FINAL REPORT

Visualization Tool For Electric Vehicle Charge And Range Analysis

1. INTRODUCTION

1.1 Project Overview

Electric vehicles (EVs) are revolutionizing the transportation industry. As demand grows, users and analysts require efficient tools to explore data such as charge levels, range, and pricing. This project leverages Tableau to build a visualization tool that simplifies EV data analysis.

1.2 Purpose

By using Tableau, the primary goal of this project is to create a dashboard-based platform for visualizing electric vehicle data. Users can compare EV performance across multiple parameters to make informed decisions or derive insights.

2. IDEATION PHASE

The team collaboratively identified the lack of centralized, visual, and analytical tools for EV data as a core challenge. Brainstorm sessions generated ideas around user-centric dashboards to enable charge, range, and price-based filtering

2.1 Problem Statement

To build a data visualization dashboard that helps analyze Visualization Tool For Electric Vehicle Charge And Range Analysis

2.2 Empathy Map Canvas

The empathy map helped understand EV customers:

- Think & Feel: Desire reliable EV data to compare options.

- Hear: Industry discussions about charging infrastructure.

- See: Confusing, scattered technical data online.

- Say & Do: Look for trustworthy insights.

- Pain: Difficulty in choosing the right EV.

- Gain: A clear, visual tool makes comparison easier

2.3 Brainstorming

We listed ideas like:

The team generated ideas including:

- Brand-based EV comparison

- Interactive filters

- Charging station mapping

Ideas were prioritized based on usability, data availability, and visualization clarity.

3. REQUIREMENT ANALYSIS
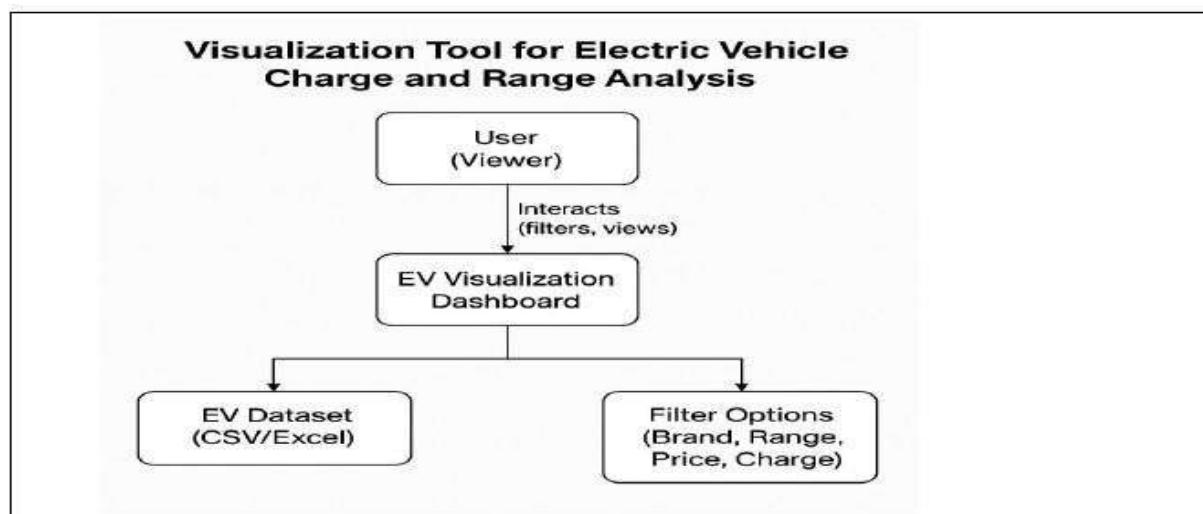
3.1 Customer Journey Map

Stage	Action	Tool	Emotion	Opportunity
Discover	User finds our dashboard	Tableau Public	Curious	Impress with visuals
Explore	Filters by country/type	Filters	Engaged	Add story sections
Learn	Sees endangered sites	Graphs	Surprised	Promote awareness
Share	Shares dashboard	Link	Proud	More reach & impact

3.2 Solution Requirement

• Dashboard must be interactive

• Support filtering by brand, range, charge

• Allow exporting data or visuals

• Visual consistency across charts

3.3 Data Flow Diagram

Visualization Tool for Electric Vehicle Charge and Range Analysis

3.4 Technology Stack

- **Frontend**: Tableau Public,python

- **Backend**: flask(data-based project)

- **Preprocessing Tool**: Excel / Google Sheets

- **Data Source:** https://drive.google.com/drive/folders/1Rkzdks6Us1Uq2SRB4nxMAb83jN5bpHll

4. PROJECT DESIGN

4.1 Problem-Solution Fit

Problem: Users lack an intuitive EV comparison tool.

Solution: Creating a Tableau dashboard that simplifies EV data

4.2 Proposed Solution

An interactive dashboard where users can:

- Filter EVs by multiple criteria

- View charts and KPIs

- Explore charge, range, and price visually

4.3 Solution Architecture

1. Input: EV dataset (range, price, battery, brand)

2. Clean: Remove nulls, format units

3. Load: Create Tableau data extract

4. Display: Dashboards with bar, donut, scatter charts

5. Interaction: Filters and story points for easy navigation

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

- Collected data, removed nulls, formatted fields
- Created charts, designed dashboard layout
- Finalized KPIs, added filters, published dashboards
- Performed testing, documentation, final edits

Week Task

1   Data Collection and Understanding

2   Data Cleaning and Preprocessing

3   Creating Dashboards in Tableau

4   Designing Story Slides

5   Final Testing and Review

6   Documentation and Report Writing
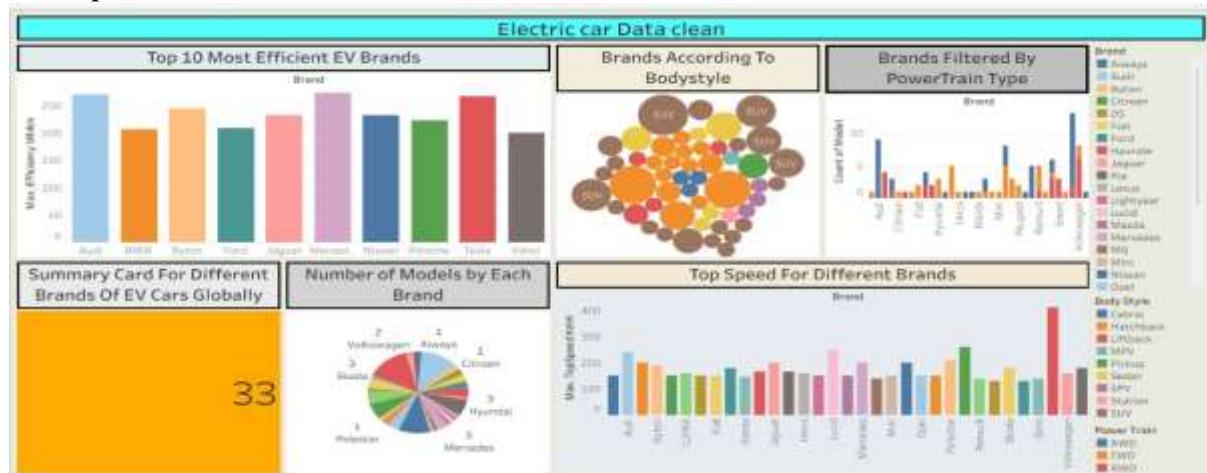
6. FUNCTIONAL AND PERFORMANCE TESTING
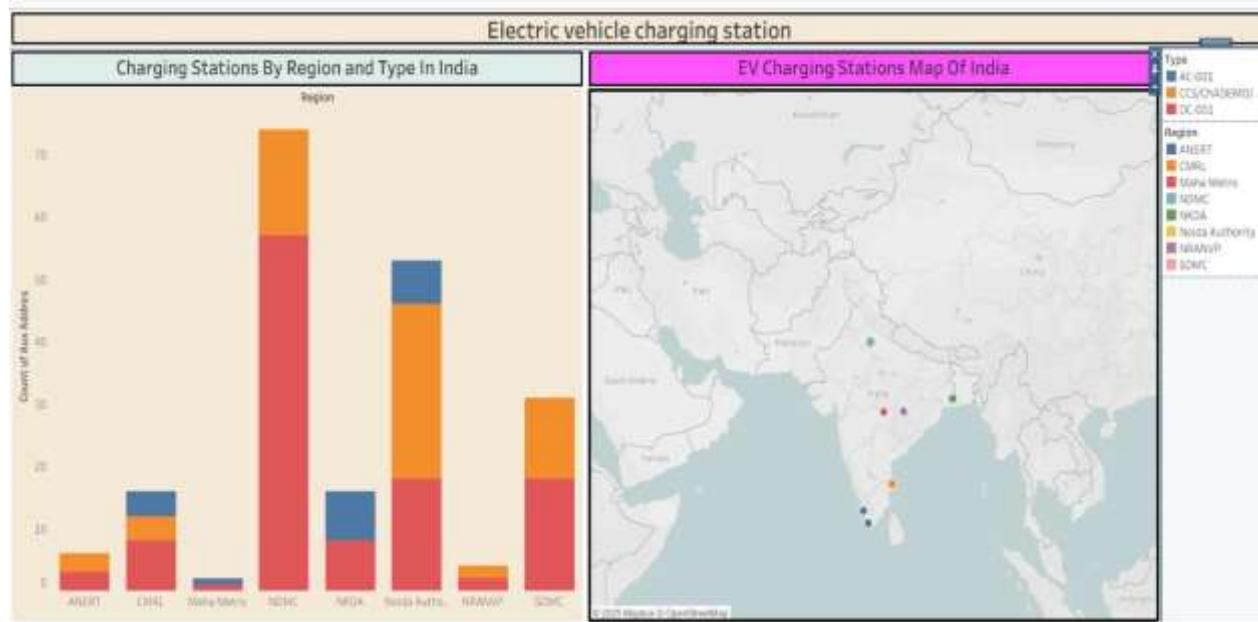
6.1 Performance Testing

We tested the dashboard on different devices and browsers. It loaded quickly and worked well. Filters and visuals responded smoothly, and no lag was noticed.

7. RESULTS

7.1 Output Screenshots

EVIndia

Brands Filtered by Powertrain type

Price for Different Cars In India

Summary Card For Different Brands Of EV Cars India

Different EV Cars In India

Electric vehicle charging station

Charging Stations By Region and Type In India

EV Charging Stations Map Of India

8. ADVANTAGES & DISADVANTAGES

Advantages

- • - User-friendly and interactive
- • - Accessible via Tableau Public
- • - Easy comparison across EV parameters

Disadvantages

- Limited to available dataset

- Tableau Public may have privacy limitations

- Not real-time data

9. CONCLUSION

The project successfully delivers an effective and intuitive platform for analyzing EV data. By visualizing charge, range, and pricing insights, the dashboard empowers both consumers and researchers to make informed decisions.

10. FUTURE SCOPE

• Integrate real-time EV data feeds

• Add geolocation-based insights for local EV models

• Expand with government incentives and subsidy details

• Build predictive analytics using historical trends

11. APPENDIX

Source Code:

```html
<!DOCTYPE html>
<html lang="en">
<head>
 <meta charset="UTF-8">
 <meta name="viewport" content="width=device-width, initial-scale=1.0">
 <title>EV Visualization Tool</title>
 <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css"
rel="stylesheet">
 <style>    body {    font-family:
'Segoe UI', sans-serif;
  }
  .hero {
```

```
    background-image:
url('https://www.electricvehicles.in/wpcontent/uploads/2020/11
/electric-cars.jpg');     background-size: cover;
background-position: center;     height: 100vh;     color:
white;     text-shadow: 2px 2px 4px rgba(0, 0, 0, 0.7);
    }
    .hero-content {     text-
align: center;     padding-
top: 20%;
    }
    .section-title {     margin-
top: 60px;
    }
  </style>
</head>
<body>


  <header class="hero">
    <div class="hero-content">
      <h1 class="display-4 fw-bold">EV Visualization Tool</h1>
      <p class="lead">An Interactive Dashboard for Electric Vehicle Charge and Range
Analysis</p>
    </div>
  </header>


  <section class="container" id="about">
    <h2 class="section-title">About the Project</h2>
    <p>This project presents a data-driven visualization of electric vehicles (EVs),
focusing on charge levels, range, price, and brand comparisons. Using Tableau, it enables
users to interactively explore EV insights, analyze charging station availability, and
understand market trends across India.</p>
  </section>
```

```html
<section class="container" id="features">
  <h2 class="section-title">Key Features</h2>
  <ul>
    <li>Interactive Tableau dashboards</li>
    <li>Brand-wise and region-wise EV data insights</li>
    <li>EV charging station visualization</li>
    <li>Price vs Range, Capacity, and Charge Level comparisons</li>
  </ul>
</section>

<section class="container" id="dashboards">
  <h2 class="section-title">Visual Insights</h2>

  <div class="mb-5">
    <h4>Dashboard 1: EV Overview by Brand and Range</h4>
    <div class='tableauPlaceholder' id='vizEV1' style='position: relative'>
      <noscript><a href='#'><img alt='EV Overview'
src='https://public.tableau.com/static/images/El/Electriccardata_clean/Dashboard1/1_rs
s.png' /></a></noscript>
      <object class='tableauViz' style='display:none;'>
        <param name='host_url' value='https%3A%2F%2Fpublic.tableau.com%2F'/>
        <param name='embed_code_version' value='3'/>
        <param name='site_root' value=''/>
        <param name='name' value='Electriccardata_clean/Dashboard1'/>
        <param name='tabs' value='no'/>
        <param name='toolbar' value='yes'/>
      </object>
    </div>
    <p>This dashboard displays electric car data by brand, range, charge level, and
price. It allows users to apply filters and view KPIs and comparisons interactively.</p>
  </div>
```

```html
    <div class="mb-5">
      <h4>Dashboard 2: EV Charging Stations in India</h4>
      <div class='tableauPlaceholder' id='vizEV2' style='position: relative'>
        <noscript><a href='#'><img alt='EV Charging Stations'
src='https://public.tableau.com/static/images/el/electric_vehicle_charging_station_list/D
ashboard1/1_rss.png' /></a></noscript>
        <object class='tableauViz' style='display:none;'>
          <param name='host_url' value='https%3A%2F%2Fpublic.tableau.com%2F'/>
          <param name='embed_code_version' value='3'/>
          <param name='site_root' value=''/>
          <param name='name' value='electric_vehicle_charging_station_list/Dashboard1'/>
          <param name='tabs' value='no'/>
          <param name='toolbar' value='yes'/>
        </object>
      </div>
      <p>This dashboard provides a geographic view of charging stations across India,
including city-wise distribution and station types. It's useful for both EV owners and
infrastructure planners.</p>
    </div>


    <div class="mb-5">
      <h4>Dashboard 3: EV Trends and Stats in India</h4>
      <div class='tableauPlaceholder' id='vizEV3' style='position: relative'>
        <noscript><a href='#'><img alt='EV Trends'
src='https://public.tableau.com/static/images/EV/EVIndia_17508291503480/Dashboard
1/1_rss.png' /></a></noscript>
        <object class='tableauViz' style='display:none;'>
          <param name='host_url' value='https%3A%2F%2Fpublic.tableau.com%2F'/>
          <param name='embed_code_version' value='3'/>
          <param name='site_root' value=''/>
          <param name='name' value='EVIndia_17508291503480/Dashboard1'/>
          <param name='tabs' value='no'/>
```

```
      <param name='toolbar' value='yes'/>

    </object>

  </div>

    <p>This dashboard highlights EV growth trends, state-wise adoption, and
registration insights across India. It gives a macro view of India's electric mobility
landscape.</p>

  </div>

 </section>


 <footer class="bg-dark text-white text-center py-3 mt-5">
  <p>&copy; 2025 EV Visualization Tool</p>
 </footer>


 <script type='text/javascript'>
   ['vizEV1', 'vizEV2', 'vizEV3'].forEach(function(id) {      var divElement =
document.getElementById(id);      var vizElement =
divElement.getElementsByTagName('object')[0];      vizElement.style.width
= '100%';      vizElement.style.height = '700px';      var scriptElement =
document.createElement('script');      scriptElement.src =
'https://public.tableau.com/javascripts/api/viz_v1.js';
vizElement.parentNode.insertBefore(scriptElement, vizElement);
   });
 </script>

</body> </html>


App.py from flask import Flask,
render_template


app = Flask(__name__)
```

```
@app.route("/") def

home():

    return render_template("index.html")


if __name__ == "__main__":

    app.run(debug=True, port=1212)
```

Dataset Link

https://drive.google.com/drive/folders/1Rkzdks6Us1Uq2SRB4nxMAb83jN5bpHll

GitHub & Project Demo Link:

https://github.com/Yogasrivalli/Visualization-Tool-For-Electric-Vehicle-Charge-And-Range-Analysis-