VIRTUAL INTERNSHIP PROJECT DOCUMENT

Qlik Analysis Of Road Safety And Accident Patterns In India

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Define Problem/ Problem Understanding:

Specify the business problem:
Despite technological advancements in transportation that have minimized distances, road accidents remain a significant concern in India, resulting in the loss of lakhs of lives and causing serious injuries to crores of people annually. The Indian government, policymakers, and road safety authorities need effective strategies to mitigate these accidents and improve road safety. 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 and policies of the society.

Business Requirements:

A thoroughly cleaned Dataset
Interactive dashboards
Visualizations that drive insights
An user interactive story that allows analysis of data and visualizations

Literature Survey:

S. No.	Title	Author	Review
1.	Identifying the causes of road traffic accidents	Devi Prasad Dash,	This study analyzes road fatality rates across Indian states from 2006 to 2015, using baseline regression

	in India: An empirical investigation	Narayan Sethi, Aruna Kumar Dash	to examine the impact of human errors, weather conditions, and control variables on traffic fatalities and injuries. Key findings indicate that reckless driving, defective vehicles, adverse weather, and rash driving, especially by buses, trucks, and cars, are major contributors to road accidents. Increased motorization and rash driving are primary causes of fatalities, with bad weather significantly impacting urban areas. The study also highlights issues like accident underreporting, inadequate road safety regulations, flawed investigations, rising vehicle usage, and urbanization, which exacerbate road safety problems in India. These insights can guide targeted strategies to reduce road fatalities and improve traffic safety.
2.	Data mining approach to analyse the road accidents in India	Ayushi Jain; Garima Ahuja; Anuranjana; Deepti Mehrotra	Despite ongoing efforts to enhance road safety in India, certain regions continue to be susceptible to various vulnerabilities, contributing to persistently high accident rates. The diverse and heterogeneous nature of these vulnerability-inducing factors necessitates an effective analytical approach to significantly reduce these alarming figures. This paper aims to employ data mining techniques to develop a model that addresses the heterogeneity of data by grouping similar objects. The model identifies accident-prone areas across the country based on different accident-related factors and determines the associations between these factors and resulting casualties. By leveraging data mining, the study seeks to create clusters of similar

			incidents, thereby smoothing out data inconsistencies and enabling a more precise identification of high-risk areas. Additionally, the model elucidates the relationships between various factors and accident outcomes, providing deeper insights into the root causes of road accidents. The findings aim to inform targeted interventions and policies to mitigate road accidents and enhance road safety in India.
3.	Modern data sources and techniques for analysis and forecast of road accidents: A review	Camilo Gutierrez-Osorio, César Pedraza	Road accidents are a major cause of injuries and deaths worldwide, prompting significant research into using advanced algorithms to predict and analyze traffic accidents. This paper reviews state-of-the-art methods for road accident prediction, focusing on machine learning techniques such as convolutional neural networks (CNNs) and long short-term memory networks (LSTMs). It also examines commonly used data sources for forecasting, including open data, measurement technologies, onboard equipment, and social media. The study compares various predictive algorithms based on their applicability, results, and ease of interpretation. The best outcomes are achieved by combining multiple techniques. Future challenges include incorporating diverse data sources like geospatial data, traffic statistics, and social media to improve prediction accuracy.

4.	IDENTIFICATION OF FACTORS IN ROAD ACCIDENTS THROUGH IN-DEPTH ACCIDENT ANALYSIS	Mouyid BIN ISLAM (Research Associate), Kunnawee KANITPONG (Assistant Professor)	The increasing motorization and improving socio-economic status in Thailand have worsened road safety, resulting in approximately 130,000 fatalities and 500,000 permanently disabled injuries over the past decades. The annual cost of road crashes, estimated at US$2,500 million (3.4% of GNP), poses a significant public health issue. This paper conducts an in-depth study through crash investigation and reconstruction, a method not yet widely practiced in Thailand, to identify contributory factors in road crashes. The research links causes and consequences by classifying events in investigated cases, focusing on dynamic driving situations such as initial traveling speed, pre-impact, and post-impact speeds. Major risk factors identified include inaccurate risk assessment, delayed evasive actions, lack of street lighting, inadequate lane markings, and poor visibility. These factors significantly increase the severity of crashes and injuries, underscoring the need for enhanced road safety measures in Thailand.
5.	ANALYSIS OF ROAD ACCIDENTS IN 2002-2019 ON THE EXAMPLE OF POLAND	DAMIAN FREJ , KRZYSZTOF LUDWINEK	This article examines road safety issues in Polish road transport from 2002 to 2019, focusing on detailed analyses of road accidents categorized by side, front, and rear collisions, and the dynamics of these changes. It also reviews the trends in passenger and truck registrations in Poland from 2000 to 2018. Additionally, the article presents data on fatalities in road accidents during 2002-2019, categorized by collision type. Forecasts for 2020-2030 indicate a downward trend in the number of road accidents and rear collisions, but emphasize the severe risks associated with rear-end collisions, particularly the potential for upper

			cervical spine injuries, even at low speeds of 20 km/h. Such injuries can result in permanent disability, highlighting the need for continued focus on road safety improvements.

Social impact:

Road accidents have profound and far-reaching social impacts. They result in the tragic loss of lives and cause long-term disabilities, profoundly affecting victims and their families emotionally and financially. The healthcare system is strained with increased medical costs and rehabilitation needs, while the economy suffers from lost productivity and income due to the incapacitation or death of working individuals. Communities experience disruption and a diminished quality of life, with survivors and witnesses often facing long-lasting psychological trauma. Additionally, road accidents can erode public confidence in transportation safety and hinder social and economic development, highlighting the critical need for comprehensive road safety measures and policies. Thus the analysis of the available data through an interactive platform like Qlik Sense can help us to get insights and develop better strategies and policies to reduce these accidents and hence avoid such negative social impact imparted by it.

Data Collection & Extraction From Database

Downloaded Dataset

- RA2019_A24.csv
- RA2019_A25.csv
- RA2019_A26.csv
- RA2019_A29.csv
- RA2019_A29a.csv
- RA2019_A29c.csv
- RA2019_A32.csv
- RA2019_A33.csv

- RA2019_A35.csv

The columns are identified and the files are named accordingly.

Understanding the data

- State/UT-wise Pedestrians Killed by Age and Gender during 2019

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

- State/UT-wise Pedestrians involved by Age and Gender during 2019

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

- State/UT-wise Pedestrians Killed by Impacting Vehicle Type during 2019

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

- State/UT-wise Accidents by Type of Traffic Control during 2019

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

- State/UT-wise Accidents by Vehicle Type during 2019

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

- State/UT-wise Two-Wheeler Riders Killed by Impacting Vehicle Type during 2019

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

- State/UT-wise Road Accident Fatalities by Gender and Road User Category during 2019

- States/UTs
- Pedestrian – Male
- Pedestrian – Female

- Pedestrian – Total
- Bicycles – Male
- Bicycles – Female
- Bicycles – Total
- Two Wheelers – Male
- Two Wheelers – Female
- Two Wheelers – Total
- Two Wheelers – Rank
- Auto Rickshaws – Male
- Auto Rickshaws – Female
- Auto Rickshaws – Total
- Cars, taxies Vans and LMV – Male
- Cars, taxies Vans and LMV – Female
- Cars, taxies Vans and LMV – Total
- Trucks/Lorries – Male
- Trucks/Lorries – Female
- Trucks/Lorries – Total
- Buses – Male
- Buses – Female
- Buses – Total
- Other non-Motor vehicles(E-Rickshaw) – Male
- Other non-Motor vehicles(E-Rickshaw) – Female
- Other non-Motor vehicles(E-Rickshaw) – Total
- Others – Male
- Others – Female
- Others - Total

- State/UT-wise Accident Victims due to different causes during 2019

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

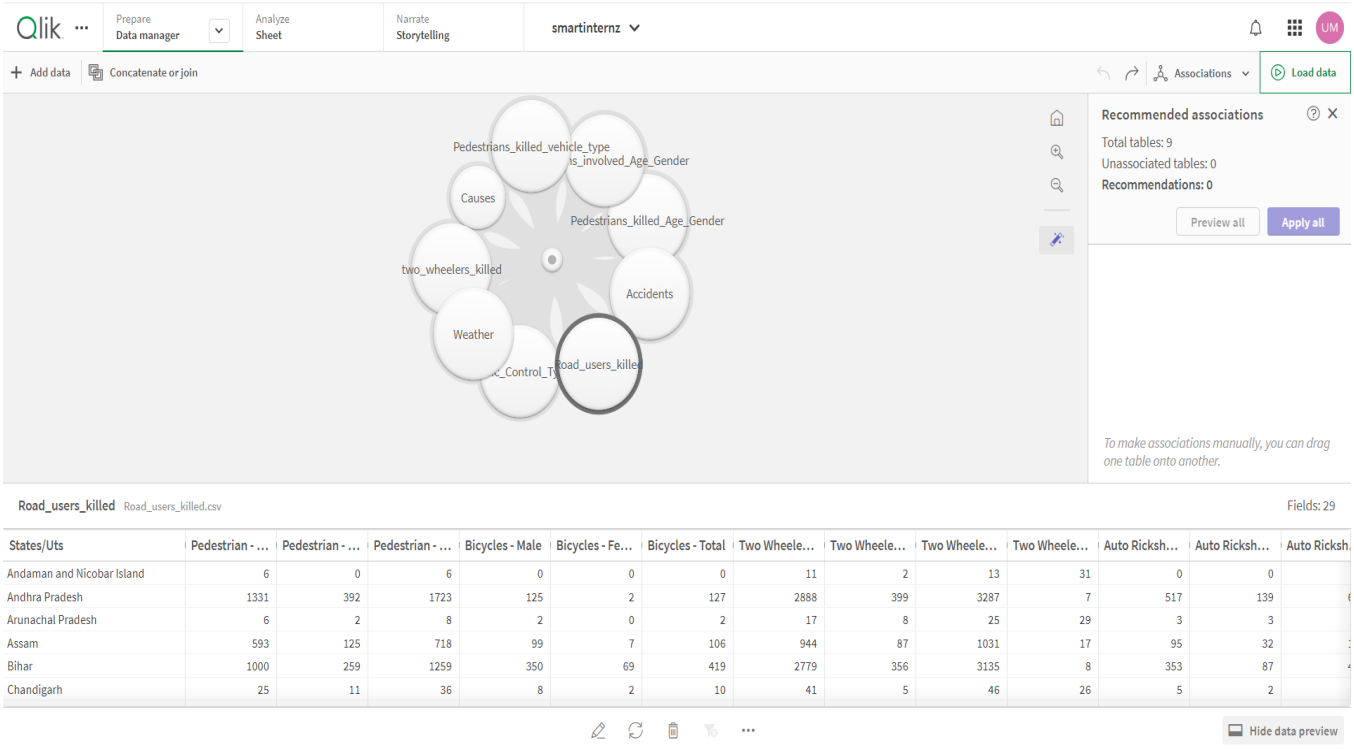
- State/UT-wise Accident Victims by weather during 2019

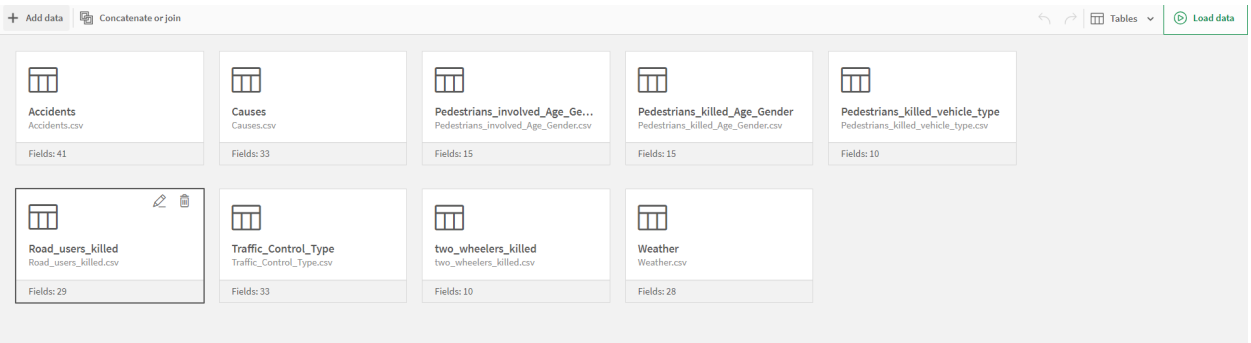
1. States/UTs
2. Sunny/Clear - Total Accidents – Number
3. Sunny/Clear - Total Accidents – Rank
4. Sunny/Clear - Persons Killed – Number
5. Sunny/Clear - Persons Killed – Rank
6. Sunny/Clear - Persons Injured - Grievously Injured
7. Sunny/Clear - Persons Injured - Minor Injury
8. Sunny/Clear - Persons 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

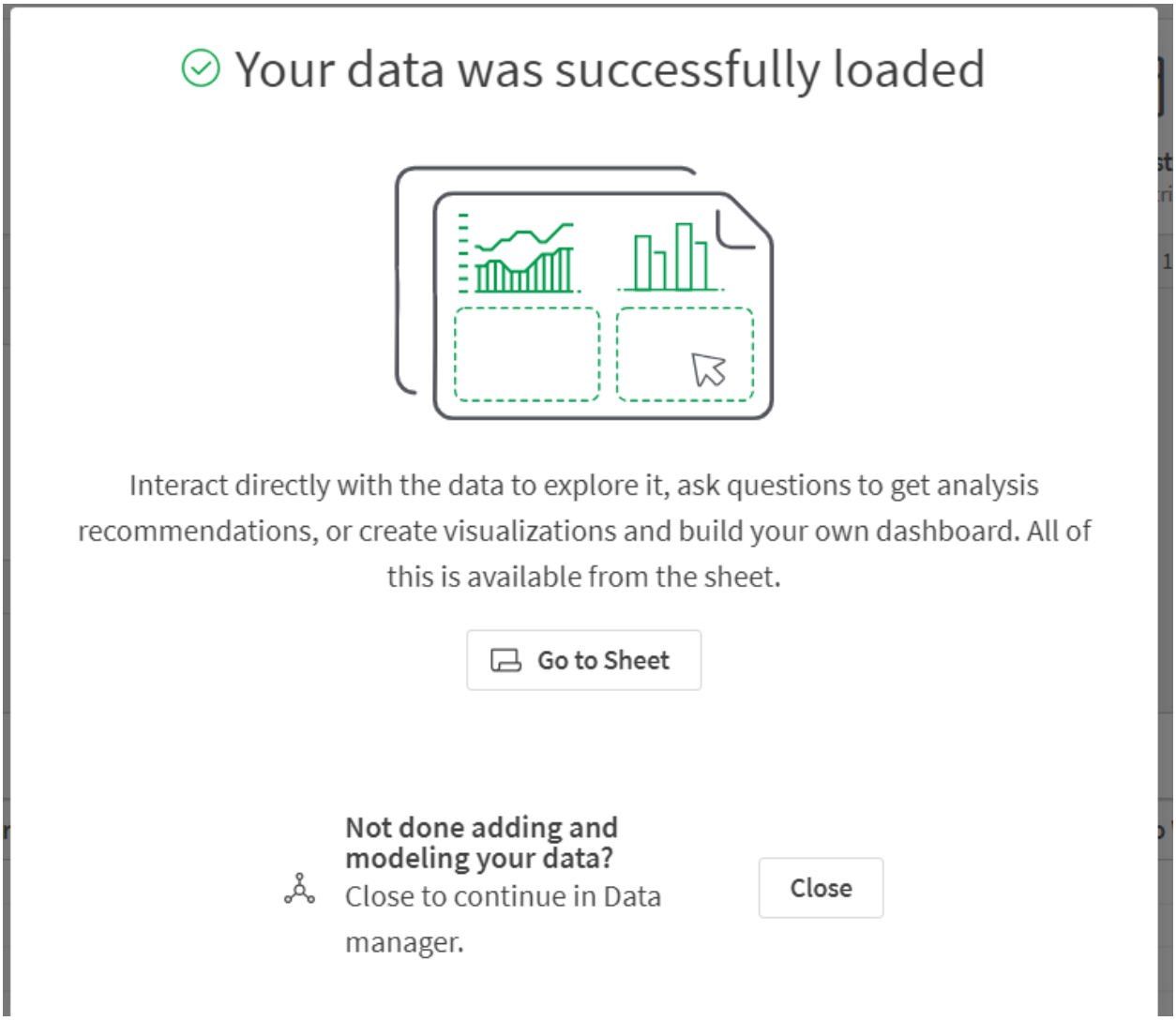
Prepare The Data For Visualization

Data is added to the Data Manager and associations are established.



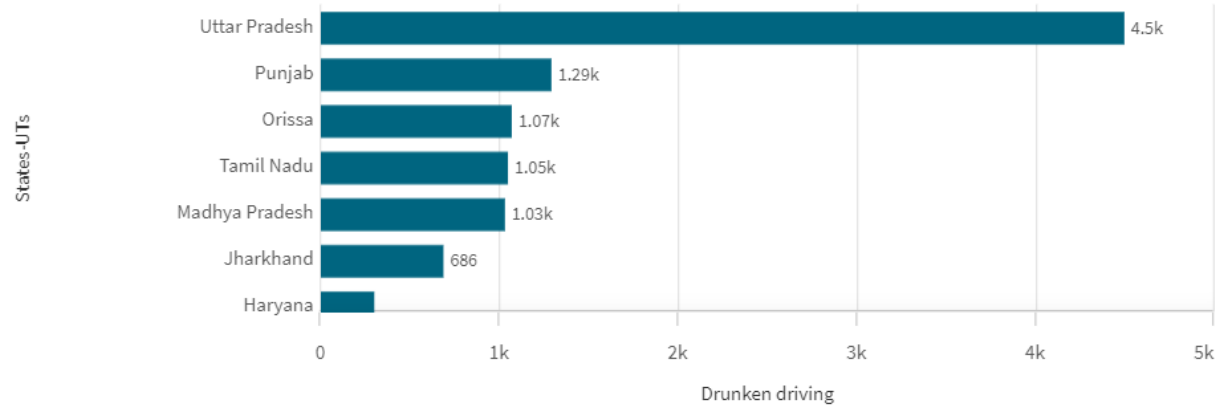


Data is cleaned thoroughly by removing duplicate values and the values that are irrevelant and can impact the visualizations negatively are set to zero for better analysis in this section..
Data is loaded finally.

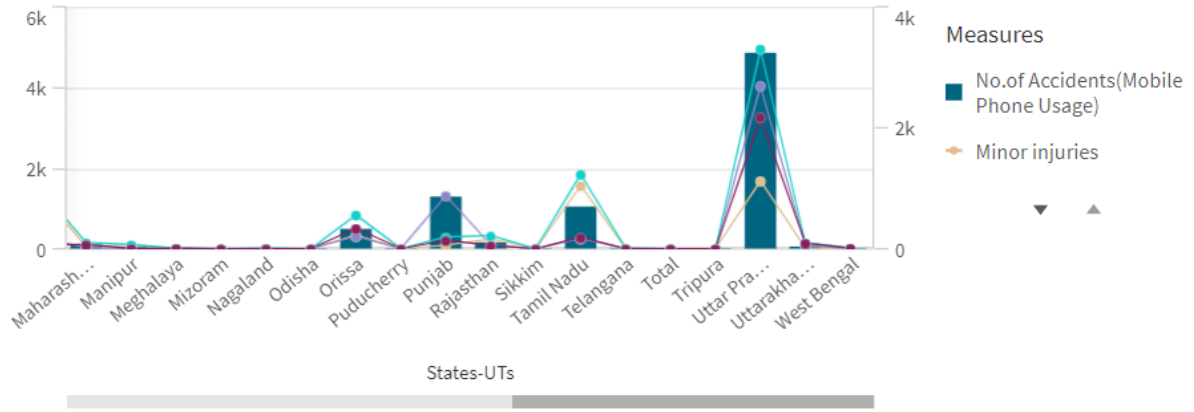


Data Visualizations

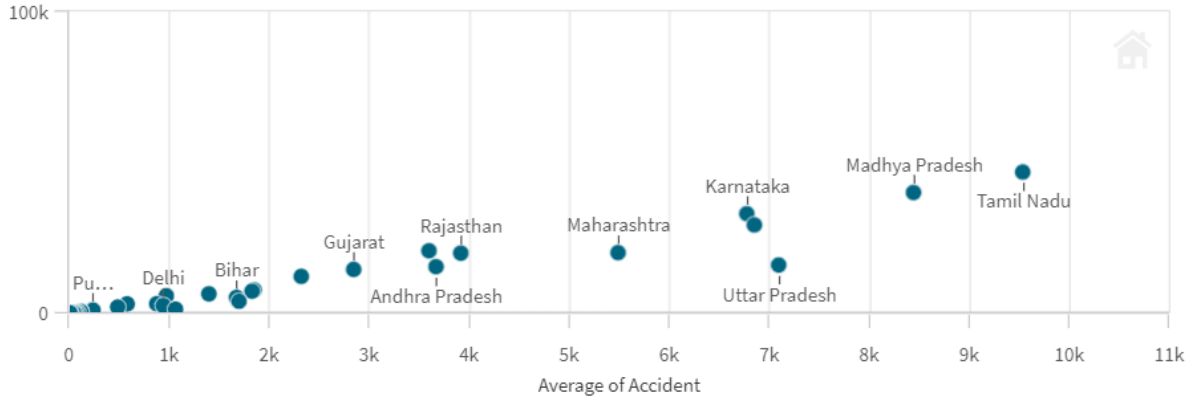
Caused by drunken driving



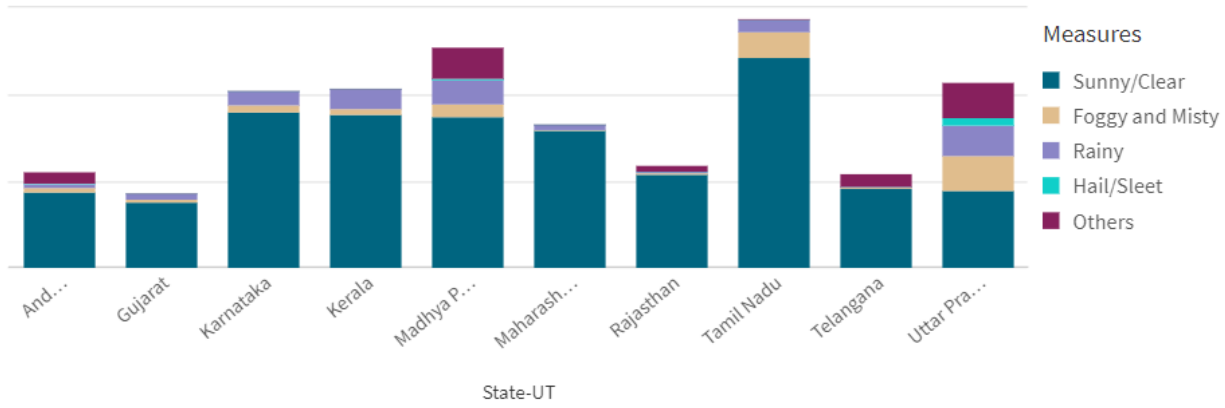
State-wise mobile phone usage



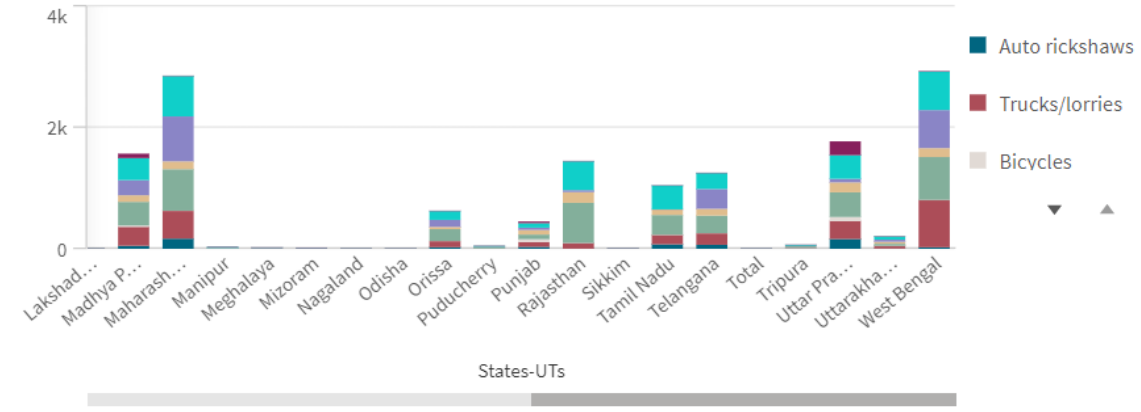
Correlation: Speeding and number of accidents



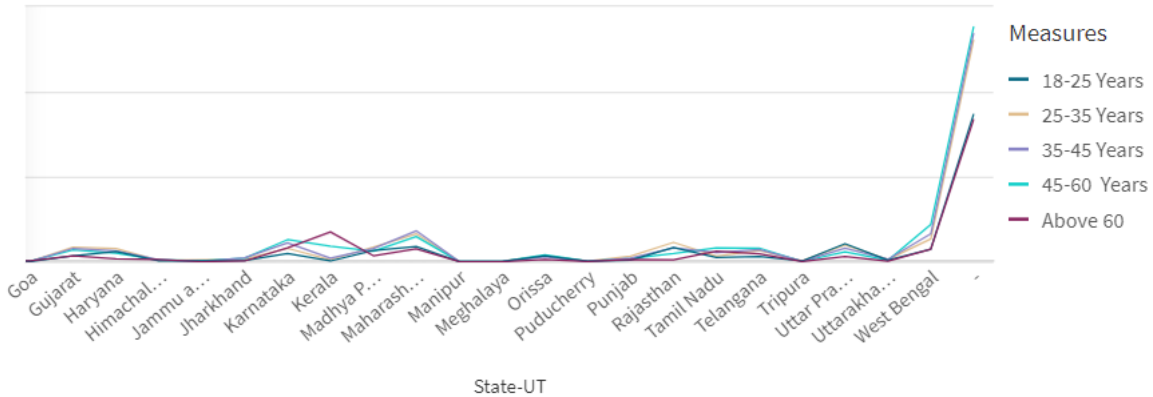
Accidents by weather type



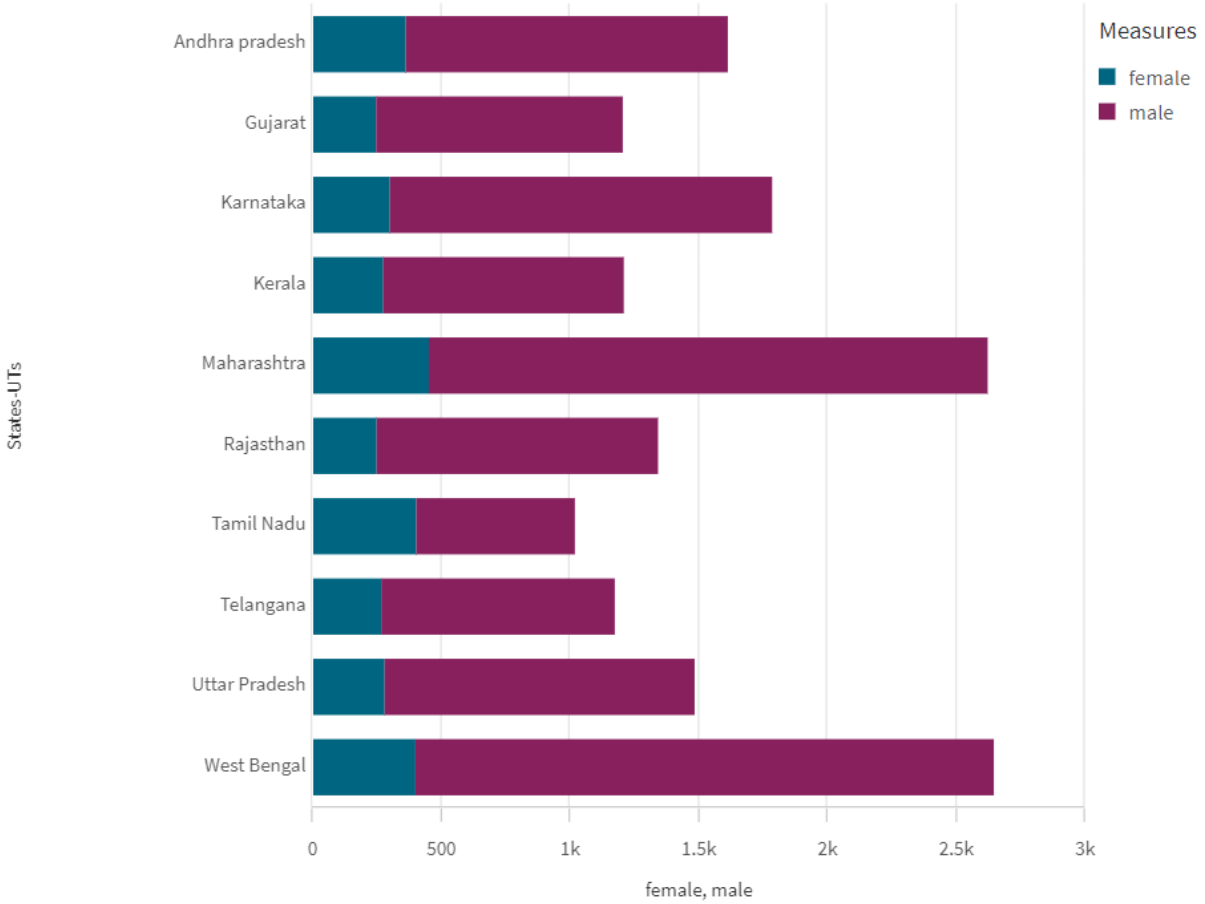
Vehicle type Analysis on pedestrian deaths



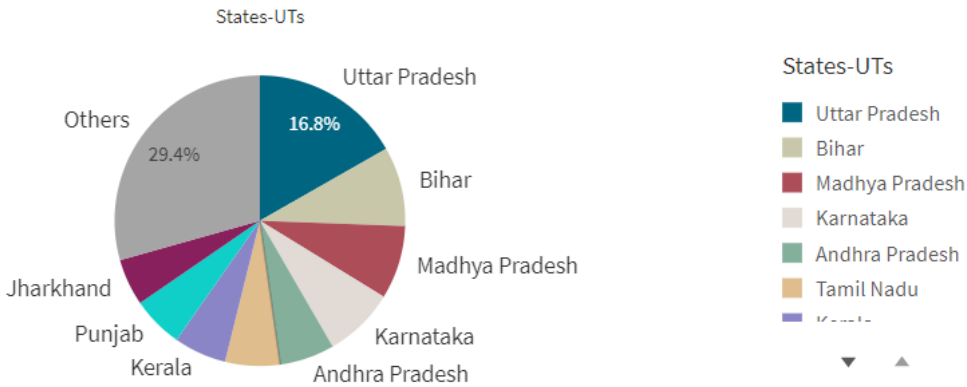
Pedestrians killed: Age groups



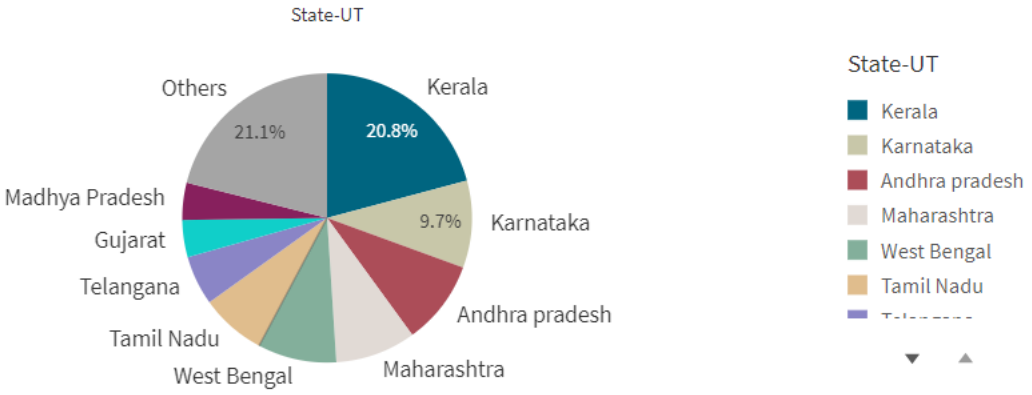
Age group analysis on pedestrian deaths



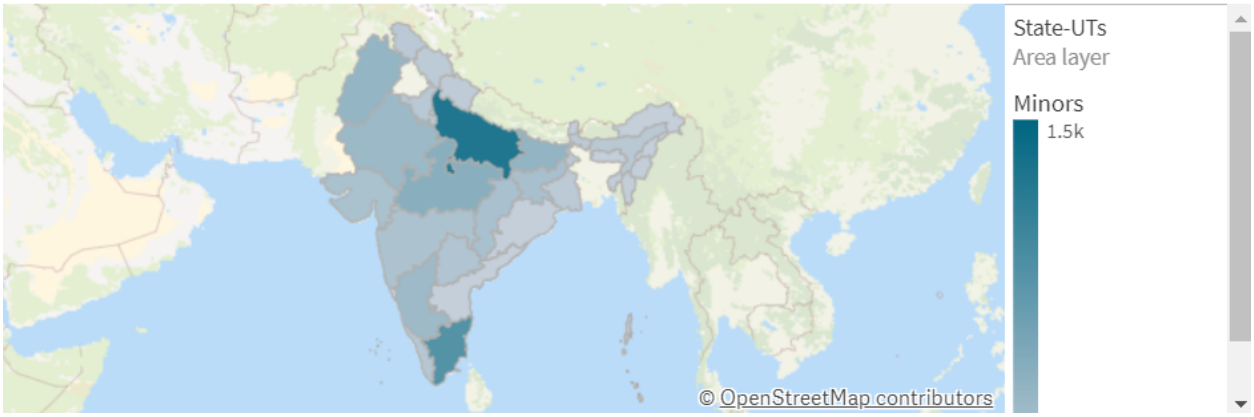
Senior citizens involved



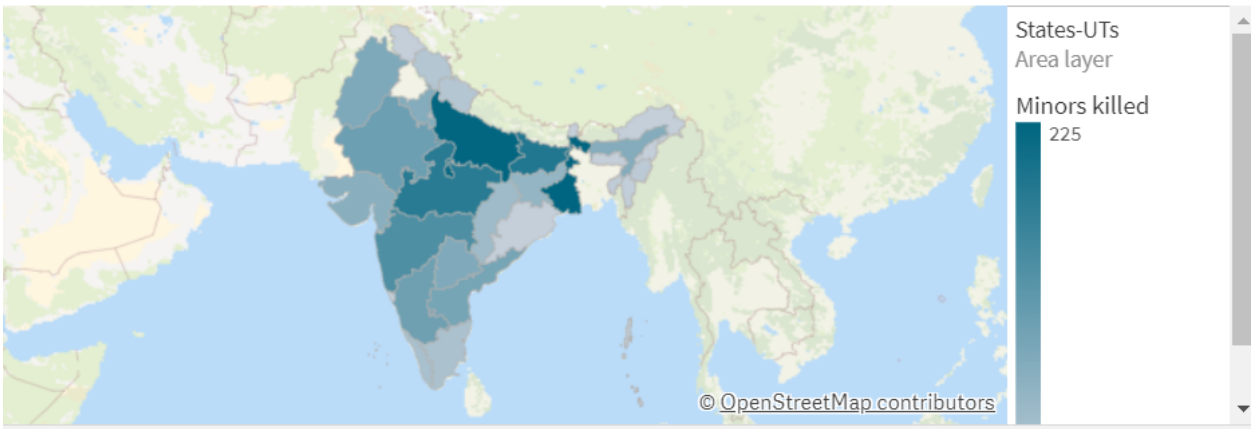
Senior citizens killed

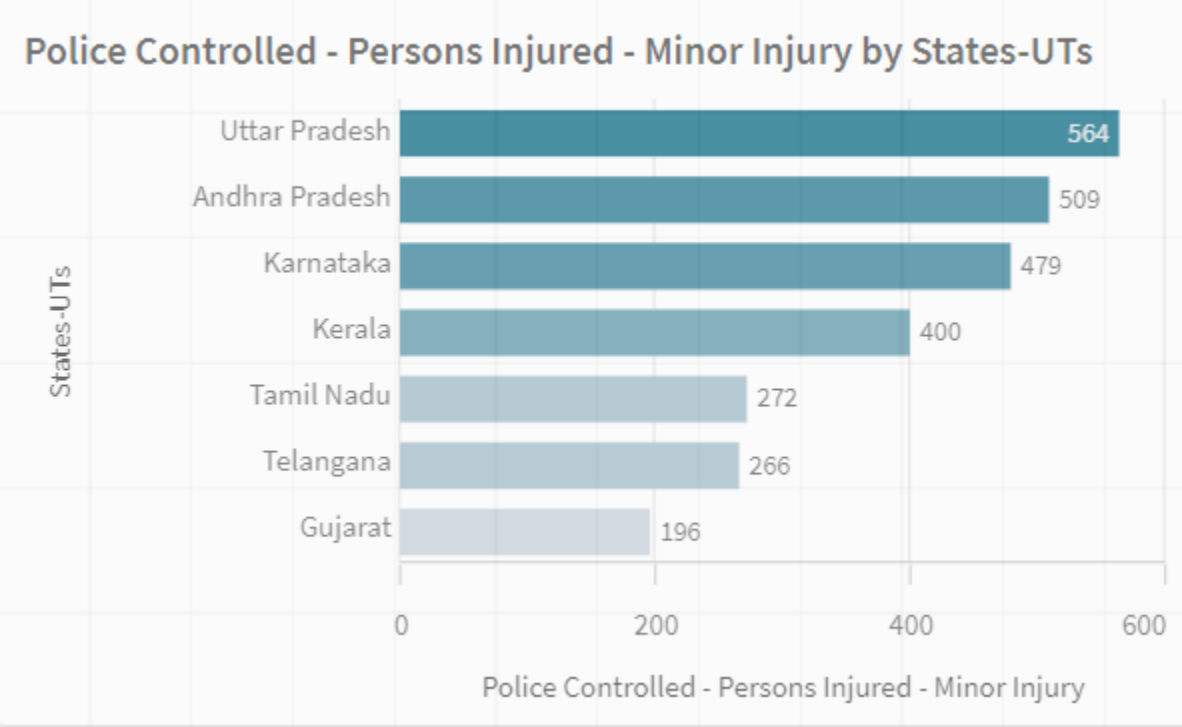


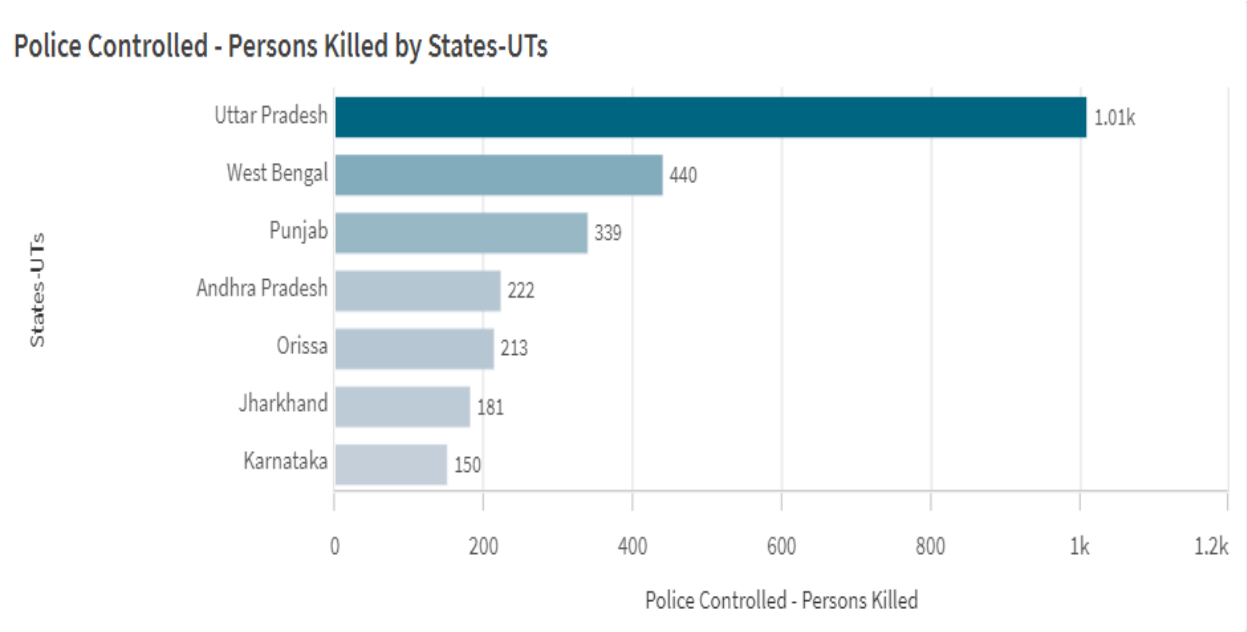
Minors injured



Minors killed







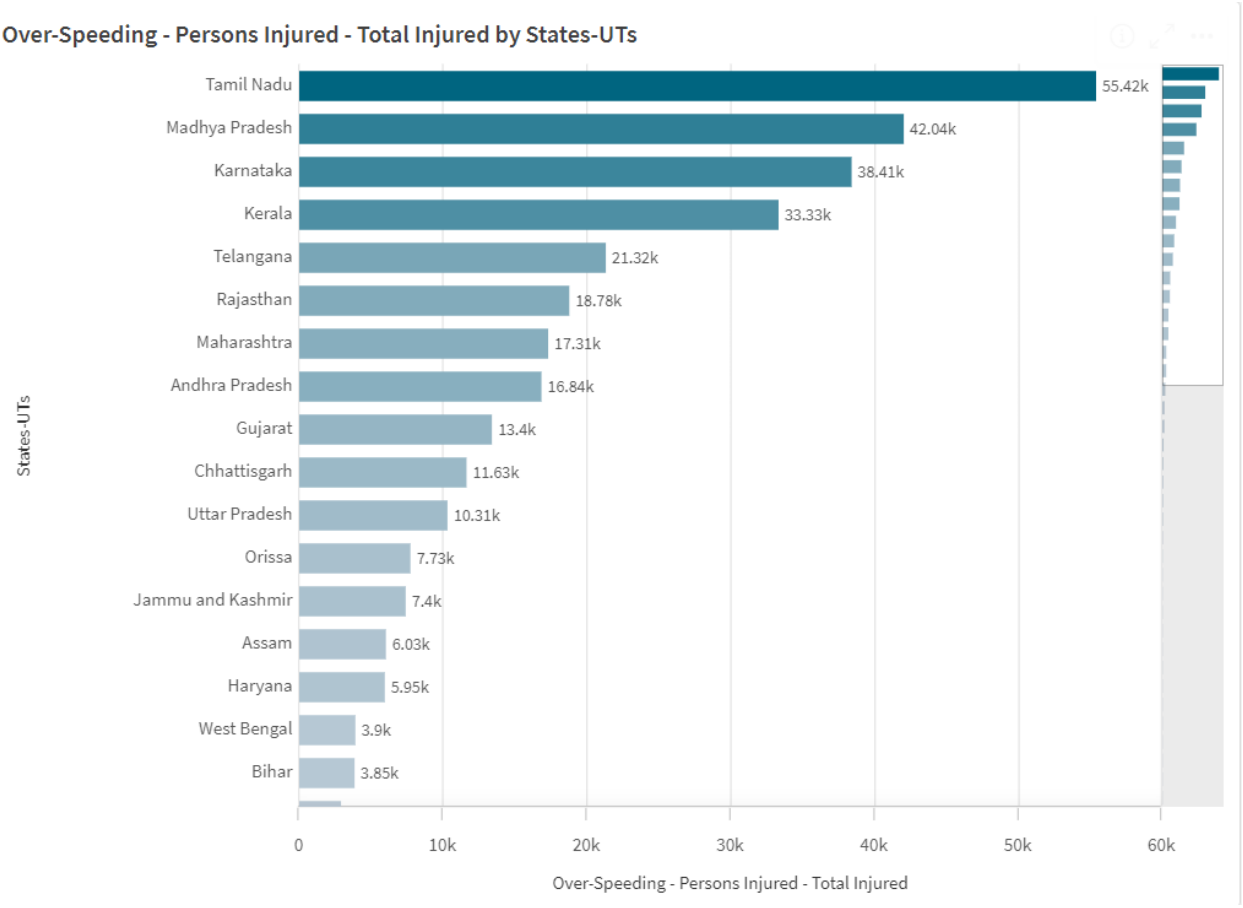
Correlation- Flashing Signal/Blinker - Total Injured and Killed

97.92%

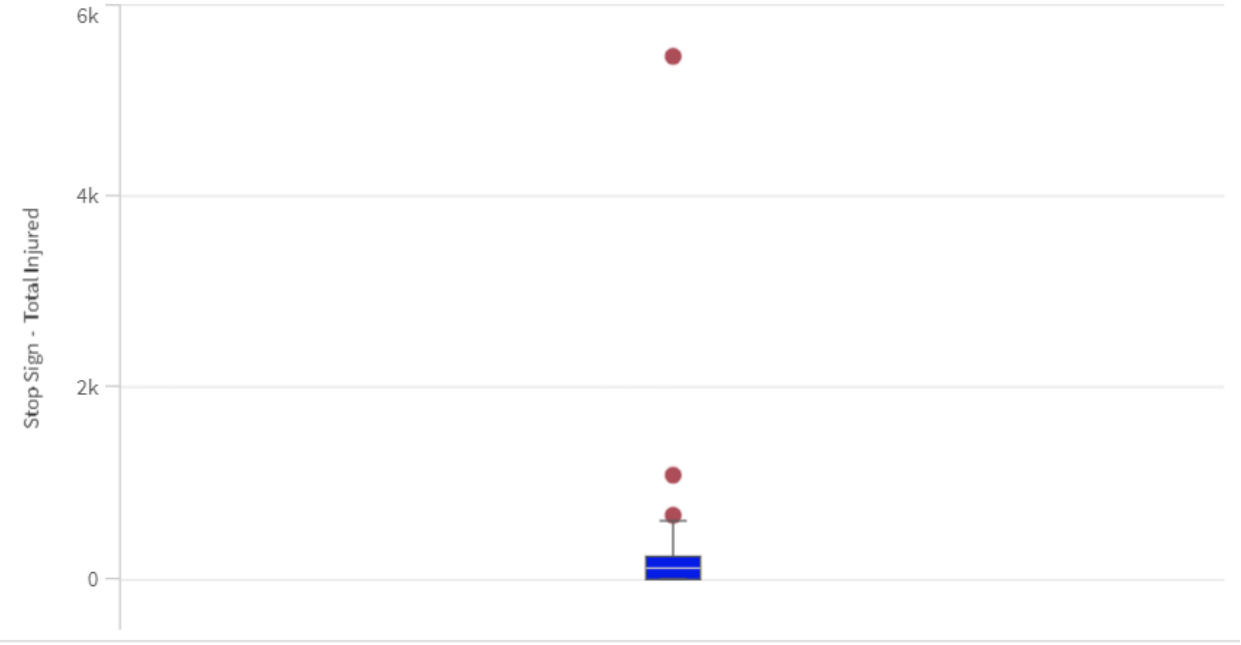
Correlation -Jumping Red Light - Greviously Injured and Nu...

92.24%

Over-Speeding - Persons Injured - Total Injured by States-UTs

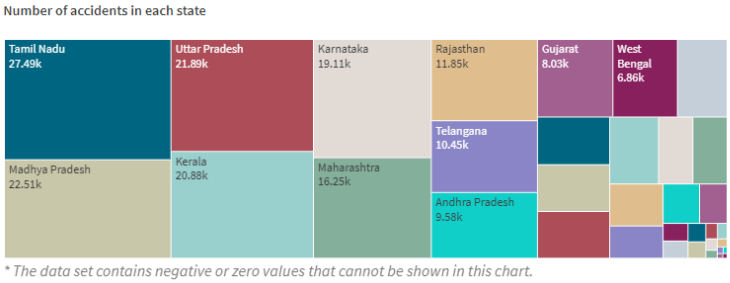


Overview of Stop Sign - Persons Injured - Total Injured by Uncontrolled - Persons Killed - Rank



Story telling

State-wise distribution of accidents



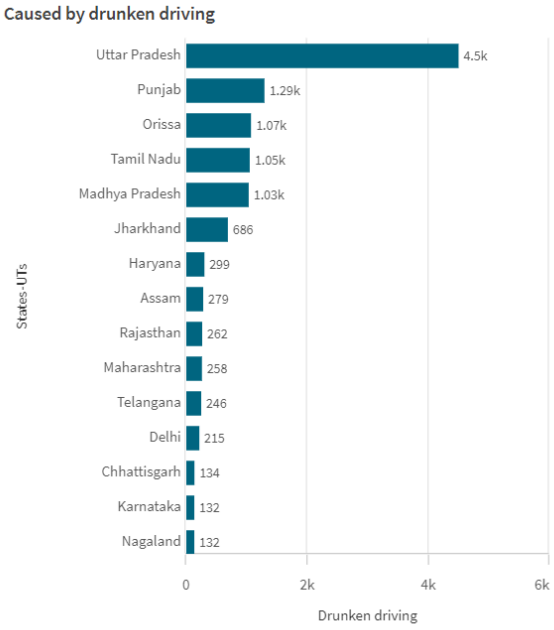
** The data set contains negative or zero values that cannot be shown in this chart.*

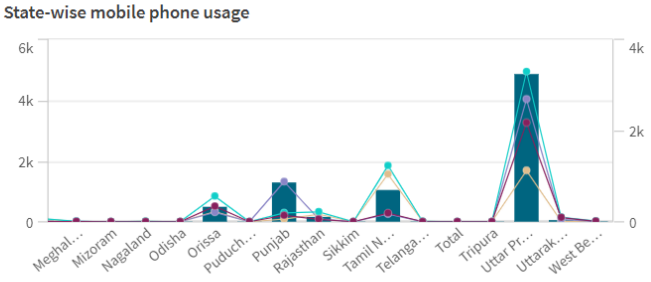
Total Number of Accidents
433,850

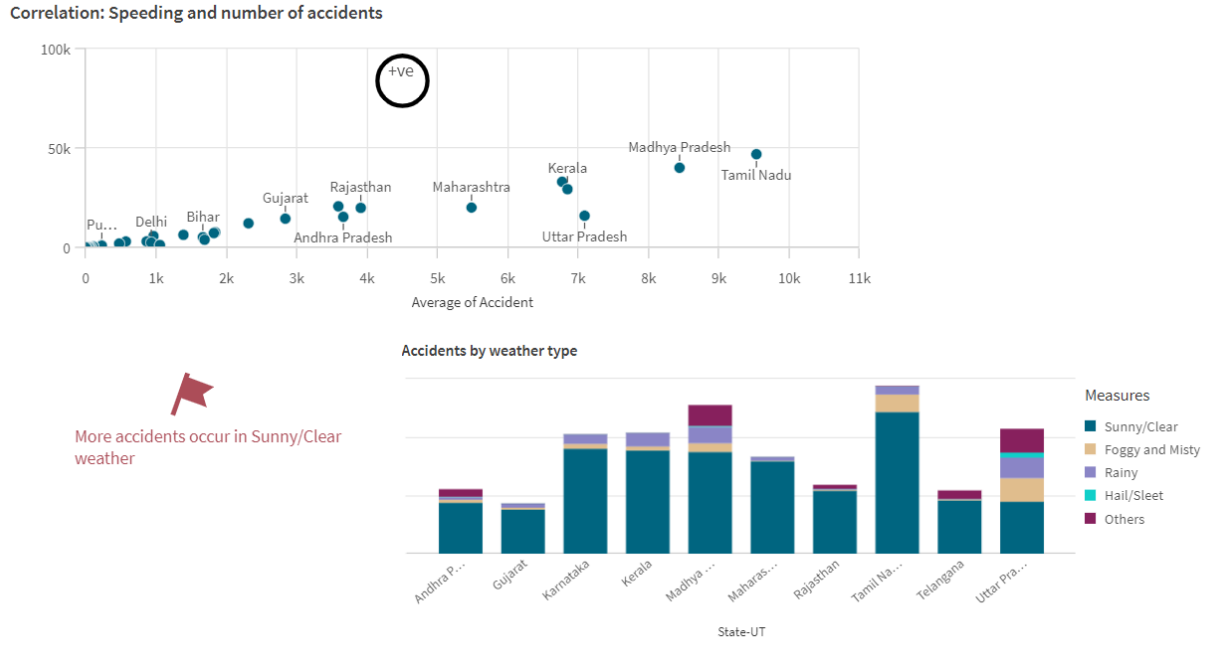
People killed
296,096

Minorly injured people
534,450

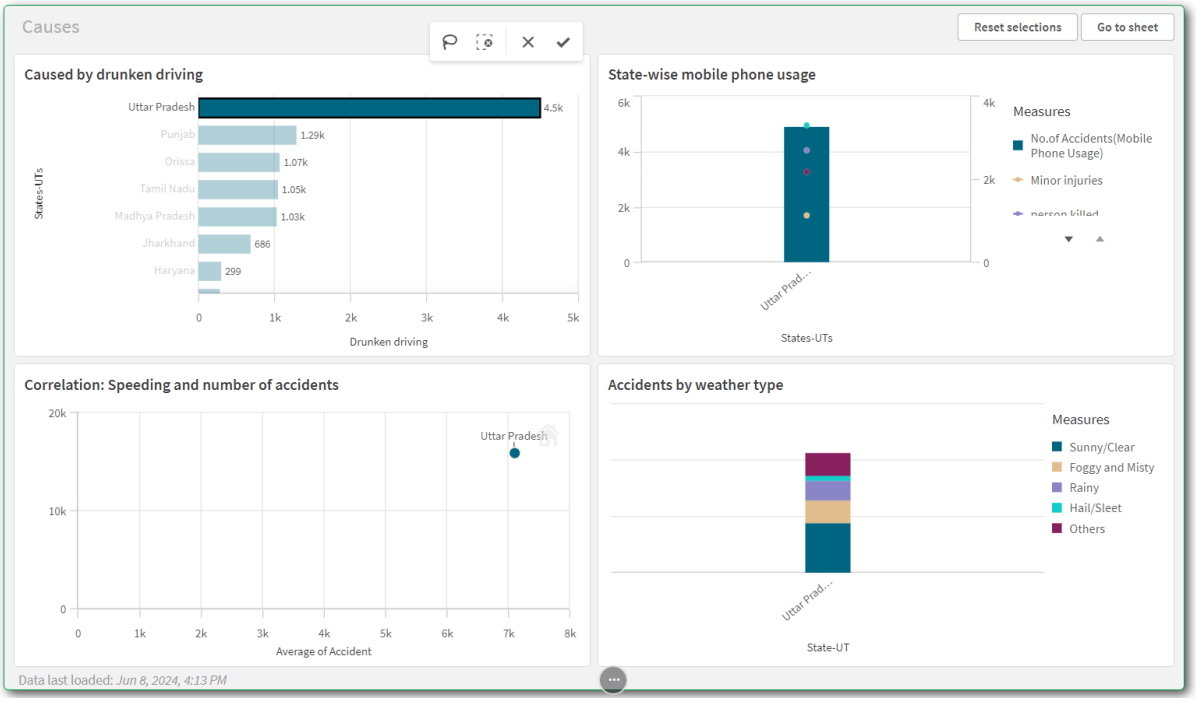
People Greviously injured
368,272

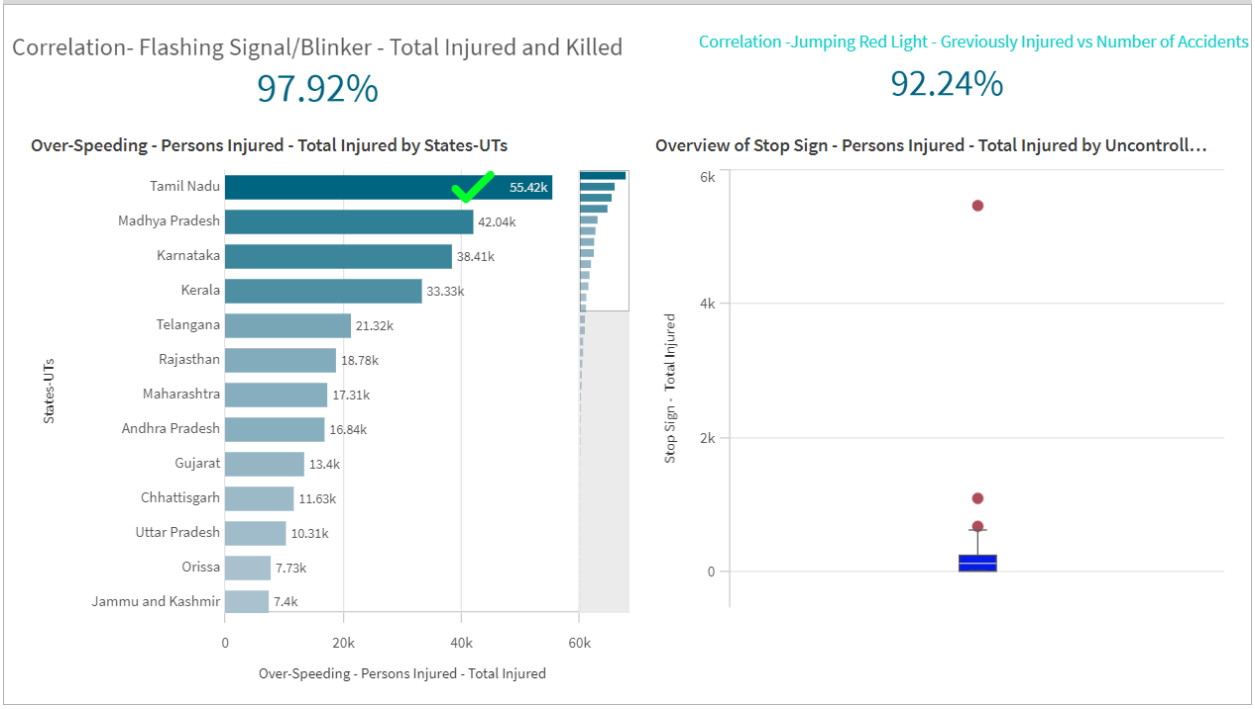




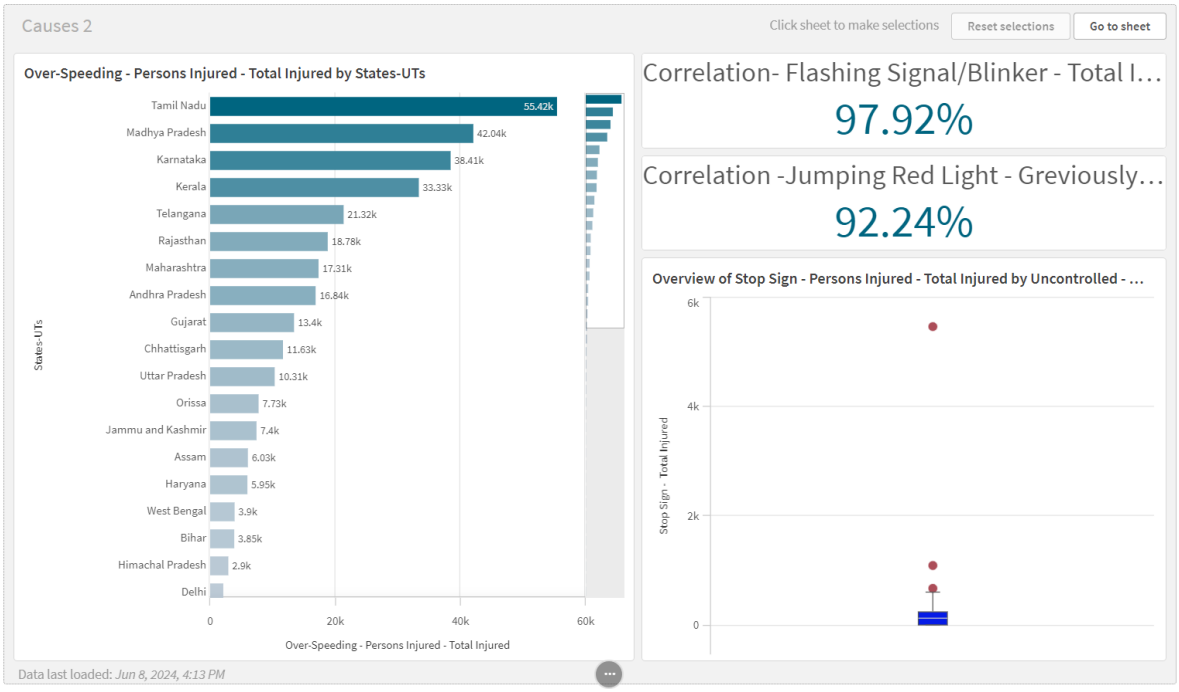


A live sheet for analysis preferred by user

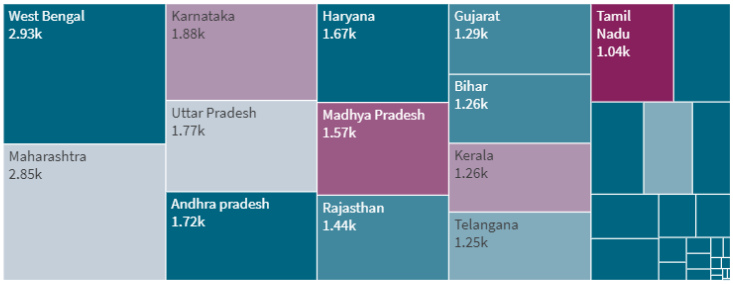




Live sheet for user defined selections



Pedestrians killed in the accidents



State-wise distribution of number of pedestrians killed in accidents

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

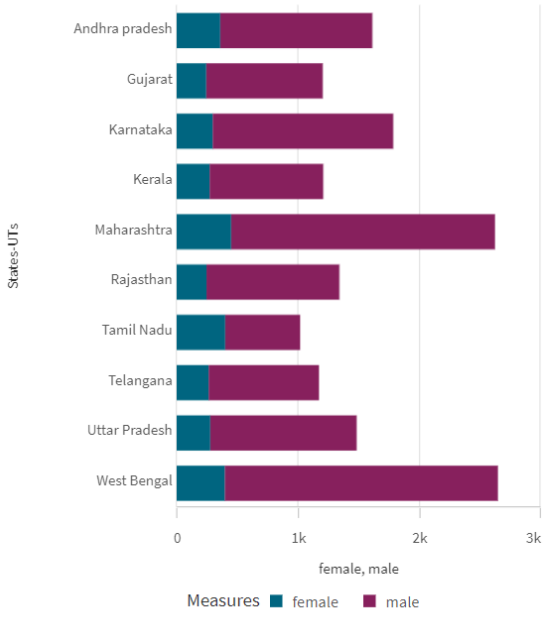
No.of accidents involving pedestrians

119,858

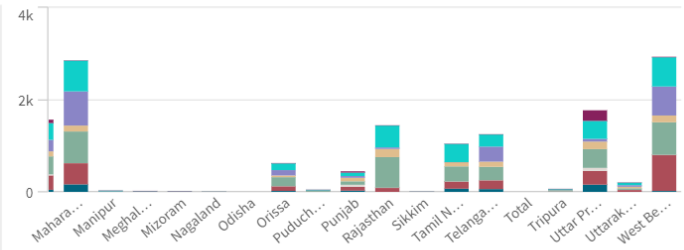
Pedestrians killed

51,716

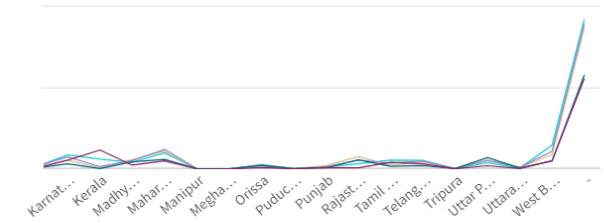
Gender analysis on pedestrian deaths



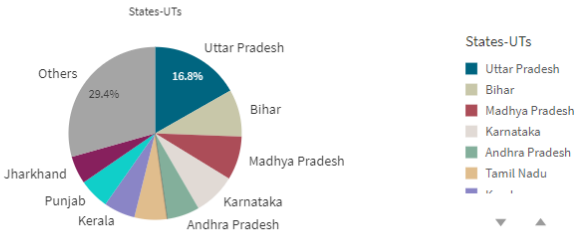
Vehicle type Analysis on pedestrian deaths



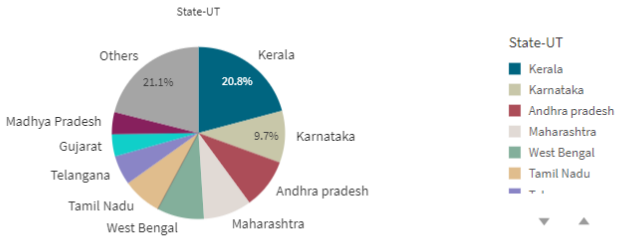
Pedestrians killed: Age groups



Senior citizens involved

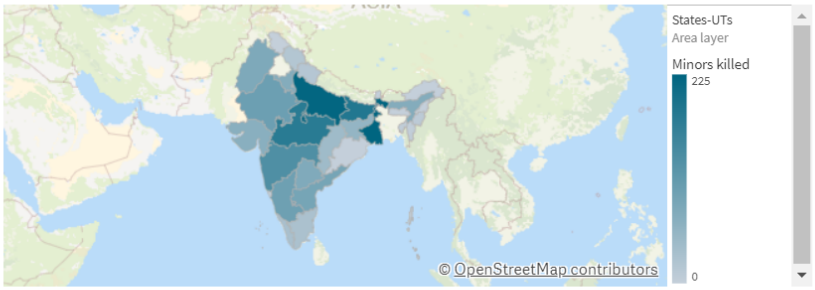


Senior citizens killed

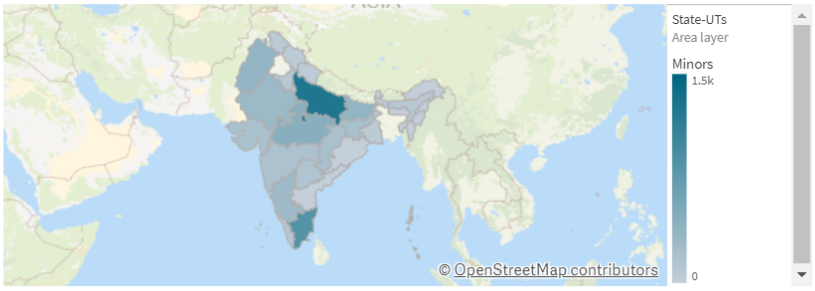


Map wise distribution of minors involved in accidents

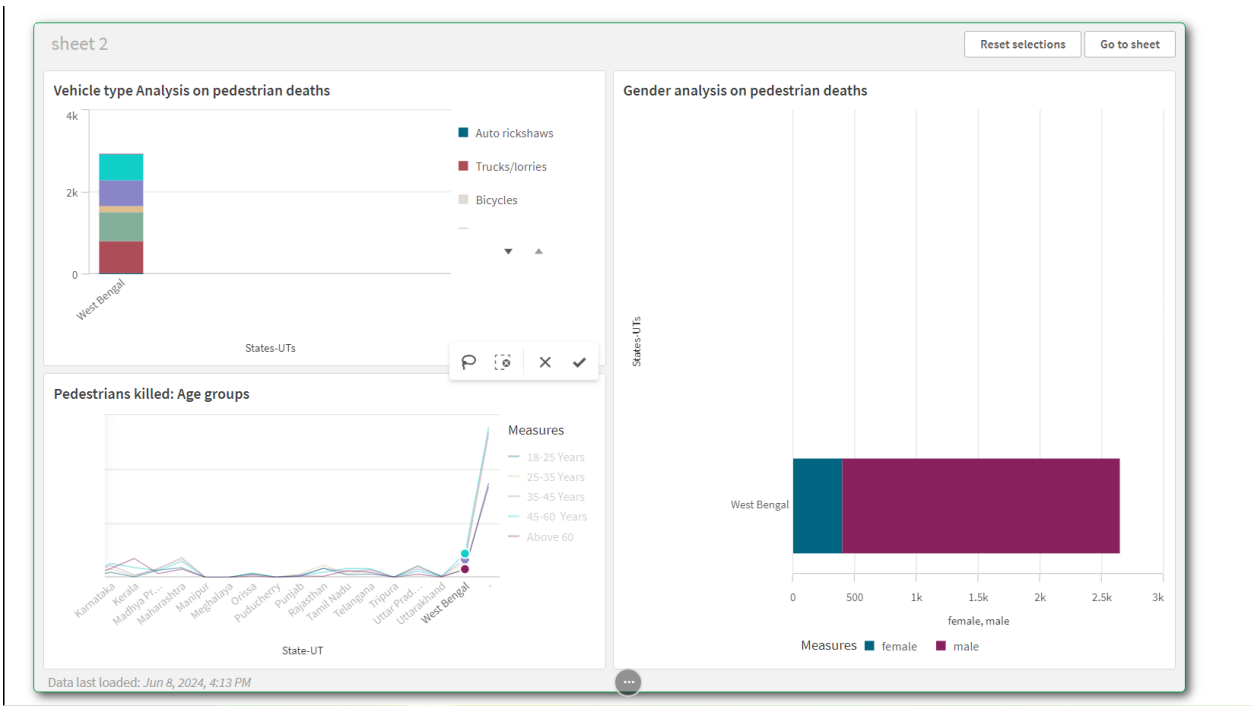
Minors killed

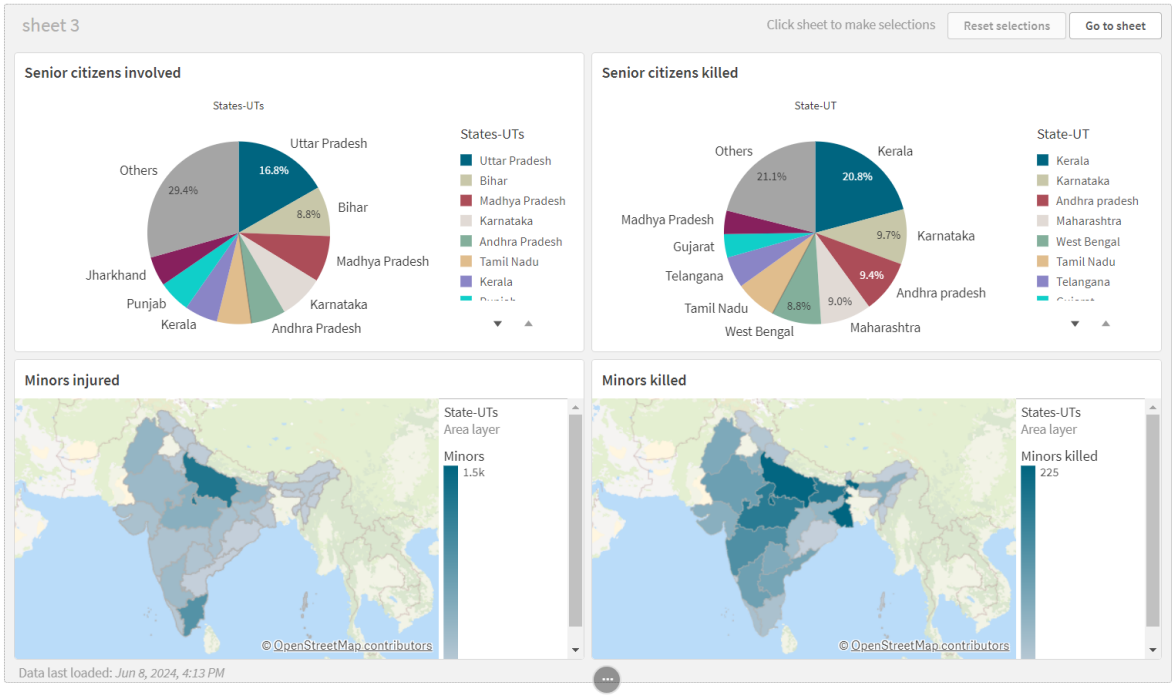


Minors injured

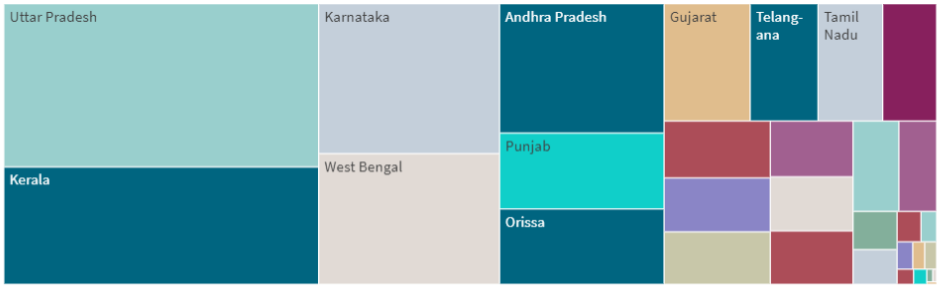


Live sheets for analysis





Number of Accidents near Police Controlled Areas



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

Police Control:No. of Accidents

10,425

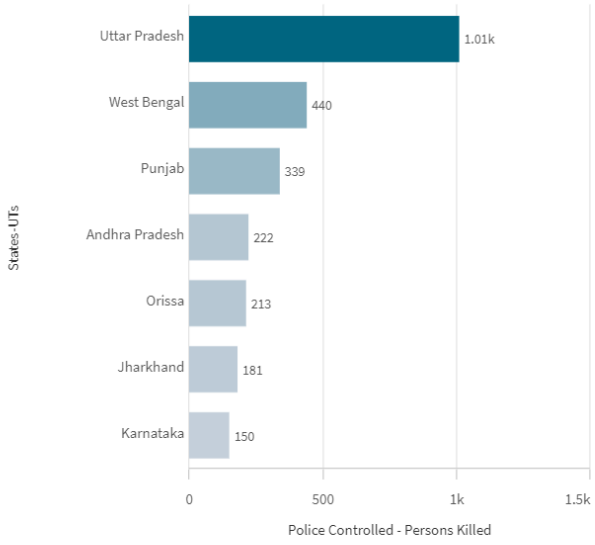
People killed in police controlled areas

3,501

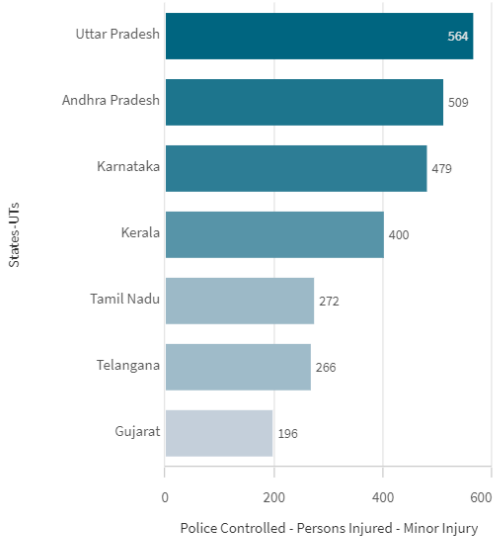
People greviously injured in police controlled areas

5,324

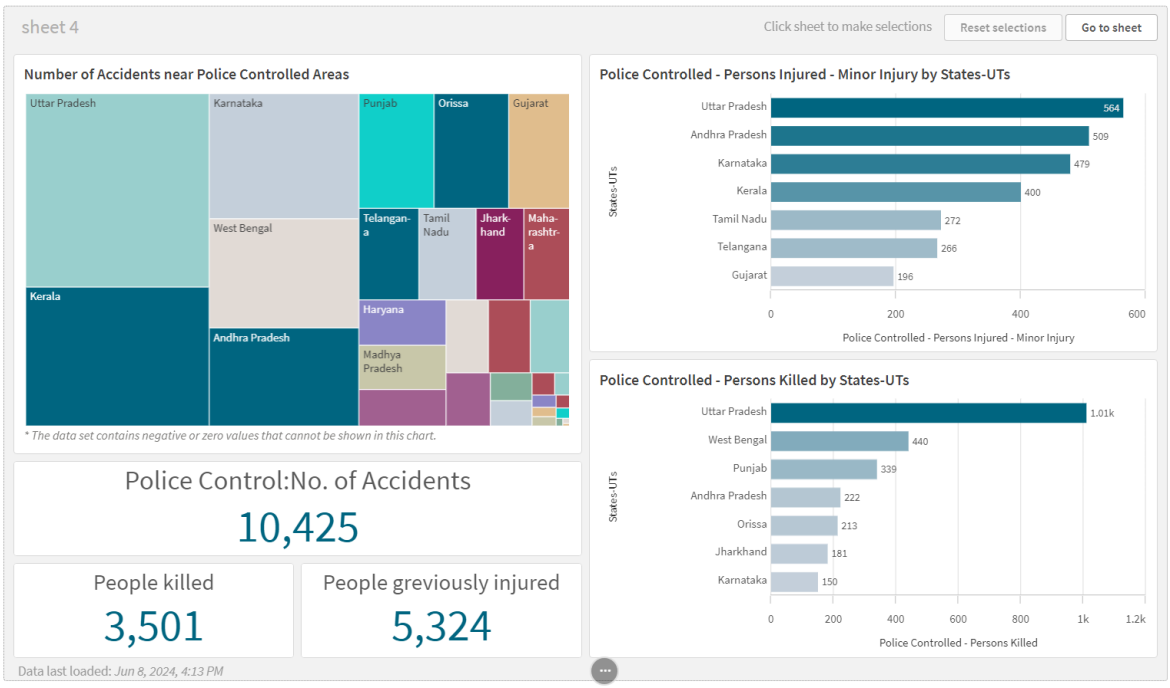
Police Controlled - Persons Killed by States-UTs



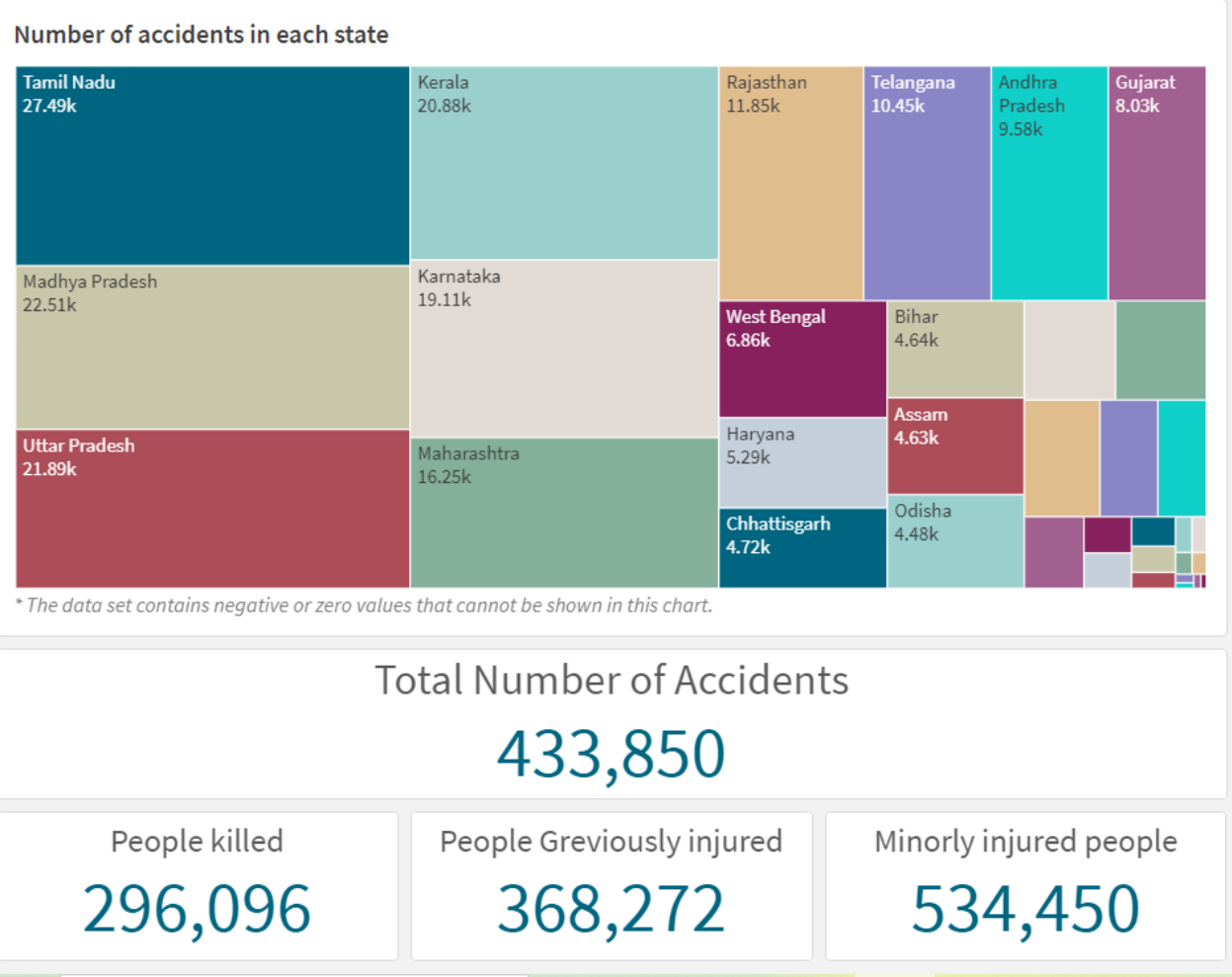
Police Controlled - Persons Injured - Minor Injury by States-...



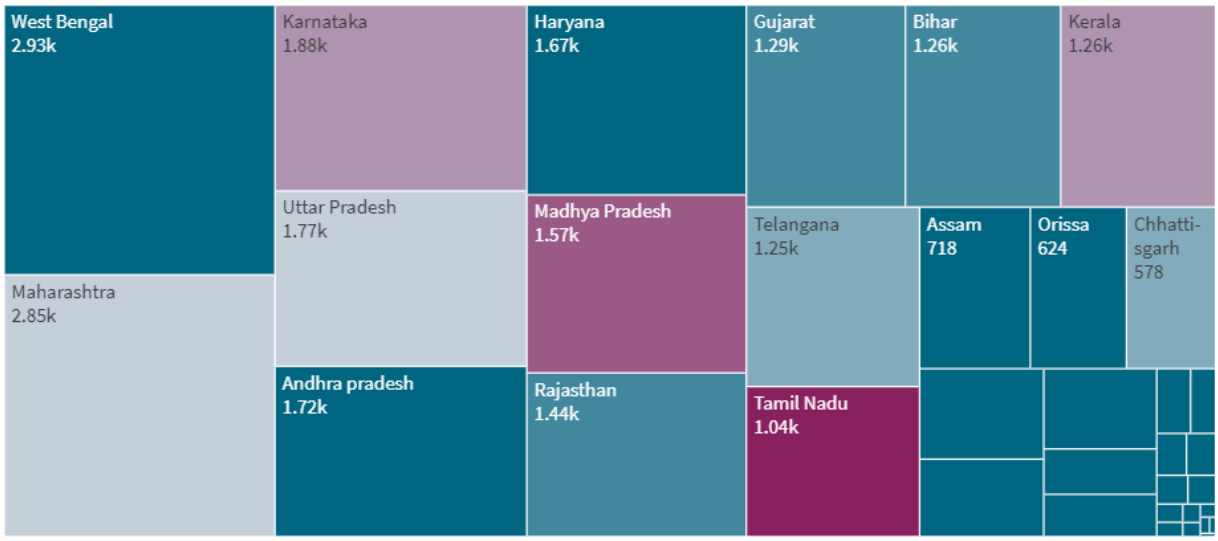
Live sheet for analysis



Dashboards


Number of accidents in each state
Tamil Nadu
27.49k
Kerala
20.88k
Rajasthan
11.85k
Telangana
10.45k
Andhra Pradesh
9.58k
Gujarat
8.03k
Madhya Pradesh
22.51k
Karnataka
19.11k
West Bengal
6.86k
Bihar
4.64k
Assam
4.63k
Uttar Pradesh
21.89k
Maharashtra
16.25k
Haryana
5.29k
Chhattisgarh
4.72k
Odisha
4.48k
* The data set contains negative or zero values that cannot be shown in this chart.
Total Number of Accidents
433,850
People killed
296,096
People Greviously injured
368,272
Minorly injured people
534,450

Pedestrians killed in the accidents



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

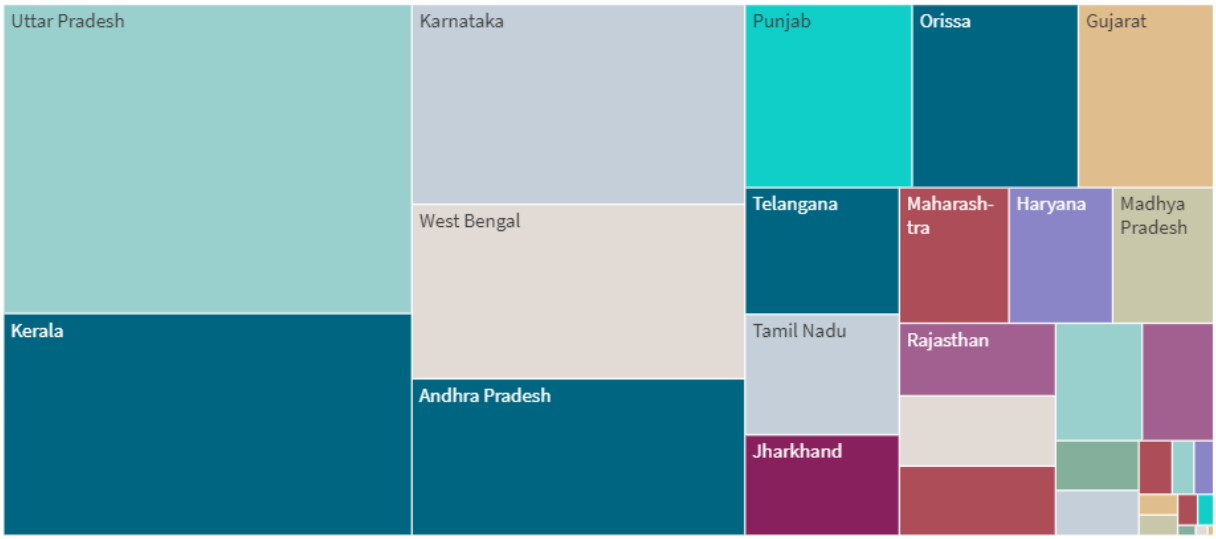
No.of accidents involving pedestrians

119,858

Pedestrians killed

51,716

Number of Accidents near Police Controlled Areas



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

Police Control:No. of Accidents

10,425

People killed

3,501

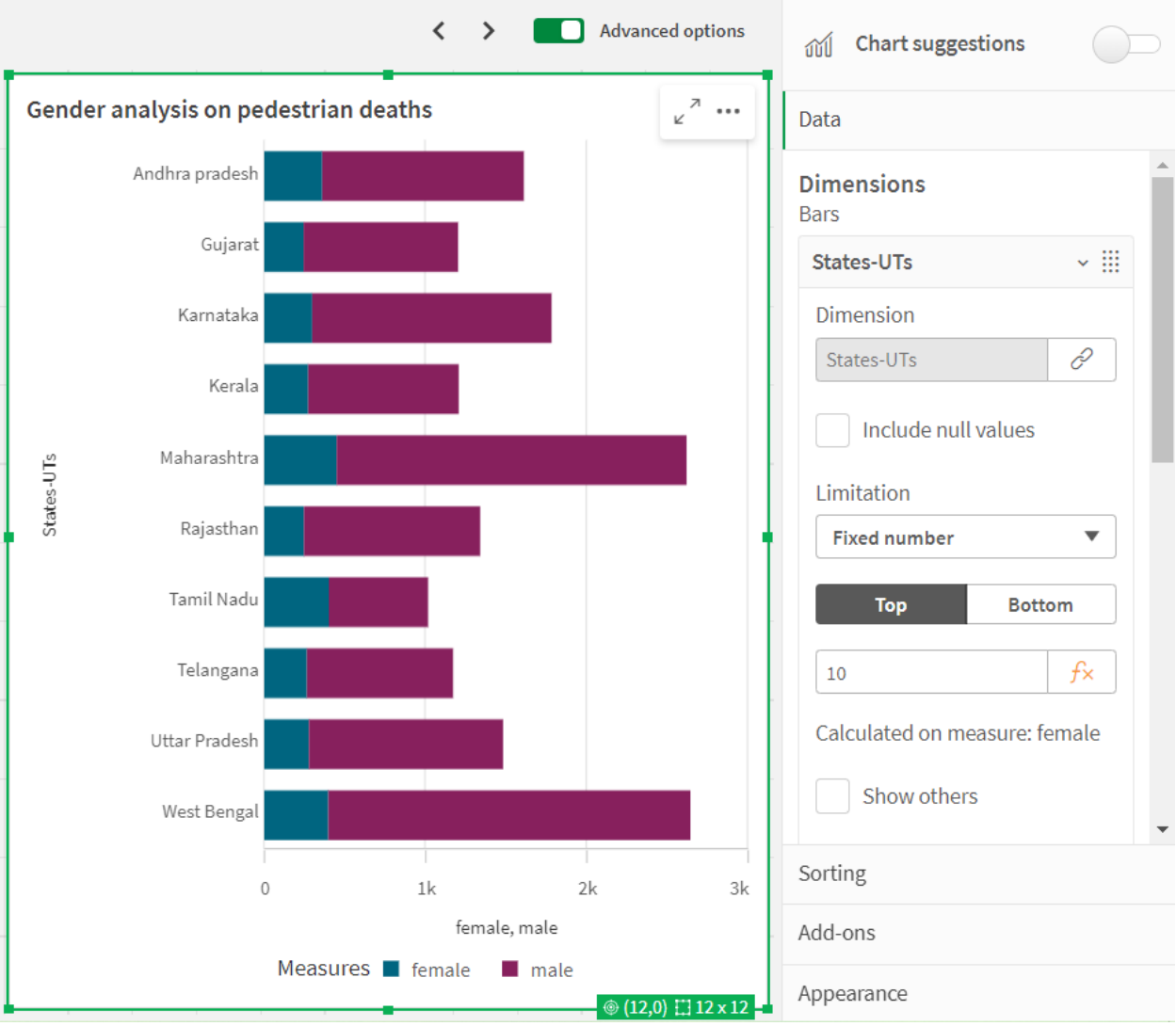
People greviously injured

5,324

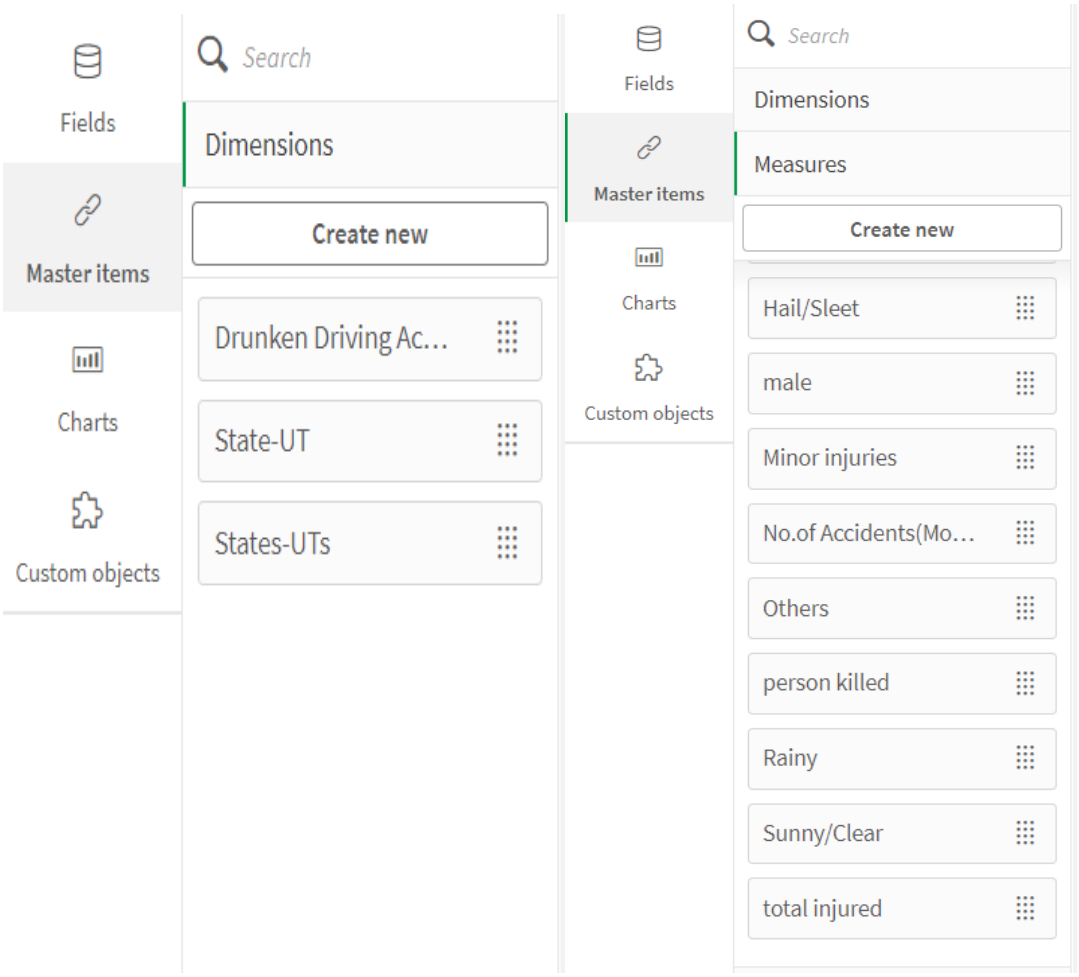
Performance testing

Use of Data Filters

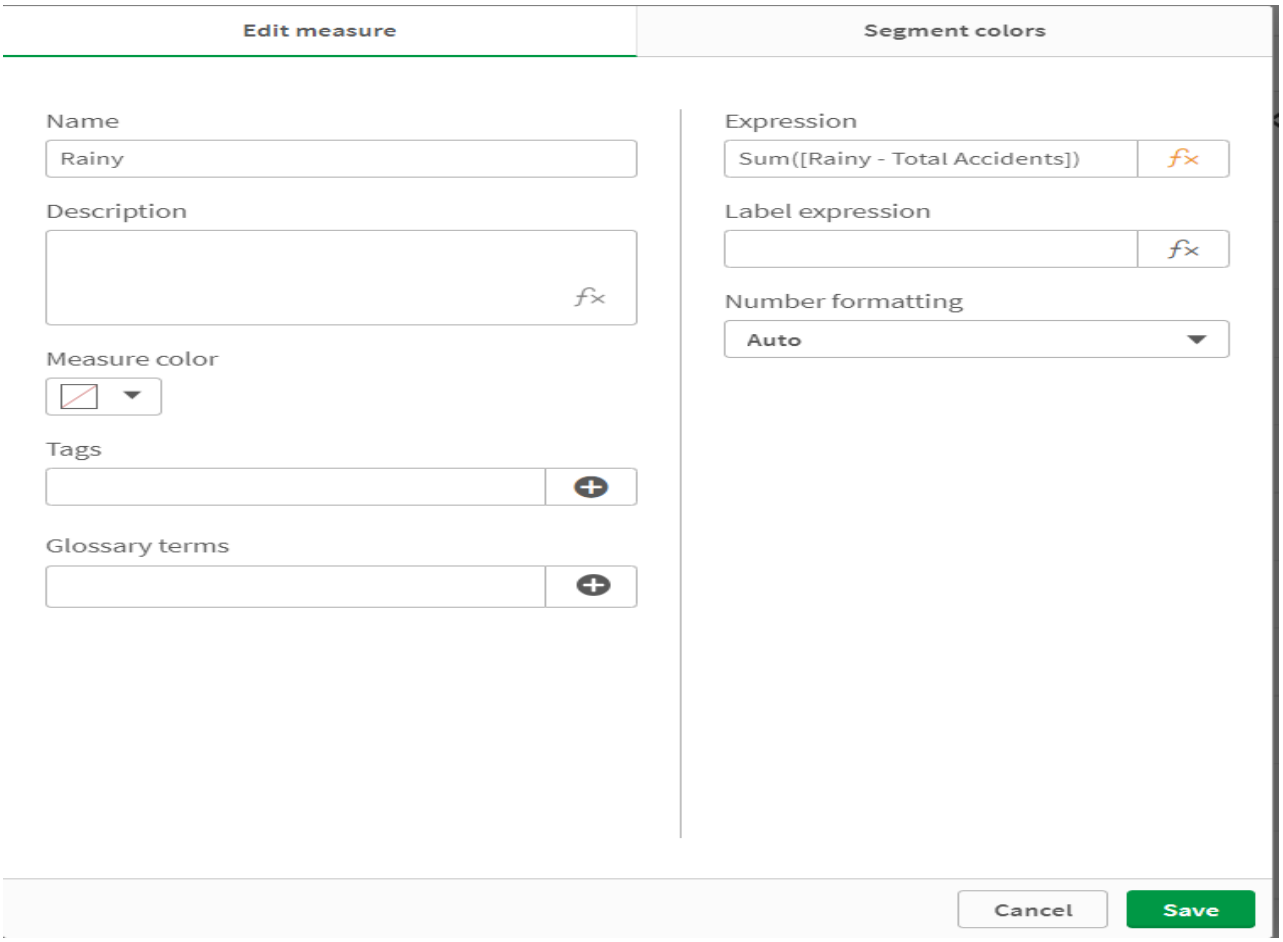
Data filters have been applied throughout the application. One of the instances is shown.


Advanced options
Chart suggestions
Gender analysis on pedestrian deaths
Andhra pradesh
Gujarat
Karnataka
Kerala
Maharashtra
Rajasthan
Tamil Nadu
Telangana
Uttar Pradesh
West Bengal
States-UTs
0
1k
2k
3k
female, male
Measures
female
male
(12,0)
12 x 12
Data
Dimensions
Bars
States-UTs
Dimension
States-UTs
Include null values
Limitation
Fixed number
Top
Bottom
10
Calculated on measure: female
Show others
Sorting
Add-ons
Appearance

Use of master items



Many master items are created. One of them is shown for reference.


Edit measure
Segment colors
Name
Rainy
Description
Measure color
Tags
Glossary terms
Expression
Sum([Rainy - Total Accidents])
Label expression
Number formatting
Auto
Cancel
Save


Edit expression
1
Sum([Rainy - Total Accidents])
OK
Sum([Rainy - Total Accidents])
Fields
Filter by table
Traffic_Control_Type
Field
Police Controlled - Persons Inju...
Aggregation functions
Sum
Set Expression
Make selections in the app to Enable Set expression
Distinct
Total
Insert
Expression generator
Functions
Set expressions
Variables
Cancel
Apply

Use of calculated items

Number of visualizations

1. Caused by drunken driving
2. State-wise mobile phone usage
3. Correlation:Speeding and number of accidents
4. Accidents by weather type
5. Over-Speeding - Persons Injured - Total Injured state-wise distribution
6. Correlation- Flashing Signal/Blinker - Total Injured and Killed(KPI)
7. Correlation -Jumping Red Light - Greviously Injured and Number of Accidents(KPI)
8. Overview of Stop Sign - Persons Injured - Total Injured by Uncontrolled - Persons Killed - Rank
9. Vehicle type Analysis on pedestrian deaths
10. Gender analysis on pedestrian deaths
11. Pedestrians killed: Age groups
12. Senior citizens involved

13. Senior citizens killed
14. Minors killed
15. Minors injured
16. Police Controlled - Persons Injured - Minor Injury by States-UTs
17. Police Controlled - Persons Killed by States-UTs