Time Series Sales Forecasting Report

Dataset

Dataset: Perrin Freres Monthly Champagne Sales (Millions)

Source: Kaggle - Monthly Champagne Sales Data

Objective

The goal of this project is to develop a reliable time series forecasting model for monthly champagne sales using the ARIMA framework. The model aims to understand historical sales patterns and predict future values to support strategic inventory and business decisions.

Methodology

1. Visualizing the Time Series

The dataset consists of monthly champagne sales spanning multiple years. An initial line plot was used to visualize the raw time series data, revealing clear upward trends and seasonal fluctuations, indicating the presence of both trend and seasonality components.

2. Making the Time Series Stationary

To apply time series models effectively, the data was transformed into a stationary format. This involved using differencing techniques to remove trends and stabilize the variance over time. The Augmented Dickey-Fuller test confirmed stationarity post-transformation.

3. Plotting ACF and PACF

Autocorrelation (ACF) and Partial Autocorrelation (PACF) plots were analyzed to determine the optimal parameters for the ARIMA model. These plots helped in identifying the number of lags to be included in the autoregressive and moving average components.

4. Constructing the ARIMA Model

An ARIMA model was constructed using the selected parameters derived from the ACF/PACF plots. The model was trained on the stationary time series and evaluated using summary statistics and diagnostic plots to ensure the residuals were white noise.

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5. Making Predictions

Using the trained ARIMA model, future sales values were forecasted. The predictions aligned well with the observed seasonal patterns and provided a strong basis for future sales planning.