Project Name – Demand Forecasting for E-Commerce

Week 1 Deliverables

Hypothesis List –

1. **Stationarity:** The time series data for sales, Google clicks, and Facebook impressions is stationary (i.e., mean and variance do not change over time)

   Interpretation:

   In ADF test, ADF Statistic for Quantity: -4.445

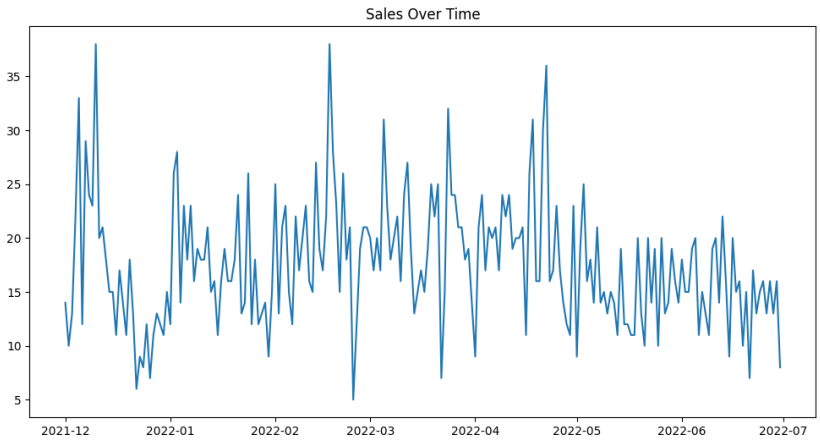
   p-value: 0.00024

   Sales quantity data is stationary.

The p-value is less than 0.05, indicating that the sales quantity data is stationary.

2. **Trend:** There is a significant upward or downward trend in the sales data over time. This could indicate a growing or declining market.

Interpretation:



Initially, the trend is relatively low, increases to a peak, and then decreases again. This indicates that there is an overall trend in the sales data that changes over time.

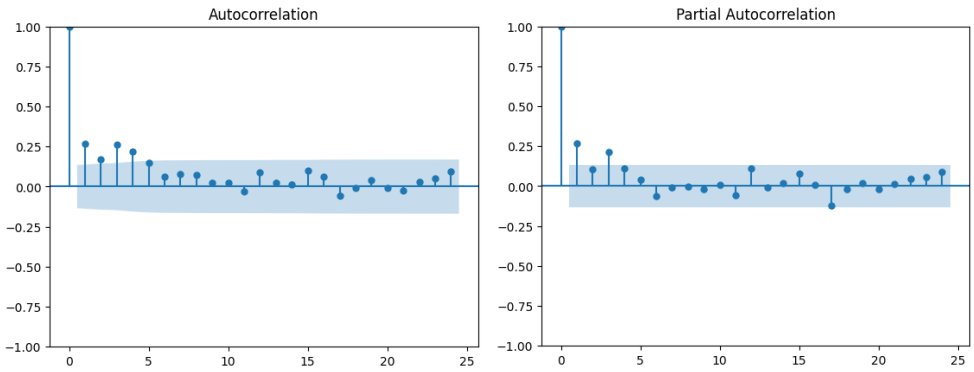
3. **Seasonality:** The sales data exhibits seasonality (e.g., weekly, monthly, or yearly patterns). This is common in retail data due to holidays, promotions, and other recurring events.

   Interpretation:

   From above plot, there seem to be recurring patterns or cycles in the sales data, which might indicate seasonality.

4. **Autocorrelation:** There is a significant correlation between past and future values of sales, clicks, or impressions. This can be used to build autoregressive models (ARIMA).

   Interpretation:



   Significant spikes in the ACF and PACF plots indicate the presence of autocorrelation, suggesting that past values influence future values.

5. **Google Clicks Effect:** An increase in Google clicks is associated with an increase in sales. This tests the effectiveness of online advertising.

   Interpretation:

   In Correlation Analysis, Correlation between Sales and Google Clicks: 0.37

   A positive correlation of 0.37 suggests a moderate relationship between Google clicks and sales.

6. **Facebook Impressions Effect:** An increase in Facebook impressions is associated with an increase in sales. This tests the impact of social media marketing.

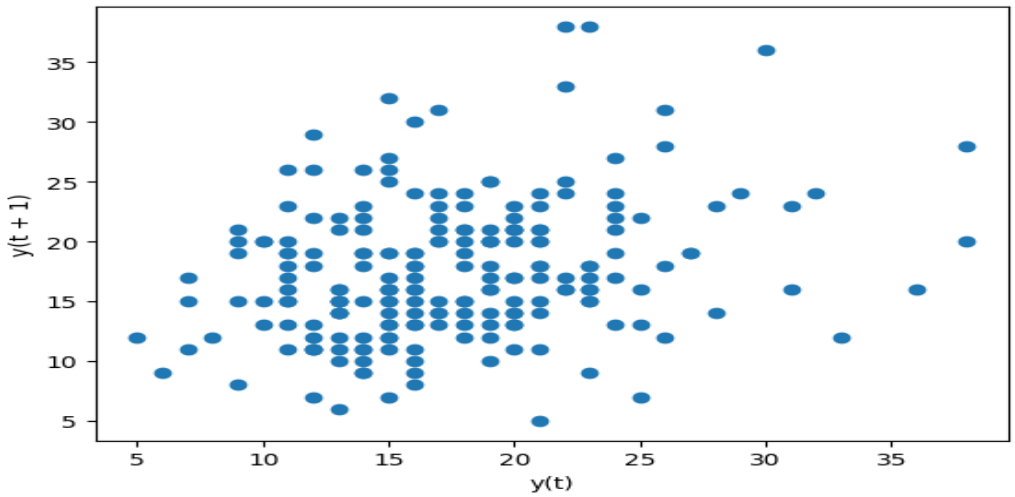
   Interpretation:

   Correlation between Sales and Facebook Impressions: 0.13

   A positive correlation of 0.13 suggests a moderate relationship between Facebook impressions and sales.

7. **Lagged Effects:** Past values of sales, clicks, or impressions have a significant impact on current sales. This could indicate a delayed response to marketing efforts or a carryover effect from previous periods.

Interpretation:



Lagged Correlation between Sales and Google Clicks: 0.35

Lagged Correlation between Sales and Facebook Impressions: 0.13

Positive lagged correlations suggest that past values of Google clicks and Facebook impressions have a delayed impact on sales.