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Electric Vehicle Sales Analysis by State in India

Unlocking Adoption Trends & Predictive
Modeling for Sustainable Mobility

Nasir Husain | Data Science Intern
ID: UMID14112570495 | Organization: Unified Mentor



Sustainable Modernity

The Green Shift: Context & Objectives



The Objective:
Analyze **2014-2024** sales
data to uncover patterns
and forecast **demand**.

Impact: Guiding infrastructure investment and state frameworks

The Data Foundation

96,845 Rows

2014 – 2024 Timeline

All Indian States & UTs

- **Source:** Clean Mobility Shift (Web Scrapped)
- **Key Attributes:** State, Vehicle Type (2W/3W/4W), Sales Quantity
- **Status:** Nulls Removed, Preprocessed, Cleaned

Technical Architecture & Tools



Core Engine



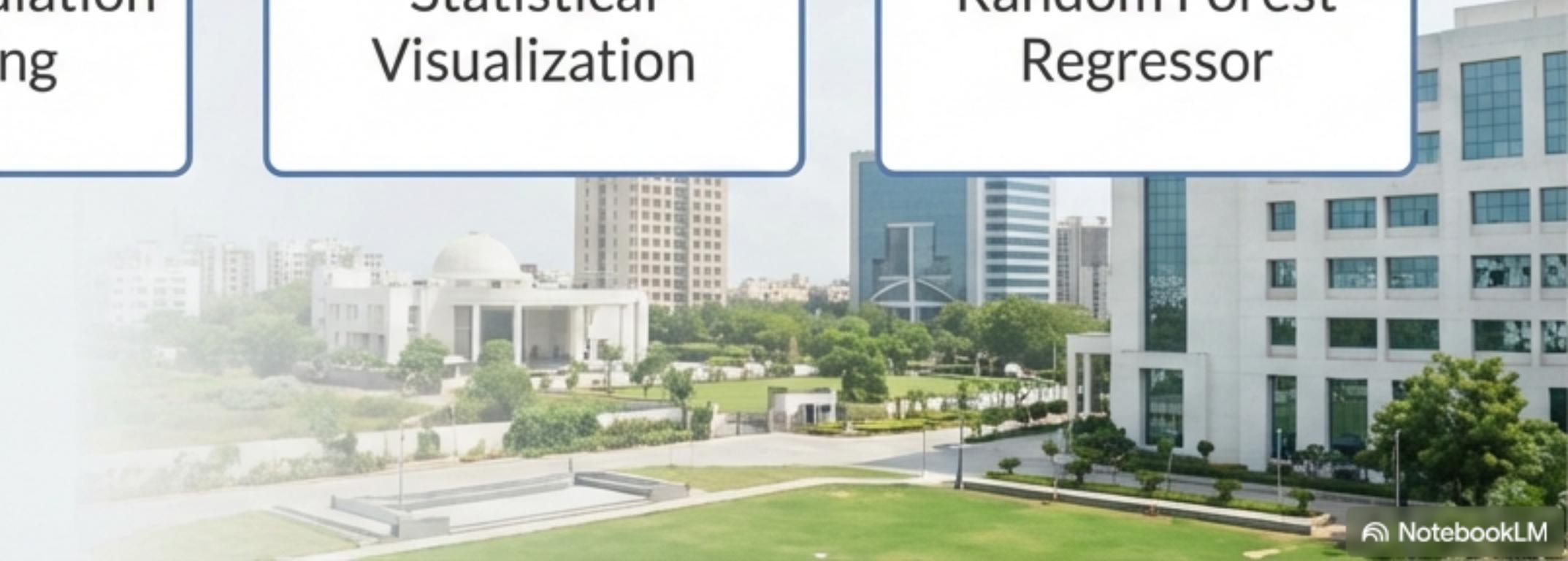
Data Manipulation
& Cleaning



Statistical
Visualization



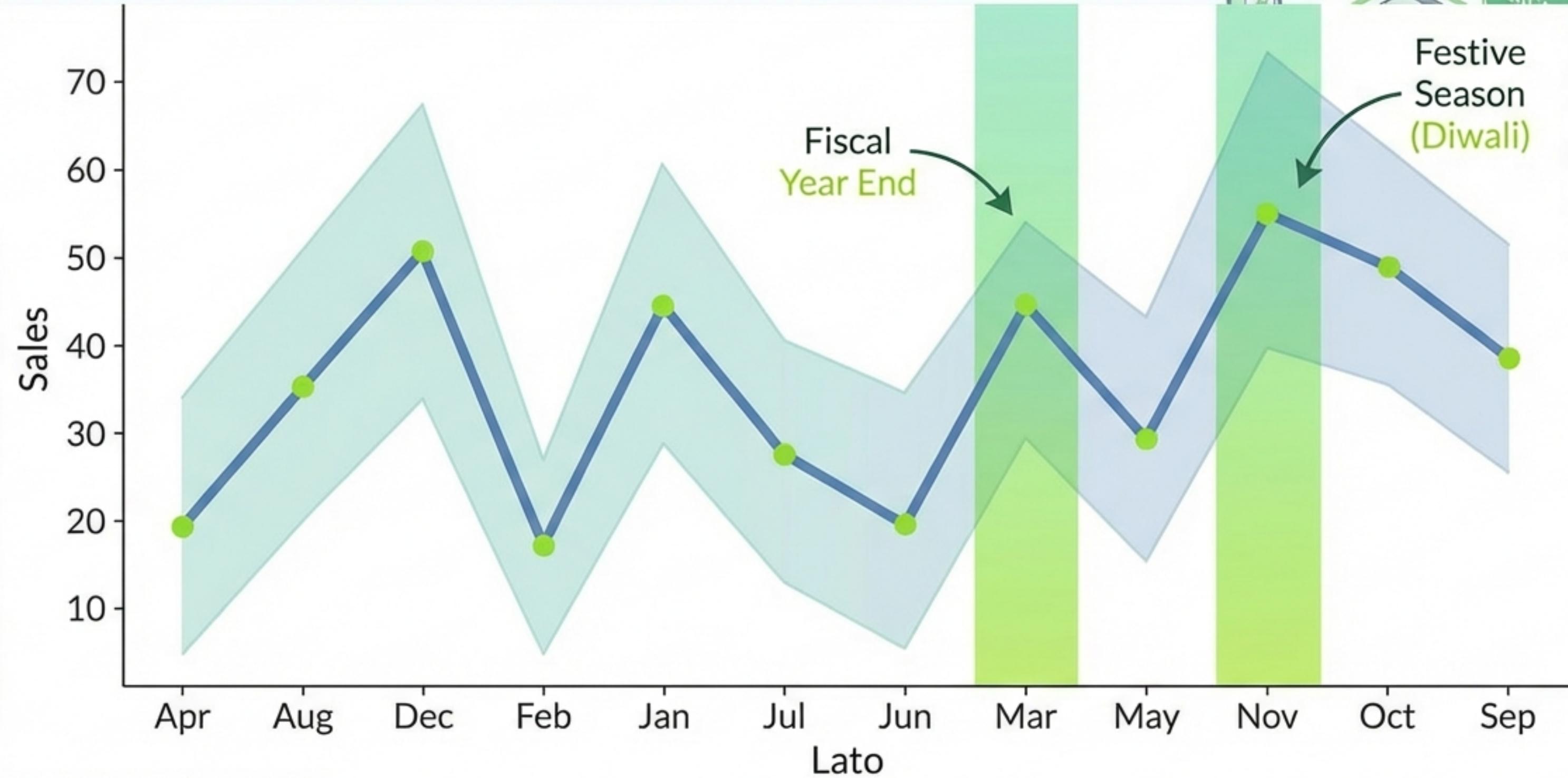
Random Forest
Regressor



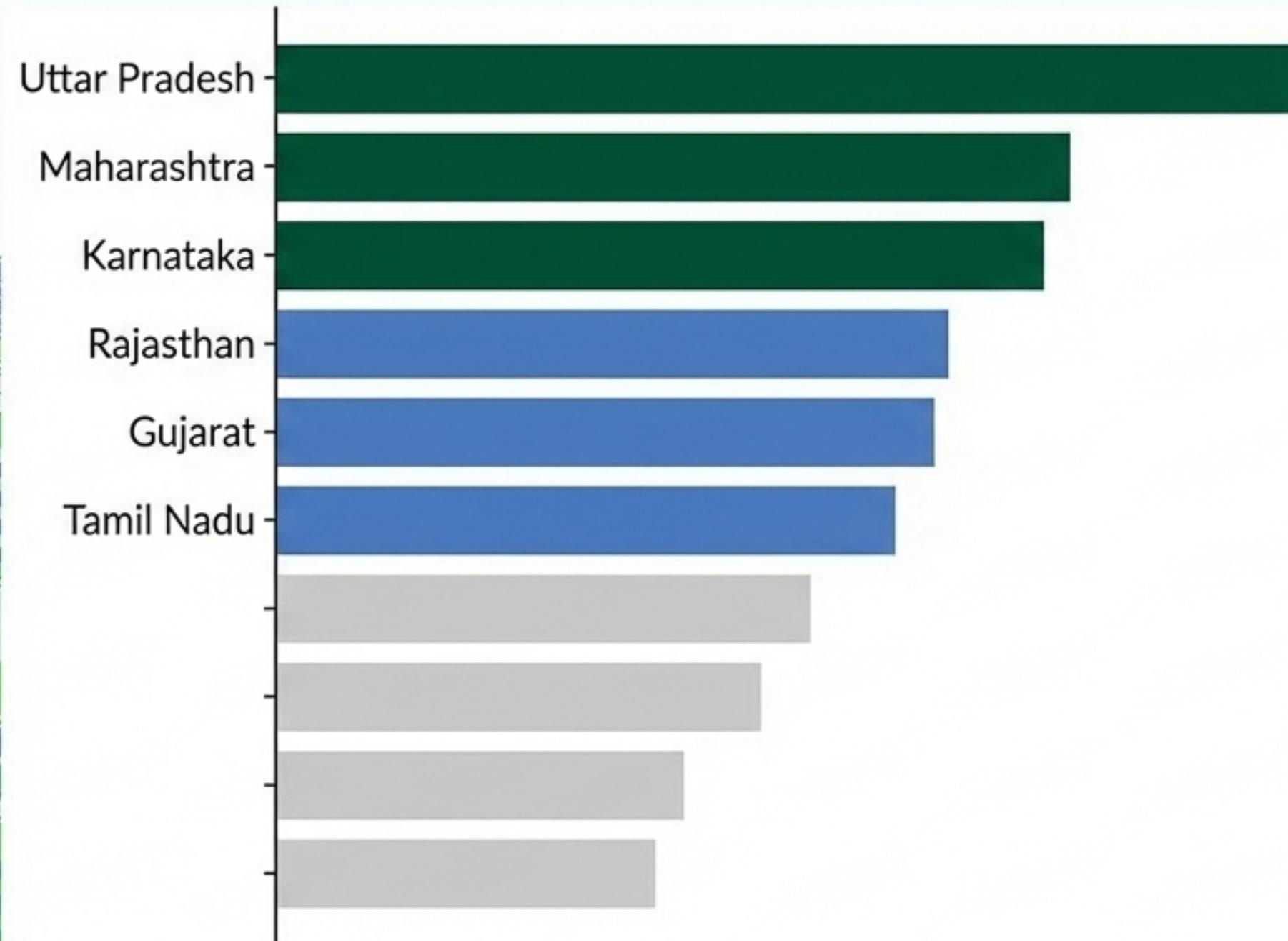
Temporal Trends: The Post-2021 Surge



Seasonality & Monthly Buying Patterns



Geographic Disparities: The EV Leaders



- **Top Performers:** UP, Maharashtra, Karnataka.
- **Observation:** Strong correlation with state population and economy.
- **Laggards:** North-East & Island Territories.

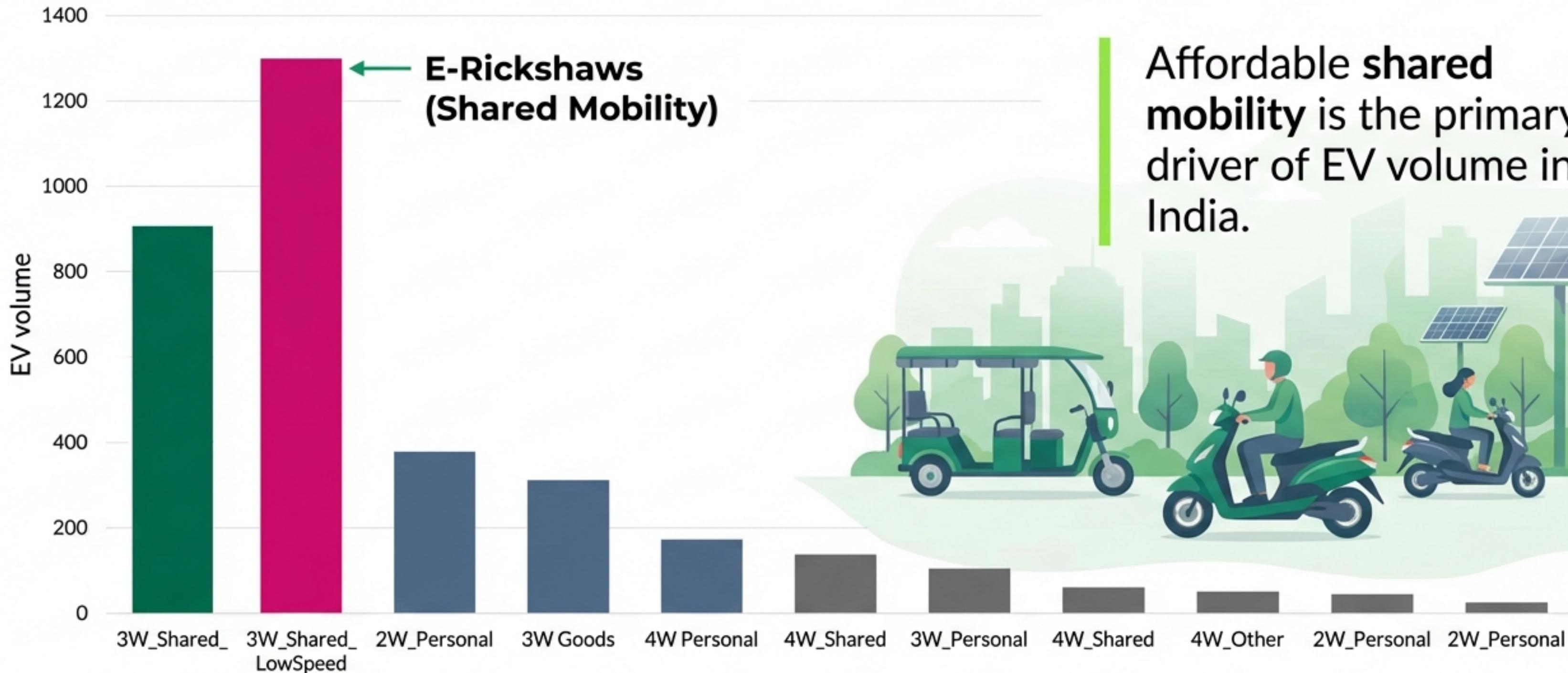
Category Dominance: A 2W & 3W Market



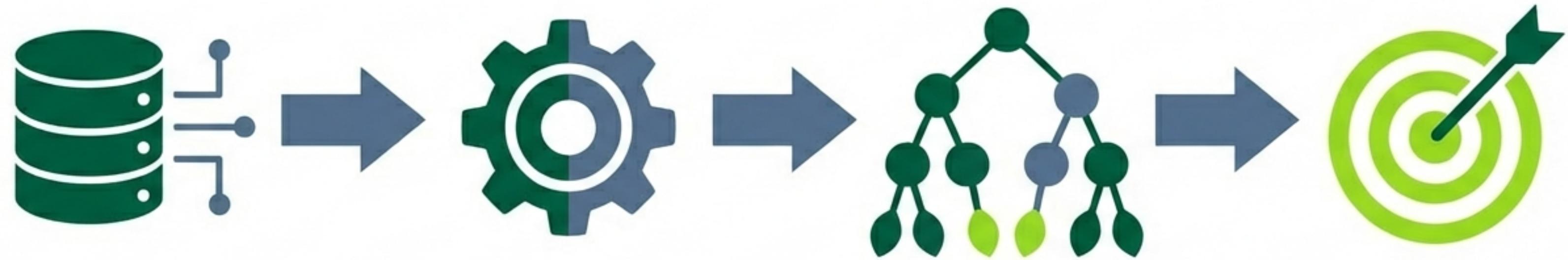
Personal cars (4W) are a niche segment. The revolution is driven by scooters and rickshaws.



Vehicle Type Breakdown: The ‘Shared Mobility’ Factor



Machine Learning Methodology



Input Data

Features: State,
Category, Date

Preprocessing

One-Hot Encoding,
Datetime Conversion

Random Forest Regressor

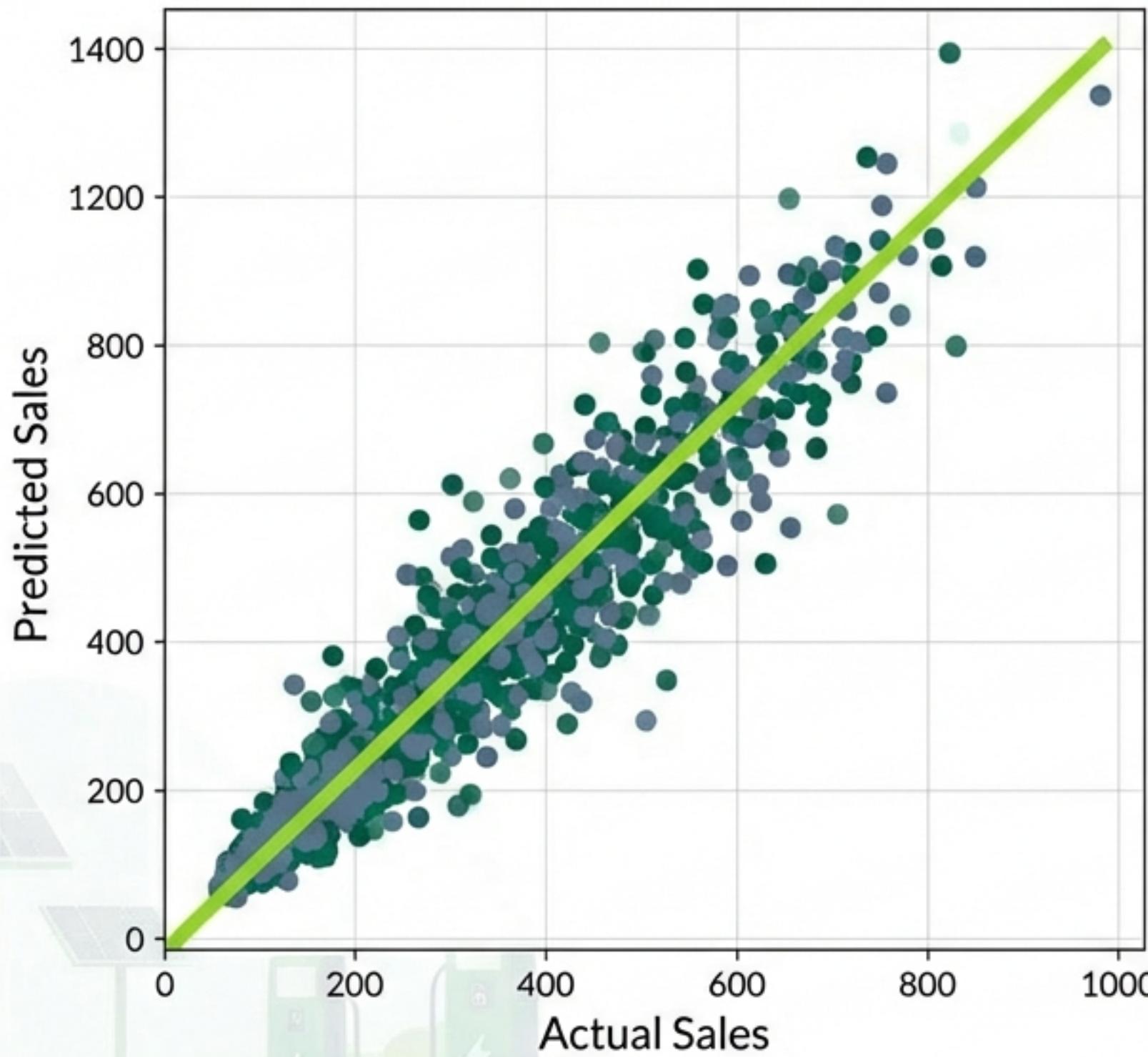
`n_estimators=100`

Prediction

EV Sales Quantity

Validation Strategy: 80/20 Train-Test Split

Model Evaluation & Performance



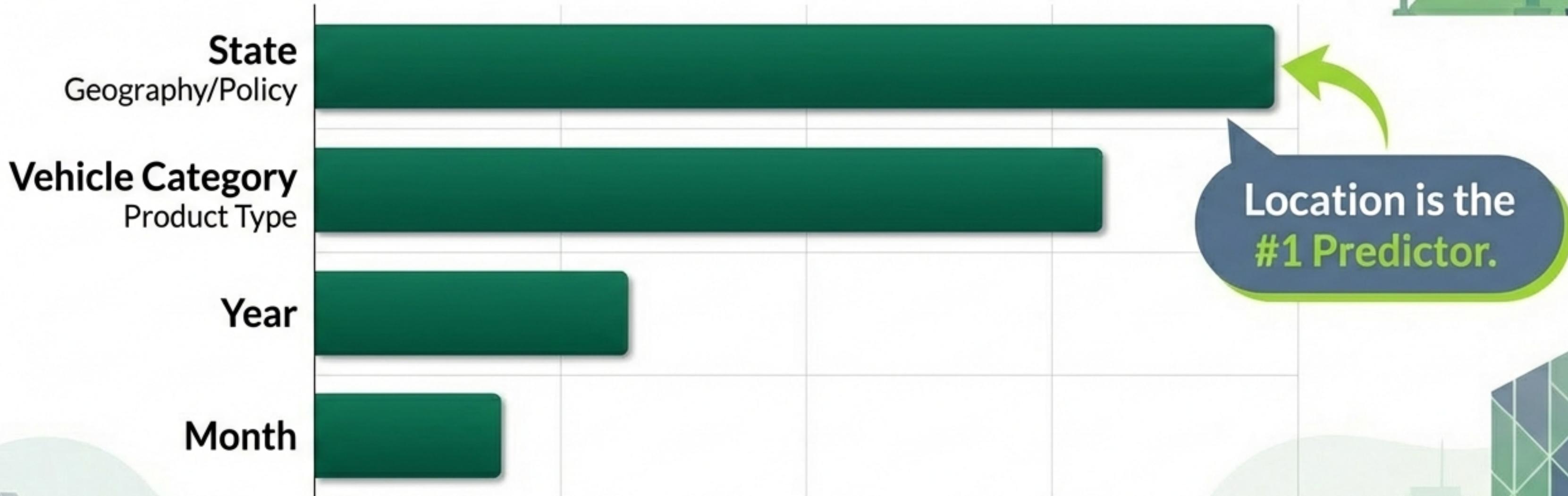
Metric: RMSE (Root Mean Squared Error)

0.371.098

Result: High Predictive Accuracy

Interpretation: The model successfully captures variance across states and years, validating it for inventory forecasting.

Feature Importance: What Drives Sales?



A national strategy is insufficient. Policy and infrastructure must be state-specific.

Key Findings Summary



Uneven Geography

Adoption is concentrated in UP, Maharashtra, & Karnataka.



Mass Market Driven

E-Rickshaws and Scooters dominate; luxury EVs are outliers.



Exponential Maturity

Market dynamics fundamentally shifted post-2021.



Strategic Recommendations



Infrastructure



Prioritize charging hubs and swapping stations in high-growth states first.



Policy



Incentivize 4-wheeler adoption to bridge the gap with the 2W/3W market.



Expansion



Launch awareness campaigns in “Middle Pack” states like Gujarat and Tamil Nadu.



Future Scope & Next Steps



Deployment

Live dashboard via
Flask/Streamlit.



Advanced Forecasting

Implement
ARIMA/SARIMA
models.



Data Enrichment

Integrate battery
prices & charging
density.



Questions?

Nasir Husain | Data Science Intern
GitHub: [\[Link to Portfolio\]](#)