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ENGINEERING



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Saveetha Institute of Medical And Technical Sciences
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Trend Visualization of Electric Vehicle Adoption for Sustainable Transportation Analysis

DSA0613-Data Handling and Visualization for Data Analytics

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INTRODUCTION

- Electric Vehicles (EVs) are transforming global mobility and helping reduce dependence on fossil fuels.
- Visualizing EV adoption trends enables understanding of how fast and where the transition toward green transport is happening.
- EV data visualization helps policymakers, manufacturers, and consumers make informed decisions.
- It supports UN Sustainable Development Goals by promoting clean energy, sustainable cities, and climate action.
- This project analyzes EV adoption trends to understand how charging stations, government policies, and consumer demand support sustainable transportation.



PROBLEM STATEMENT



- **Current State:-**

EV adoption is growing worldwide, but available sales and charging-station data is not fully utilized to understand long-term trends in sustainable transportation.

- **Challenges:-**

Incomplete or inconsistent EV sales and infrastructure data.

Difficulty linking policy support, charging availability, and EV growth.

Limited visual tools to clearly interpret adoption patterns over time and regions.

- **Goal:-**

To develop a system that preprocesses and visualizes EV adoption trends, helping policymakers and researchers make informed decisions for sustainable mobility.

OBJECTIVES

- To collect and analyze EV registration, charging infrastructure, and emission data.
- To visualize growth trends across different years, regions, and vehicle categories.
- To compare EV adoption rates among nations and states.
- To measure the sustainability impact of EV adoption (e.g., CO₂ reduction, energy savings).
- To forecast future EV demand using predictive visualization models.

LITERATURE SURVEY



- Studies show that this growth is driven by falling battery costs and government incentives.
- Electric Vehicle (EV) adoption has grown rapidly worldwide in the last decade.
- Research highlights that countries like China, Europe, and the U.S. lead in EV sales.
- Range anxiety and lack of charging infrastructure are major barriers found in multiple studies.
- Visualization research commonly uses time-series graphs to show EV sales over different years.



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ARCHITECTURE DIAGRAM





MODULE-1



Trend Visualization of EV Adoption

- Collecting and cleaning EV sales, registration, and charging station data.
- Time-series analysis and ARIMA forecasting for adoption trends.
- Graphs: line charts, bar plots, and heatmaps to visualize growth.
- Comparison between countries, states, or vehicle types.
- Identification of top-performing regions and adoption patterns.

Outcome:- Provides clear insights into growth rate, market trends, and regional adoption patterns.



MODULE-2



Environmental Impact & Sustainability Analysis

- Analyzing how increased EV use reduces CO₂ emissions and fossil fuel dependency.
- Comparing emission data before and after EV adoption.
- Visualization of CO₂ reduction trends and renewable energy integration.
- Assessing EV contribution toward UN Sustainable Development Goals .
- Policy recommendations for improving sustainability impact.

Outcome:- Demonstrates how EV adoption supports sustainable transportation and cleaner environments.

TOOLS / TECHNIQUES

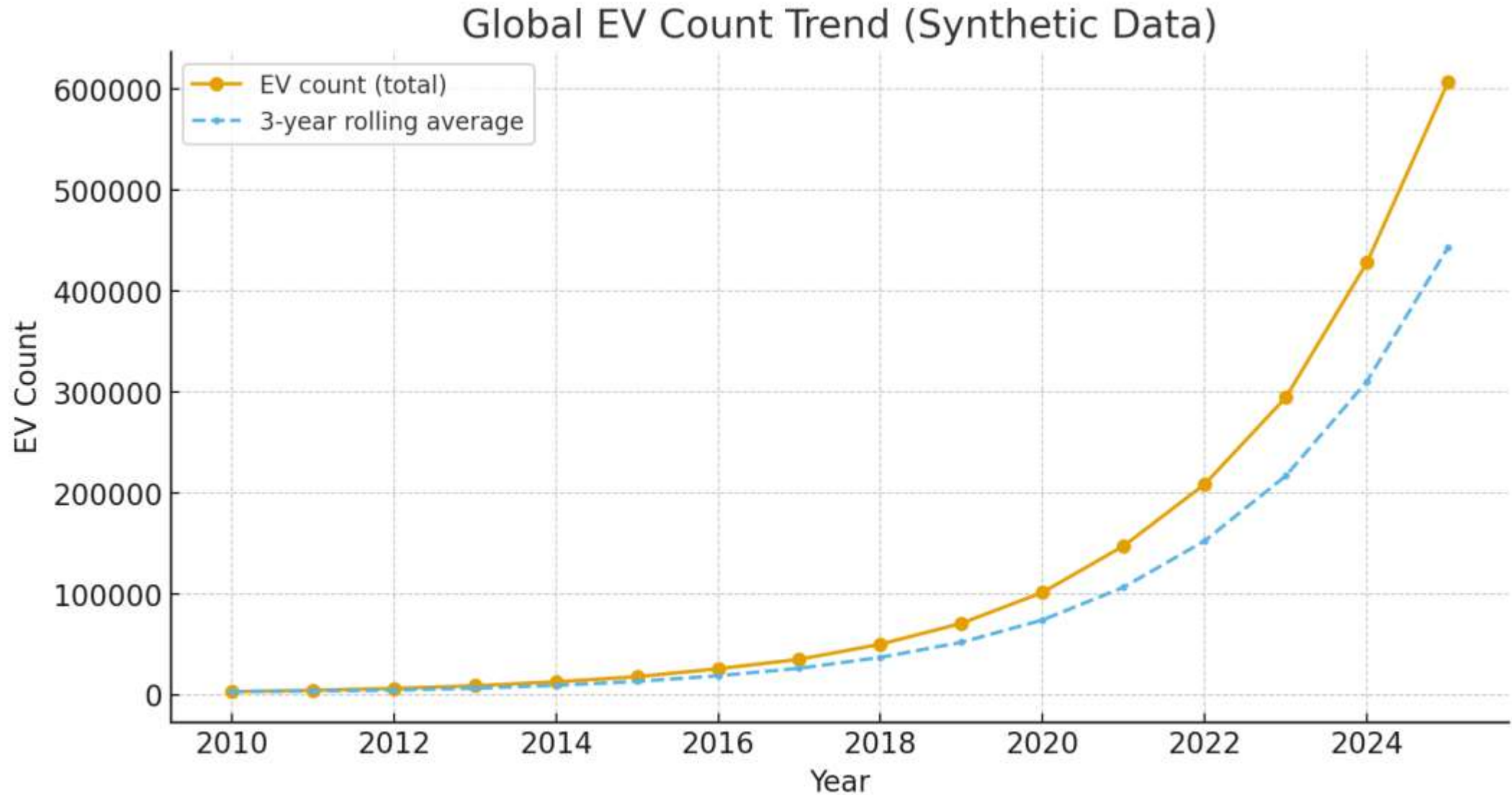
- Programming: R code
- Visualization Tools: Tableau / Power BI for interactive dashboards
- Analysis Models: Linear Regression, Time-Series Forecasting
- Metrics: EV penetration rate, CO₂ savings, charging station density
- Approach: Data-driven insight generation for sustainability decisions



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OUTPUT IMAGE



CONCLUSION

- EV adoption visualization enables evidence-based decision-making for sustainable transport.
- Data shows a clear positive transition toward clean mobility worldwide.
- Policy, infrastructure, and public awareness drive adoption rates.
- Effective trend visualization bridges the gap between data and sustainable action
- The study confirms that data visualization is an effective tool to identify adoption gaps and future opportunities for growth.

FUTURE WORK

- Build real-time EV monitoring dashboards linked to government data.
- Integrate geospatial analysis for charging network optimization.
- Use AI and Machine Learning for predictive adoption modeling.
- Extend analysis to include battery recycling and renewable energy integration.
- Develop a mobile-friendly dashboard for public awareness and EV incentives.
- Extend visualization to include battery life cycle, recycling, and supply chain sustainability.

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Thank