StellarMart — Demand Forecasting Case Study

Problem

StellarMart experienced stockouts and excess inventory due to inconsistent demand patterns. Business teams required an explainable and reliable forecasting system for daily sales to support inventory planning and merchandising decisions.

Approach

1. **Data Cleaning & Preparation:** Processed transaction-level data into a clean daily sales time series.
2. **Feature Engineering:** Added lag features (1, 7, 14, 28 days), rolling averages (7 & 28 days), and calendar indicators.
3. **Modeling:** Trained GradientBoostingRegressor using a time-based split (last 90 days as holdout).
4. **Benchmarking:** Compared against naive lag-1 model to prove real value.
5. **Deployment:** Delivered a Streamlit dashboard showing KPIs, actual vs predicted values, and a 14■day forward forecast.

Results (Insert Your Real Numbers After Running Your Model)

- Holdout MAPE: **X%**
- Improvement vs naive baseline: **Y%** RMSE reduction
- Identified top-selling products: Top 10 SKUs accounted for **Z%** of revenue
- Detected clear weekly seasonality driving demand patterns

Business Impact

The forecasting pipeline enables proactive inventory planning, reduces emergency reorder costs, and helps merchandising teams prioritize high-impact SKUs. With further integration, the system can directly support automated stock-level recommendations.

Next Steps

- Extend to SKU-level and category-level forecasting
- Add holiday and promo effects to models
- Integrate inventory optimization and reorder triggers
- Deploy as a public-facing dashboard