

Qlik Analysis of Road Safety and Accident Patterns in India

Category: Data Analytics

Skills Required:

Qlik

Project Description:

This project leverages Qlik's data analytics platform to analyze road safety and accident trends in India. By integrating multiple data sources, including traffic data, accident records, weather information, road infrastructure details, and demographic data, the project aims to uncover patterns, identify accident-prone areas, and understand the factors contributing to road accidents. The insights gained will be instrumental for stakeholders, such as government agencies, transportation authorities, and road safety organizations, in making informed decisions to enhance road safety, reduce accident rates, and save lives.

Scenario 1: Hotspot Identification Qlik's analytics capabilities allow for the identification of regions or specific road segments in India with a high incidence of accidents. By correlating accident data with variables such as traffic density, road conditions, and time of day, the platform can identify accident hotspots. This critical information enables targeted interventions like enhanced traffic surveillance, improved road signage, and adjusted speed limits to mitigate accident risks.

Scenario 2: Trend Analysis Through historical accident data analysis, Qlik can identify recurring patterns and factors leading to road accidents. This involves examining accident types (e.g., vehicle collisions, pedestrian accidents), seasonal variations, and driver behaviors (e.g., speeding, distracted driving). The insights derived can inform the development of awareness campaigns, driver education programs, and policy changes aimed at addressing the root causes of accidents.

Scenario 3: Predictive Modeling Utilizing predictive analytics, Qlik can anticipate potential accident scenarios based on real-time data inputs. By factoring in variables like weather conditions, traffic flow patterns, and historical accident data, the platform can generate early warnings and suggest proactive measures to prevent accidents. This predictive capability

enables authorities to deploy resources efficiently and implement safety measures in advance.

Project Flow

The activities listed below must be completed:

1. Define Problem / Problem Understanding

- **Specify the business problem**
- **Business requirements**
- **Literature Survey**
- **Social or Business Impact**

2. Data Collection

- **Collect the dataset**
- **Connect Data with Qlik Sense**

3. Data Preparation

- **Prepare the Data for Visualization**

4. Data Visualizations

- **Number of Unique Visualizations**

5. Dashboard

- **Responsive and Design of Dashboard**

6. Story

- **Story Creation**

7. Performance Testing

- **Amount of Data Rendered to DB**
- **Utilization of Data Filters**
- **Number of Calculation Fields/Master Items**
- **Number of Visualizations/Graphs**

8. Project Demonstration & Documentation

- **Record explanation Video for project end-to-end solution**

- Project Documentation - Step by step project development procedure

Define Problem / Problem Understanding

Specify the business problem

Technological advancement in transportation has minimised the distances but has increased the risk to life. Every year, accidents result in loss of lakhs of lives and serious injuries to crores of people. A study to analyse road safety and accident trends in India is to be conducted using Qlik Sense, a data analytics platform. This study involves examining data related to road incidents, such as types of accidents, locations, causes, and potentially factors contributing to road safety or risks. The use of Qlik Sense is a data-driven approach, utilizing visualizations and insights generated from the analysis to understand patterns and potentially inform strategies for improving road safety in India.

Business requirements

The analysis aims to provide valuable insights into user demographics, accident patterns, and problem areas. The primary focus is on creating interactive and visually compelling dashboards to support strategic planning and operational improvements. The insights derived from this analysis will be instrumental in making informed decisions, implementing better safety protocols, and ensuring compliance with regulations.

Literature Survey

A literature survey for the Road Safety and Accident Patterns analysis would involve researching and reviewing previous studies, articles, reports and figures on the topic. This could include information on the methods and techniques used for analysing accidents data, as well as the results and conclusions of these studies. It is recommended to explore academic databases such as PubMed, IEEE Xplore, Google Scholar, and institutional repositories. Additionally, government reports and publications can provide insights into the latest developments.

Social Impact

Social Impact Analysis:

- Create visualizations to display the demographic distribution of accidents across the country.
- Compare the severity of accidents in different areas of traffic control.
- Explore any correlation between speeding, weather, and total accidents.
- Identify the leading causes of accidents.
- Examine the distribution of age groups and gender of the victims.
- Investigate the contribution of diverse types of vehicles to the total number of accidents.

Data Collection & Extraction from Database

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, evaluate outcomes and generate insights from the data.

Downloading the dataset

Please use the link to download the dataset

ROAD ACCIDENTS IN INDIA | Kaggle..

Kaggle is the world's largest data science community with powerful tools and resources to help you achieve your data science goals...

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

Understand the data

Data contains all the meta information regarding the columns described in the Excel files.

Description of the Dataset:

There are nine data files that have been converted to Excel worksheets(.xlsx) for ease of use with respect to Qlik Sense. The list of files is as follows:

1. Pedestrians: State/UT-wise pedestrians involved in accidents according to classification of age and gender during 2019.

Columns of the dataset:

1. State/UT
2. Less than 18 years – Male
3. Less than 18 years – Female
4. 18-25 Years – Male
5. 18-25 Years – Female
6. 25-35 Years – Male
7. 25-35 Years – Female
8. 35-45 Years – Male
9. 35-45 Years – Female

- 10. 45-60 Years – Male**
- 11. 45-60 Years – Female**
- 12. 60 and Above – Male**
- 13. 60 and Above – Female**
- 14. Age not known – Male**
- 15. Age not known – Female**
- 2. Pedestrians killed: State/UT-wise pedestrians killed according to classification of age and gender during 2019.**
Columns of the dataset:
 - 1. State/UT**
 - 2. Less than 18 years - Killed - Male**
 - 3. Less than 18 years - Killed - Female**
 - 4. 18-25 Years - Killed - Male**
 - 5. 18-25 Years - Killed - Female**
 - 6. 25-35 Years - Killed - Male**
 - 7. 25-35 Years - Killed - Female**
 - 8. 35-45 Years - Killed - Male**
 - 9. 35-45 Years - Killed - Female**
 - 10. 45-60 Years - Killed - Male**
 - 11. 45-60 Years - Killed - Female**
 - 12. 60 and Above - Killed - Male**
 - 13. 60 and Above - Killed - Female**
 - 14. Age not known - Killed – Male**
 - 15. Age not known - Killed – Female**
- 3. Pedestrians killed – Impacting vehicles: State/UT-wise Pedestrians killed in accidents classified by the type of impacting vehicles during 2019**
Columns of the dataset:
 - 1. States/UTs**
 - 2. Bicycles**
 - 3. Two Wheelers**
 - 4. Auto Rickshaws**
 - 5. Cars, Taxis, Vans and LMV**
 - 6. Trucks/Lorries**
 - 7. Buses**
 - 8. Other Non-Motorized Vehicles (E-rickshaw etc.)**
 - 9. Others**
 - 10. Total**
- 4. Traffic Control Type: State/UT-wise accidents classified according to the type of traffic control during 2019**

Columns of the dataset:

1. States/UTs
 2. Traffic Light Signal - Total number of Accidents
 3. Traffic Light Signal - Persons Killed
 4. Traffic Light Signal - Persons Injured - Grievously Injured
 5. Traffic Light Signal - Persons Injured - Minor Injury
 6. Traffic Light Signal - Persons Injured - Total Injured
 7. Police Controlled - Total number of Accidents
 8. Police Controlled - Persons Killed
 9. Police Controlled - Persons Injured - Grievously Injured
 10. Police Controlled - Persons Injured - Minor Injury
 11. Police Controlled - Persons Injured - Total Injury
 12. Stop Sign - Total number of Accidents
 13. Stop Sign - Persons Killed
 14. Stop Sign - Persons Injured - Grievously Injured
 15. Stop Sign - Persons Injured - Minor Injury
 16. Stop Sign - Persons Injured - Total Injured
 17. Flashing Signal/Blinker - Total number of Accidents
 18. Flashing Signal/Blinker - Persons Killed
 19. Flashing Signal/Blinker - Persons Injured - Grievously Injured
 20. Flashing Signal/Blinker - Persons Injured - Minor Injury
 21. Flashing Signal/Blinker - Persons Injured - Total Injured
 22. Uncontrolled - Total number of Accidents – Number
 23. Uncontrolled - Total number of Accidents – Rank
 24. Uncontrolled - Persons Killed – Number
 25. Uncontrolled - Persons Killed – Rank
 26. Uncontrolled - Persons Injured - Grievously Injured
 27. Uncontrolled - Persons Injured - Minor Injury
 28. Uncontrolled - Persons Injured - Total Injured
 29. Others - Total number of Accidents
 30. Others - Persons Killed
 31. Others - Persons Injured - Grievously Injured
 32. Others - Persons Injured - Minor Injury
 33. Others - Persons Injured - Total Injured
 5. Weather: State/UT-wise accidents classified according to the type of weather and severity of the accidents during 2019
- Columns of the dataset:**
1. States/UTs
 2. Sunny/Clear - Total Accidents – Number

3. Sunny/Clear - Total Accidents – Rank
 4. Sunny/Clear - Persons Killed – Number
 5. Sunny/Clear - Persons Killed – Rank
 6. Sunny/Clear - Persons Injured - Grievously Injured
 7. Sunny/Clear - Persons Injured - Minor Injury
 8. Sunny/Clear - Persons Injured - Total Injured
 9. Rainy - Total Accidents
 10. Rainy - Persons Killed
 11. Rainy - Persons Injured - Grievously Injured
 12. Rainy - Persons Injured - Minor Injury
 13. Rainy - Persons Injured - Total Injured
 14. Foggy and Misty - Total Accidents
 15. Foggy and Misty - Persons Killed
 16. Foggy and Misty - Persons Injured - Grievously Injured
 17. Foggy and Misty - Persons Injured - Minor Injury
 18. Foggy and Misty - Persons Injured - Total Injured
 19. Hail/Sleet - Total Accidents
 20. Hail/Sleet - Persons Killed
 21. Hail/Sleet - Persons Injured - Grievously Injured
 22. Hail/Sleet - Persons Injured - Minor Injury
 23. Hail/Sleet - Persons Injured - Total Injured
 24. Others - Total Accidents
 25. Others - Persons Killed
 26. Others - Persons Injured - Grievously Injured
 27. Others - Persons Injured - Minor Injury
 28. Others - Persons Injured - Total Injured
6. **Killed on Two Wheelers - Impacting vehicles: State/UT-wise Two Wheelers killed in accidents classified by the type of impacting vehicles during 2019**
- Columns of the dataset:**
1. States/UTs
 2. Bicycles
 3. Two Wheelers
 4. Auto Rickshaws
 5. Cars, Taxis, Vans and LMV
 6. Trucks/Lorries
 7. Buses
 8. Other Non-Motorized Vehicles (E-rickshaw etc.)
 9. Others
 10. Total

7. Road Users Killed – Gender: State/UT-wise male and female persons killed in road accidents in terms of road user categories during 2019

Columns of the dataset:

1. States/UTs
 2. Pedestrian – Male
 3. Pedestrian – Female
 4. Pedestrian – Total
 5. Bicycles – Male
 6. Bicycles – Female
 7. Bicycles – Total
 8. Two Wheelers – Male
 9. Two Wheelers – Female
 10. Two Wheelers – Total
 11. Two Wheelers – Rank
 12. Auto Rickshaws – Male
 13. Auto Rickshaws – Female
 14. Auto Rickshaws – Total
 15. Cars, taxies Vans and LMV – Male
 16. Cars, taxies Vans and LMV – Female
 17. Cars, taxies Vans and LMV – Total
 18. Trucks/Lorries – Male
 19. Trucks/Lorries – Female
 20. Trucks/Lorries – Total
 21. Buses – Male
 22. Buses – Female
 23. Buses – Total
 24. Other non-Motor vehicles(E-Rickshaw) – Male
 25. Other non-Motor vehicles(E-Rickshaw) – Female
 26. Other non-Motor vehicles(E-Rickshaw) – Total
 27. Others – Male
 28. Others – Female
 29. Others - Total
- 8. Causes: State/UT-wise Accident victims classified according to the causes of accidents during 2019**

Columns of the dataset:

1. States/UTs
2. Over-Speeding - Number of Accidents – Number
3. Over-Speeding - Number of Accidents – Rank
4. Over-Speeding - Persons Killed – Number

5. Over-Speeding - Persons Killed – Rank
6. Over-Speeding - Persons Injured - Grievously Injured
7. Over-Speeding - Persons Injured - Minor Injury
8. Over-Speeding - Persons Injured - Total Injured
9. Drunken Driving/ Consumption of alcohol and drug - Number of Accidents
10. Drunken Driving/ Consumption of alcohol and drug - Persons Killed
11. Drunken Driving/ Consumption of alcohol and drug - Persons Injured - Grievously Injured
12. Drunken Driving/ Consumption of alcohol and drug - Persons Injured - Minor Injury
13. Drunken Driving/ Consumption of alcohol and drug - Persons Injured - Total Injured
14. Driving on Wrong side - Number of Accidents
15. Driving on Wrong side - Persons Killed
16. Driving on Wrong side - Persons Injured - Grievously Injured
17. Driving on Wrong side - Persons Injured - Minor Injury
18. Driving on Wrong side - Persons Injured - Total Injured
19. Jumping Red Light - Number of Accidents
20. Jumping Red Light - Persons Killed
21. Jumping Red Light - Persons Injured - Grievously Injured
22. Jumping Red Light - Persons Injured - Minor Injury
23. Jumping Red Light - Persons Injured - Total Injured
24. Use of Mobile Phone - Number of Accidents
25. Use of Mobile Phone - Persons Killed
26. Use of Mobile Phone - Persons Injured - Grievously Injured
27. Use of Mobile Phone - Persons Injured - Minor Injury
28. Use of Mobile Phone - Persons Injured - Total Injured
29. Others - Number of Accidents
30. Others - Persons Killed
31. Others - Persons Injured - Grievously Injured
32. Others - Persons Injured - Minor Injury
33. Others - Persons Injured - Total Injured
9. Accidents – Severity and Vehicles: State/UT-wise vehicle type of victims and severity of accidents during 2019
Columns of the dataset:
 1. States/UTs
 2. Pedestrian - Number of Road Accidents
 3. Pedestrian - Number of Persons – Killed
 4. Pedestrian - Number of Persons - Grievously Injured
 5. Pedestrian - Number of Persons - Minor Injured
 6. Bicycles - Number of Road Accidents
 7. Bicycles - Number of Persons – Killed

- 8. Bicycles - Number of Persons - Grievously Injured**
- 9. Bicycles - Number of Persons - Minor Injured**
- 10. Two Wheelers - Number of Road Accidents**
- 11. Two Wheelers - Number of Persons – Killed**
- 12. Two Wheelers - Number of Persons - Grievously Injured**
- 13. Two Wheelers - Number of Persons - Minor Injured**
- 14. Auto Rickshaws - Number of Road Accidents**
- 15. Auto Rickshaws - Number of Persons – Killed**
- 16. Auto Rickshaws - Number of Persons - Grievously Injured**
- 17. Auto Rickshaws - Number of Persons - Minor Injured**
- 18. Cars, Taxis, Vans and LMV - Number of Road Accidents**
- 19. Cars, Taxis, Vans and LMV - Number of Persons – Killed**
- 20. Cars, Taxis, Vans and LMV - Number of Persons - Grievously Injured**
- 21. Cars, Taxis, Vans and LMV - Number of Persons - Minor Injured**
- 22. Trucks/Lorries - Number of Road Accidents**
- 23. Trucks/Lorries - Number of Persons – Killed**
- 24. Trucks/Lorries - Number of Persons - Grievously Injured**
- 25. Trucks/Lorries - Number of Persons - Minor Injured**
- 26. Buses - Number of Road Accidents**
- 27. Buses - Number of Persons – Killed**
- 28. Buses - Number of Persons - Grievously Injured**
- 29. Buses - Number of Persons - Minor Injured**
- 30. Other non-motorized vehicle (E-rickshaw etc.) - Number of Road Accidents**
- 31. Other non-motorized vehicle (E-rickshaw etc.) - Number of Persons – Killed**
- 32. Other non-motorized vehicle (E-rickshaw etc.) - Number of Persons - Grievously Injured**
- 33. Other non-motorized vehicle (E-rickshaw etc.) - Number of Persons - Minor Injured**
- 34. Others - Number of Road Accidents**
- 35. Others - Number of Persons – Killed**
- 36. Others - Number of Persons - Grievously Injured**
- 37. Others - Number of Persons - Minor Injured**
- 38. Total - Number of Road Accidents**
- 39. Total - Number of Persons – Killed**
- 40. Total - Number of Persons - Grievously Injured**
- 41. Total - Number of Persons - Minor Injured**

Data Preparation

Prepare the Data for Visualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring that the data is accurate and complete. This process helps to make data easily understandable and ready for creating visualizations to gain insights.

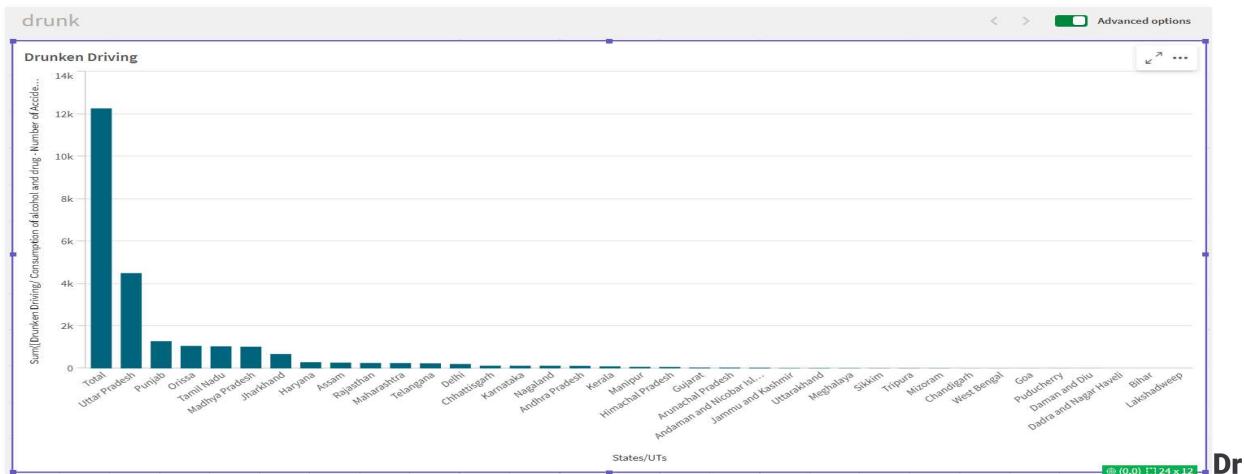
Data Visualization

Data visualization is the process of creating graphical representations of data to help people understand information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualization can help people identify patterns, trends, and outliers quickly in the data.

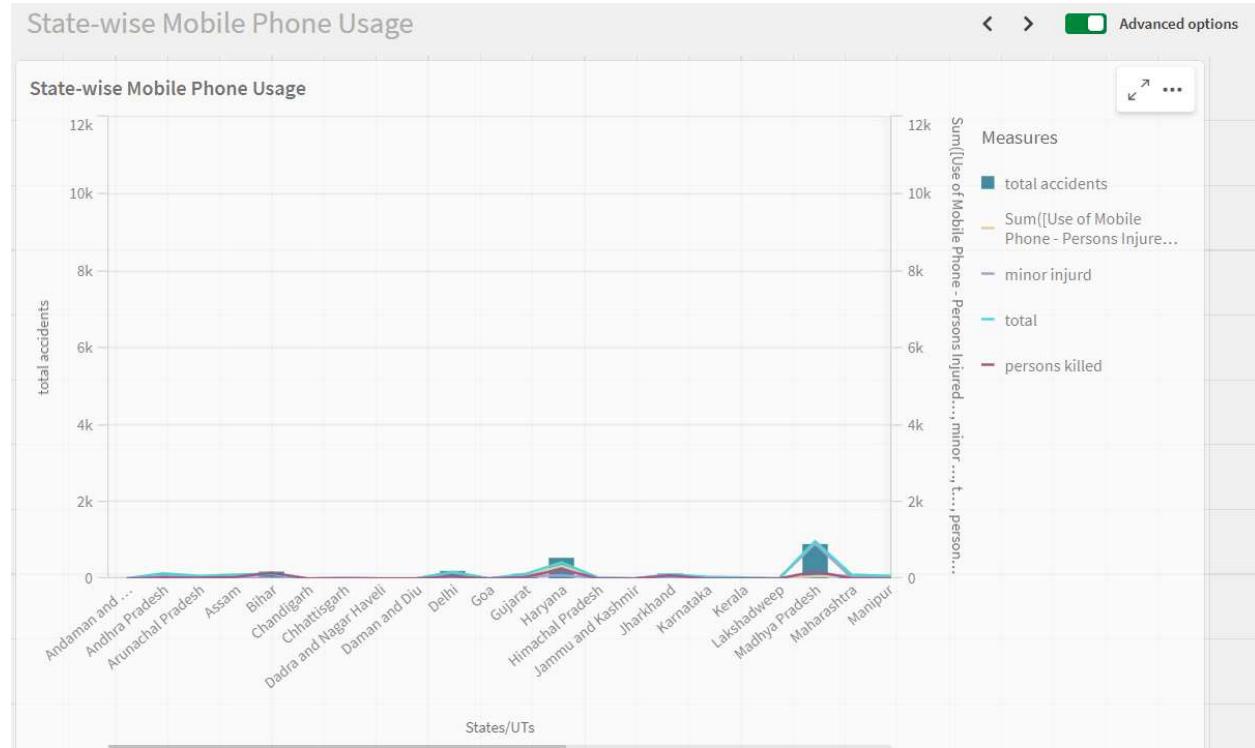
Number of unique visualizations

The number of unique visualizations that can be created with a given dataset. Some common types of visualizations that can be used to analyse include bar charts, line charts, heat maps, scatter plots, pie charts, maps etc. These visualizations can be used to compare, track changes over time, show distribution, relationships between variables, breakdown of one category and much more.

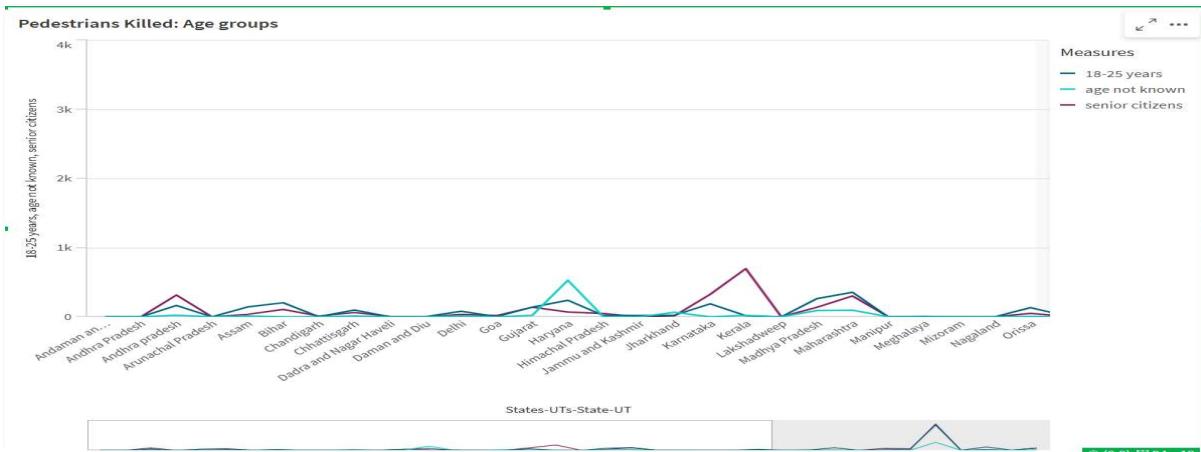
Activity 1.1: Accidents due to Drunken



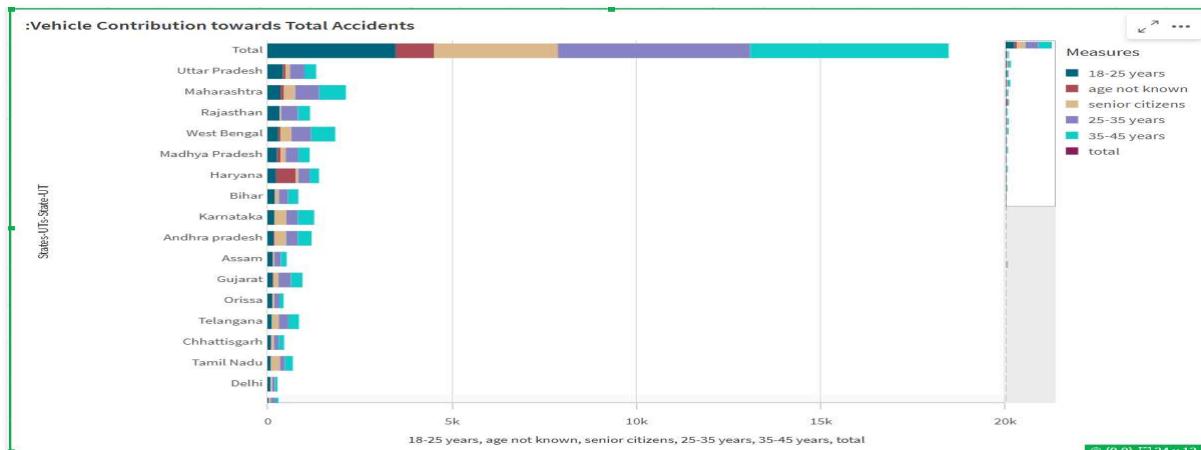
Activity 1.2: State-wise Mobile Phone Usage



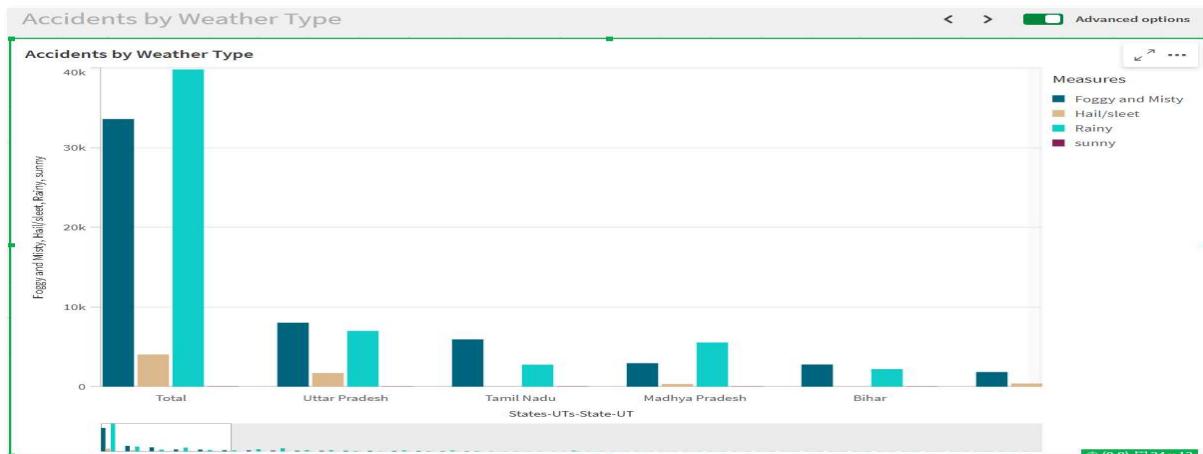
Activity 1.3: Pedestrians Killed: Age groups



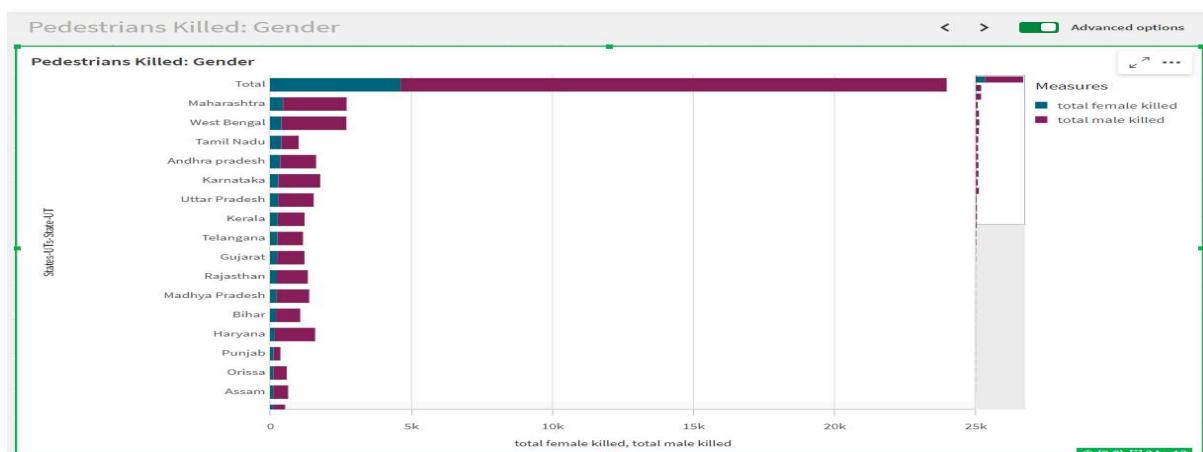
Activity 1.4: Vehicle Contribution towards Total Accidents



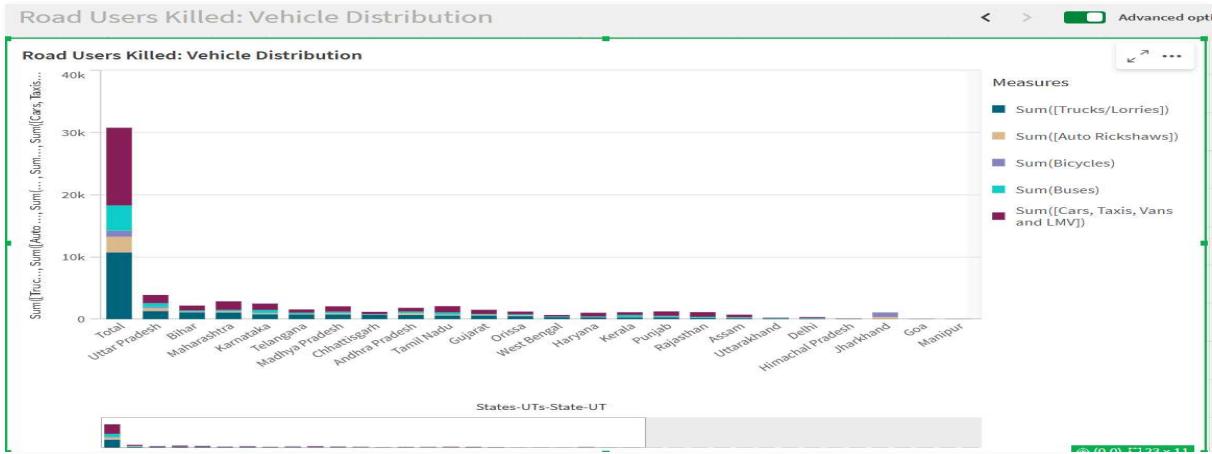
Activity 1.5: Accidents by Weather Type



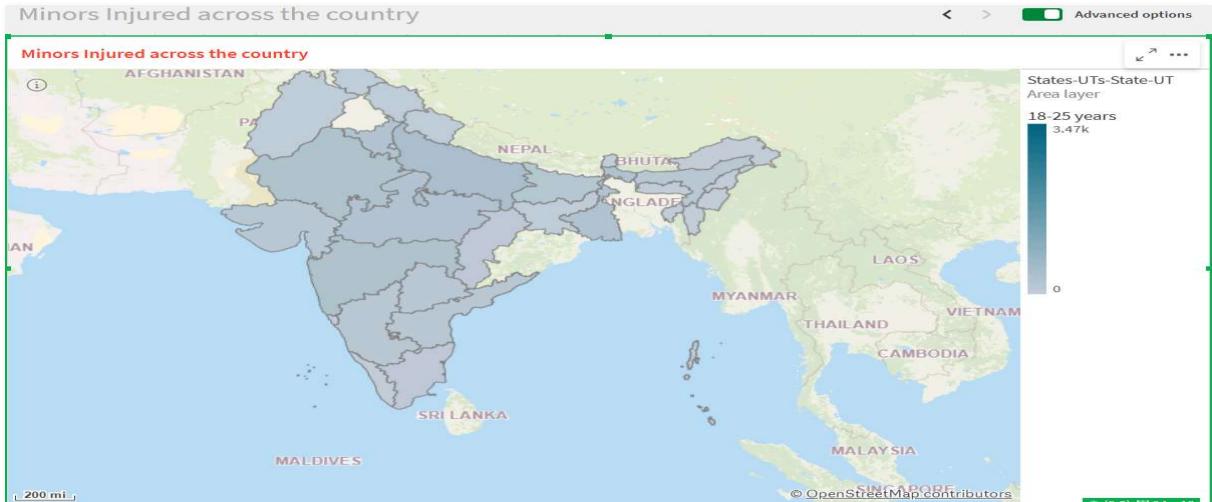
Activity 1.6: Pedestrians Killed: Gender



Activity 1.7: Road Users Killed: Vehicle Distribution



Activity 1.8: Minors Injured across the country

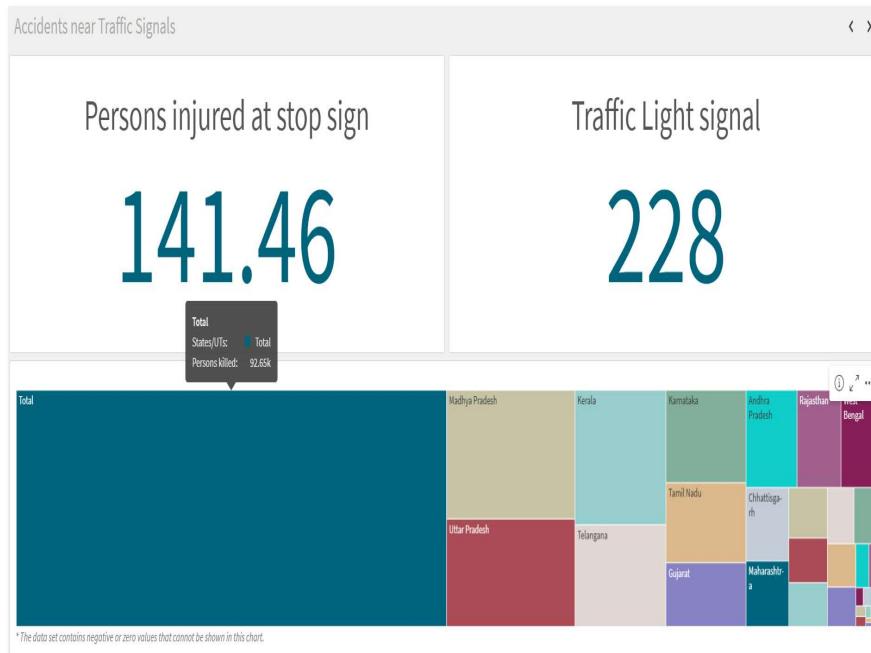


Dashboard

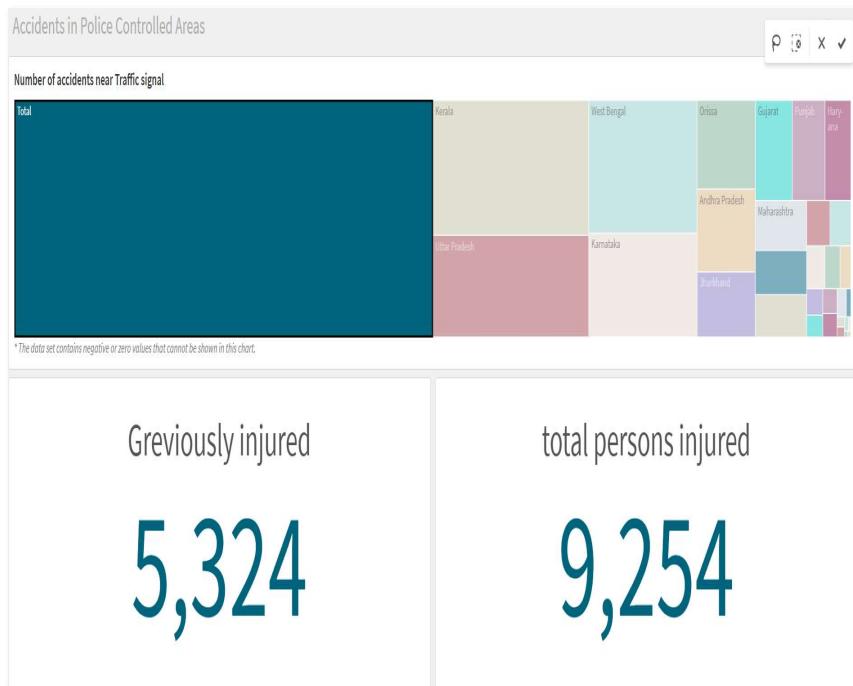
A dashboard is a graphical user interface (GUI) that displays information and data in an organized and easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data. They are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

Responsive and Design of Dashboard

Dashboard: Accidents near Traffic Signals



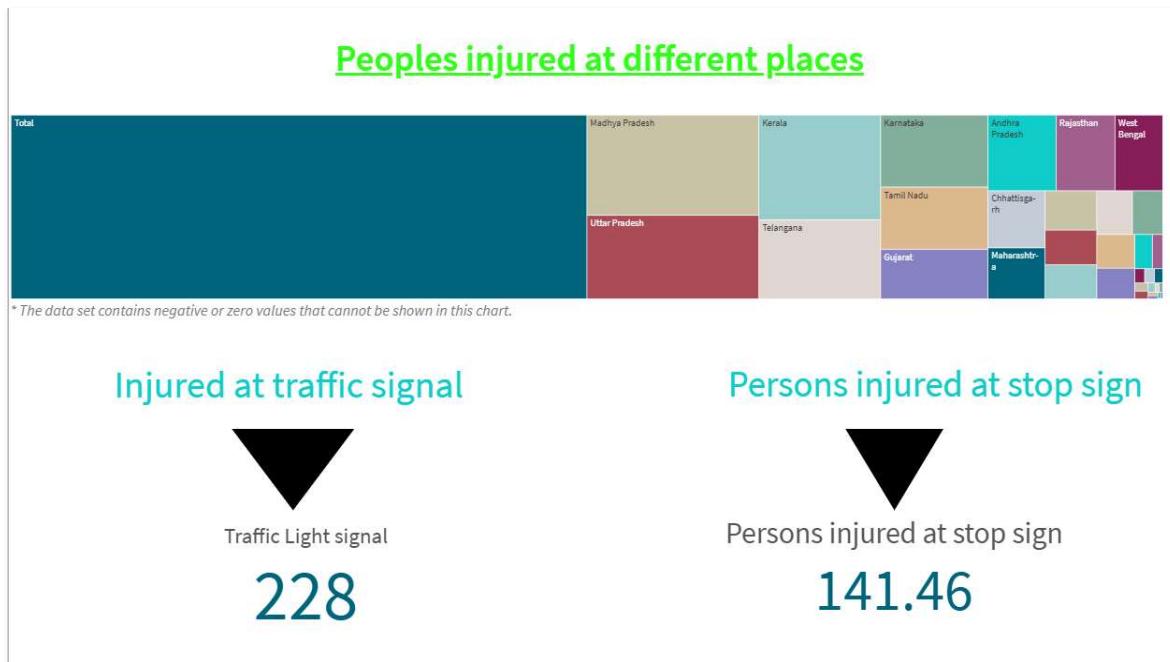
Dashboard: Accidents in Police Controlled Areas



Storytelling

A data story is a way of presenting data and analysis in a narrative format, with the goal of making information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis in a logical and systematic way and a conclusion that summarizes the key findings and highlights their implications. Data stories can be told using a variety of media, such as reports, presentations, interactive visualizations and videos.

Design of Story



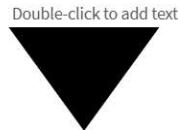
Police Controlled Areas

Number of accidents near Traffic signal



* The data set contains negative or zero values that cannot be shown in this chart.

No of persons Grievously Injured



Grievously injured

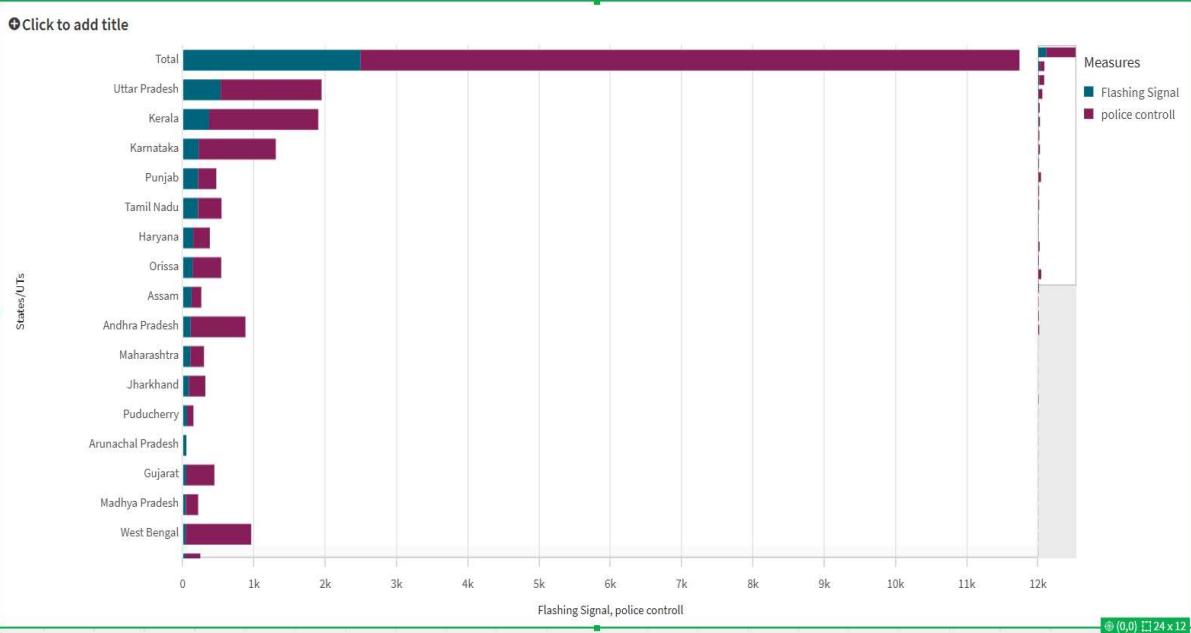
10,648

Total No of persons injured



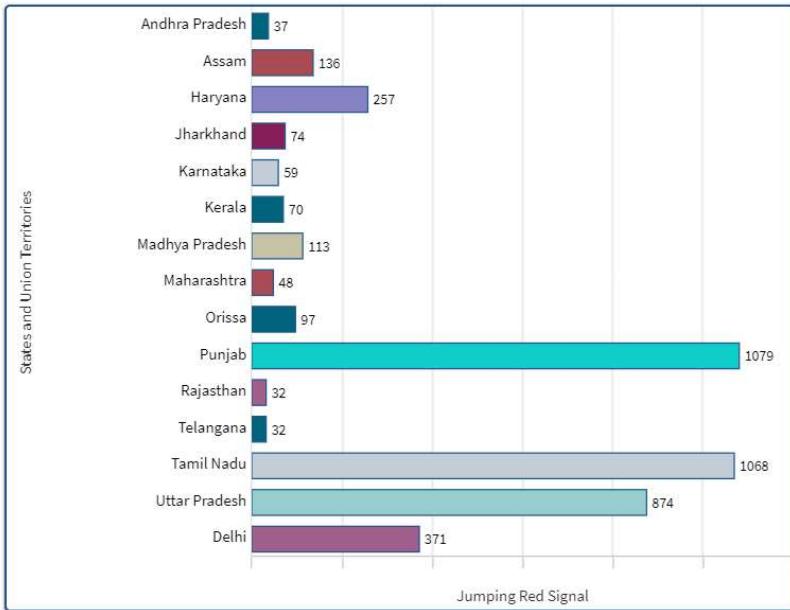
total persons injured

18,508



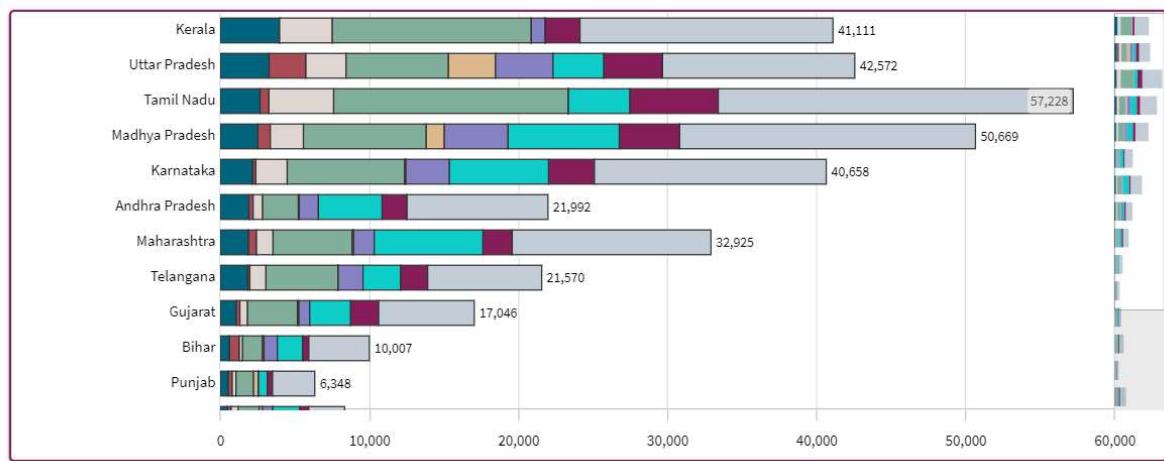
Cause : Jumping Red Signal

Highest : Punjab

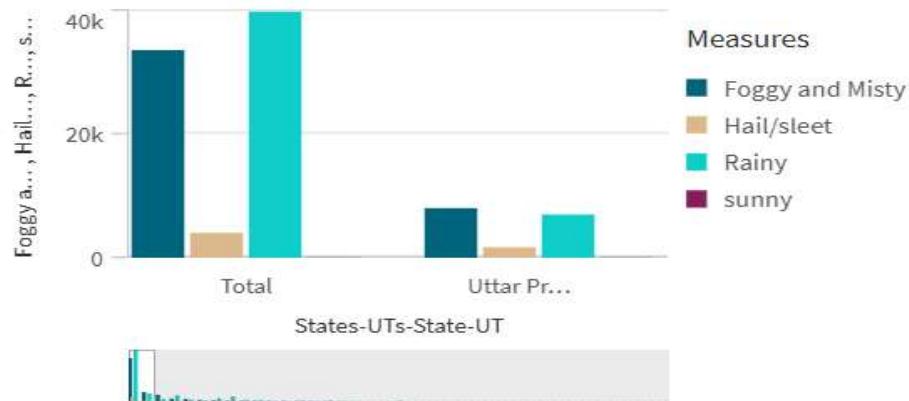


Accidents by Vehicle Type

Vehicle type that is involved in most accidents : Two Wheeler

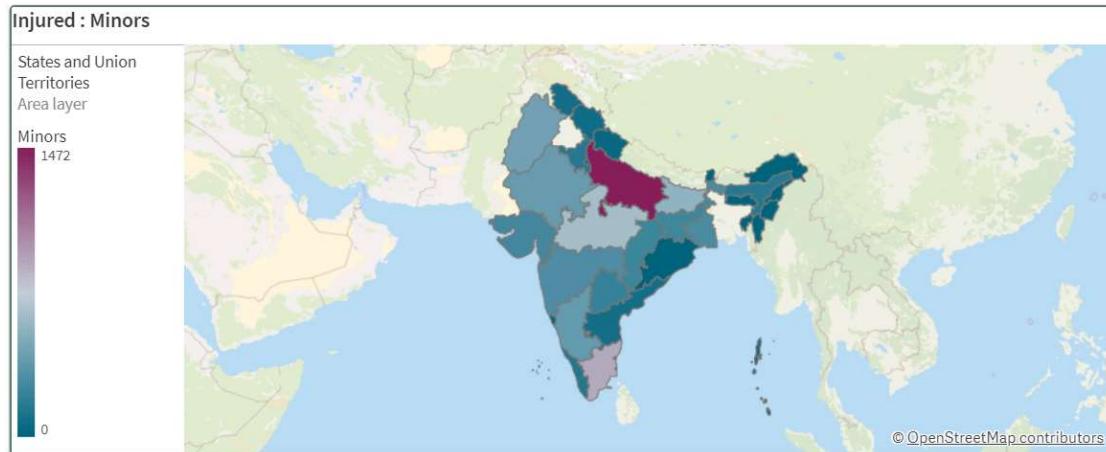


Accidents by Weather Type

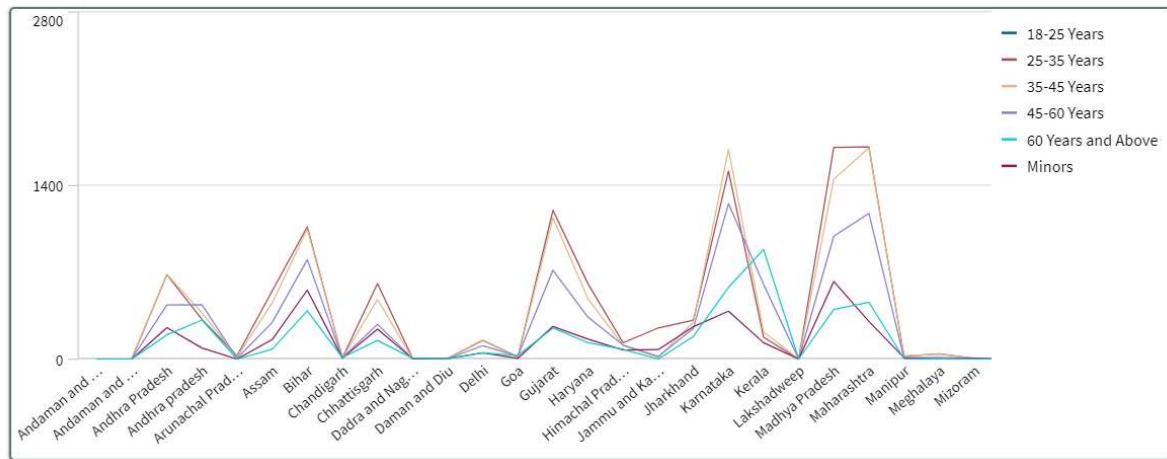


Most Accidents due to Rainy

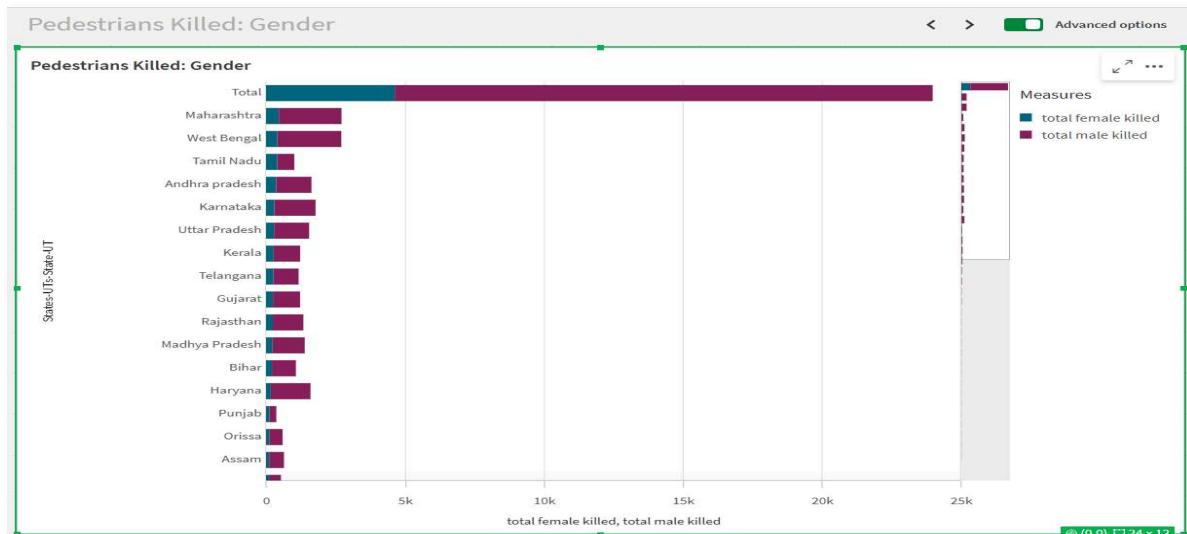
Highest Number of Minors Injured : Uttar Pradesh and Tamil Nadu respectively

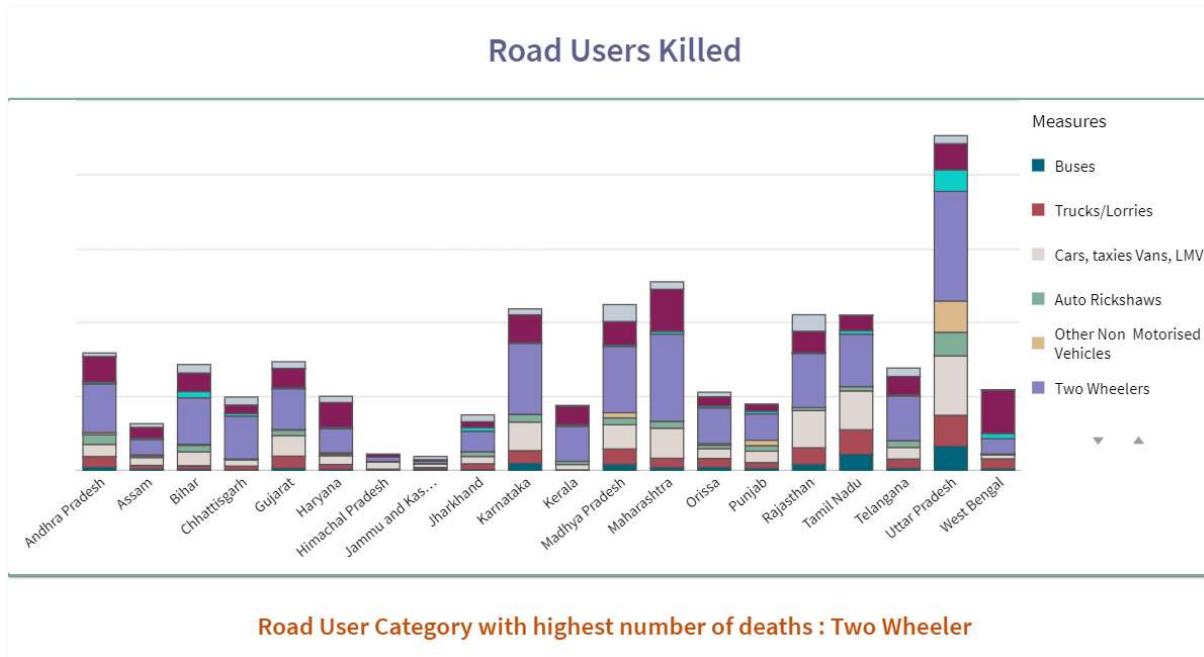


Pedestrians Killed : Age



Age group with highest number of pedestrians killed : 25-35 Years

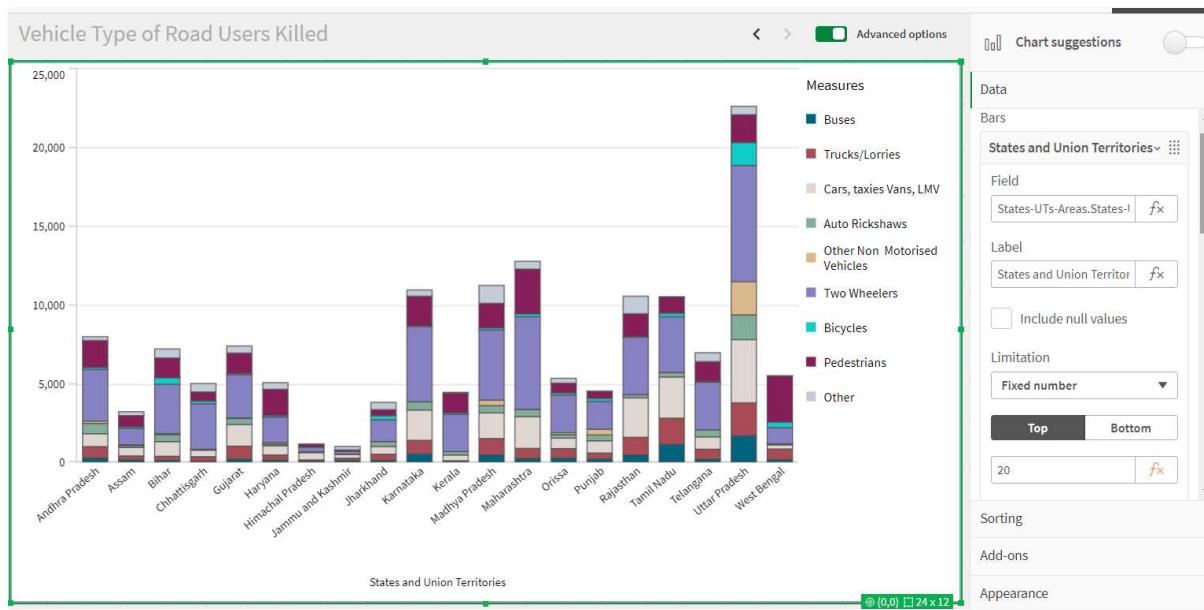
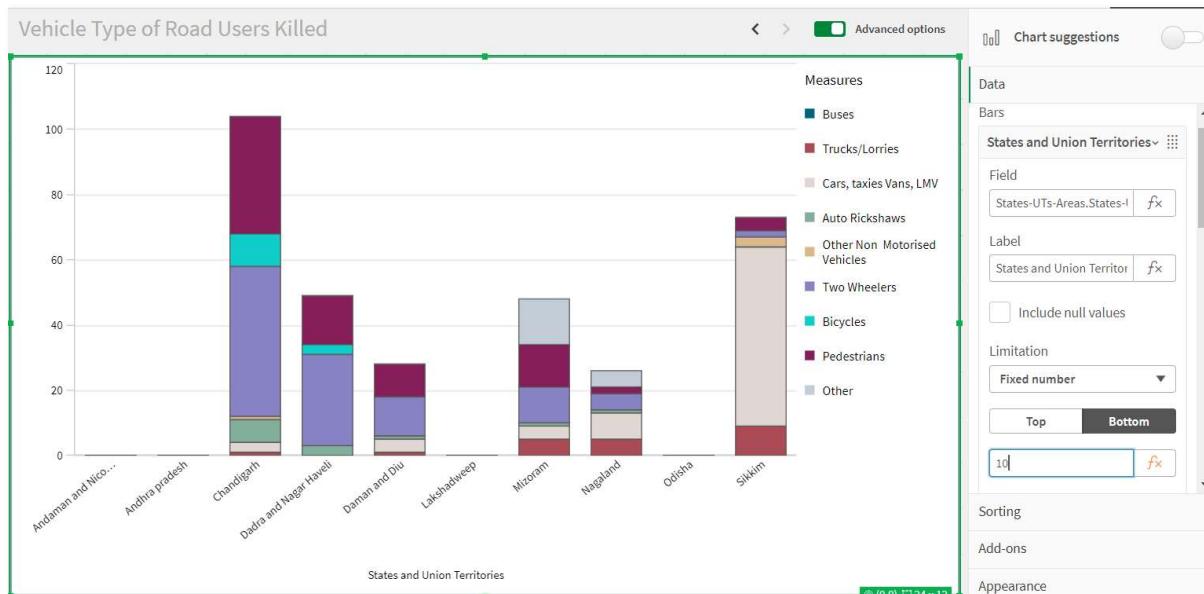




Performance Testing

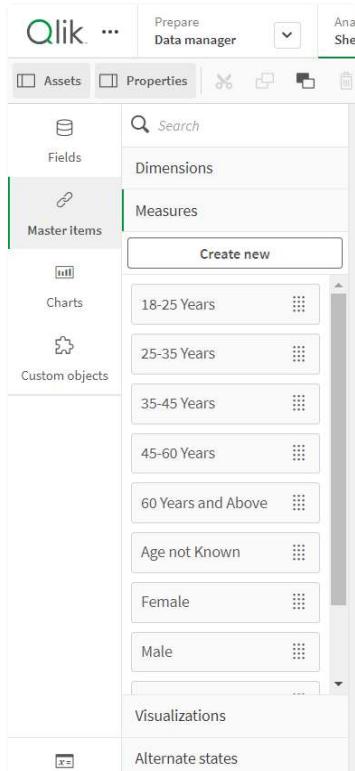
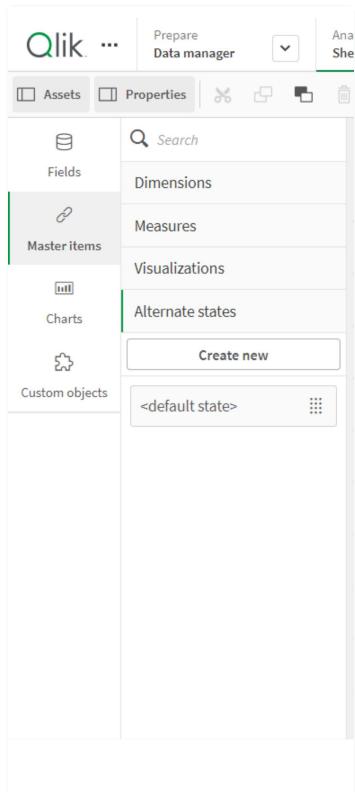
Application of Data Filters

Selections within the data allows users to filter data based on individual fields or dimensions. Users can choose specific values within a field to include or exclude from analysis. Complex filters based on predefined conditions and logic can also be created.



Use of Master Items/Calculated Fields

Qlik Sense allows the creation of reusable filter objects like Master Items, Calculated Fields which can simplify the process of applying consistent filters across multiple visualizations and dashboards.



Edit measure

Segment colors

Name	Male	Expression	Sum([18-25 Years - Male])+Sum([25-35 Years - Male])+Sum([35-45 Years - Male])+Sum([45-60 Years - Male])+Sum([60 and Above - Male]) Sum([Age not known - Male])
Description	Males of all ages	Label expression	
Measure color	<input type="color"/>	Number formatting	Number
Tags		Formatting	Custom
Glossary terms		Format pattern	###0
		Example	1000

Cancel **Save**

Edit expression

```
1 Sum([18-25 Years - Male])+Sum([25-35 Years - Male])+Sum([35-45 Years - Male])+Sum([45-60 Years - Male])+Sum([60 and Above - Male])+
2 Sum([Age not known - Male])
```

Fields

Filter by table: All tables
Field: 18-25 Years - Male
Aggregation functions: No aggregation
Set Expression, Distinct, Total

Insert

Expression generator

Functions

Set expressions

Variables

OK
Sum([18-25 Years - Male])+Sum([25-35 Years - Male])+Sum([35-45 Years - Male])+Sum([45-60 Years - Male])+Sum([60 and Above - Male])+Sum([Age not known - Male])

Cancel **Apply**

Number of Graphs/ Visualizations

1. Accidents due to Drunken Driving
2. State-wise Mobile Phone Usage
3. Vehicle Contribution towards Total Accidents
4. Correlation - Speeding and Number of accidents
5. Accidents by Weather Type
6. Minors Injured across the country
7. Pedestrians Killed: Gender
8. Pedestrians Killed: Age groups
9. Road Users Killed: Vehicle Distribution

Technical Architecture

