REPORT

Riya Aggarwal(24N0452)

1. Technical Overview

- **Demand Forecasting**: Using past demand data, we applied a **SARIMAX** (Seasonal Autoregressive Integrated Moving Average) model to predict future demand. The model parameters were determined by analyzing the differenced time series and examining Autocorrelation (ACF) and Partial Autocorrelation (PACF) plots to select appropriate AR, MA, and seasonal components. A 10-day forecast was generated to estimate short-term demand.
- **Inventory Management**: Using **Object-Oriented Programming** (OOP), we developed an Inventory Management class to calculate key inventory metrics based on the forecasted demand.
  - **Optimal Order Quantity**: This metric determines the optimal order quantity to minimize holding costs and reduce the risk of stockouts while maintaining the desired service level.
  - **Reorder Point**: The reorder point is the inventory level at which a new order should be placed to avoid stockouts.
  - **Safety Stock**: This is the extra inventory kept on hand to safeguard against unexpected fluctuations in demand or supply chain delays.
  - **Total Cost**: The total cost combines inventory holding costs and stockout costs, aiming to minimize the overall expenses.

2. Use of AI Tools

- We have used ChatGPT to assist in building the OOP class for inventory management.

3. Future Explorations

- We could integrate this system with real-time inventory data, allowing it to automatically adjust reorder points and order quantities as stock levels fluctuate.
- The system could be expanded to forecast customer preferences or trends, helping businesses stock more of the products that are most likely to be in demand.