

Report on Seasonal Decomposition Feasibility

Objective:

To determine the feasibility of applying seasonal decomposition across product categories in the Superstore Sales Dataset.

Summary of Findings:

We conducted stationarity tests (ADF and KPSS) on individual product sub-categories to assess the suitability of seasonal decomposition. The results revealed that many categories exhibit **non-stationary** characteristics, which conflict with the foundational assumption of seasonal decomposition that the time series should be stationary for effective separation of trend, seasonality, and residual components.

Implications of Non-Stationarity:

Attempting to force stationarity through differencing was considered; however, this approach would alter the trend component, potentially leading to unreliable and less interpretable results. Therefore, preserving the integrity of the original trend data takes precedence, and we've concluded that applying seasonal decomposition to this dataset would not yield accurate insights.

Decision:

Based on these findings, we will not proceed with seasonal decomposition. Instead, we will advance to machine learning methods to explore potential solutions, leveraging rapid beta testing of approaches to efficiently address our objectives.