

Week12_Assignment12_2_LalitNayyar

July 1, 2025

1 Week 12: Required Assignment 12.2

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University: IIMK – Professional Certificate in Data Science and Artificial Intelligence for Managers

1.1 Assignment Overview

You are a consultant advising retail companies on optimizing their operations based on historical sales data. This assignment focuses on using time series forecasting concepts to extract actionable insights without coding. It will test your ability to apply strategic thinking to time series data, leveraging its components (trend, seasonality, cycles, and irregularities) to drive business decisions.

Dataset Reference: [Retail Sales Data](#)

1.2 1. Addressing a Consistent Downward Trend in Sales

A persistent downward trend in sales for a specific product category signals underlying issues that require immediate and strategic intervention.

Strategic Recommendations:

1. **Product Portfolio Review & Innovation:** Analyze whether the decline is due to changing customer preferences, market saturation, or increased competition. For example, if sales in a fashion category are dropping, survey customers to understand evolving tastes and consider introducing new styles or variants.
 2. **Pricing and Promotion Strategy:** Evaluate pricing relative to competitors. Implement targeted promotions, discounts, or loyalty programs to stimulate demand. For instance, bundle slow-moving products with popular ones or offer limited-time discounts to clear inventory.
 3. **Channel Optimization and Customer Engagement:** Assess the effectiveness of sales channels (online/offline). If digital engagement is low, invest in digital marketing and e-commerce enhancements. Use personalized marketing campaigns based on historical purchase data to re-engage lapsed customers.
 4. **Inventory Rationalization:** Adjust procurement and inventory levels to minimize overstock risk and markdown losses.
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1.3 2. Preparing for December Sales Spike (Seasonality)

Seasonal spikes, such as a significant increase in December sales, present both opportunities and challenges.

Recommended Strategies:

1. **Inventory Planning:** Use historical data to forecast demand and ensure optimal stock levels for high-demand products. For example, if electronics sales triple in December, pre-order sufficient inventory by October/November.
 2. **Staffing Optimization:** Increase temporary staffing during peak periods to maintain high service quality and manage increased footfall or order volumes. Cross-train staff for flexibility.
 3. **Targeted Marketing Campaigns:** Launch holiday-themed campaigns in late November, using social media, email, and in-store promotions. Highlight limited-time offers, gift bundles, and exclusive products.
 4. **Logistics and Supply Chain Readiness:** Coordinate with logistics partners for timely deliveries and returns. Prepare contingency plans for disruptions.
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1.4 3. Evaluation of Facebook Prophet for Forecasting

a. Suitability Based on Data Characteristics

Facebook Prophet is designed for time series data with strong trend and seasonality components, and it handles missing data and outliers well. Given the dataset exhibits clear trends (downward in some categories) and pronounced seasonality (December spike), Prophet is highly suitable.

b. Business Value

Prophet’s intuitive interface and automation reduce dependency on specialized data science resources, empowering business analysts to generate reliable forecasts quickly. This supports proactive inventory, staffing, and marketing decisions.

c. Limitations and Considerations

While Prophet manages trend and seasonality well, it may not fully capture complex, non-linear relationships or sudden market shifts (e.g., due to external shocks). For categories with high irregularities, supplement Prophet forecasts with expert judgment or ensemble approaches.

d. Recommendation

Investing in Facebook Prophet is recommended, as its strengths align with the dataset’s characteristics and the company’s need for actionable, timely forecasts. Periodic validation and continuous model refinement are essential.

1.5 Conclusion

By leveraging time series insights—addressing downward trends with targeted interventions, preparing for seasonal spikes, and adopting advanced forecasting tools like Facebook Prophet—retailers can make data-driven decisions that enhance competitiveness and operational efficiency.

Note: - This notebook is structured to provide strategic, business-focused responses as per assignment requirements. - If data analysis or code is required in future, code cells and visualizations can be added.