

Generative AI for Demand Forecasting in the Door Industry - TrimLite



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ABSTRACT

Partnering with Trimlite LLC, we developed AI-powered demand forecasting for the door industry by evaluating SARIMA, Prophet, LSTM, and Holt-Winters to replace manual methods. Our models capture seasonality, volatility, and long-term trends—boosting accuracy, reducing inventory mismatches, and optimizing production. Scalable and adaptable to new products and market shifts, this solution equips Trimlite with a future-ready, data-driven forecasting system.

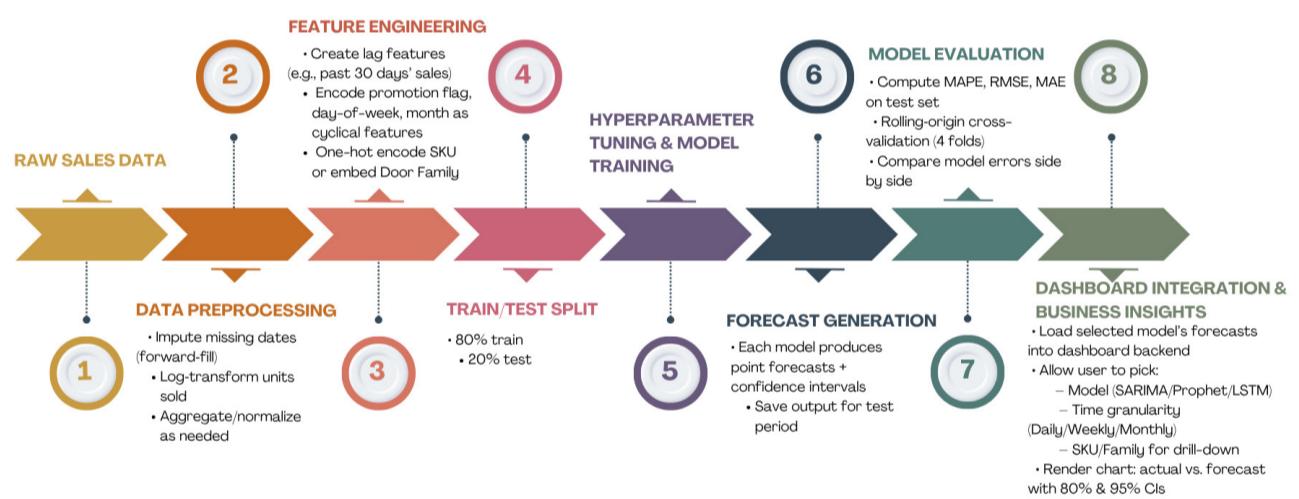
RESULTS

The SARIMA model produced a reliable 12-month forecast that mirrors historical demand patterns, capturing seasonal peaks like end-of-year surges so Trimlite can anticipate high-demand periods. While Prophet and LSTM were tested, SARIMA proved most consistent for typical SKUs. The interactive dashboard displays actual and forecasted demand side by side, allowing stakeholders to switch models instantly. By forecasting peak months, Trimlite can adjust production and inventory to reduce overstock and stockouts. This scalable workflow will improve accuracy over time and enhance supply-chain efficiency.

INTRODUCTION

Trimlite LLC enlisted us to build an AI-driven demand forecasting solution tailored to the door industry's unique seasonality and volatility. By comparing and deploying SARIMA, Prophet, and LSTM models on historical sales data, we replaced manual forecasting with automated, data-driven predictions. The result is an interactive dashboard that lets stakeholders choose any SKU, select a forecasting model, and view forecasts—complete with confidence intervals—at daily, weekly, or monthly granularity. This scalable system improves accuracy, minimizes inventory mismatches, and supports smarter production planning as Trimlite expands its product lines and adapts to shifting market trends.

METHODOLOGY



DASHBOARD VISIBILITY

The dashboard interface includes:

- Multi-Model Demand Forecasting**: Advanced time series analysis with SARIMA, Prophet, and LSTM models + AI insights.
- Model Configuration**: SARIMA Selected. Includes Model Selection (Forecasting Model: SARIMA, Frequency: Monthly), SARIMA Config (Order (p, d, q): 1, 1, 1; Seasonal Order (P, D, Q, S): 1, 1, 1, 12), Prophet Config, and LSTM Config.
- Forecasting Dashboard**: SARIMA Model Recommended. 31 item groups - 12 period forecast. Key metrics: Total Quantity (2,043), Total Revenue (\$319,705.55), Avg Quantity (4.3), Time-Series Points (266).
- Historical Data**: A line chart showing actual sales data from Oct 2023 to Dec 2024.
- SARIMA Forecast Results**: A line chart showing SARIMA forecasts for the same period, with a shaded area representing 80% and 95% confidence intervals.
- Model Performance Metrics**: SARIMA results:
 - MAE: 94.04
 - MSE: 11593.36
 - RMSE: 107.67
 - AIC: 356
 - BIC: 359Model Configuration: Order (p,d,q): (0, 1, 0); Seasonal Order: (0, 1, 1, 12).

CONCLUSION

The forecasting workflow can be scaled across all SKUs—improving accuracy as more data accumulate—while automated alerts for significant deviations will further enhance operational agility. Together, these results demonstrate a clear path toward a robust, data-driven system that significantly improves Trimlite's supply-chain efficiency.



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