**Project Report: Electric Vehicle Data Analysis Dashboard:**

**1. Project Title:**  
Electric Vehicle Data Analysis Dashboard (Google Colab + Plotly)

**2. Tools and Technologies Used:**

* Programming Language: Python
* Libraries: Pandas, Plotly, NumPy
* Platform: Google Colab
* Output: Interactive HTML Dashboard, CSV Export

**3. Objective:**  
To analyze electric vehicle (EV) specifications and performance metrics by creating an interactive dashboard that enables stakeholders to explore data-driven insights and make informed decisions regarding EV features and market trends.

**4. Dataset Description:**  
The dataset contains detailed specifications of modern electric vehicles, including the following attributes:

* Brand
* Model
* Top Speed (km/h)
* Battery Capacity (kWh)
* Battery Type
* Number of Cells
* Torque (Nm)
* Efficiency (Wh/km)
* Range (km)
* Acceleration (0-100 km/h in seconds)

**5. Methodology:**

**a. Data Loading & Setup:**

* Imported dataset into Google Colab.
* Loaded the data using Pandas and verified structure, dimensions, and sample records.

**b. Data Preprocessing:**

* Handled missing values and duplicates.
* Standardized column names and formats.
* Converted numerical columns to appropriate data types.

**c. Exploratory Data Analysis (EDA):**

* Summary statistics and distribution analysis.
* Relationship analysis between battery capacity, efficiency, range, and acceleration.
* Group-wise analysis by brand and battery type.

**d. Interactive Visualizations (Plotly):**

* Bar charts: Top 10 EVs by range, top speed.
* Pie charts: Distribution of battery types.
* Scatter plots: Battery capacity vs. range.
* Box plots: Acceleration times across brands.
* Dropdown filters simulated for brand and battery type.

**e. Exporting Dashboard:**

* Used Plotly's write\_html() method to export visualizations as interactive HTML.
* Generated ev\_data\_cleaned.csv for Power BI integration and further analysis.

**6. Key Insights:**

* Certain brands consistently offer better performance across range and acceleration.
* Battery type significantly affects vehicle efficiency.
* EVs with higher torque tend to have better acceleration but not necessarily longer range.

**7. Challenges Faced:**

* Managing inconsistent or missing data entries.
* Visualizing high-dimensional relationships effectively.

**8. Outcome:**  
Delivered an interactive, shareable EV dashboard with clean visual insights. Supported real-world use cases such as product comparison, market analysis, and performance benchmarking.

**9. Future Enhancements:**

* Integrate real-time EV data APIs.
* Add regional pricing, environmental impact, and adoption rate analytics.
* Deploy the dashboard as a web app with user controls.

**Appendix:**

* Dataset File: ev\_data\_cleaned.csv
* HTML Report: ev\_dashboard.html
* Google Colab Notebook: Electric\_Vehicle\_Specs\_.ipynb