

Electric Vehicle Sales by State in India

Machine Learning & Time-Series Forecasting Project Report

Introduction

This project analyzes Electric Vehicle (EV) sales trends across Indian states using machine learning and time-series forecasting techniques.

Objective

To analyze EV sales, identify key influencing factors, build predictive models, and forecast future EV growth.

Dataset Description

The dataset includes Year, Month, Date, State, Vehicle Class, Vehicle Category, Vehicle Type, and EV Sales Quantity.

Data Preprocessing

Converted date columns, performed feature engineering, encoded categorical variables, and removed low-impact features.

Exploratory Data Analysis

EV sales show strong yearly growth, high state dependency, and dominance of two-wheelers.

Modeling Approach

Multiple models were tested including Linear Regression, Decision Tree, Random Forest, and XGBoost. Random Forest achieved the highest R^2 score of 0.94.

Model Validation

5-fold cross-validation confirmed strong generalization with a mean R^2 score of approximately 0.94.

Feature Importance Analysis

State, Year, Vehicle Class, and Vehicle Type were identified as the most influential features impacting EV sales.

Time-Series Forecasting

Facebook Prophet was used to forecast future EV sales trends, revealing sustained growth and minimal seasonality.

Business Insights

State-level policies strongly influence EV adoption. Two-wheelers dominate the EV market, and adoption is accelerating year over year.

Conclusion

The project successfully built accurate machine learning and forecasting models to analyze and predict EV sales across India.