Analysis Of Road Safety And Accident Patterns In India

1 Introduction

1.1 Overview

This project, titled "Analysis of Road Safety and Accident Patterns in India," utilizes Qlik Sense Cloud, a data analytics platform, to analyze road safety and accident patterns across the country. The analysis leverages the "ROAD ACCIDENTS IN INDIA" dataset available on Kaggle.

1.2 Purpose

The project aims to achieve the following objectives:

- Identify high-risk accident zones (hotspots).
- Analyze trends and recurring factors leading to accidents.
- Develop data-driven insights to support decision-making for improving road safety and reducing accidents in India.

1.3 Technical Architecture

The project utilized Qlik Sense Cloud as the primary Business Intelligence (BI) platform for data exploration, analysis, and visualization. Here's a breakdown of the technical architecture:

- **Data Source:** The primary data source was the Kaggle dataset. A secure connection was established within Qlik Sense Cloud for data access.
- **Data Transformation:** The data underwent cleaning and transformation to ensure accuracy and consistency for analysis.
- **Data Model:** A data model was designed within Qlik to represent relationships between data elements (e.g., location, date, accident type).
- **Data Analysis and Visualization:** Qlik's capabilities were used to perform data analysis and create interactive visualizations for effective communication of insights.

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2 Problem Understanding

2.1 Business Problem

Road accidents are a significant public health concern in India, resulting in numerous casualties and substantial economic losses.

2.2 Business Requirements

The project aimed to:

- Identify geographical locations with a disproportionately high number of accidents (hotspots).
- Analyze trends in accident types, severity, and potential contributing factors.
- Generate insights to inform targeted interventions and policy changes aimed at improving road safety.

2.3 Litrature Survey

While research exists on road safety challenges in India and the benefits of data analytics in this domain, a gap exists regarding the specific application of Qlik for Indian road safety analysis. Further studies are needed to explore how Qlik can be leveraged to analyze road accident data in India, potentially filling a knowledge gap and contributing to improved road safety measures.

3 Data Collection

3.1 Collection of data

The primary data source for this project was the "ROAD ACCIDENTS IN INDIA" dataset available on Kaggle. This dataset offers information on road accidents across various Indian states, potentially including details like location, date, accident type, severity, contributing factors, and vehicle types involved. Depending on data availability and project needs, further exploration might be required to confirm specific attributes and potentially identify supplemental datasets for a more comprehensive analysis.

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3.2 Data connection with Qlik Sense

The project utilized a two-step approach for data access in Qlik Sense Cloud. First, the "ROAD ACCIDENTS IN INDIA" dataset was downloaded and extracted from Kaggle. This ensured secure data ownership and avoided relying solely on external access. Second, the extracted data was loaded into the Qlik Sense Cloud app, making it readily available within the Qlik environment for manipulation and visualization. This approach combined data security with efficient analysis capabilities.

4 Data Preparation

4.1 Prepare the data for visualization

In preparation for visualization, the "ROAD ACCIDENTS IN INDIA" dataset underwent a cleaning and transformation process within Qlik Sense. This included addressing missing values to ensure data accuracy. Additionally, new measures and dimensions were derived from existing data to facilitate deeper analysis. This data preparation step ensured the data was consistent, informative, and ready to be transformed into compelling visualizations that reveal key patterns and insights in road safety.

5 Data Visualization

5.1 Visualizations

To explore various aspects of road safety in India, the project utilized a range of visualizations within Qlik Sense Cloud. Interactive dashboards displayed insights on:

- **Accidents due to Drunken Driving:** Highlighting the prevalence of this issue across different regions.
- **State-wise Mobile Phone Usage:** Identifying states with potentially higher risks associated with distracted driving.
- **Vehicle Contribution towards Total Accidents:** Visualizing the distribution of accidents across various vehicle types (e.g., two-wheelers, cars, trucks).

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- **Correlation between Speeding and Number of Accidents:** Unveiling potential relationships between speeding and accident frequency.
- **Accidents by Weather Type:** Examining how weather conditions might influence accident rates.
- **Distribution of Injuries:** Highlighting areas with a concerning number of minors injured in accidents.
- **Pedestrian Fatalities:** Shedding light on gender and age group demographics of pedestrian fatalities.
- **Road User Fatalities by Vehicle:** Pinpointing the types of vehicles most involved in fatal accidents for different road user categories (e.g., pedestrians, cyclists, motorists).

These visualizations, along with dashboards and storytelling elements provided a comprehensive view of road safety challenges in India.

6 Dashboard

6.1 Responsive and design of dashboards

The project prioritized user experience through the creation of responsive dashboards in Qlik Sense. A clear and intuitive interface with easy navigation was central to the design, allowing users to access insights regardless of their screen size. Color palettes and visual elements were chosen strategically to promote clear data representation and avoid information overload on smaller screens. This responsive design approach empowers stakeholders to access critical road safety information anytime, anywhere, fostering informed decision-making for improved road safety.

7 Report

7.1 Report Creation

To complement the interactive dashboards, a comprehensive report(storytelling) was generated summarizing the project's findings. This report documented the methodology employed for data analysis, including data sources and cleaning

processes. Key visualizations were presented alongside clear explanations of their significance and the insights they revealed regarding road safety patterns in India. Actionable recommendations, based on the analysis, were outlined within the report, providing stakeholders with a roadmap for implementing data-driven strategies to improve road safety and save lives. This report serves as a valuable resource for stakeholders seeking to understand the project's outcomes and leverage the insights to make informed decisions for a safer road environment.

8 Performance Testing

8.1 Amount of data Rendered

The project evaluated the application's performance with varying data volumes, focusing on the impact of data size on rendering speed. This assessment of the "Amount of data Rendered" is crucial for ensuring the dashboards and visualizations function efficiently even when handling potentially larger datasets in the future. By analyzing rendering times at different data volumes, optimizations can be identified and implemented within Qlik Sense. It involved techniques like data filtering strategies and optimizing visualization complexity for larger datasets. The goal is to maintain a user-friendly experience with minimal loading times, regardless of the data volume being explored.

8.2 Utilization of Data Filters

Data filters played a crucial role in facilitating deeper analysis within the Qlik Sense sheets and dashboards. These filters allowed users to explore specific subsets of the data based on their interests. This ability to filter data dynamically empowered to personalize the exploration and gain targeted insights relevant to their specific areas of concern.