# Car Sales Analysis Report: 2022–2023

Overview

We analyzed data from the **Car Sales Report for 2022 and 2023** using two classification models: **Logistic Regression** and **Random Forest Classifier**. Both models provided valuable insights into customer preferences and the popularity of car categories.

Key Results

- **High Prediction Accuracy**:
  The overall prediction error across all car categories was **1.88%**, confirming the **reliability** of the forecast and enabling **data-driven planning** across departments.
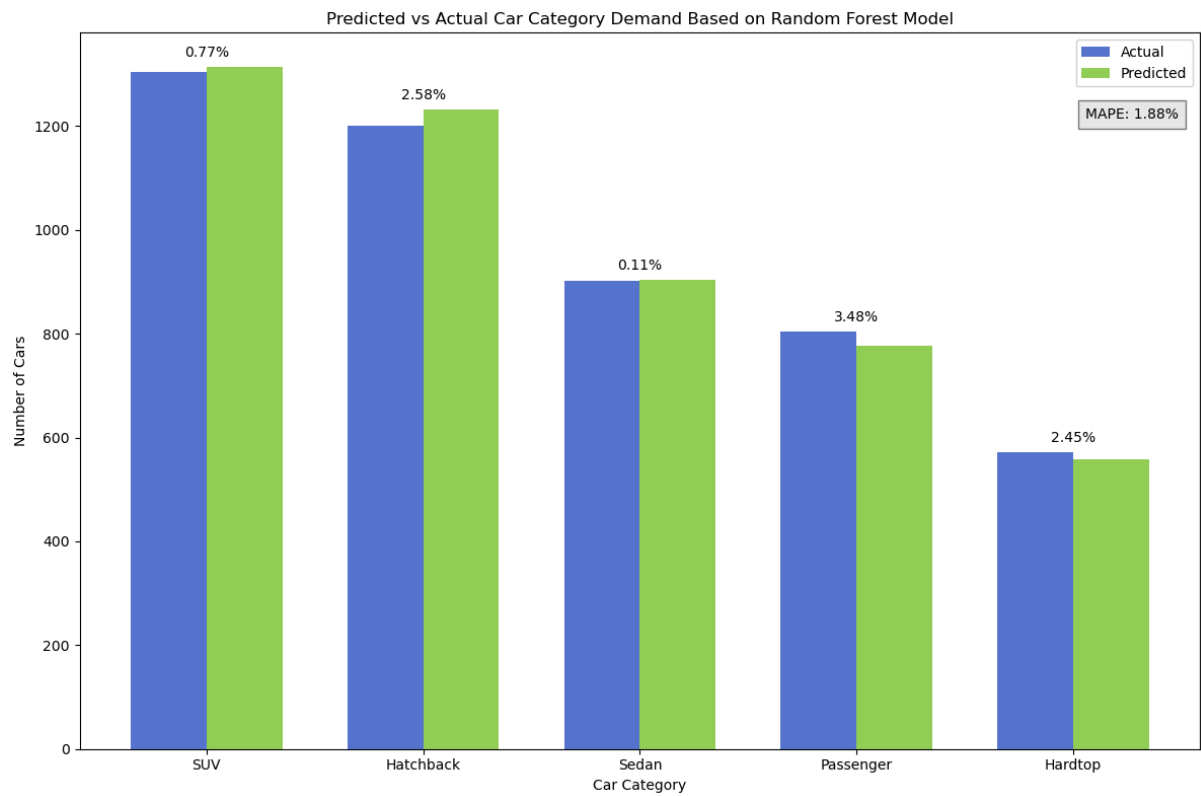
- **Top Car Categories**:
  SUV and **Hatchback** emerged as the most popular categories, each with over **1,200 units sold** and higher projected demand in future periods.

Car Category Popularity: Actual Purchases vs Predicted Purchases Based on Random Forest Model
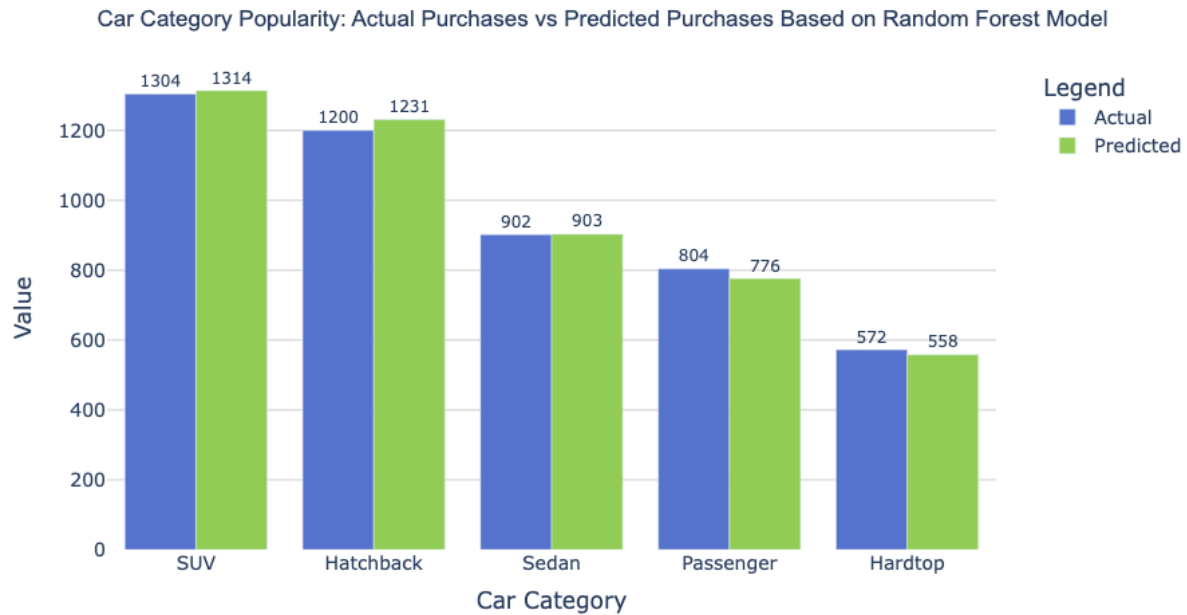
Department-Specific Insights

Sales Team

- **Opportunity**: Focus on stocking **high-demand models, such as SUVs and Hatchbacks,** to meet customer demand and avoid overstocking low-demand categories, like Hardtops.
- **Action**: Prioritize the availability of SUVs and Hatchbacks, especially in high-performing regions.

Marketing Team

- **Opportunity**: Leverage forecast results to tailor marketing campaigns toward **SUVs and Hatchbacks**.
- **Strategy**: Promote lower-demand models like **Passenger** and **Hardtop** through **limited-time offers** or targeted campaigns.
- **Action**: Run **targeted ads** based on predicted customer preferences by category.

Product Management

- **Insight**: Consistent SUV demand supports continued investment in **feature-rich, fuel-efficient SUVs**.
- **Recommendation**: Evaluate **phasing out or redesigning Hardtop models** with low demand.
- **Action**: Segment customers by predicted car preferences to guide **product development**.

Business Executives

- **Key Takeaway**: Stable demand patterns suggest a **predictable revenue stream** and support **risk-reduced forecasting**.
- **Data Opportunity**: Enhancing data collection (e.g., adding **marital status**, **final owner**, or **usage data**) can yield deeper insights.
- **Action**: Use the prediction model to support **quarterly sales targets**, optimize investments, and improve **data quality** for future analysis.

Next Steps

- Develop models to **predict "best-seller" car models**.
- Implement regression analysis to **estimate optimal selling prices**.
- Expand analysis to examine **regional popularity trends** for each car model.