Use Case: AI-Powered Demand Forecasting for Water Heater Manufacturer

Client

A prominent consumer goods manufacturer specializing in water heaters, catering to both residential and commercial markets worldwide. The company offers a diverse range of water heater models tailored to different geographic regions.

Business Problem

The client faced challenges in accurately forecasting the demand for their water heater models across various sizes and capacities. Relying on a rule-based sales forecasting model in Excel yielded an average demand forecasting accuracy of 50-60%. To enhance accuracy and address regional biases, the client sought a machine learning-based solution. Accurate forecasting was crucial for optimizing production, distribution, and inventory management.

Solution

To address the client's demand forecasting challenges, we introduced an AI-powered Forecasting platform. Leveraging historical sales data spanning three years, captured at a daily granularity for each model and region, we devised an approach to improve forecasting accuracy over a 4-month horizon.

- **Data Pre-processing:** We thoroughly assessed the historical sales data, categorizing water heater models into A, B, and C categories based on monthly sales patterns. Missing values were handled, and the data was checked for outliers.

- **Data Transformation:** Employing the Dickey-Fuller test, we identified and managed non-stationarity in the data. Trends and seasonality were addressed, and the data was made stationary, forming a solid foundation for modelling.

- **Algorithmic Exploration:** A suite of time series algorithms, including ARIMA, Holt-Winters, XgBoost, and LSTM, was applied to the treated data.

- **Accurate Forecasting:** The Holt-Winters algorithm exhibited exceptional accuracy, achieving over 90% demand forecasting accuracy for A Category Water Heaters. For B and C categories, XgBoost yielded forecasting accuracy ranging from 75-85%.

- **Forecasting Platform:** A comprehensive web-based Forecasting platform was developed to empower the client in predicting water heater sales accurately by model and region. The

platform facilitated periodic retraining of forecasting models, driving ongoing accuracy enhancement.

Outcome

The implementation of the AI-powered Demand Forecasting Platform delivered transformative results for the client:

- **Enhanced Planning:** Accurate demand forecasting empowered the client to strategize production and distribution more effectively. The platform allowed them to align production with actual demand, minimizing resource wastage.
- **Cost Savings:** By mitigating overproduction and streamlining inventory management, the client achieved substantial cost savings. The reduction in unnecessary inventory accumulation led to better financial efficiency.
- **Operational Efficiency:** The AI-powered platform streamlined the decision-making process, ensuring optimal allocation of resources based on data-driven insights.

Conclusion

Through the collaboration with our AI-driven forecasting solution, the water heater manufacturer was able to overcome historical forecasting challenges. Accurate demand predictions catalysed efficient production, reduced costs, and improved overall operational effectiveness, solidifying the company's position as a leader in the consumer goods industry.