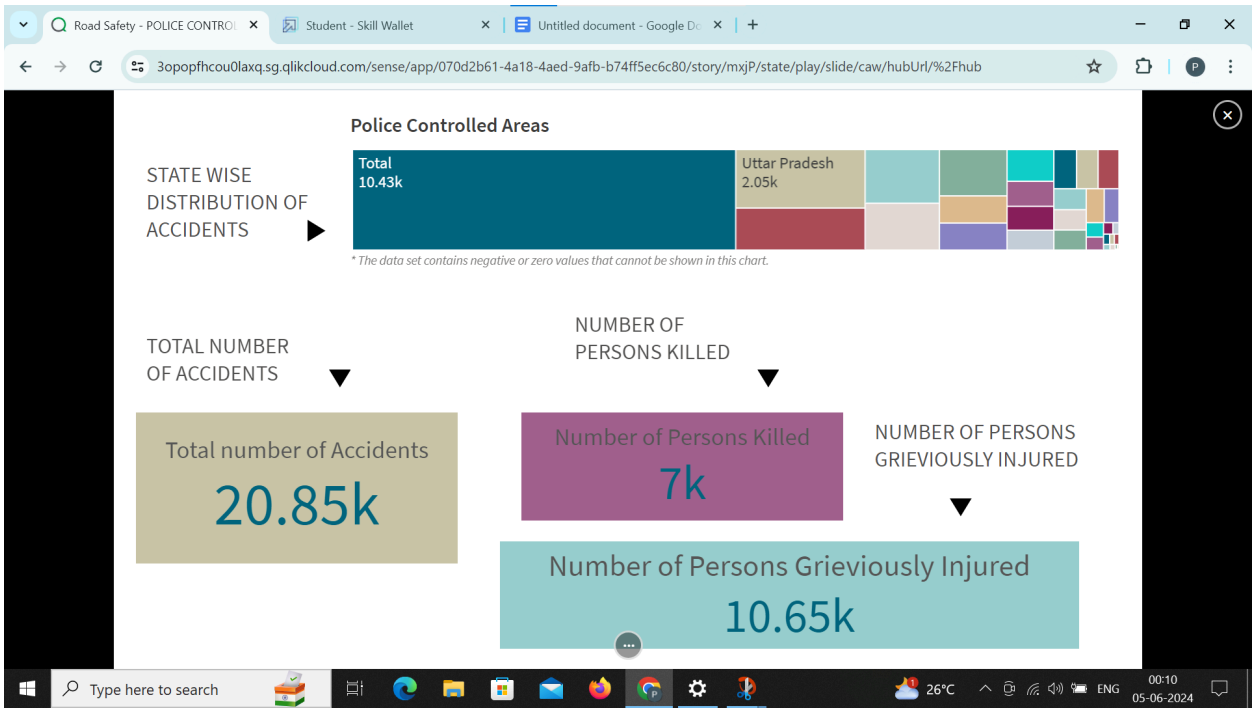
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Police Controlled Areas
STATE WISE DISTRIBUTION OF ACCIDENTS
Total 10.43k
Uttar Pradesh 2.05k
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TOTAL NUMBER OF ACCIDENTS
NUMBER OF PERSONS KILLED
NUMBER OF PERSONS GRIEVIOUSLY INJURED
Total number of Accidents
20.85k
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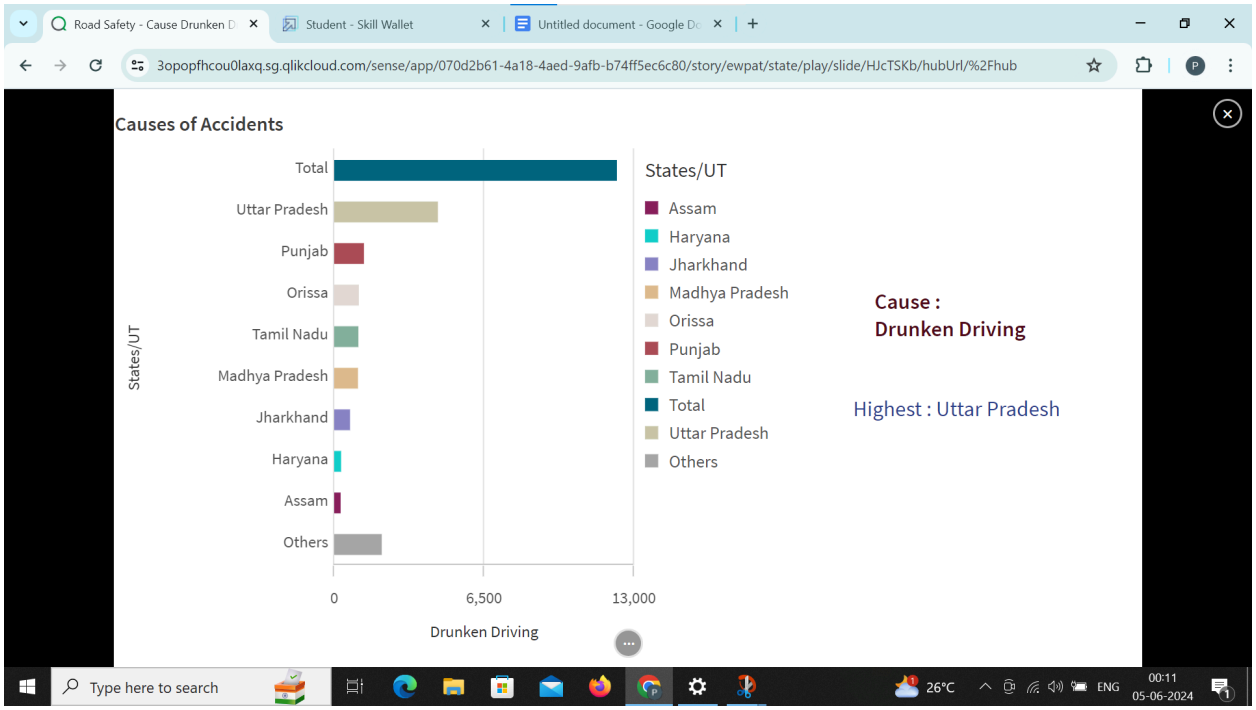
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Causes of Accidents
Total
Uttar Pradesh
Punjab
Orissa
Tamil Nadu
Madhya Pradesh
Jharkhand
Haryana
Assam
Others
States/UT
0
6,500
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Drunken Driving
States/UT
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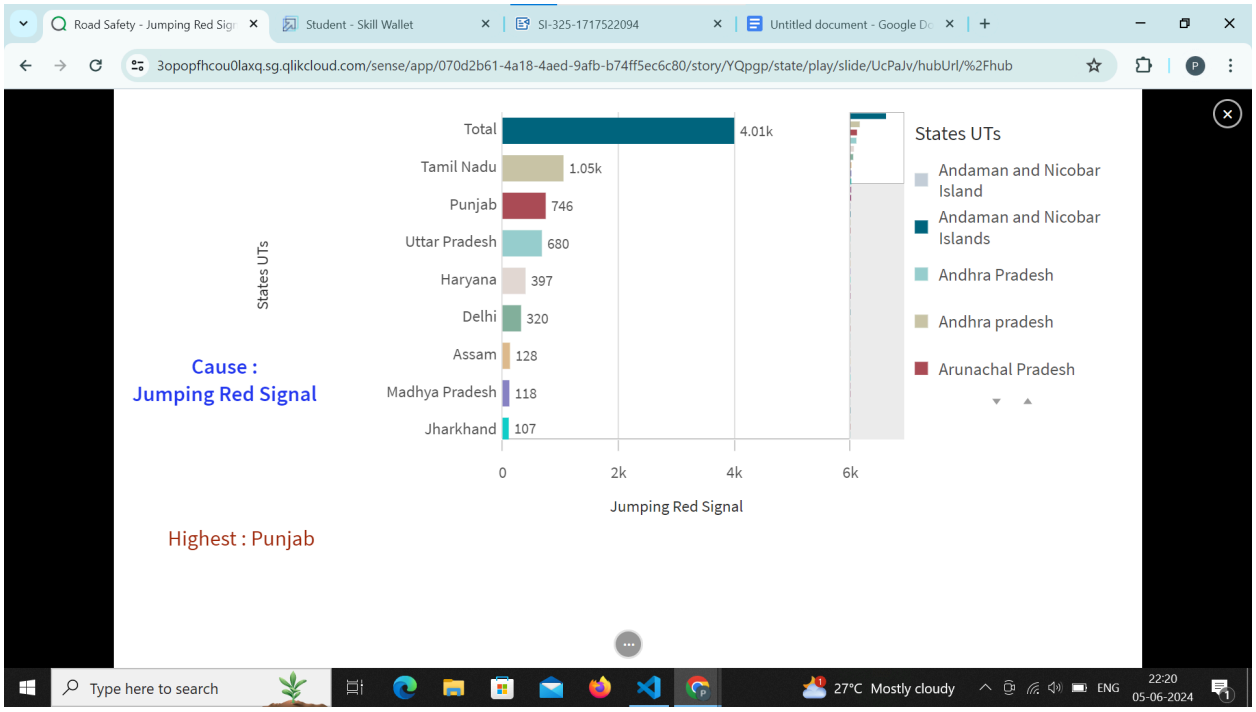
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Punjab
Uttar Pradesh
Haryana
Delhi
Assam
Madhya Pradesh
Jharkhand
4.01k
1.05k
746
680
397
320
128
118
107
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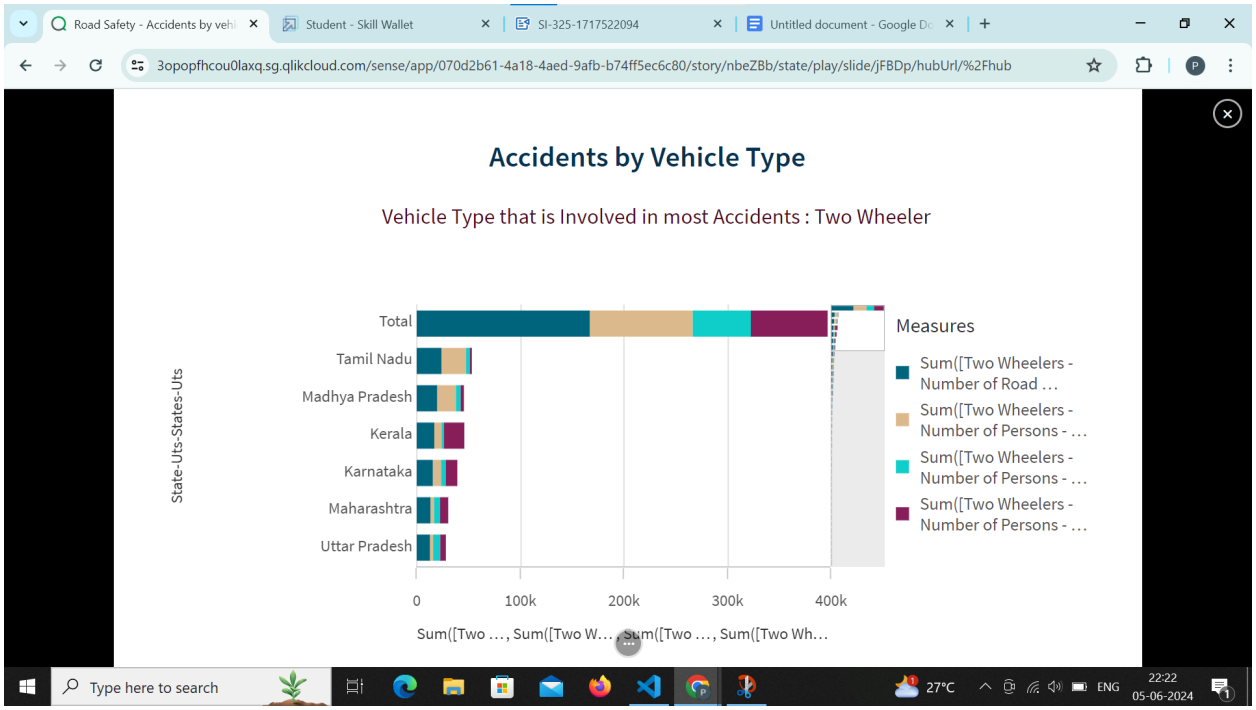
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Accidents by Vehicle Type
Vehicle Type that is Involved in most Accidents : Two Wheeler
State-Uts-States-Uts
Total
Tamil Nadu
Madhya Pradesh
Kerala
Karnataka
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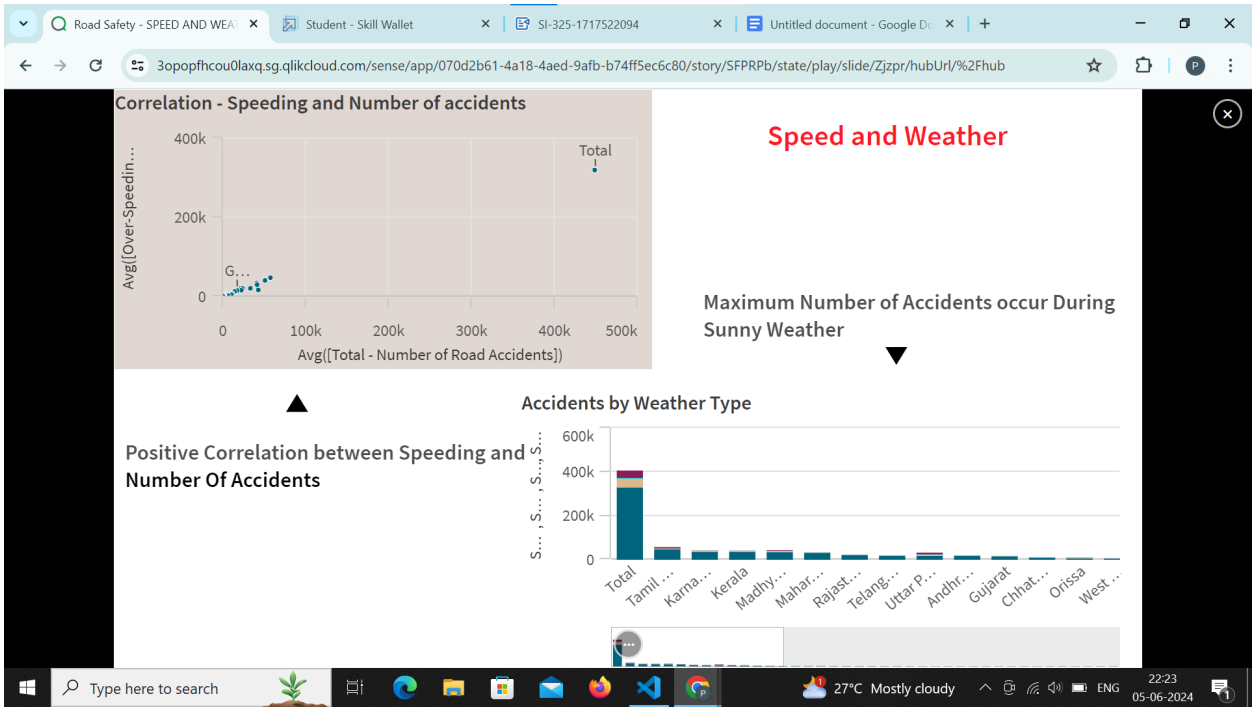
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Correlation - Speeding and Number of accidents
Avg([Over-Speedin...
400k
200k
0
Total
G...
0
100k
200k
300k
400k
500k
Avg([Total - Number of Road Accidents])
Speed and Weather
Maximum Number of Accidents occur During Sunny Weather
Positive Correlation between Speeding and Number Of Accidents
Accidents by Weather Type
S..., S..., S..., S...
600k
400k
200k
0
Total
Tamil ...
Karna...
Kerala
Madhy...
Mahar...
Rajast...
Telang...
Uttar P...
Andhr...
Gujarat
Chhat...
Orissa
West ...
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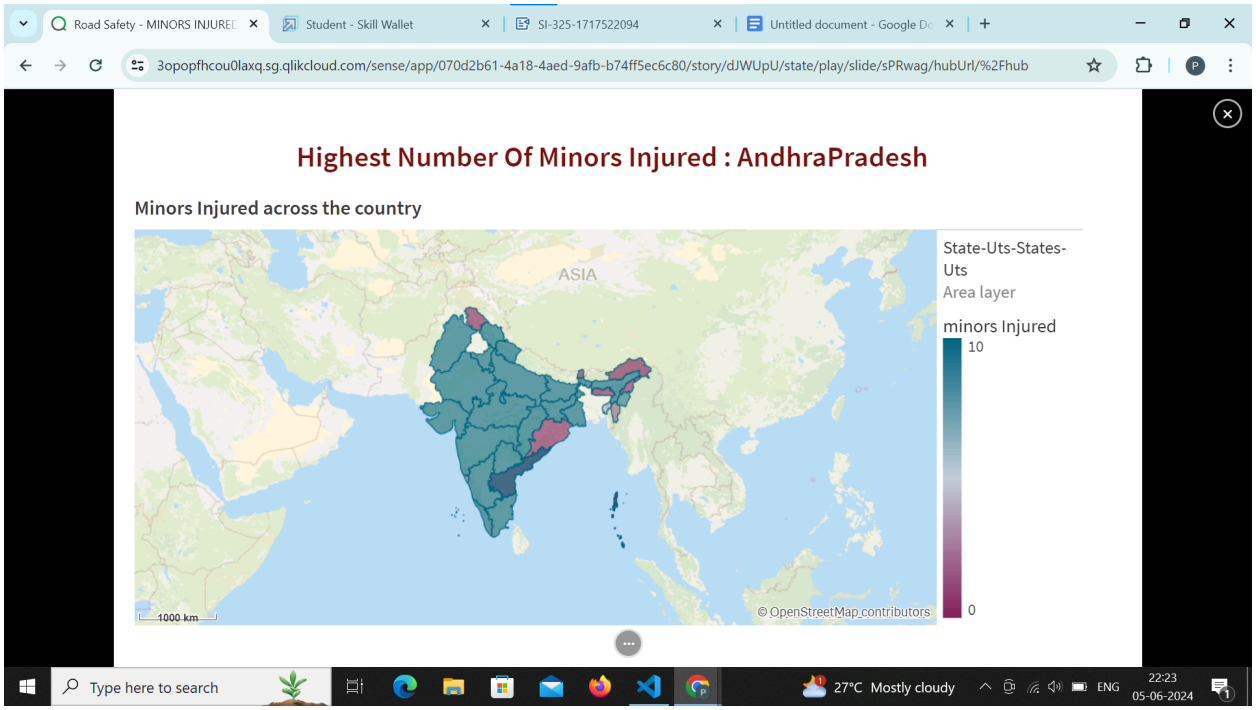
ENG
22:23
05-06-2024


Road Safety - MINORS INJURED
Student - Skill Wallet
SI-325-1717522094
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Highest Number Of Minors Injured : AndhraPradesh
Minors Injured across the country
ASIA
State-Uts-States-Uts
Area layer
minors Injured
10
0
1000 km
© OpenStreetMap contributors
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ENG
22:23
05-06-2024


Road Safety - PEDESTRIANS KIL
Student - Skill Wallet
SI-325-1717522094
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Pedestrian Killed : Age
Age Groups Killed
1.., Age ... , Seni... , 2.., 4.., M..
6k
4k
2k
0
Andaman a...
Andaman a...
Andhra Pra...
Andhra pra...
Arunachal P...
Assam
Bihar
Chandigarh
Chhattisgarh
Dadra and ...
Daman and ...
Delhi
Goa
Gujarat
Haryana
Himachal Pr...
Jammu and...
Jharkhand
Measures
18-25
Age Not Known
Senior Citizens
State-Uts-States-Uts
Age Group With Highest Number Of Pedestrians Killed : 45-60
Type here to search
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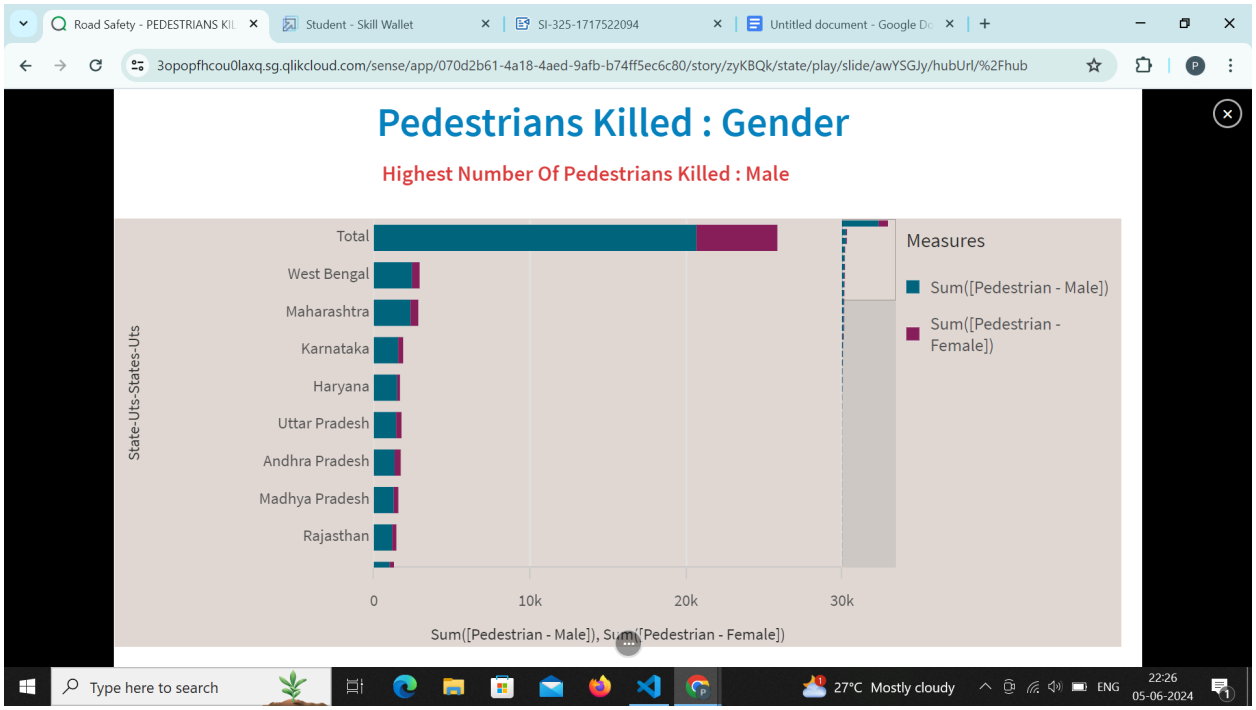
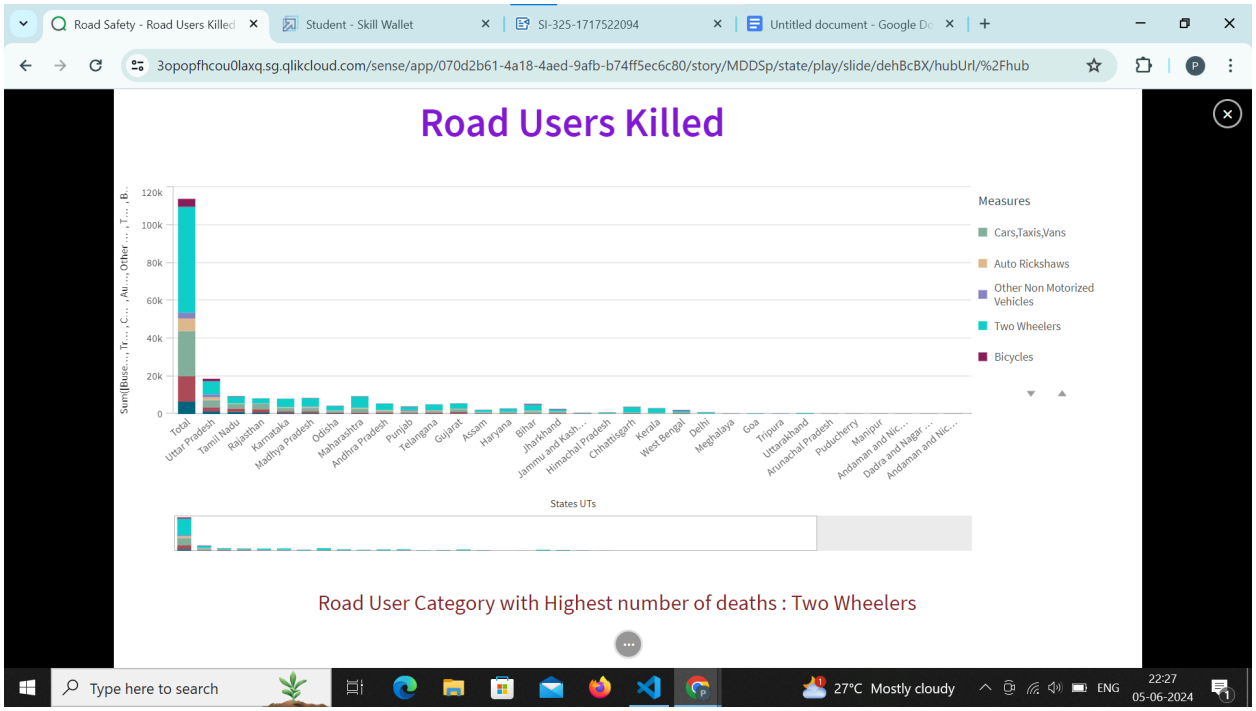
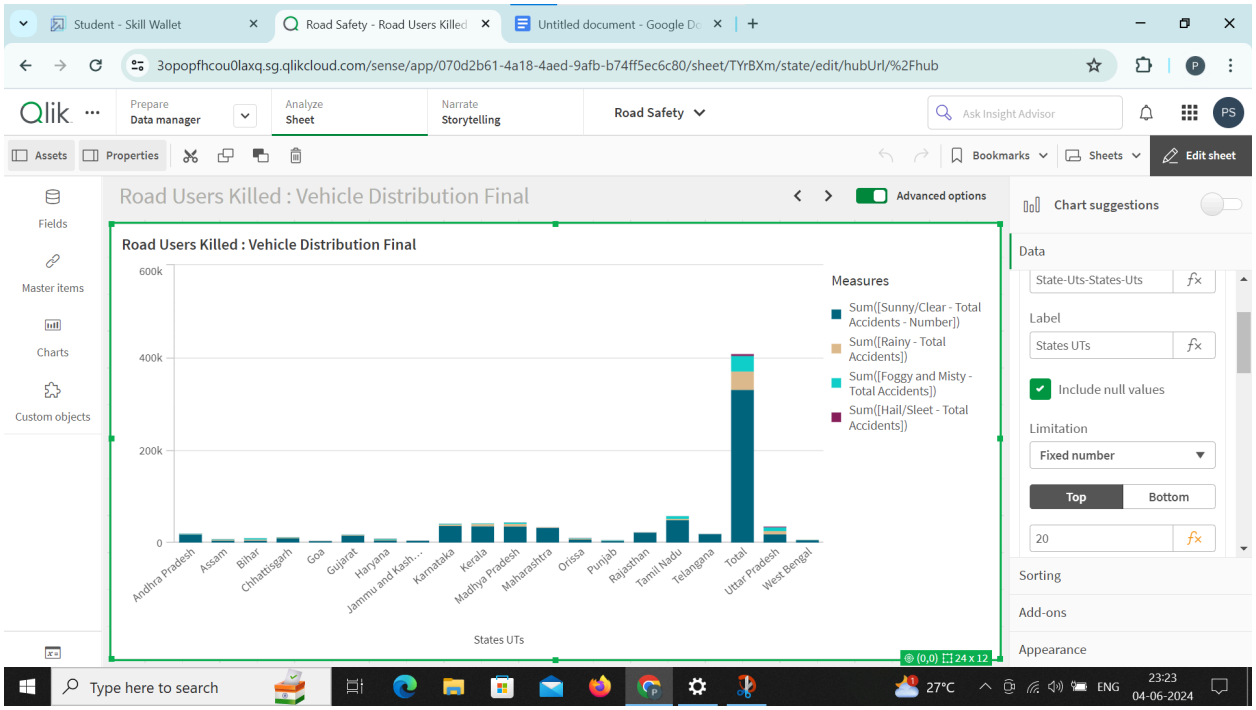
ENG
22:25
05-06-2024



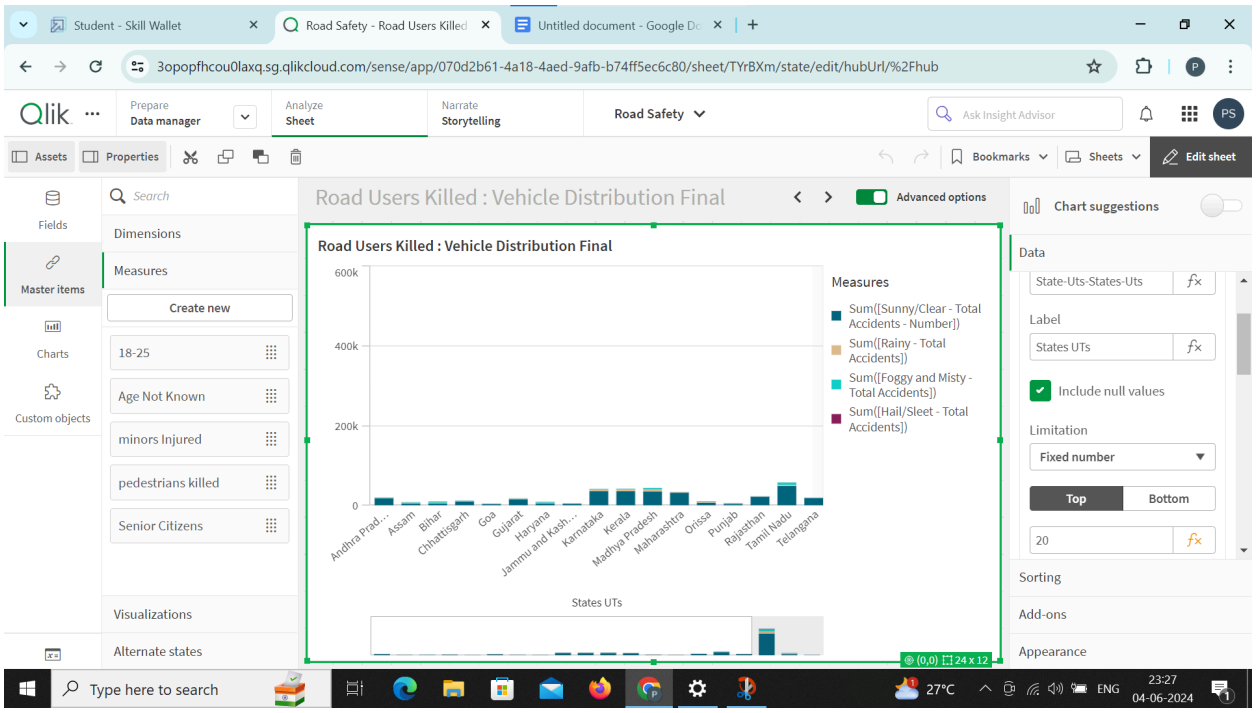


Performance Testing

Application Of Data Filters

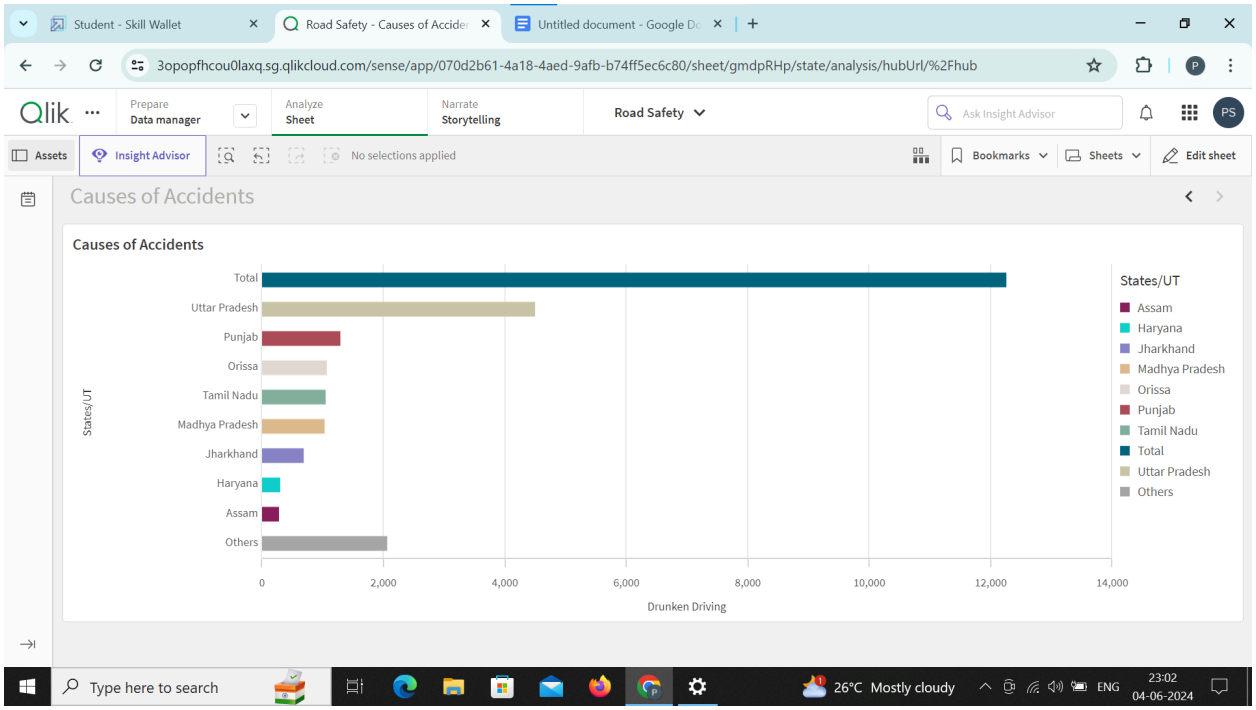


Use Of Master Items/Calculated Fields

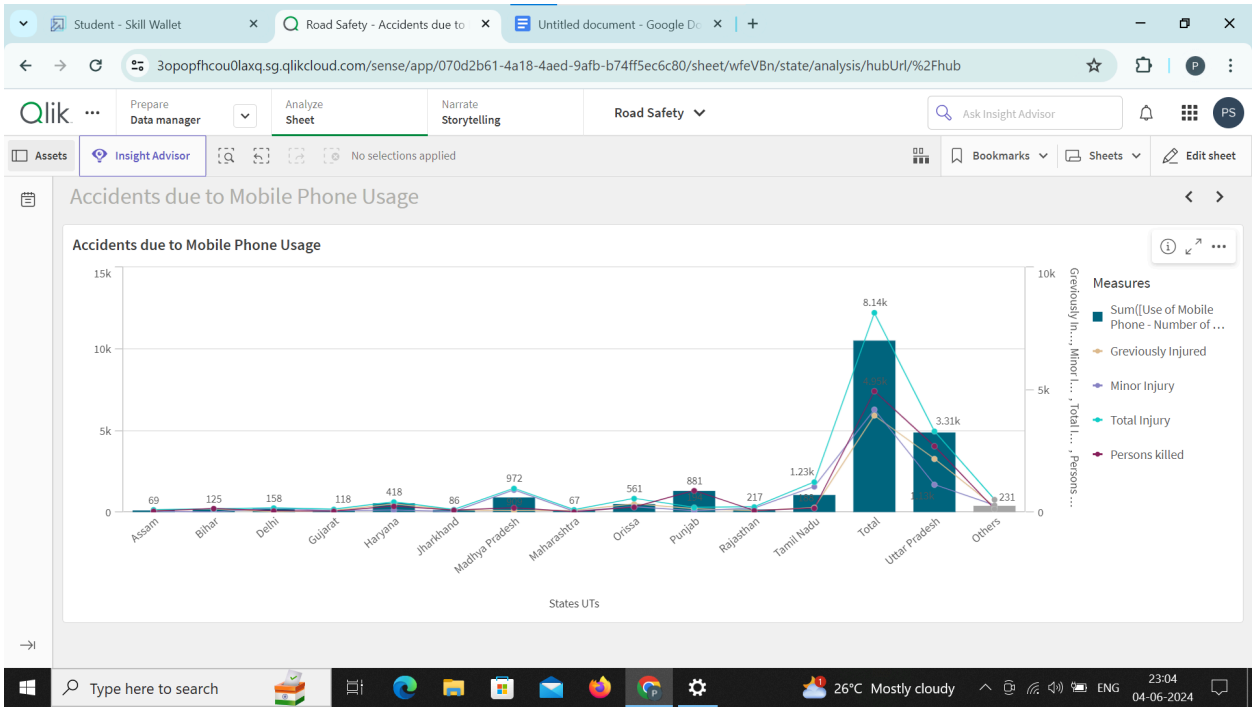


Number Of Graphs/ Visualizations

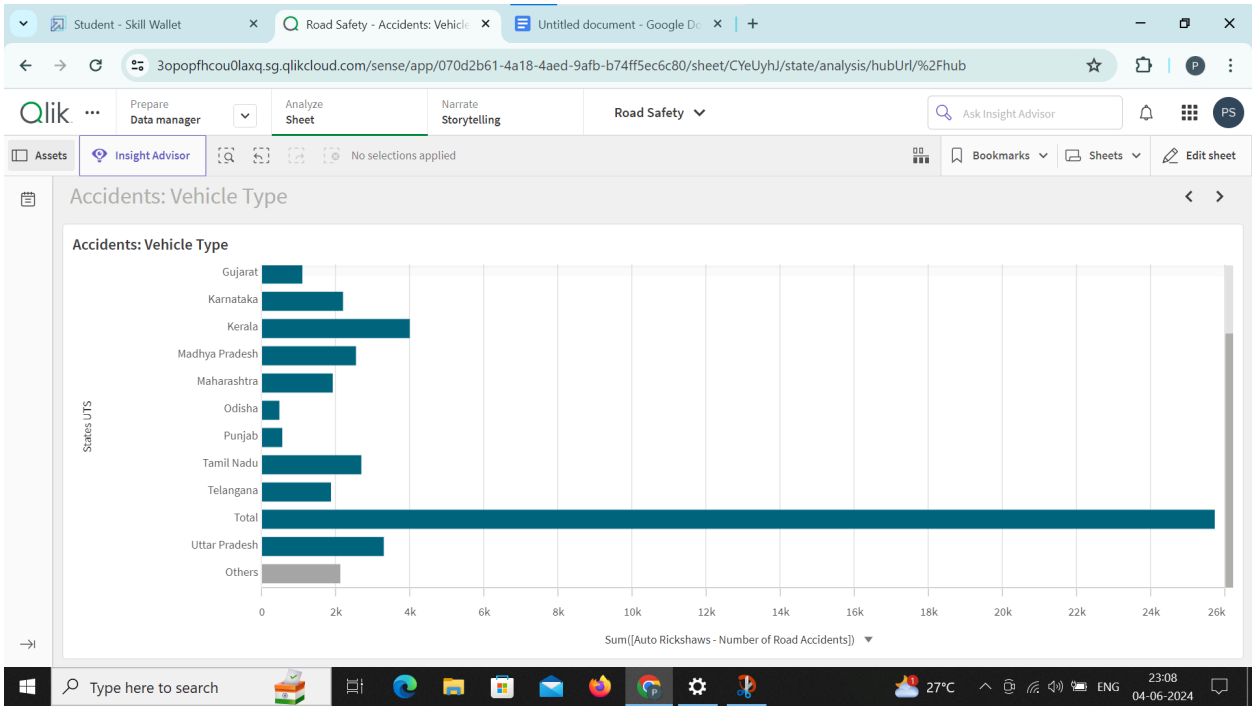
Accidents due to Drunken Driving



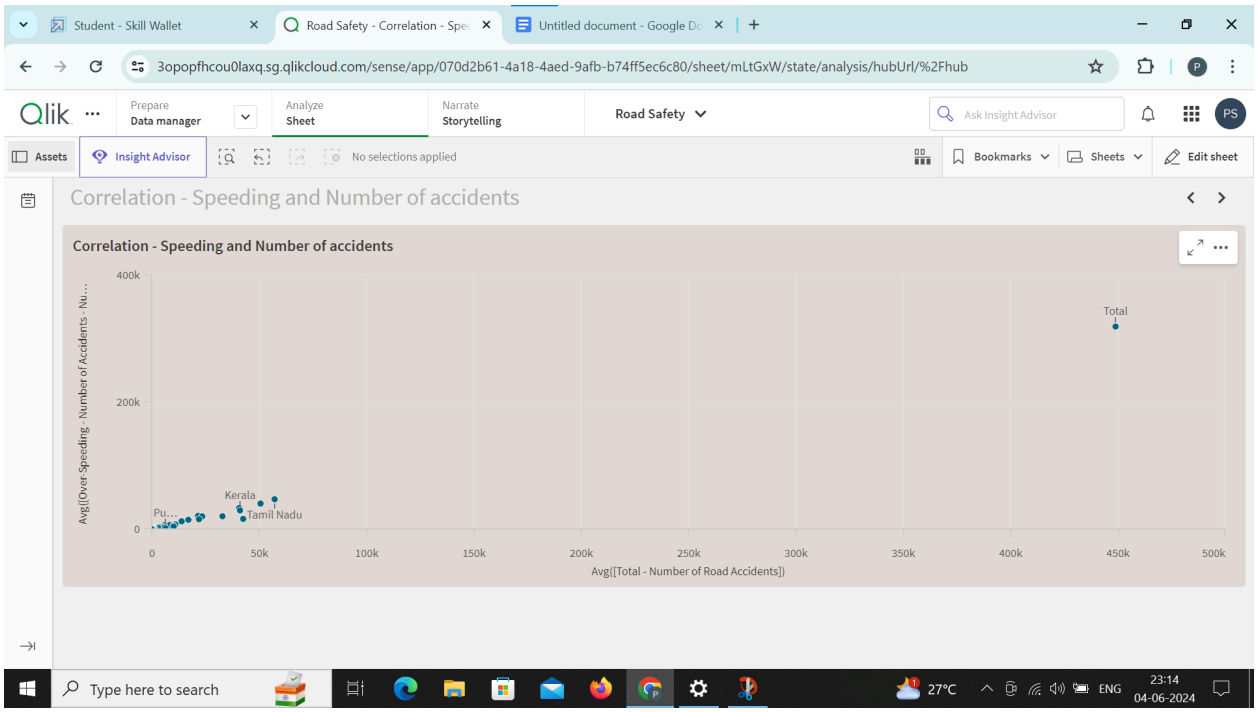
State-wise Mobile Phone Usage



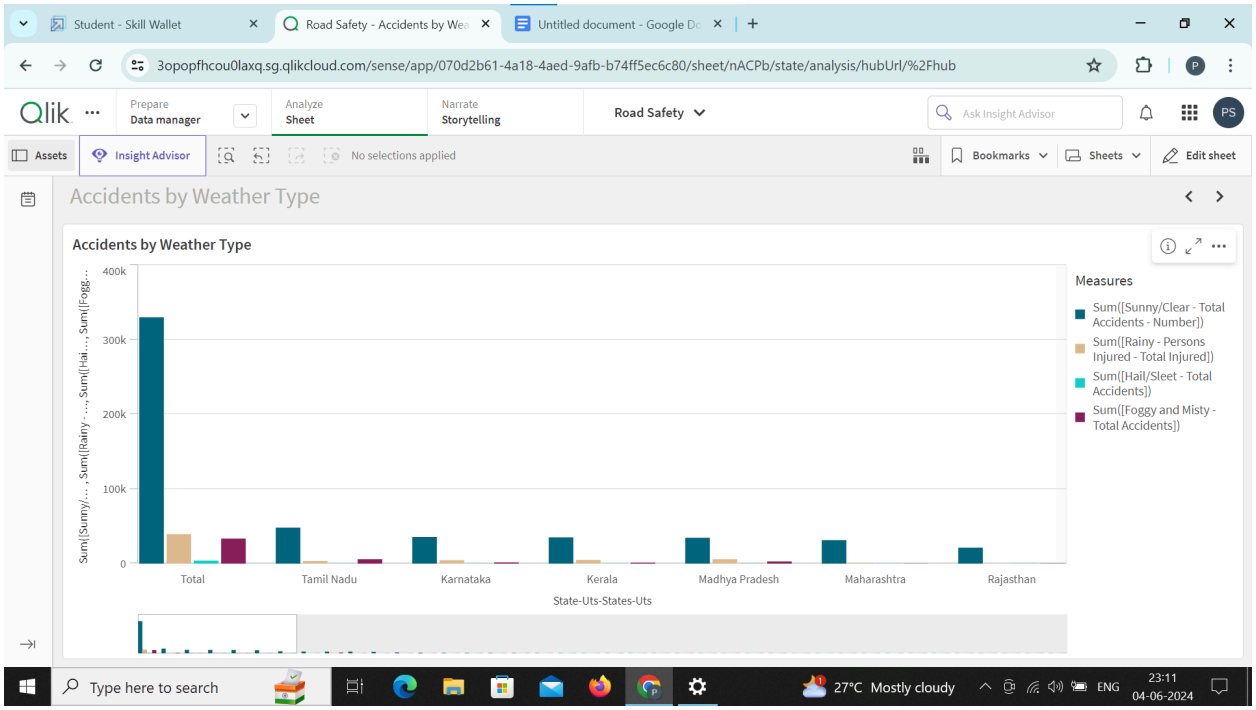
Vehicle Contribution towards Total Accident



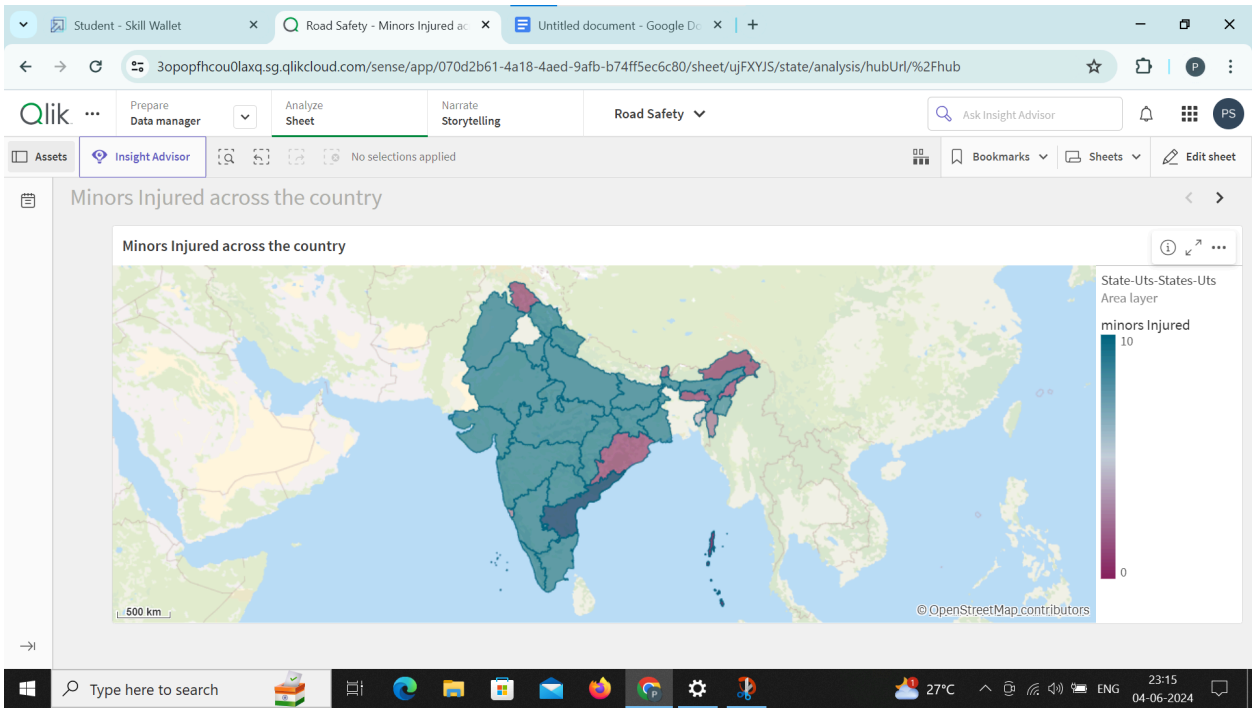
Correlation - Speeding and Number of accidents



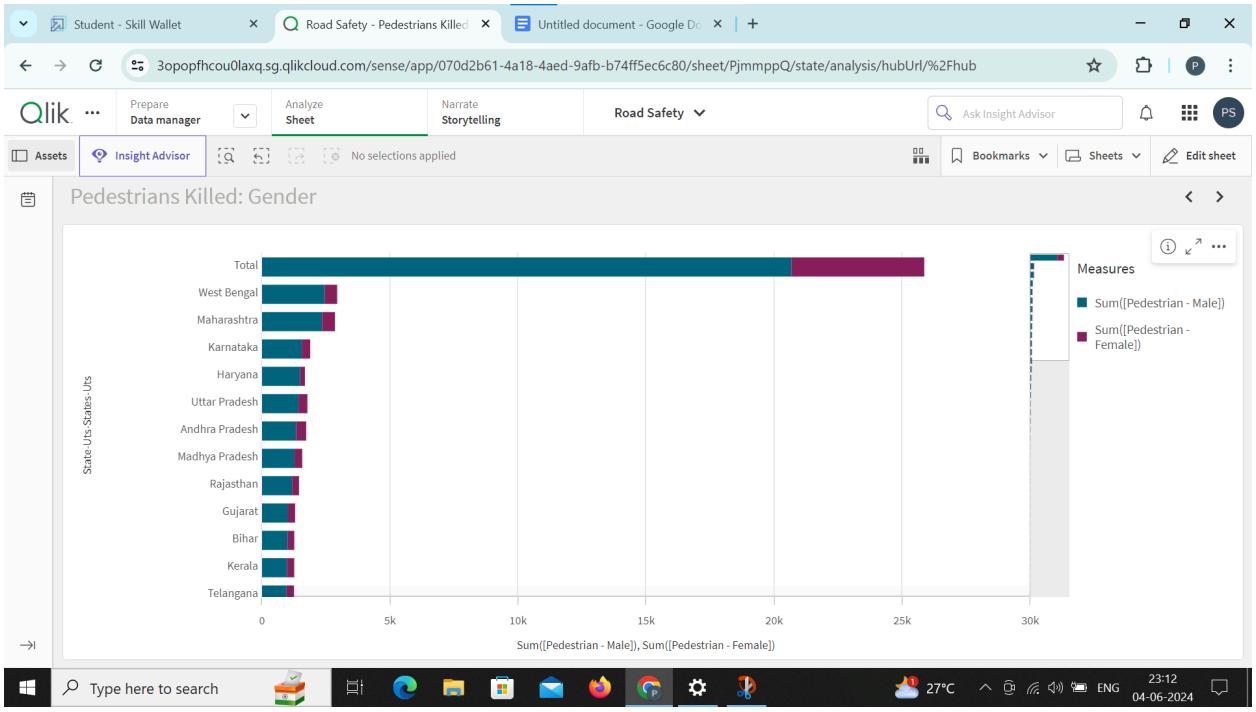
Accidents by Weather Type



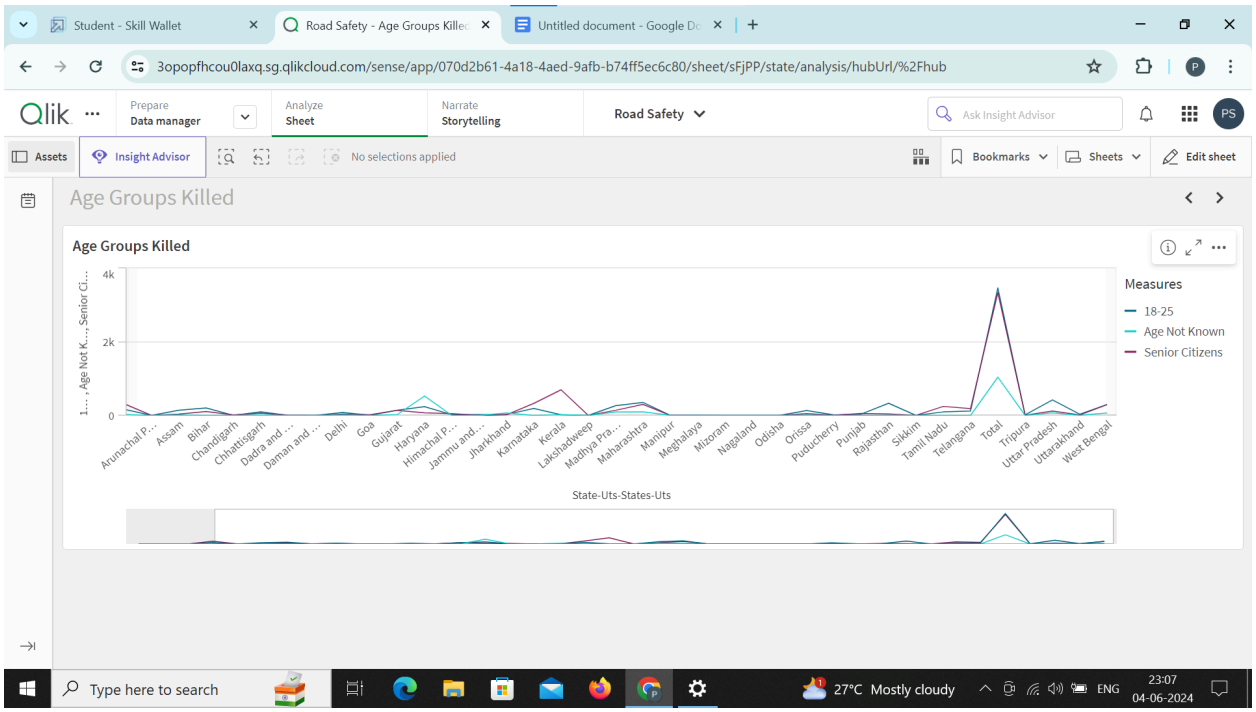
Minors Injured across the country



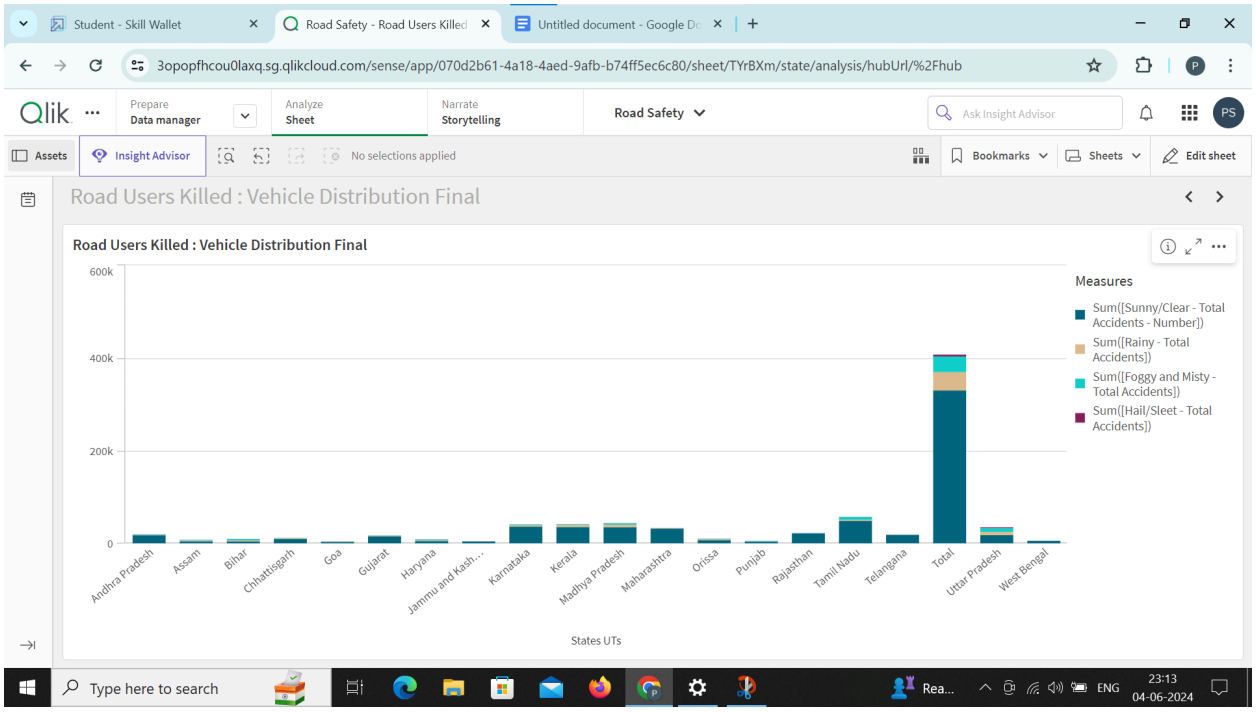
Pedestrians Killed: Gender



Pedestrians Killed: Age groups



Road Users Killed: Vehicle Distribution



Project Demonstration & Documentation

Activity 1: Recorded video
Activity 2: Project Documentation.

GITHUB LINK:

https://github.com/prithikasathivel/Qlik-Analysis-Of-Road-Safety-And-Accident-Patterns-In-India.git