

Task 6: Forecasting Future Sales (Time Series Analysis)

Internship at Nexus AI Digital — Data Science & Machine Learning

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Objective:

The purpose of this task was to forecast sales for the next 30 days so that GlobalMart can make better inventory and supply chain decisions. Forecasting helps the business avoid overstocking and stockouts by estimating demand in advance.

Steps Followed:

1. Data Preparation:

- Loaded the Superstore Sales dataset (`train.csv`).
- Converted the "`Order Date`" column into a proper datetime format.
- Aggregated sales values per day.
- Filled missing days using forward fill to ensure continuous daily data.

2. Stationarity Check:

- Applied the Augmented Dickey-Fuller (ADF) Test.
- If the p-value > 0.05 , the data was considered non-stationary. In that case, differencing was applied to stabilize the series.

3. Model Training (SARIMA):

- Selected SARIMA (1,1,1)(1,1,1,7) model to capture both trend and weekly seasonality.
- Trained the model on the historical daily sales data.

4. Forecasting:

- Generated a 30-day forecast beyond the dataset.
- Constructed confidence intervals to account for uncertainty in predictions.

5. Visualization:

- Plotted:

- Historical Sales (blue line)
- Forecasted Sales for 30 days (red line)
- Confidence Interval (shaded region around forecast)

Results:

- The SARIMA model successfully captured weekly sales patterns.
- The 30-day forecast shows a realistic continuation of sales trends, with slight fluctuations.
- The shaded confidence interval indicates the possible range of values, giving GlobalMart a sense of uncertainty.

Key Insights:

- The sales data has clear weekly seasonality, which was modeled using SARIMA.
- Forecasting allows GlobalMart to:
 - Anticipate inventory needs.
 - Reduce stockouts (lost sales).
 - Avoid overstocking (extra holding cost).

Takeaway:

By using time series forecasting, businesses can make data-driven inventory decisions. This improves efficiency, reduces costs, and ensures products are available when customers need them.