Qlik Analysis of Road Safety and Accident Patterns in India
Project Report

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1. Introduction:

1.1 Overview: A brief description about the project:This project aims to enhance road safety in India by identifying high-risk regions and analyzing accident patterns using Qlik's data analytics platform. By integrating various data sources, including traffic data, accident reports, meteorological data, road infrastructure, and demographic information, the project seeks to detect patterns, identify frequent accident locations, and forecast future incidents. The insights gained will support data-driven decision-making by government bodies, transportation agencies, and road safety organizations to improve safety measures and reduce accident rates.

Situation 1: Locating Hotspots Qlik's analytics will help identify areas or specific roads in India with high accident frequency. By analyzing accident data alongside traffic volume, road conditions, and time of day, the platform will highlight areas more prone to accidents. This data is crucial for implementing targeted interventions such as enhanced traffic monitoring, improved signage, and reduced speed limits.

Scene 2: Examination of Trends The platform will analyze historical accident data to uncover trends and recurring causes. This includes examining different types of accidents (e.g., collisions, pedestrian accidents), seasonal variations, and driving behaviors (e.g., speeding, inattentiveness). Insights will guide awareness campaigns, driver training programs, and legislative reforms to address the root causes of accidents.

Predictive Modeling Scenario Using real-time data and predictive analytics, Qlik will estimate potential accident scenarios. The platform will provide early warnings and suggest proactive measures to reduce accidents by considering factors such as weather forecasts, traffic flow patterns, and historical accident trends. This predictive capability will enable authorities to allocate resources effectively and implement preventive safety measures.

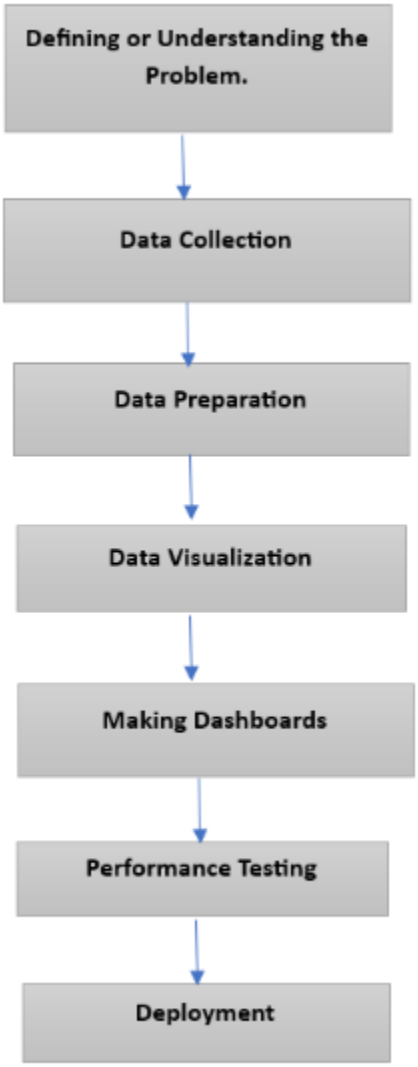
Overall, this initiative aims to leverage data analytics to save lives, improve road safety in India, and reduce accident rates.

1.2 Purpose: The use of the project. What can be achieved using this: The objective of this project is to utilize the Qlik platform to enhance road safety in India. By analyzing weather patterns, accident reports, road infrastructure, traffic data, and demographic information, the project aims to:

- **Determine Accident Hotspots:**
  - **Goal:** Identify locations with high accident rates.
  - **Benefit:** Implement targeted safety measures, such as improved signage and modified speed limits, to prevent accidents.
- **Examine Accident Patterns:**
  - **Goal:** Identify trends and common causes of accidents.
  - **Benefit:** Direct legislative changes, driver education programs, and awareness efforts to address underlying issues.
- **Estimate and Prevent Accidents:**
  - **Goal:** Use current data to predict potential accidents.
  - **Benefit:** Enhance overall road safety by implementing early warning systems and proactive initiatives to prevent accidents.

By creating safer roads in India, this project aims to save lives, reduce accident rates, and facilitate well-informed decision-making using Qlik's analytics.

1.3 Technical Architecture:


Defining or Understanding the Problem.
Data Collection
Data Preparation
Data Visualization
Making Dashboards
Performance Testing
Deployment

2. Define Problem:

2.1 Specify the Business Problem: India continues to experience alarmingly high rates of traffic accidents, leading to a significant number of fatalities and injuries annually, despite advancements in transportation that have made travel more efficient. The main issues include high accident rates, insufficient understanding of accident trends, lack of data-driven decision-making, and ineffective resource allocation. To enhance road safety, the goal is to identify accident hotspots, analyze patterns and causes, and develop a data-driven strategy to reduce fatalities and accidents, ultimately saving lives and improving road safety in India. The project aims to develop interactive dashboards for analyzing user demographics, accident patterns, and problem areas.

2.2 Business Requirements: To achieve the project goals, the following key requirements are identified:

1. **Data Integration:** Aggregate accurate data from various sources.
2. **Dashboard Design:** Create user-friendly, interactive dashboards with filters and multiple views.
3. **Data Visualization:** Utilize dynamic graphs, charts, and maps to present insights clearly.

Success will be measured by the clarity and utility of the insights provided by these dashboards.

2.3 Literature Review: Road traffic accidents result in a considerable number of fatalities and injuries each year, making road safety a major global concern. Improving road safety requires understanding the factors contributing to accidents and evaluating the effectiveness of various interventions.

Road Safety Influencing Factors:

1. **Human Behavior:** Distractions, speeding, and intoxicated driving are significant causes of accidents. Traffic law enforcement and education are crucial (Dingus et al., 2016).
2. **Vehicle Condition:** Poor vehicle maintenance, such as malfunctioning brakes and tire blowouts, increases accident risk (NHTSA, 2015).
3. **Road Infrastructure:** Quality of lighting, signage, and road design greatly impacts safety (Federal Highway Administration, 2018).
4. **Environmental Factors:** Adverse weather conditions like rain and fog elevate accident likelihood (Andrey et al., 2003).

Efficacy of Interventions:

- **Legislative Actions:** Seat belt mandates and DUI laws reduce fatal accidents (Elvik, 2008).
- **Engineering Solutions:** Roundabouts and pedestrian bridges enhance safety (Retting et

al., 2003).
- **Campaigns for Education:** Public awareness initiatives promote safe driving practices (Tison et al., 2010).
- **Technological Innovations:** Advanced driving assistance systems (ADAS) help prevent accidents (Cicchino, 2017).

Role of Analytics:

- **Predictive Analytics:** Forecast high-risk behaviors and accident hotspots for preventive action (Abdel-Aty and Haleem, 2011).
- **Geospatial Analysis:** Use geographic information systems (GIS) to visualize accident data and identify trends (Anderson, 2009).
- **Big Data and Machine Learning:** Enhance precision in road safety data analysis (Montella et al., 2011).
- **Real-time Data Monitoring:** Telematics and IoT provide instant feedback on driver and vehicle performance (Barnaby and Boriboonsomsin, 2008).

In summary, a multimodal approach involving engineering solutions, education campaigns, legislative actions, and technological advancements is essential for improving road safety. Data analytics enable proactive measures to reduce accidents and improve safety. Future research should focus on leveraging advanced technologies and data-driven methods to continue enhancing road safety globally.

2.4 Social Impact:

- **Create visualizations** to display the demographic distribution of accidents across the country.
- **Compare the severity** of accidents in different traffic control areas.
- **Explore correlations** between speeding, weather conditions, and total accidents.
- **Identify the leading causes** of accidents.
- **Examine the distribution** of age groups and gender among victims.
- **Investigate the impact** of various vehicle types on the total number of accidents.

3. Data Collection

3.1 Collect the Data

The data used for this business analytics project was sourced from Kaggle, a well-known platform for datasets and data science competitions. The datasets from Kaggle are publicly available and often contain rich, structured information that is invaluable for in-depth analysis.

Accessing the Dataset

Kaggle Account: Ensure you have a registered account on Kaggle.

Dataset URL: Navigate to the Lending Club dataset page on Kaggle. The dataset can

be found here.
Google Drive Link : https://drive.google.com/drive/folders/1fVxn-8PtfmmTJKuT50aPnkrs7IEnM6a4?usp=sharing

3.2 Connect data with qlik sense:

1. Log in to Qlik Cloud

- **Access Qlik Cloud:** Navigate to the Qlik Cloud portal and log in to your account.

2. Create a New App

- **Navigate to Apps:**
  - Go to the "Apps" section in Qlik Cloud.
  - Click on "Create new app."
  - Provide a name and description for your new app.
  - Click "Create" and then "Open App" to start working on your new app.

3. Add Data

- **Begin Data Import:**
  - In your app, click on "Add Data."
  - Select "My Computer" to upload data files directly from your local storage.
  - Browse and select the pre-processed Kaggle CSV files, then click "Open."

Data Connection Configuration :-

1. Review and Load Data:

  - After uploading, Qlik Cloud will display a preview of your data.
  - Verify that the data is correctly imported and formatted.
  - Make any necessary adjustments, such as renaming fields or changing data types.
  - Click "Load Data" to load the datasets into your Qlik app.
- **Data Model Viewer:**
  - Use the Data Model Viewer to see how the data tables are related.
  - Ensure all data relationships and keys are correctly set up.

2. Create Visualizations

1. Dashboard Design:

- Go to the "Sheets" section within your app.
- Create a new sheet and start adding visualizations like charts, graphs, and tables.

2. Add Filters and Dimensions:

- Use the "Fields" panel to drag and drop dimensions and measures into your visualizations.
- Apply filters to refine data views and enhance interactivity.

3. Enhance Visualizations:

- Customize the appearance and functionality of your visualizations.
- Use advanced features like drill-downs, dynamic coloring, and data storytelling to make your dashboard more compelling.

4. Data Preparation

4.1 Preparing the Data for Visualization

Preparing the data for visualization involves several crucial steps to ensure it is accurate, complete, and ready for analysis. Initially, this process includes cleaning the data by removing any irrelevant or missing information. Following this, the data is transformed into a format that can be easily visualized. Exploring the data helps in identifying patterns and trends, while filtering focuses on specific subsets relevant to the analysis. Finally, preparing the data for visualization software ensures it is ready for creating meaningful and insightful visual representations. Given that the data is already cleaned, we can proceed directly to visualization.

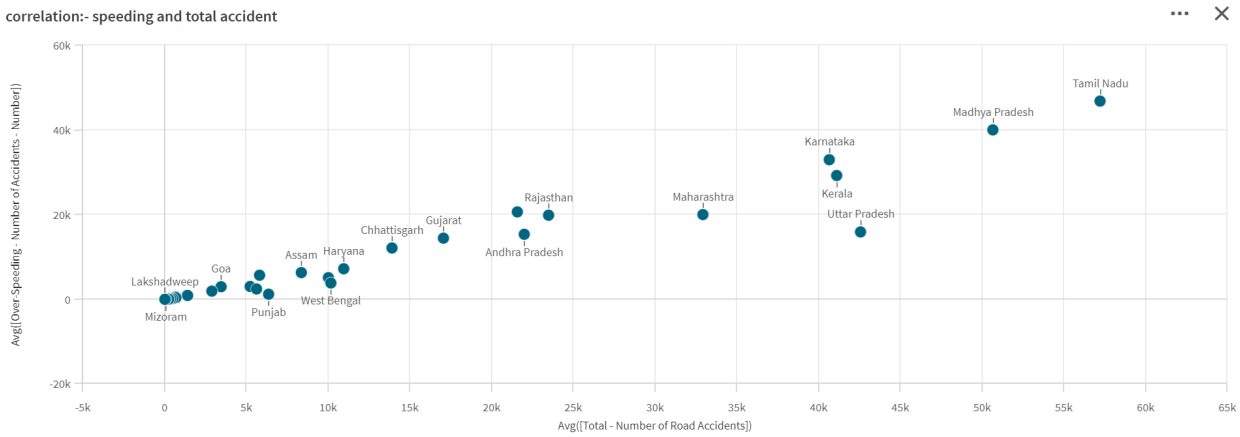
5. Data Visualization

Data visualization is the practice of creating graphical representations of data to facilitate understanding and exploration. The primary goal is to make complex data sets more accessible, intuitive, and easier to interpret. By employing visual elements such as charts, graphs, and maps, data visualizations enable users to quickly identify patterns, trends, and outliers. In the context of Road Safety and Accident Patterns in India, this visualization will encompass various aspects, including accident causes, and the demographics of minors and genders affected. Common types of visualizations used for this analysis include bar charts, map charts, line charts, pie charts, tree maps, key performance indicators (KPIs), gauges, and correlation graphs. These visual tools collectively provide a comprehensive understanding of the data, aiding in the identification of critical insights.

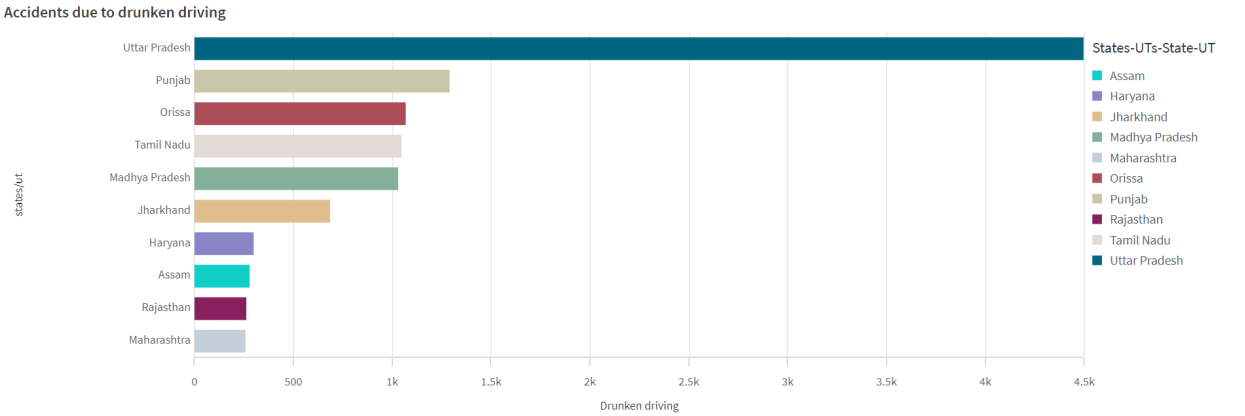
Road Safety and Accident Patterns in India

This visualization project explores various aspects of road safety and accident patterns in India. It includes detailed reports on the causes of accidents, as well as the impact on different demographics such as minors and genders. To analyze this data effectively, several types of visualizations are employed, including bar charts, map charts, line charts, pie charts, tree maps,

key performance indicators (KPIs), gauges, and correlation graphs. These visual tools help in providing a comprehensive and insightful analysis of the accident data.

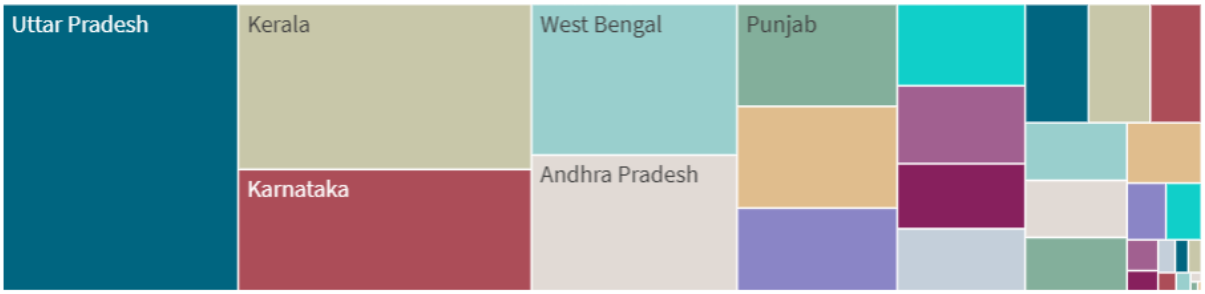


This chart shows the correlation between accidents by over speeding and total accidents.



This graph shows the Accidents caused by Drunken Driving, no of people killed and total injured.

number of accidents in police control area



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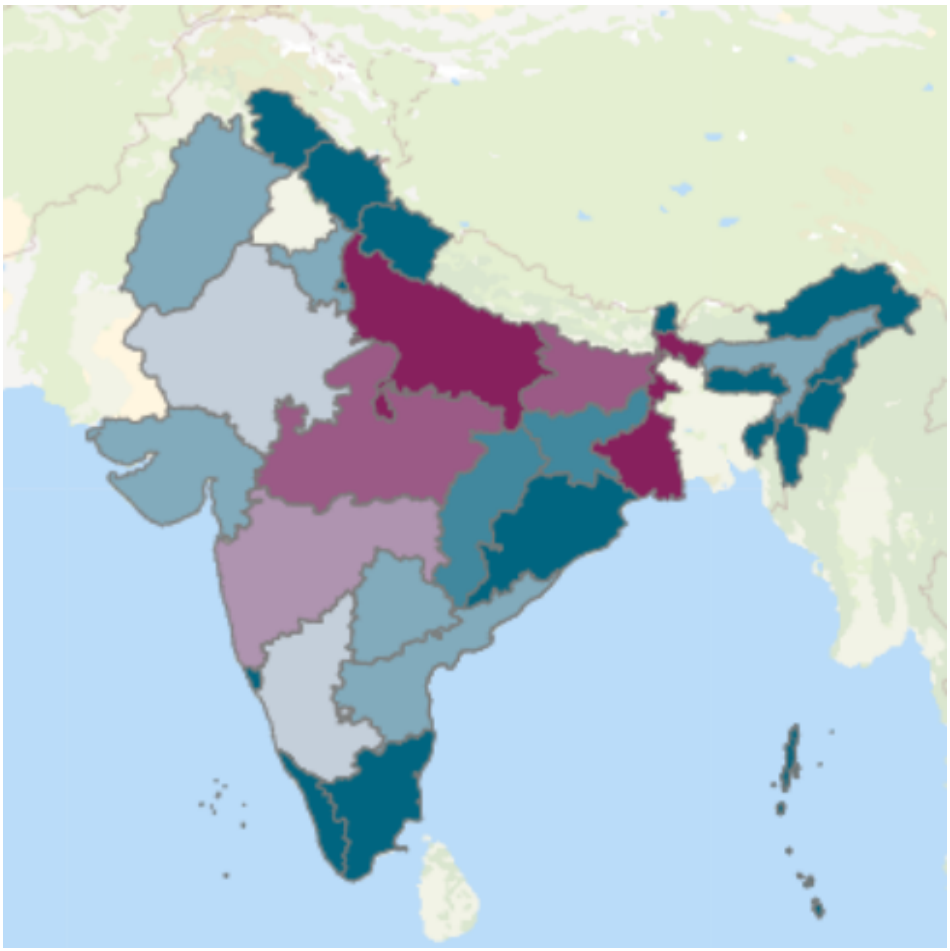
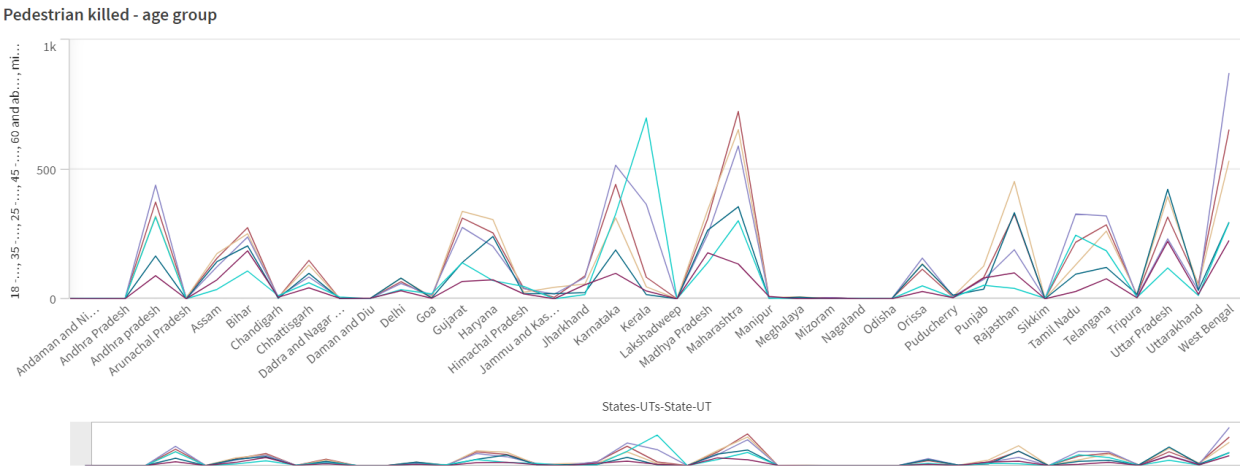
Number of accidents near traffic signals

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

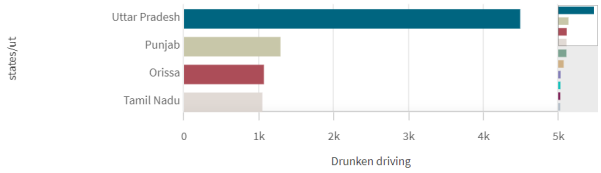


The map shows the number of minors killed in different states

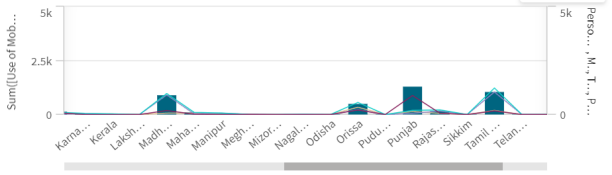


and the age group of people were killed

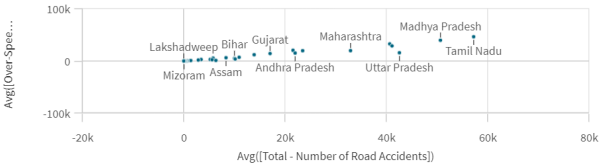
Accidents due to drunken driving



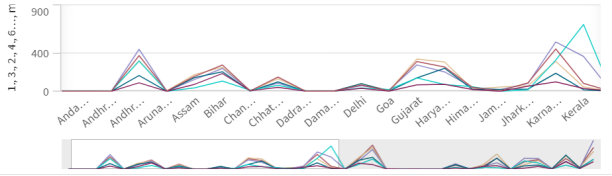
Mobile usage



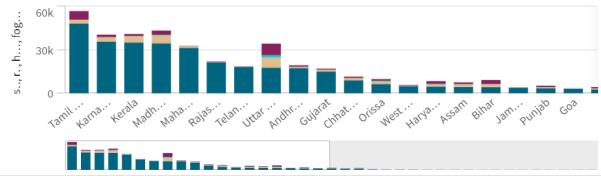
correlation:- speeding and total accident



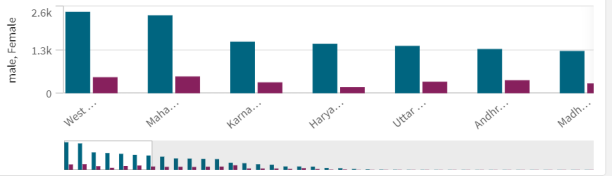
Pedestrian killed - age group



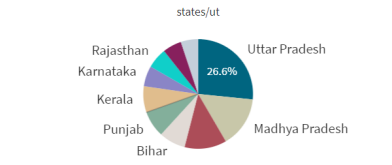
accidents by weather



Pedestrian killed Gender



Accidents due to driving on wrong sides



Insights

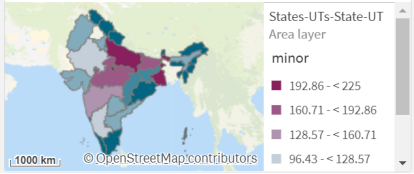
Calculated measure (KPI)

- The total Sum([Driving on Wrong side - Number of Accidents]) is 24.43k.

Ranking

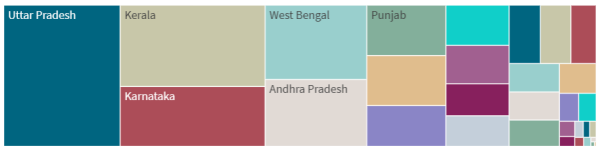
- The top states/ut is Uttar Pradesh with Sum([Driving on Wrong side - Number of

Minors killed



Next sheet: My new sheet (3)

number of accidents in police control area



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total number of accidents
10.43k

number of people killed
3.5k

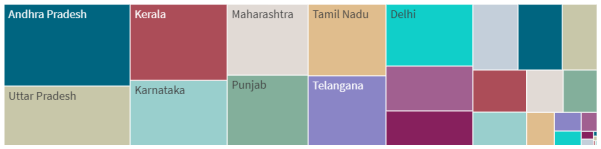
greviosly injured
5.32k

number of people killed
2.84k

number of accidents
9.72k

greviously injured
4.23k

Number of accidents near traffic signals



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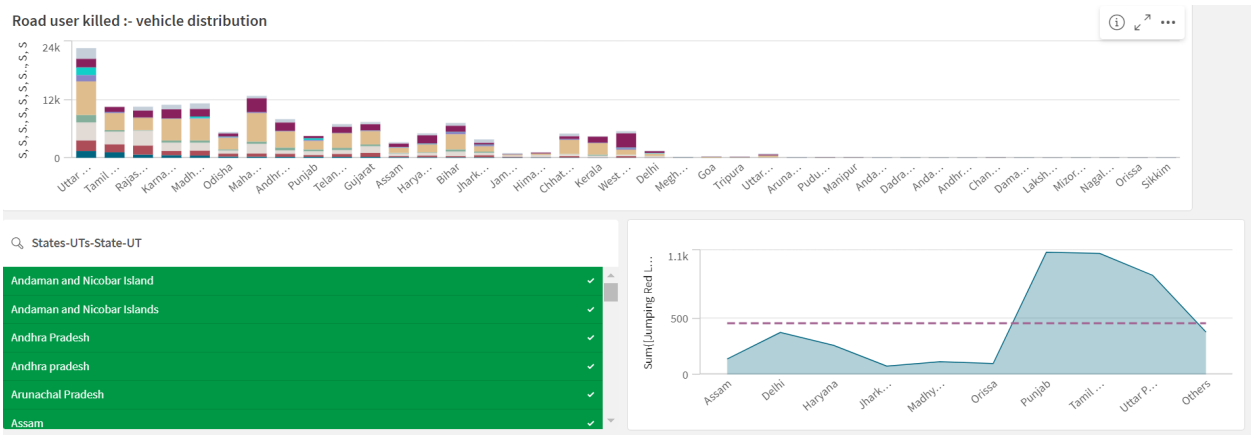
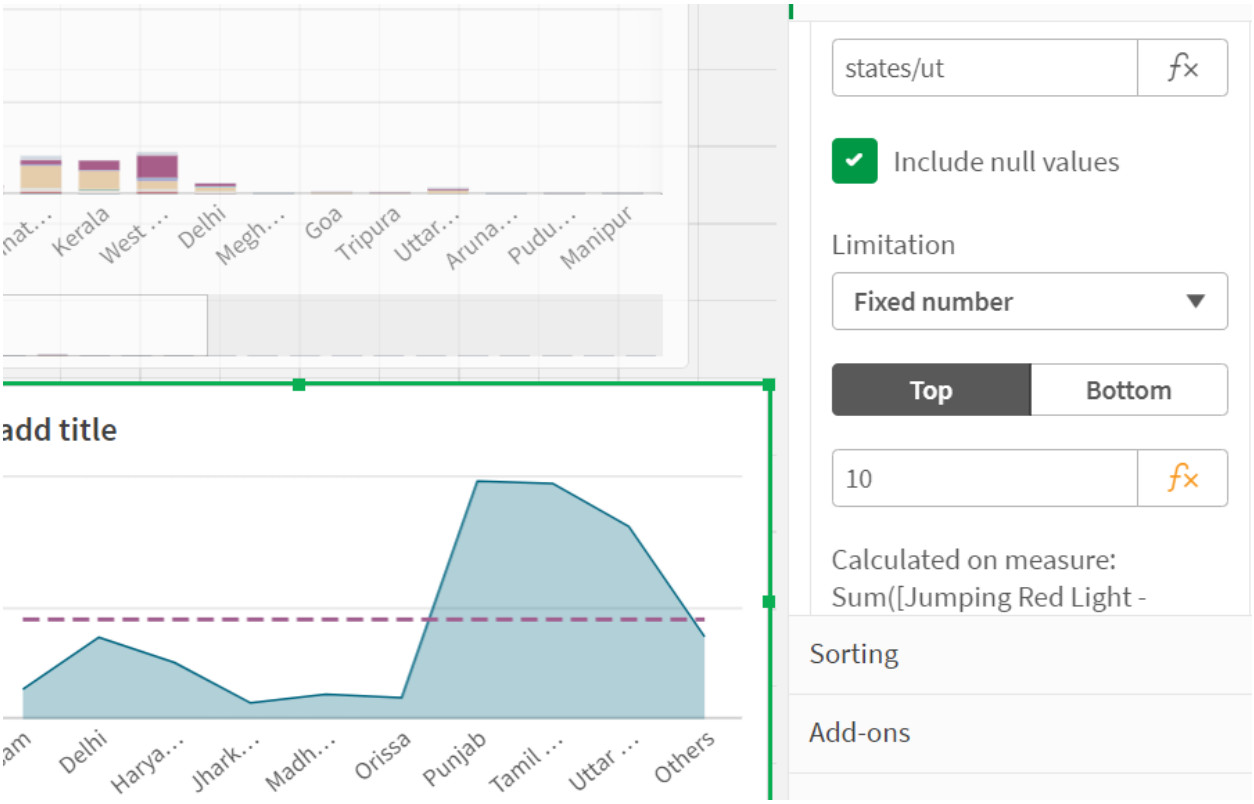


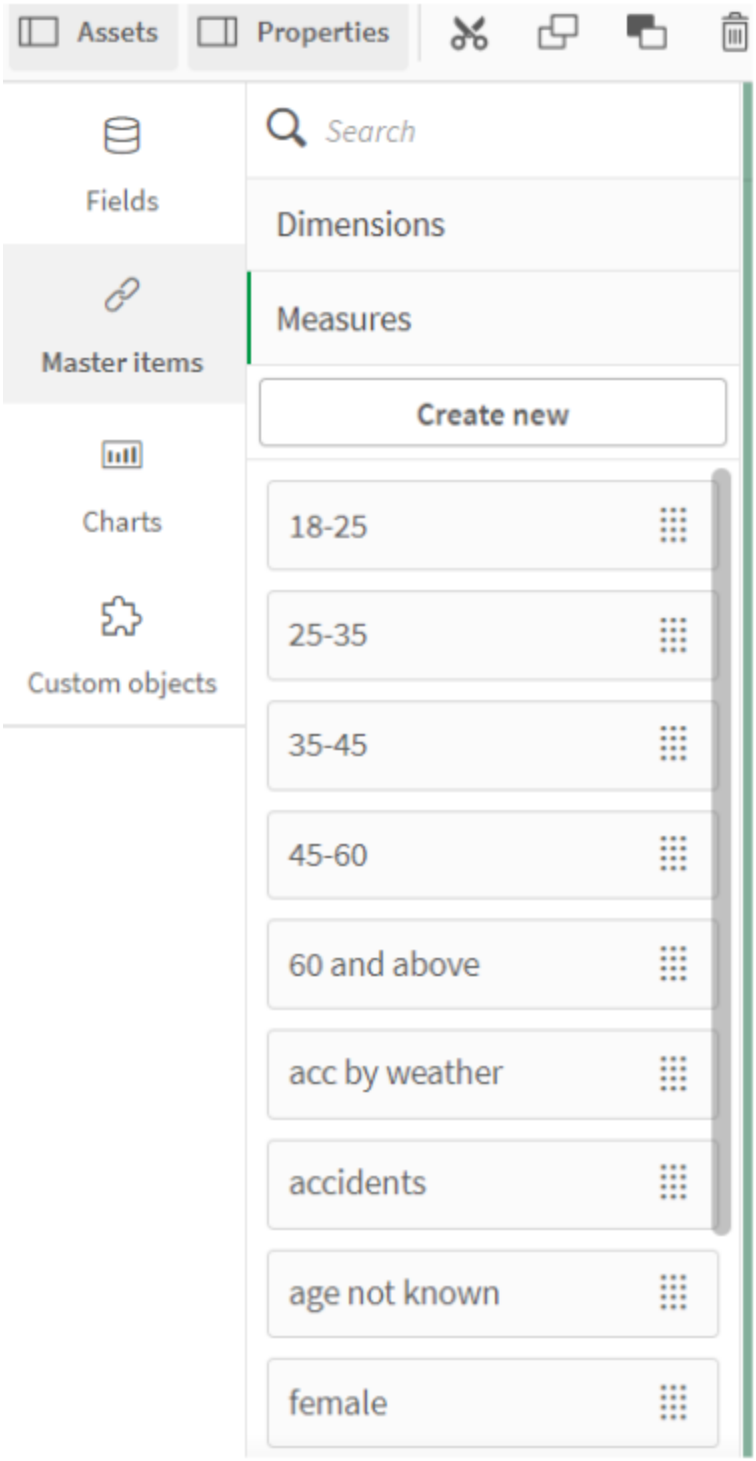
7 Performance testing:

Applications on Data Filters:

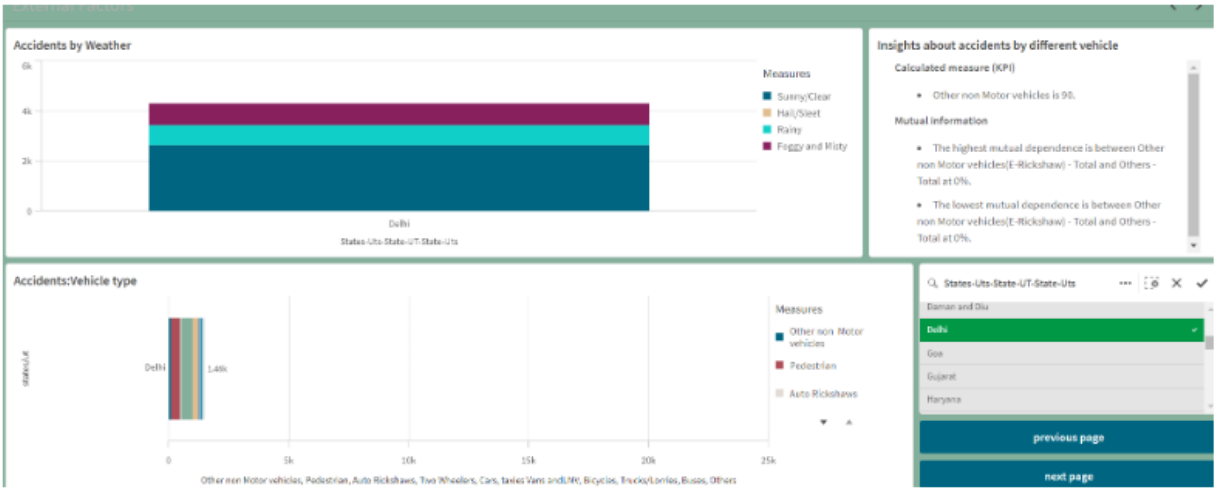
Data filter of 5 States



Use of Master Items:



Use of Filters



Conclusion

This report provides a detailed analysis of road safety and accident patterns in India, uncovering key factors influencing accidents and casualties. It offers actionable insights that can be utilized to enhance safety measures and strategies for reducing accidents and improving overall road safety.