

Qlik Analysis Of Road Safety And Accident Patterns In India

1 Introduction:

1.1 OverView:

Travel has become more convenient due to the reduction of distances due to technological developments in transportation. But with advancement has also come greater risks, chief among them being auto accidents. Every year, traffic accidents in India claim lakhs of lives and seriously injure crores of others, making them a huge public health concern. In order to find patterns, causes, and contributing factors to these incidents, this project will employ Like Sense, a potent data analytics platform, to study road safety and accident statistics in India.

1.2 Purpose :

This project's main goal is to lower India's high rate of traffic accidents by offering insightful information gleaned from data analysis. In order to inform and direct the implementation of efficient road safety measures, the project aims to identify accident hotspots, analyze trends, and develop prediction models. The ultimate objective is to assist stakeholders in making data-driven decisions to enhance road safety, which will prevent injuries and save lives.

1.3 Technical Architecture:



Qlik Analysis Of Road Safety And Accident Patterns In India

2. Define Problem / Problem Understanding

2.1 Specify the Business Problem:

The primary business problem is the high incidence of road accidents in India, leading to substantial loss of life, serious injuries, and economic costs. The goal is to reduce these accidents by identifying the patterns, causes, and contributing factors. This project aims to analyze road safety and accident trends in India using Like Sense.

2.2 Business Requirements:

The goal of the analysis is to offer insightful information on user demographics, accident trends, and trouble spots. The creation of visually stimulating and interactive dashboards to assist with operational and strategic planning is the main goal. The investigation yielded valuable insights that will facilitate well-informed decision-making, enhanced safety protocol implementation, and regulatory compliance.

2.3 Literature Survey:

- **Traffic Accident Analysis Using Machine Learning Paradigms** (IEEE Xplore)
 - This study explores the application of machine learning techniques to analyze traffic accident data. It highlights how different algorithms can predict accident severity and identify high-risk areas. The findings suggest that machine learning can significantly improve the accuracy of accident predictions.
- **Road Traffic Accidents in India: Issues and Challenges** (Journal of Transport & Health, Google Scholar)
 - This article discusses the major issues and challenges related to road traffic accidents in India. It emphasizes the need for better data collection, stricter enforcement of traffic laws, and improved road infrastructure. The study provides statistical data on accident rates, causes, and demographic distribution of victims.
- **Global Status Report on Road Safety** (World Health Organization)
 - The WHO report provides a global overview of road safety, including statistics on road traffic deaths, major risk factors, and effective

Qlik Analysis Of Road Safety And Accident Patterns In India

interventions. It highlights the importance of adopting comprehensive road safety measures and international best practices.

- **Analysis of Traffic Accident Data Using Data Mining Techniques** (PubMed)
 - This research focuses on the use of data mining techniques to analyze traffic accident data. It demonstrates how clustering and classification methods can identify patterns and trends in accident data. The study also discusses the potential of data mining to uncover hidden insights that can inform policy decisions.
- **Road Safety in India: A Framework for Action** (Ministry of Road Transport and Highways, India)
 - This government report outlines a strategic framework for improving road safety in India. It includes an analysis of current road safety challenges, proposed interventions, and implementation strategies. The report stresses the importance of multi-sectoral collaboration and data-driven approaches to enhance road safety.

3.Data Collection:

3.1 Collect the Dataset

The dataset used for this project is sourced from Kaggle, specifically the "Road Accidents in India" dataset. This dataset includes detailed information on road accidents across various states and Union Territories in India. The key features of the dataset include:

- **Accident ID:** Unique identifier for each accident.
- **Date and Time:** Date and time of the accident.
- **Location:** State/UT and specific location of the accident.
- **Severity:** Severity of the accident (e.g., fatal, serious injury, minor injury).
- **Vehicle Type:** Type of vehicles involved in the accident.
- **Cause:** Cause of the accident (e.g., speeding, drunk driving, weather conditions).
- **Weather Conditions:** Weather conditions at the time of the accident.
- **Road Conditions:** Information about the road infrastructure at the accident location.

Qlik Analysis Of Road Safety And Accident Patterns In India

- **Demographic Information:** Details about the individuals involved, including age, gender, and role (e.g., driver, pedestrian).

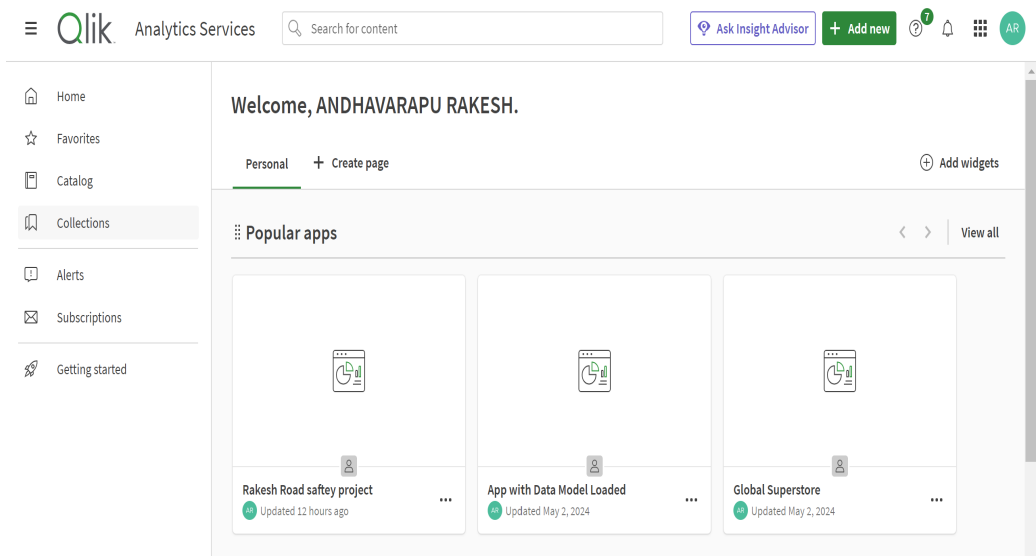
This dataset is comprehensive and includes the necessary attributes to analyze road safety and accident trends in India effectively.

3.2 Connect Data with Qlik Sense:

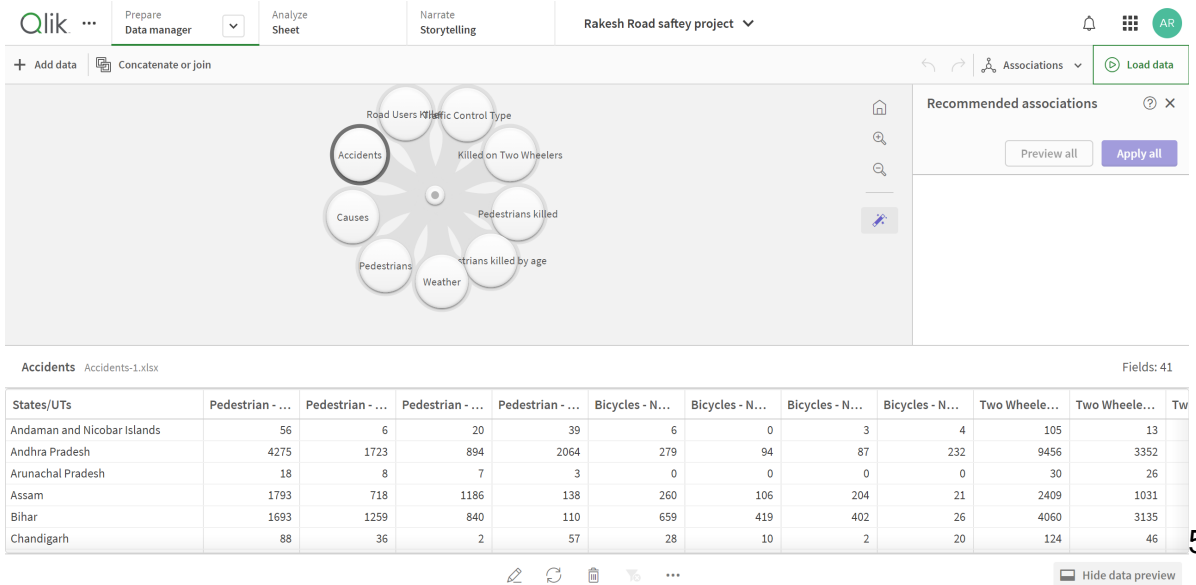
To analyze the dataset using Qlik Sense, follow these steps:

1. **Extract the Dataset:**
 - After downloading the dataset from Kaggle, extract the files to a specific location on your device.
2. **Create a New Qlik Sense App:**
 - Open Qlik Sense and create a new app named "Rakesh Road Safety Project."
 - Open the newly created app.
3. **Add Data to Qlik Sense:**
 - Click on "Data Manager."
 - Click on "Add data" and select the dataset file from the location where it was extracted.
4. **Data Integration:**
 - Ensure that all relevant fields from the dataset are correctly mapped in Qlik Sense.
 - Check for any inconsistencies or missing values in the dataset and clean the data if necessary.
5. **Data Mapping:**
 - Map fields such as Accident ID, Date, Time, Location, Severity, Vehicle Type, Cause, Weather Conditions, Road Conditions, and Demographic Information to ensure they are correctly recognized by Qlik Sense for analysis.

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➤ we need to click on add data on left side top corner .



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4.Data Preparation:

4.1 Prepare the Data for Visualization

Clean the Data

- **Remove Inconsistencies:** After downloading the dataset and converting it from CSV to Excel format, inspect the data for inconsistencies and anomalies. Look for and rectify any discrepancies in the data entries to ensure uniformity.
- **Handle Missing Values:** Identify and address any missing values in the dataset. This can involve filling in missing data points with appropriate values or removing records with substantial missing information.

Transform the Data

- **Format for Analysis:** Ensure the data is in a suitable format for analysis and visualization. This includes checking that dates, times, and numerical values are correctly formatted and that all fields are appropriately labeled.

Aggregate and Categorize Data

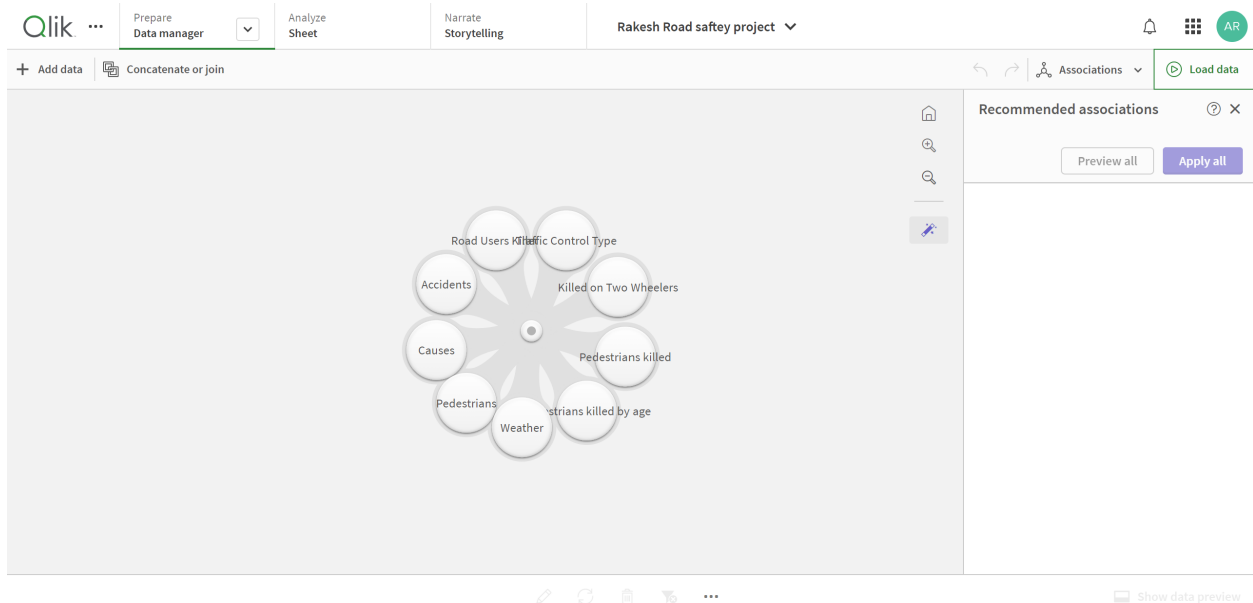
- **Remove Extra Columns:** Identify and eliminate unnecessary columns such as 'others' and 'average,' which are not relevant to the project's analysis. During the data addition process in Qlik Sense, select only the columns required for analysis and discard the extraneous ones.
- **Remove 'Total' Rows:** Identify rows that contain "total" values, which are direct additions of each column, and remove these rows from the dataset. This step ensures that aggregate data does not skew the analysis.
- **Re-upload Cleaned Data:** After cleaning the dataset by removing unwanted columns and rows, re-upload the cleaned files to Qlik Sense.

Data Association

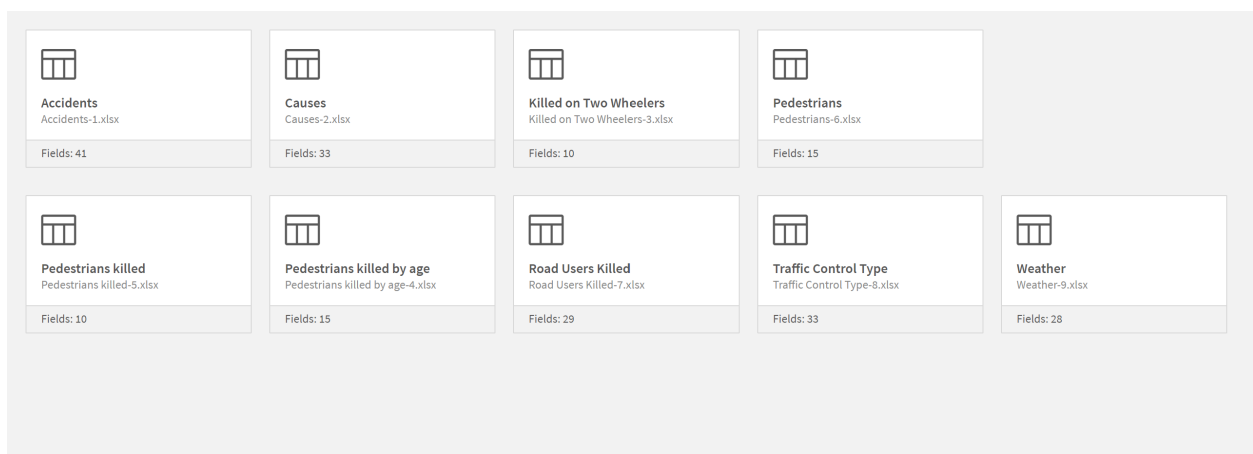
- **Qlik Sense Recommendations:** Utilize Qlik Sense's recommendations for data associations to link related data fields across different tables. This step ensures

Qlik Analysis Of Road Safety And Accident Patterns In India

that the data is properly connected and ready for comprehensive analysis.



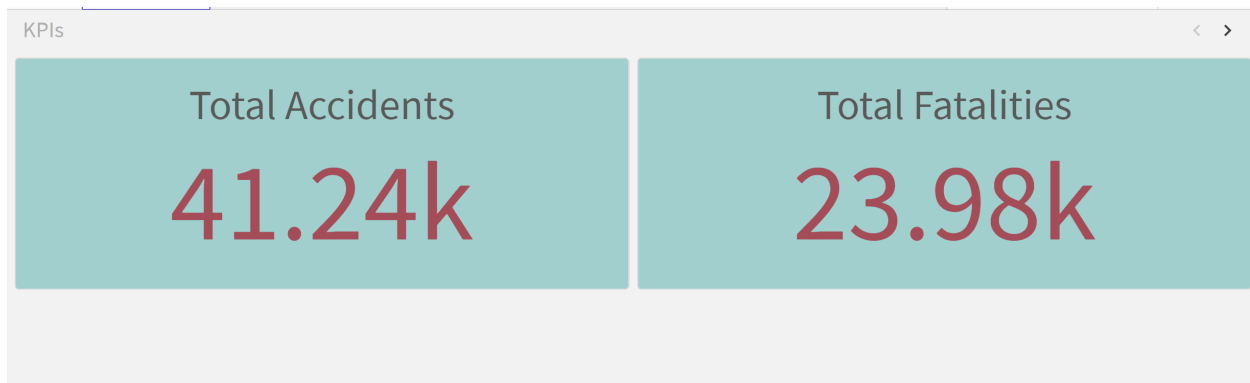
➤ after preprocessing only the association will form without errors



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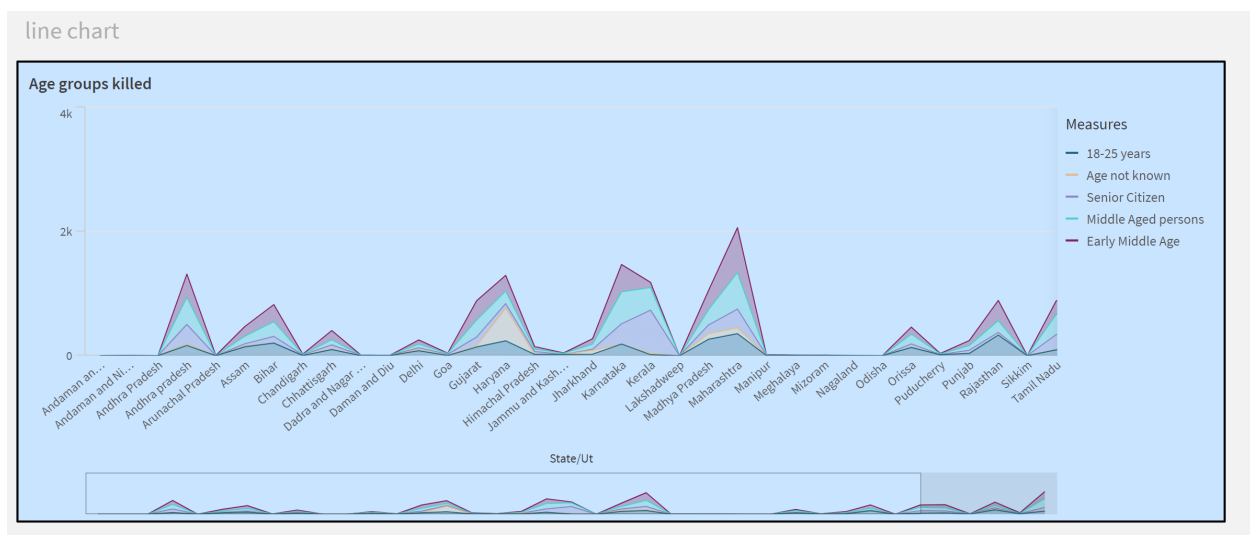
5.Data Visualizations:

5.1 KPI



- Key Performance Indicator (KPI) visualizations were created to display the total number of road accidents and fatalities. The KPI for total accidents provides a clear snapshot of the overall accident count, while the KPI for total fatalities highlights the severity and human cost associated with road safety issues.

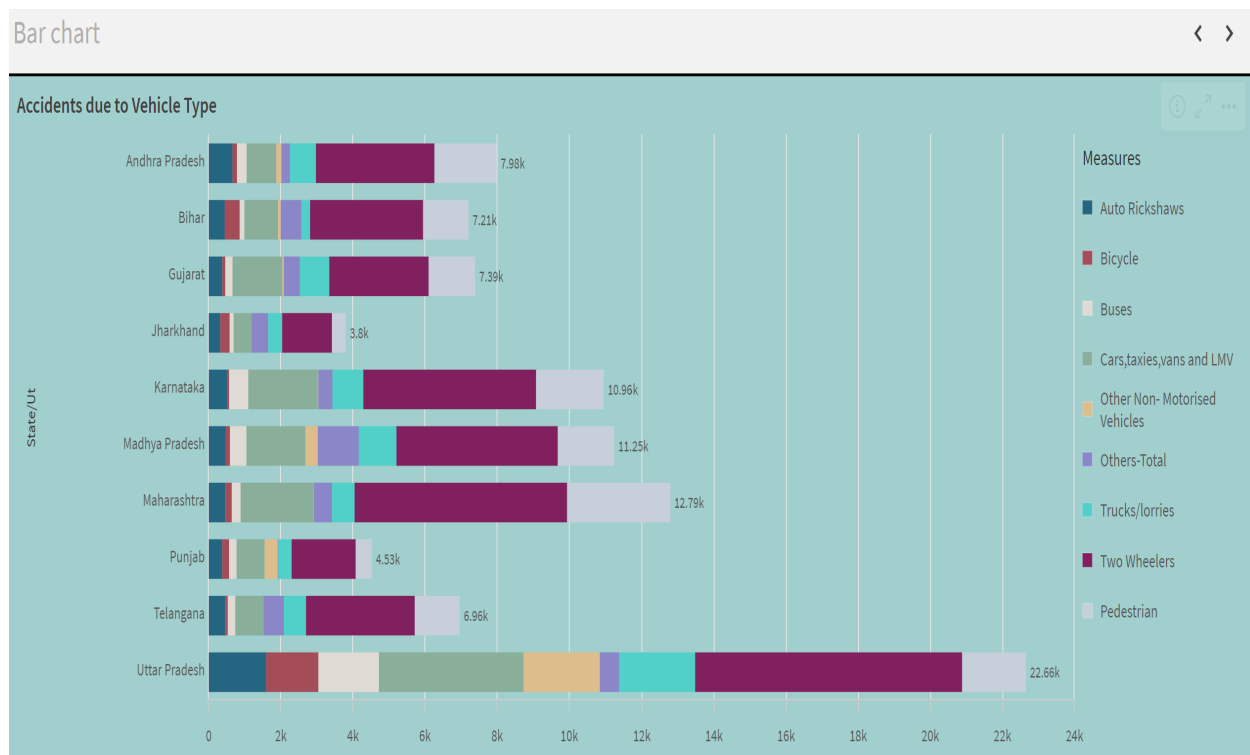
5.2 Line Chart:



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- A line chart was created to visualize deaths by age groups in particular states. The measures used include the following age groups: 18-25 years, Age not known, Senior Citizen, Middle Aged persons, and Early Middle Age. The state is used as the dimension, allowing for a comparative analysis of fatalities across different states by age group.

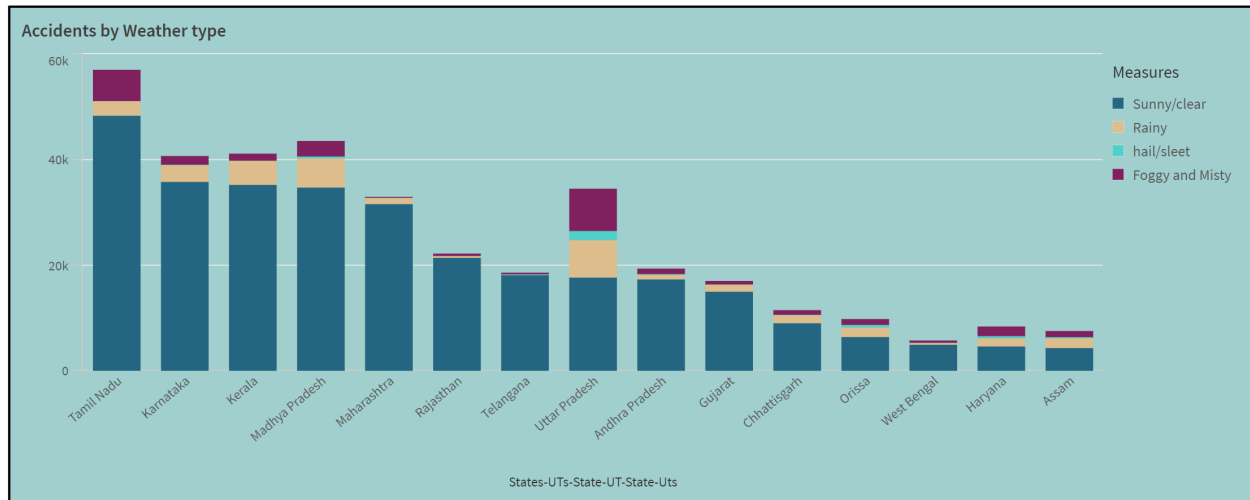
5.3 Stacked Bar Chart:



- A stacked bar chart was also developed to show the distribution of accidents caused by different types of vehicles across various states. This visualization helps in understanding the impact of different vehicle types on road in different regions.

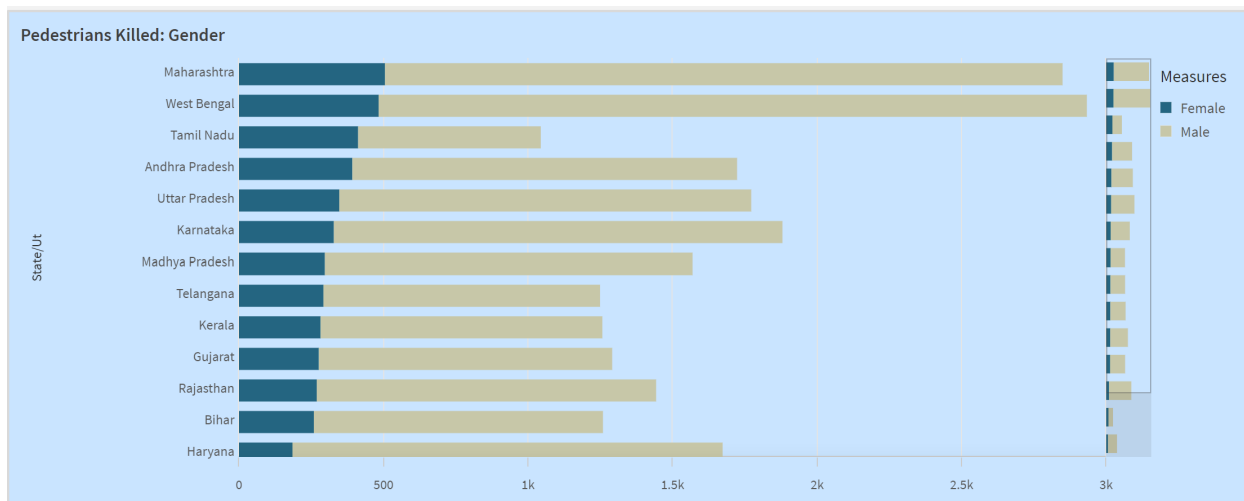
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5.4 Stacked Bar Chart[2]:



- Another stacked bar chart was created to illustrate accidents that occurred during different weather types across various regions. This chart provides insights into how weather conditions affect road safety in different parts of the country.

5.4 Stacked Bar Chart[3]:

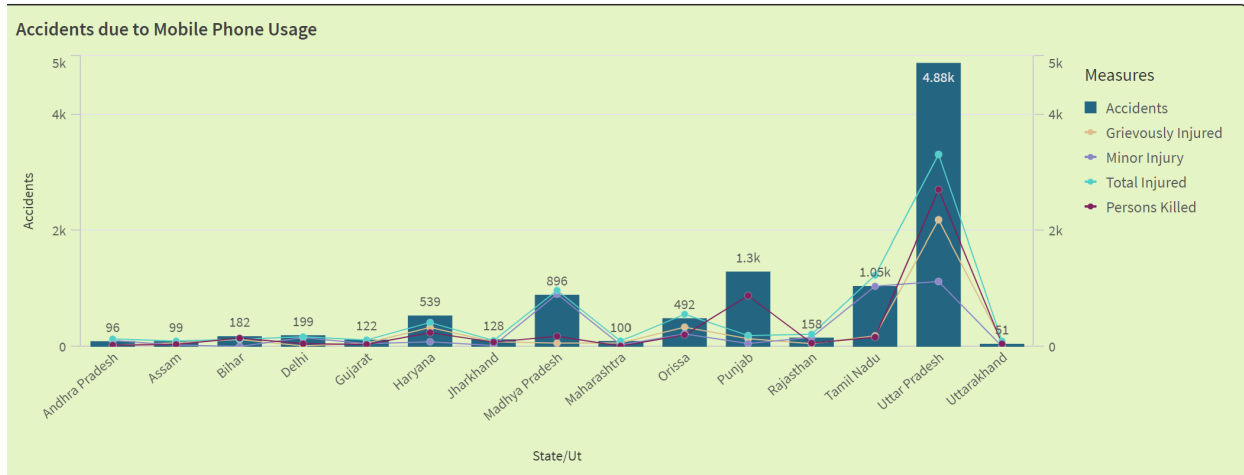


- A stacked bar chart was created to visualize the gender distribution of pedestrians killed in accidents. This chart provides insights into the number of

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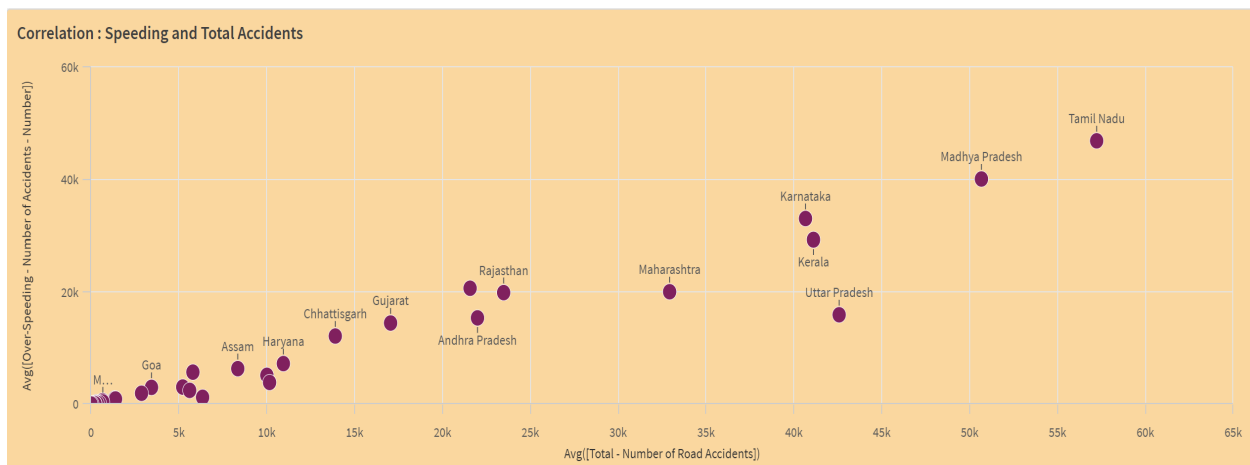
male and female pedestrians affected by road accidents.

5.5 ComboChart:



- A combo chart was created to analyze accidents caused by mobile phone usage while driving. The chart includes measures for accidents, grievously injured, minor injury, total injured, and persons killed in different regions. This visualization helps in understanding the impact of mobile phone usage on road accidents and the resulting injuries and fatalities.

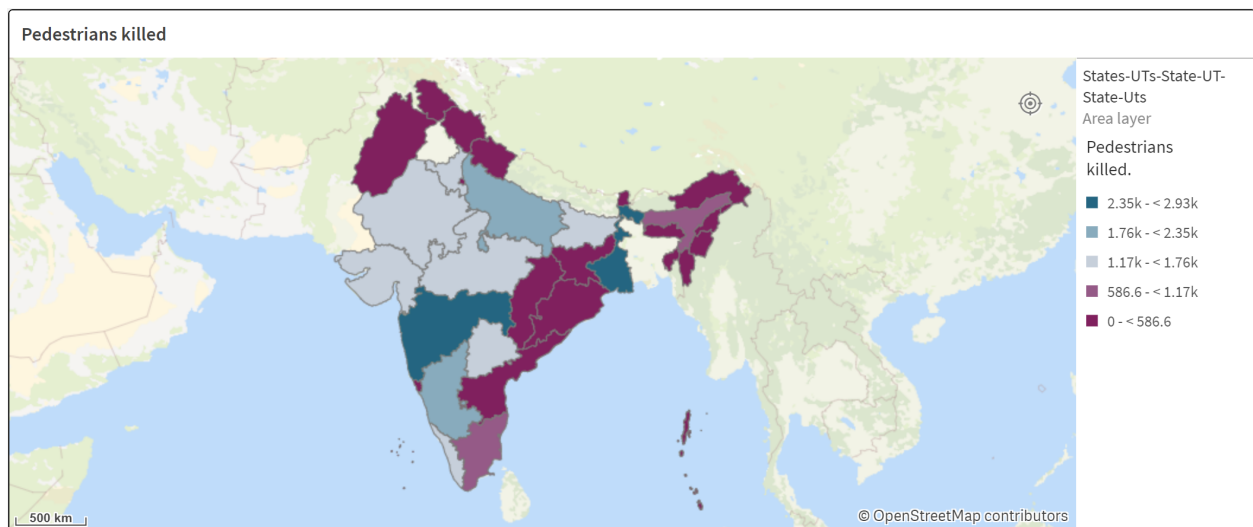
5.6 Scatter Plot:



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- A scatter plot was used to visualize the relationship between the average number of total road accidents and the average number of accidents due to over-speeding. This plot helps in understanding if there is any correlation between these two variables, providing insights into the impact of over-speeding on road accidents.

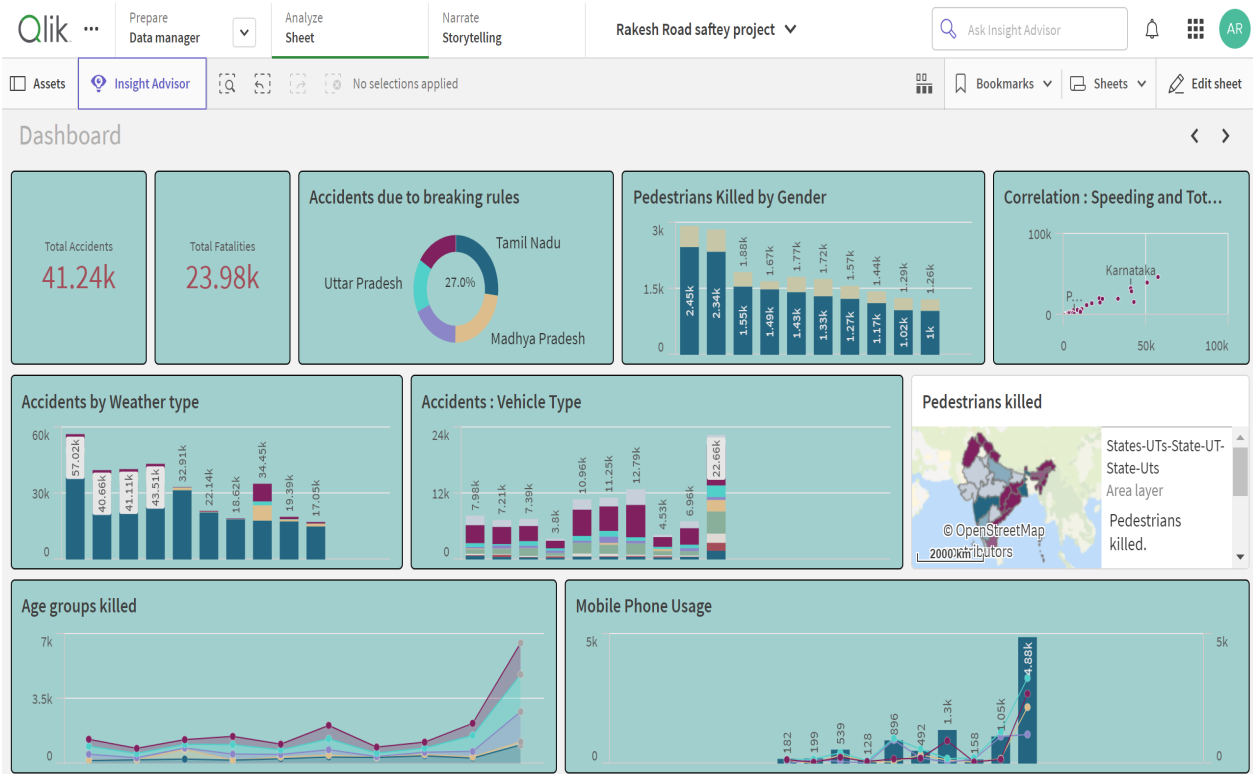
5.7 Map Chart:



- A map chart was created to visualize the number of pedestrians killed in road accidents state-wise, with color intensity indicating the range of pedestrian fatalities. This map provides a geographical overview of pedestrian fatalities, highlighting areas with higher incidences of pedestrian deaths.

Qlik Analysis Of Road Safety And Accident Patterns In India

6. Dashboard:



A comprehensive dashboard was created to provide a holistic view of road safety and accident trends in India. The dashboard includes the following key visualizations and insights:

- **Total Accidents:** Displays the total number of road accidents, providing an overview of the overall accident count.
- **Total Fatalities:** Shows the total number of fatalities resulting from road accidents, highlighting the severity of accidents and the human cost involved.
- **Accidents due to Breaking Rules:** Visualizes the number of accidents caused by breaking traffic rules, emphasizing the importance of adherence to traffic regulations.
- **Pedestrians Killed by Gender:** Presents a gender-wise distribution of pedestrians killed in road accidents, providing insights into the impact on different demographics.

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- **Correlation: Speeding and Total Accidents:** Analyzes the correlation between speeding and the total number of accidents, highlighting the role of speeding in road accidents.
- **Accidents by Weather Type:** Illustrates the distribution of accidents based on different weather conditions, providing insights into weather-related road safety challenges.
- **Accidents by Vehicle Type:** Visualizes the types of vehicles involved in accidents, helping to understand the contribution of different vehicle types to road accidents.
- **Pedestrians Killed:** Displays the total number of pedestrians killed in road accidents, highlighting the vulnerability of pedestrians on the roads.
- **Age Groups Killed:** Shows the distribution of fatalities across different age groups, providing insights into the impact on different age demographics.
- **Mobile Phone Usage:** Analyzes the impact of mobile phone usage on road accidents, highlighting the risks associated with distracted driving.

7.Report:

7.1 Key Findings:

- 1. Road Accidents Overview:** The analysis reveals a high number of road accidents in India, leading to significant fatalities and injuries.
- 2. Breaking Traffic Rules:** A notable portion of accidents is caused by violations of traffic rules, emphasizing the need for stricter enforcement.
- 3. Pedestrian Safety Concerns:** Pedestrians, especially senior citizens and middle-aged individuals, are vulnerable road users and require special attention in road safety measures.

Qlik Analysis Of Road Safety And Accident Patterns In India

4. **Weather Impact:** certain weather conditions, such as [mention the specific weather conditions], significantly affect road safety and contribute to a higher number of accidents.

5. **Vehicle Contribution:** The analysis shows that certain types of vehicles, such as two-wheelers and trucks, contribute more to accidents, suggesting targeted safety campaigns for these vehicle types.

7.2 Recommendations:

1. **Enhanced Enforcement:** Strengthen enforcement of traffic rules, especially against speeding, drunk driving, and mobile phone usage while driving.

2. **Pedestrian Safety Measures:** Implement pedestrian-friendly infrastructure such as footpaths, pedestrian crossings, and pedestrian signals.

3. **Weather-specific Safety Protocols:** Develop weather-specific safety protocols and awareness campaigns to educate drivers about safe driving practices in different weather conditions.

4. **Vehicle Safety Standards:** Enforce stricter vehicle safety standards, especially for two-wheelers and trucks, to reduce accidents caused by vehicle malfunctions.

5. **Distracted Driving Awareness:** Increase awareness about the dangers of distracted driving, especially due to mobile phone usage, and promote responsible driving behavior.

7.3 Actionable Insights:

1. **Targeted Campaigns:** Launch targeted safety campaigns focusing on high-risk groups such as young drivers, pedestrians, and drivers of specific vehicle types.

2. **Data-driven Policies:** Use data analytics to inform road safety policies and

Qlik Analysis Of Road Safety And Accident Patterns In India

interventions, ensuring they are based on empirical evidence.

3.Collaborative Efforts: Foster collaboration between government agencies, law enforcement, transport authorities, and road safety organizations to implement comprehensive road safety measures.

4. Continuous Monitoring: Establish mechanisms for continuous monitoring and evaluation of road safety initiatives to assess their effectiveness and make necessary improvements.

5. Public Awareness: Conduct regular public awareness campaigns to educate citizens about road safety practices and promote a culture of responsible driving.

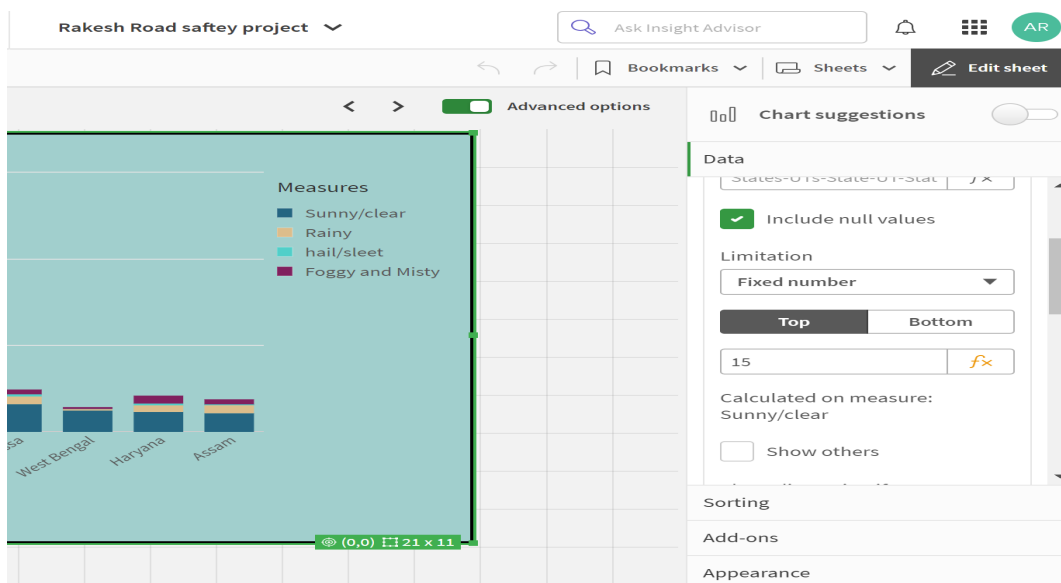
By implementing these recommendations and leveraging the actionable insights, stakeholders can work towards reducing road accidents, saving lives, and improving road safety in India.

8. Performance Testing:

8.1 Application Of Data Filters:

To focus on the top 15 states with the highest impact on a given condition in all maps, data filters can be applied in Qlik Sense. This involves creating a measure that calculates the impact of the condition for each state and then using the "Top" tab in the filter window to select the top 10 states based on this measure. By applying this filter to all maps in the dashboard, you can streamline the visualization to show only the most impactful states, providing a clearer and more targeted view of the data.

Qlik Analysis Of Road Safety And Accident Patterns In India



8.2 Use Of Master Items/Calculated Fields:

The master items created for the Qlik Sense application provide key insights into road safety and accident trends across different age groups and accident causes.

1. Age Group Analysis: By summing the fatalities and pedestrian accidents for each age group, the data reveals the impact of road accidents on different age demographics. This analysis highlights which age groups are most vulnerable and can help in designing targeted safety measures and awareness campaigns.

2. Accidents Due to Breaking Rules: The measure for accidents due to breaking rules combines various violations like over-speeding, drunken driving, driving on the wrong side, jumping red lights, and mobile phone usage. This data indicates the prevalence of these risky behaviors and underscores the importance of enforcing traffic regulations.

Qlik Analysis Of Road Safety And Accident Patterns In India

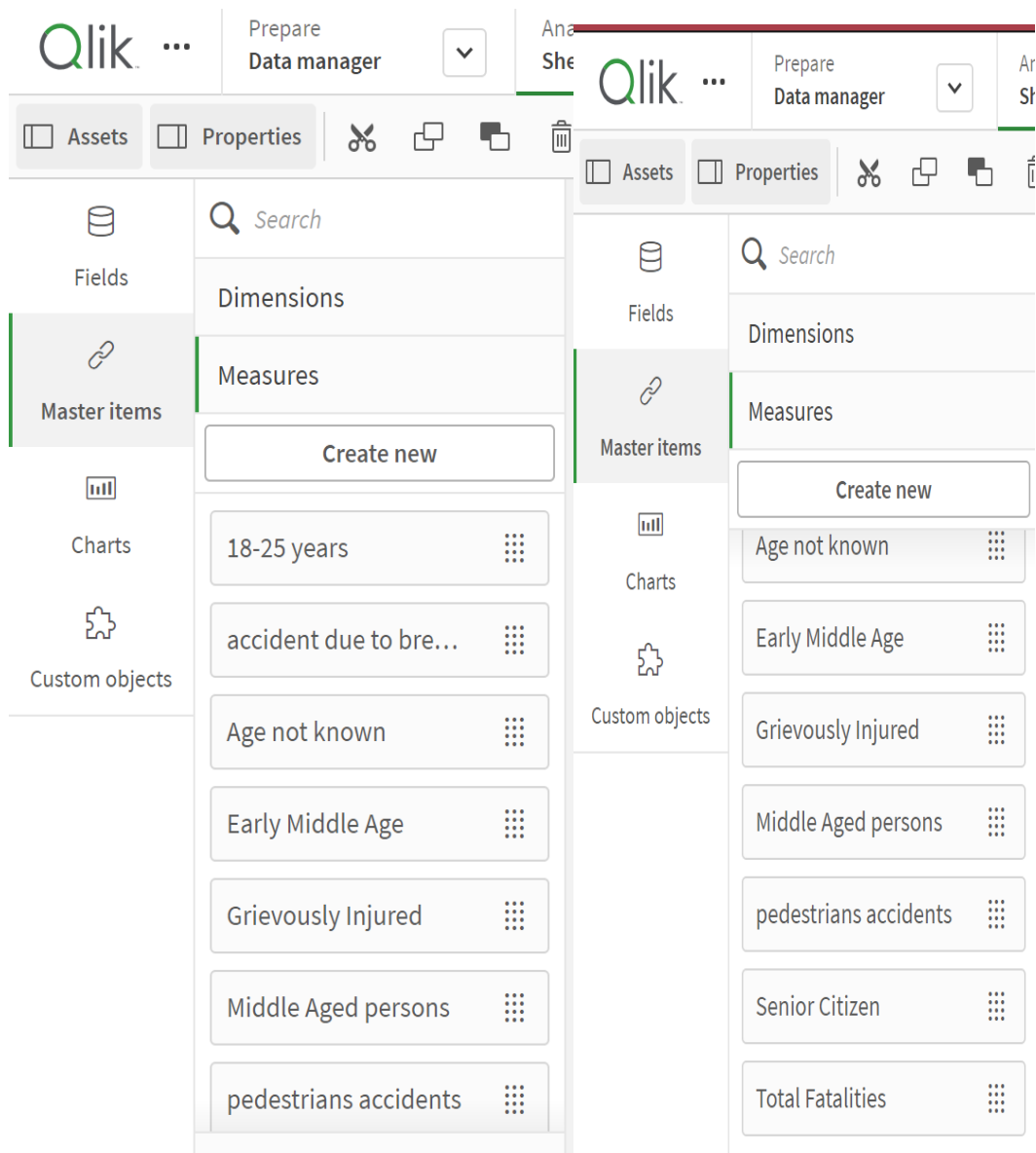
3. Total Fatalities: Summing the total fatalities across different age groups provides an overall view of the human cost of road accidents. This information is crucial for understanding the severity of the issue and advocating for improved road safety measures.

4. Pedestrian Accidents: Aggregating the pedestrian accidents for different age groups sheds light on the impact of road accidents on pedestrians of varying ages. This insight can guide infrastructure improvements and safety initiatives to protect pedestrians.

5. Grievously Injured: The measure for grievously injured pedestrians provides insight into the severity of injuries resulting from road accidents. This data is valuable for assessing the effectiveness of emergency response and medical care for accident victims.

Overall, these master items offer a comprehensive analysis of road safety and accident trends, enabling stakeholders to make informed decisions and implement targeted interventions to enhance road safety.

Qlik Analysis Of Road Safety And Accident Patterns In India



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8.3 Number Of Graphs/ Visualizations:

- Total Accidents
- Total Fatalities
- Accidents due to Breaking Rules
- Pedestrians Killed by Gender
- Correlation: Speeding and Total Accidents
- Accidents by Weather Type
- Accidents by Vehicle Type
- Pedestrians Killed
- Age Groups Killed
- Mobile Phone Usage

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