

1. Problem Understanding

Business Problem

The business problem we are addressing is the high rate of road accidents that result in fatalities, injuries, and economic losses. Our goal is to identify accident-prone areas, analyze the contributing factors (such as weather, traffic conditions, or place), and develop data-driven solutions to improve road safety. By utilizing Qlik's data analytics, we aim to uncover patterns that can inform decision-making and preventive measures.

1.2: Business Requirements for Qlik Road Safety Project (Using Kaggle Road Accident Dataset)

This analysis seeks to uncover essential insights into user profiles, accident trends, and critical risk areas. The primary objective is to design interactive, visually appealing dashboards that aid in strategic decision-making and operational optimization. The findings from this analysis will be crucial in guiding informed actions, improving safety practices, and adhering to regulatory standards.

- **Customized Reports:** Create reports for government authorities, traffic planners, and law enforcement with key insights, such as regional accident trends and high-risk vehicle types.
- **Recommendations for Policy Changes:** Based on data insights, policy changes like lowering speed limits in high-risk areas, improving road infrastructure, or increasing enforcement can be done.
- **Public Campaign Suggestions:** Identify areas and behaviors to target with safety campaigns, such as promoting helmet usage among two-wheeler riders or addressing overspeeding.

Insights for Decision-Making

- **Accident-Prone Areas:** Identify regions that need improvements in infrastructure, traffic management, or law enforcement.
- **Time-Based Insights:** Analyze when accidents are more likely to happen (e.g., nighttime, specific seasons) and suggest interventions.
- **Vehicle and Cause-Specific Strategies:** If two-wheelers or specific causes (speeding, poor weather) have a higher accident rate, propose targeted public safety campaigns or policy changes.

- **Public Safety Campaigns:** Data-driven insights will help create awareness campaigns focused on common causes of accidents, such as overspeeding, driving under the influence, or not wearing helmets.

1.3: Literature Survey

Road safety is a critical issue worldwide, with significant impacts on public health and economic stability. Research in this field focuses on understanding accident causes, evaluating safety measures, and developing strategies to reduce traffic-related injuries and fatalities.

2. Accident Causes and Risk Factors

a. Human Factors

- **Driver Behavior:** Numerous studies emphasize the role of driver behavior in accidents, including speeding, impaired driving (alcohol and drugs), and distraction [PubMed: 2022].
- **Fatigue:** Research highlights that driver fatigue significantly increases the risk of accidents, with findings showing that drowsy driving is comparable to driving under the influence of alcohol [IEEE Xplore: 2020].

b. Environmental Factors

- **Weather Conditions:** Poor weather conditions, such as rain, fog, and ice, are strongly associated with higher accident rates [Google Scholar: 2021].

Road Conditions: Road surface quality and infrastructure design (e.g., potholes, poorly marked lanes) are crucial factors influencing accident rates [Institutional Repositories: 2021].

1.4: SOCIAL IMPACTS

The social impact of analysing road safety and accident patterns in India through data analytics and visualisation can be significant:

1. **Enhanced Road Safety:** Improved understanding of accident patterns and risk factors can lead to better safety protocols and regulations, reducing the number of accidents and fatalities. This enhances public safety and quality of life.

2. **Targeted Interventions:** Identifying high-risk areas and causes allows for targeted interventions, such as improved road infrastructure, stricter enforcement of traffic laws,

and enhanced driver education programs. This can lead to more effective prevention strategies.

3. **Public Awareness:** Insights from the analysis can be used to inform public awareness campaigns, educating drivers and pedestrians about safe practices and the risks associated with certain behaviours or conditions. Increased awareness can lead to safer road behaviour and reduced accident rates.

4. **Policy Formulation:** Data-driven evidence supports the development of more effective policies and strategies for road safety. This can lead to the implementation of evidence-based regulations and initiatives that address specific issues identified through the analysis.

2: Data Collection, Understanding and Preparation

Data Collection

Data for this project is sourced from the dataset available on Kaggle titled "Road Accidents in India" by Arya Kittukrishnasai. This dataset provides a comprehensive collection of road accident records across various regions in India, including details on accident severity, location, time, and contributing factors.

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

2.1: Understanding

Examining the Data Structure

- **Opening the File:** I opened the dataset using a spreadsheet tool.
- **Columns:** The dataset includes various columns, such as:
 - **Location:** Where the accident happened.
 - **Severity:** The seriousness of the accident (minor, serious, fatal).
 - **Weather Conditions:** Information on the weather during the accident.
 - **Vehicle Types:** Types of vehicles involved in the accidents.
 - **Injuries and Fatalities:** Number of people injured or killed.

3. Understanding Data Types

- **Categorical Data:** Includes fields like accident severity, vehicle types, and weather

conditions which categorize the data.

- **Numerical Data:** Metrics such as the number of injuries or fatalities, which can be quantified

2.2: Prepration

To prepare data for Qlik analysis, follow these steps:

1. **Clean the Data:** Remove any irrelevant or missing information to ensure the dataset is accurate and reliable.
2. **Transform the Data:** Convert the data into a format that works well with Qlik, making sure it's structured properly for analysis.
3. **Explore the Data:** Look for patterns and trends to better understand the dataset and its characteristics.
4. **Filter the Data:** Narrow down to specific subsets that are most relevant to your analysis goals.
5. **Prepare for Qlik:** Ensure the data is formatted correctly for seamless integration with Qlik's tools.
6. **Validate the Data:** Double-check that the data is complete and accurate before proceeding with analysis.

2.3: Connect Data with Qlik Sense

Upload and Connect Data in Qlik Sense Cloud

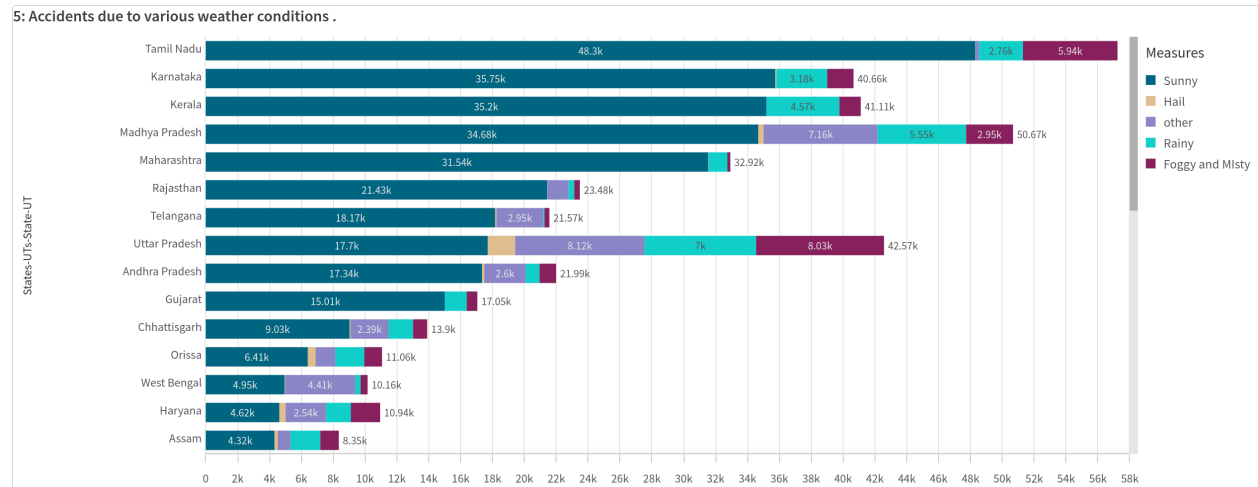
- **Log In:** Access your Qlik Sense Cloud account.
- **Create a New App:** Click on "Create New App" to start a new project.
- **Upload Data:**
 - Go to the app's "Data Manager" or "Data Load Editor" section.
 - Click on "Add Data" or "Upload Data."
 - Choose your data file (CSV, Excel, etc.) from your local storage.
 - Follow the prompts to load the data into Qlik Sense then click on load button

For extra prepration.

- **Data Load Editor:** Use the Data Load Editor to script any additional data transformations or cleaning if needed.

3: Data Visualizations

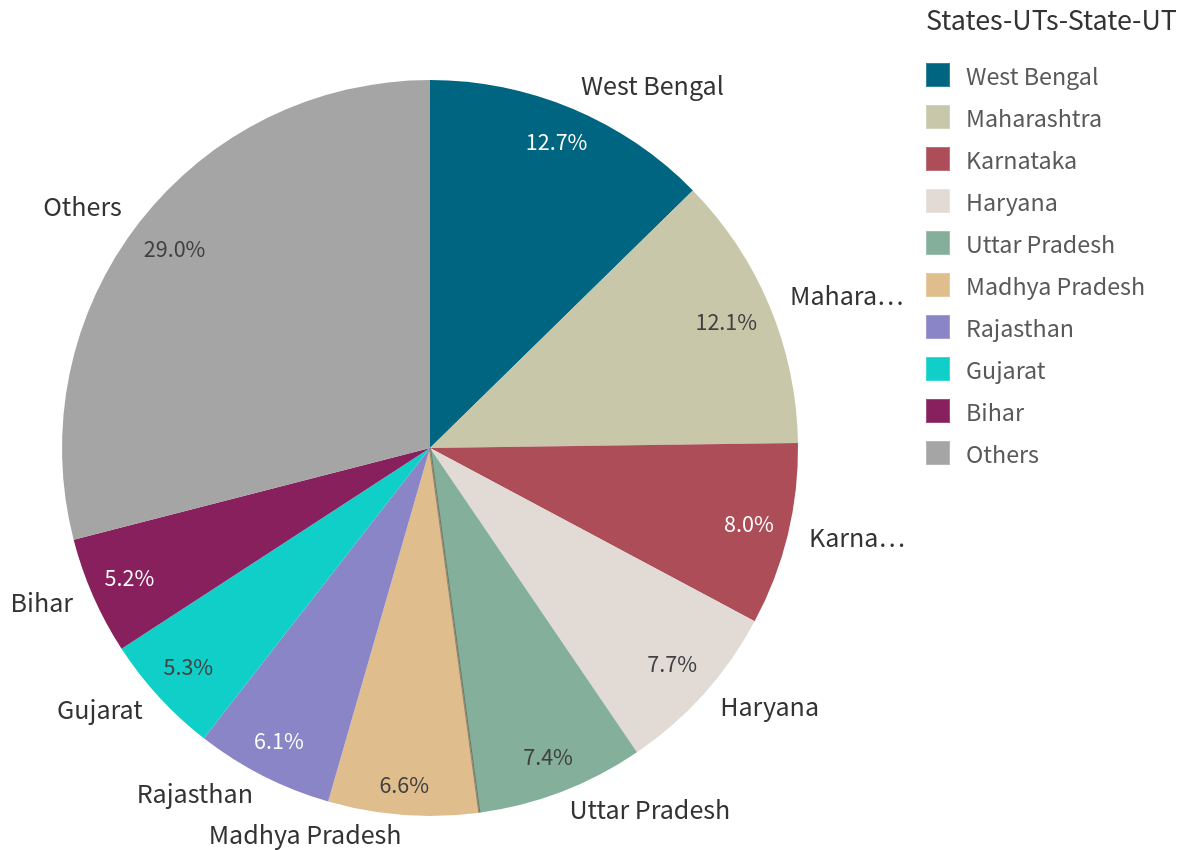
Create a Bar Chart



- **Navigate to the Sheet:**
 - Go to the “Sheets” section and click “Create New Sheet” or open an existing one.
- **Add a Bar Chart:**
 - Click on “Edit” to enter the sheet editing mode.
 - From the chart options on the left, drag and drop the “Bar Chart” onto the sheet.
- **Configure the Bar Chart:**
 - **Dimensions:** Select the field you want to use as the x-axis (e.g., Categories).
 - **Measures:** Choose the metric for the y-axis (e.g., Sales Amount).
 - **Customize:** Adjust the chart’s appearance and settings as needed.

Create a Pie Chart

6.2: (Male) Pedestrians Killed ~ State-wise

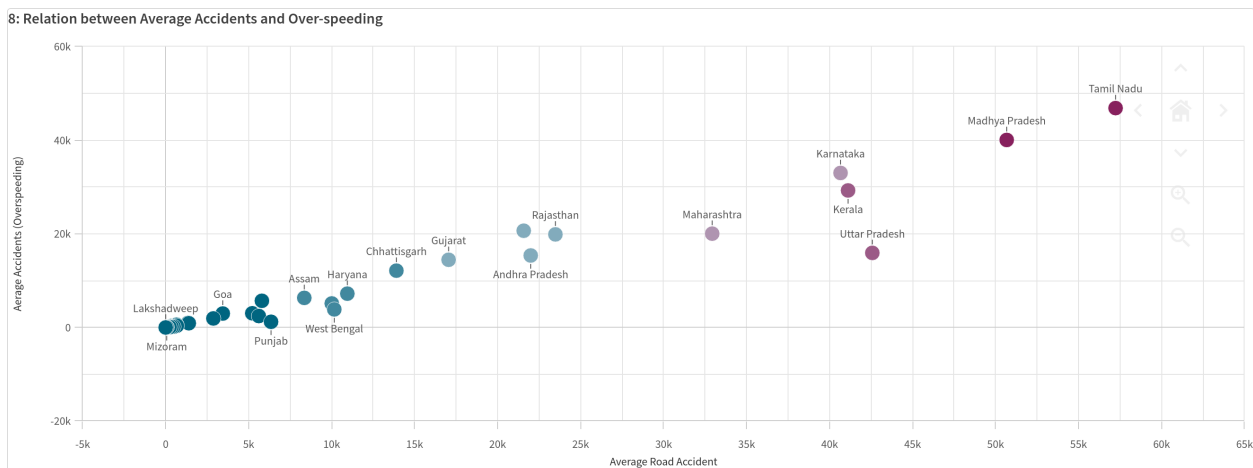


- **Navigate to the Sheet:**
 - Open the sheet where you want to add the pie chart or create a new one.
- **Add a Pie Chart:**
 - Click "Edit" to enter the sheet editing mode.
 - Drag and drop the "Pie Chart" from the chart options onto the sheet.
- **Configure the Pie Chart:**
 - **Dimensions:** Select the field to represent the slices of the pie (e.g., Product Categories).
 - **Measures:** Choose the value for each slice (e.g., Total Sales).
 - **Customize:** Modify colors, labels, and other settings to enhance the chart.

Create a Stacked Bar Chart

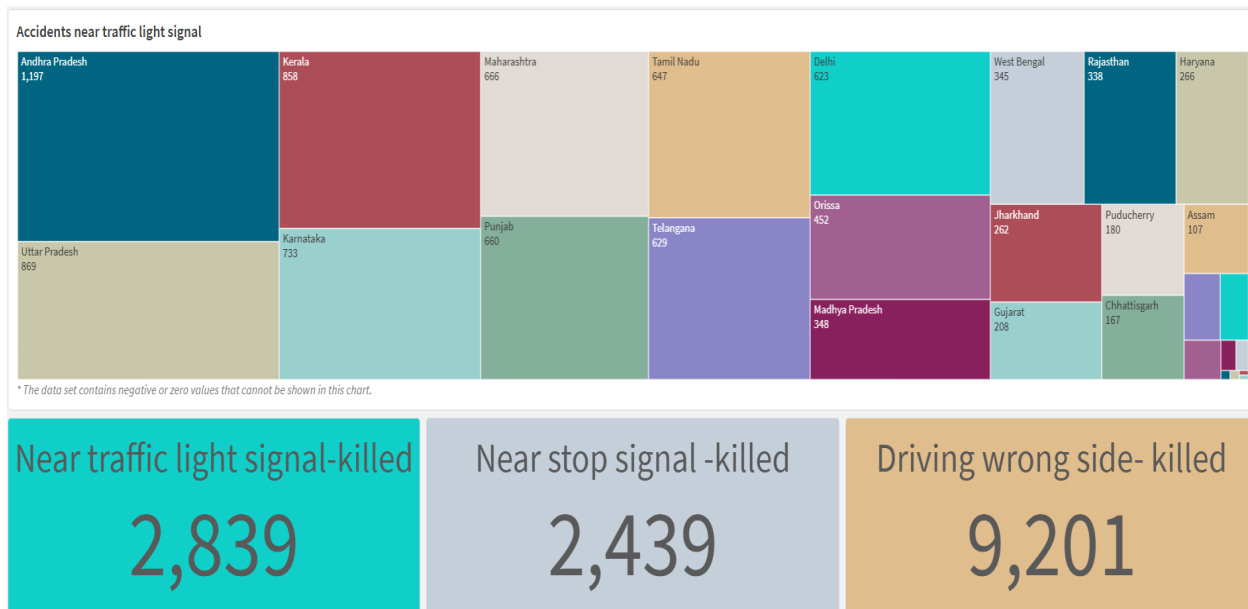
- **Navigate to the Sheet:**
 - Open the sheet where you want to add the stacked bar chart or create a new one.
- **Add a Stacked Bar Chart:**
 - Click “Edit” to enter the sheet editing mode.
 - Drag and drop the “Bar Chart” onto the sheet.
- **Configure the Stacked Bar Chart:**
 - **Dimensions:** Select the field for the x-axis (e.g., Time Periods).
 - **Measures:** Choose the metric for the y-axis (e.g., Revenue).
 - **Stacking:** Add another dimension (e.g., Product Categories) to stack the bars by. This will group and color the bars according to the secondary dimension.
 - **Customize:** Adjust the chart’s appearance, including colors and labels.

Create a Scatterplot



- **Navigate to the Sheet:**
 - Open the sheet where you want to add the scatterplot or create a new one.
- **Add a Scatterplot:**
 - Click “Edit” to enter the sheet editing mode.
 - Drag and drop the “Scatter Plot” from the chart options onto the sheet.
- **Configure the Scatterplot:**
 - **Dimensions:** Select the field for the x-axis and the y-axis.
 - **Measures:** Choose any additional metrics or size dimensions if needed.
 - **Customize:** Adjust settings such as point colors, sizes, and labels to clearly represent the data.

4: Dashboard



- Design a visually appealing and intuitive dashboard layout.
- Ensure responsiveness across different devices and screen sizes
- Organize visualizations logically to facilitate easy comprehension.
- Incorporate user-friendly navigation and interaction elements.

5: Story Creation

When creating a story in Qlik Sense to enhance your dashboard:

1. **Identify Key Insights:** Determine the main findings or trends from your data, such as high-accident areas or the effects of weather conditions on accident rates.
2. **Create the Story:** Navigate to the "Stories" section in Qlik Sense and select "Create New Story."
3. **Add Story Points:** Include visual snapshots of your key visualizations and add explanations or annotations to highlight important insights.
4. **Organize the Flow:** Arrange these story points logically to guide viewers through the narrative and make the data easy to understand.
5. **Review and Share:** Ensure the story effectively communicates your insights and then share it with stakeholders to aid in decision-making.

6: Performance Testing

To ensure your Qlik Sense dashboard performs efficiently, consider these aspects:

1. **Amount of Data Rendered to DB:**

- **Monitor:** Check how much data is being loaded into the database and ensure it's optimized. Large datasets can affect performance, so it's important to manage data efficiently.

2. **Utilization of Data Filters:**

- **Evaluate:** Assess how filters are applied. Overuse or complex filters can slow down performance. Test different filters to see their impact on dashboard speed.

3. **Number of Calculation Fields/Master Items:**

- **Review:** Look at the number of calculation fields and master items. Too many calculations can degrade performance. Monitor how the number of calculations affects load times and responsiveness.

4. **Number of Visualizations/Graphs:**

- **Test:** Consider the number of visualizations and graphs on your dashboard. Too many can slow down the dashboard. Test performance with various numbers of visualizations to find an optimal balance.

Conclusion

This research project effectively utilized data analytics and visualization tools, particularly Qlik Sense, to examine road safety and accident patterns in India. The insights gained from this study can significantly contribute to developing strategies and policies aimed at improving road safety measures and reducing accidents.

