

RETAIL-GIANT SALES FORECASTING TIME SERIES ANALYSIS – CASE STUDY

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Business Objective:

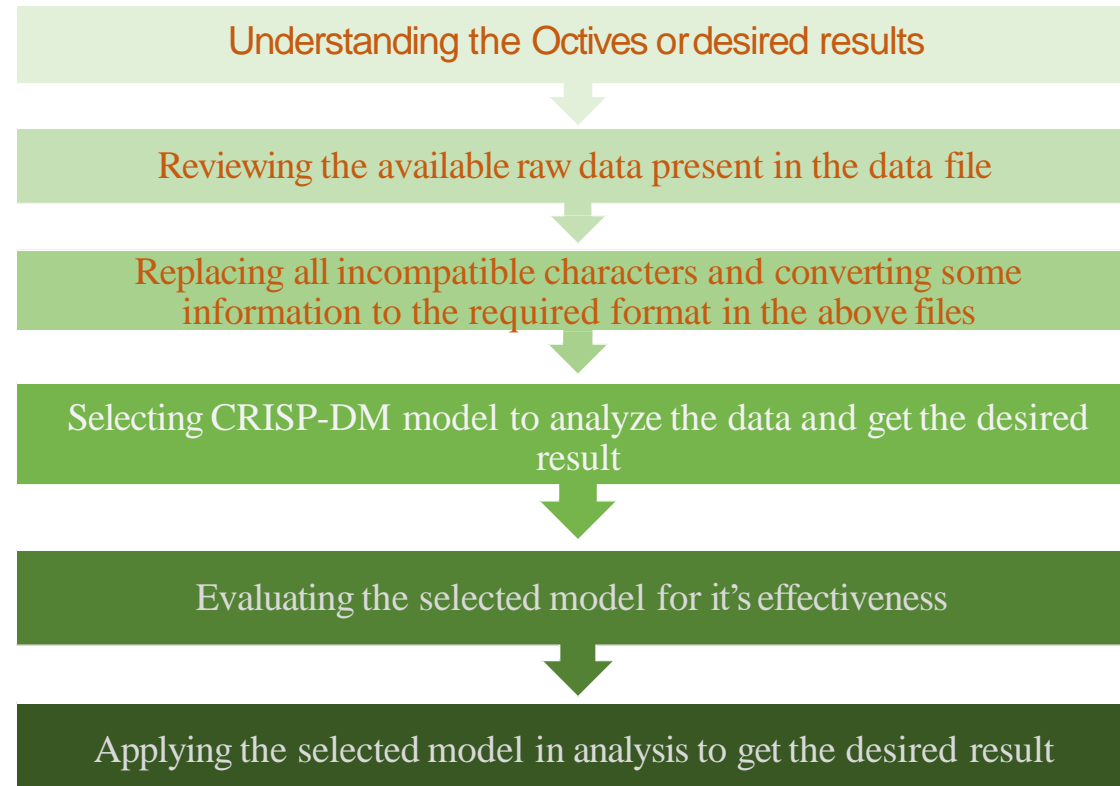
“Global Mart” is an online store super giant having worldwide operations. It takes orders and delivers across the globe and deals with all the major product categories - consumer, corporate & home office.

The Sales/ Operations manager’s objective is to finalize the plan for the next 6 months, that would help to manage the revenue and inventory accordingly.

Objectives:

- To forecast the sales and the demand for the next 6 months that would help you manage the revenue and inventory accordingly.
- Since the store caters to 7 different market segments and in 3 major categories, we have to subset the data into 21 (7×3) buckets before analyzing these data and find out 2 most profitable (and consistent) segments from these 21 buckets.
- Forecast the sales and demand for these 2 most profitable segments.

Problem Solving Methodology- CRISM-DM Framework

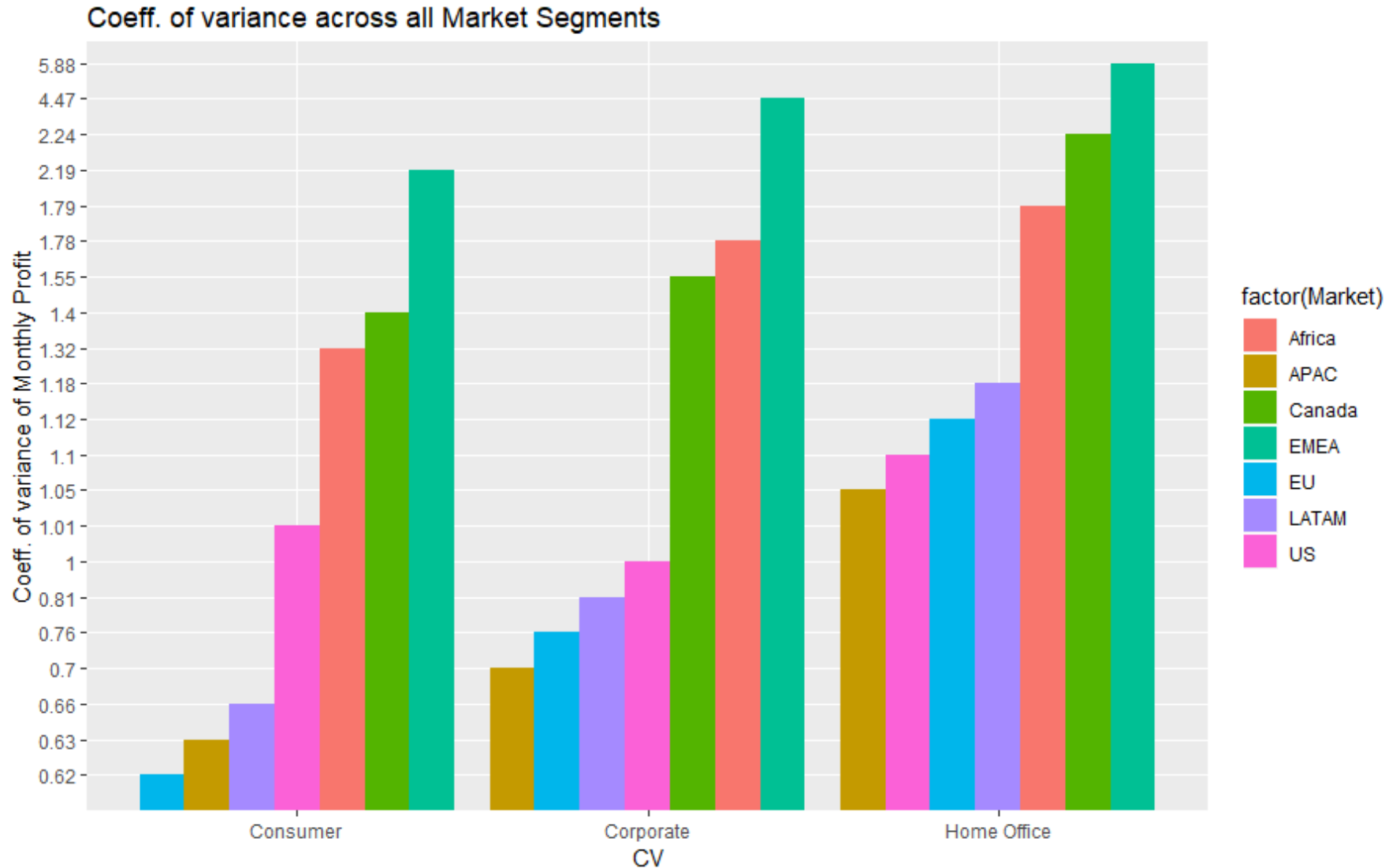


Data Analysis, Cleaning and Preparation:

Global Superstore Dataset:

- No. of sales datapoints : 51,290
- No. of attributes : 24
- Fields of Interest :
 - Market
 - Segment
 - Sales
 - Quantity
 - Profit
- Found NA values in Postal code but that attribute is not of our interest.
- Removed unnecessary columns and Formatted Order.Date as Date column and derived Month-Year attribute for analysis.

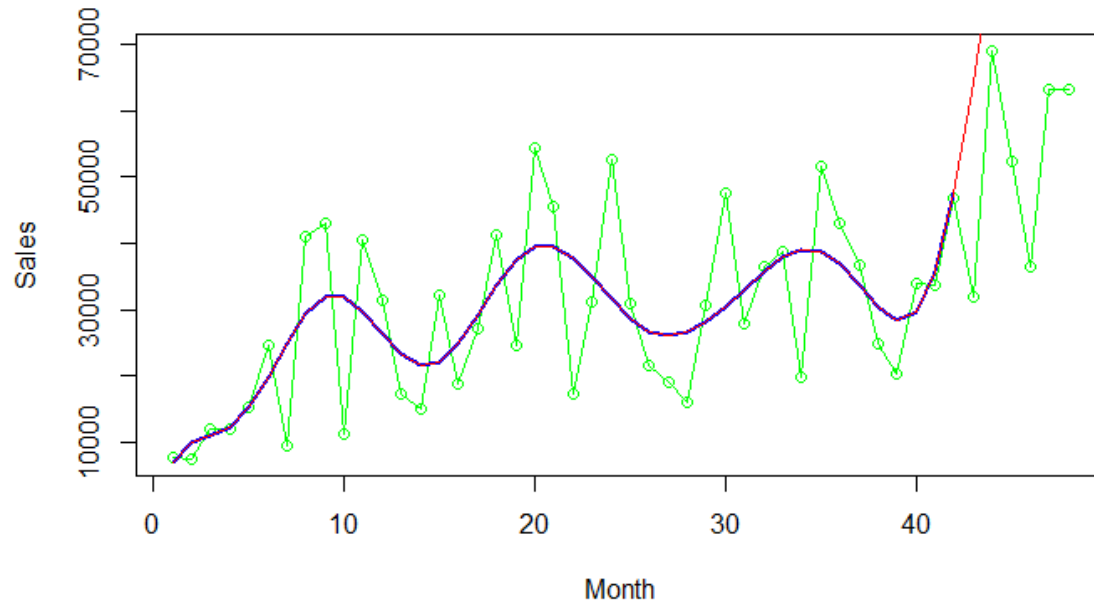
Calculating Coefficient of variation:



- Computed Coefficient of Variation (CV) based on the aggregated profit.
- The two Market Segments which have maximum and consistent Profit are
 - EU Consumer (0.624)
 - APAC Consumer (0.632)

EU CONSUMER SALES FORECASTING

EU Consumer Sales



Classical Decomposition

ARIMA(0,0,0) with zero mean

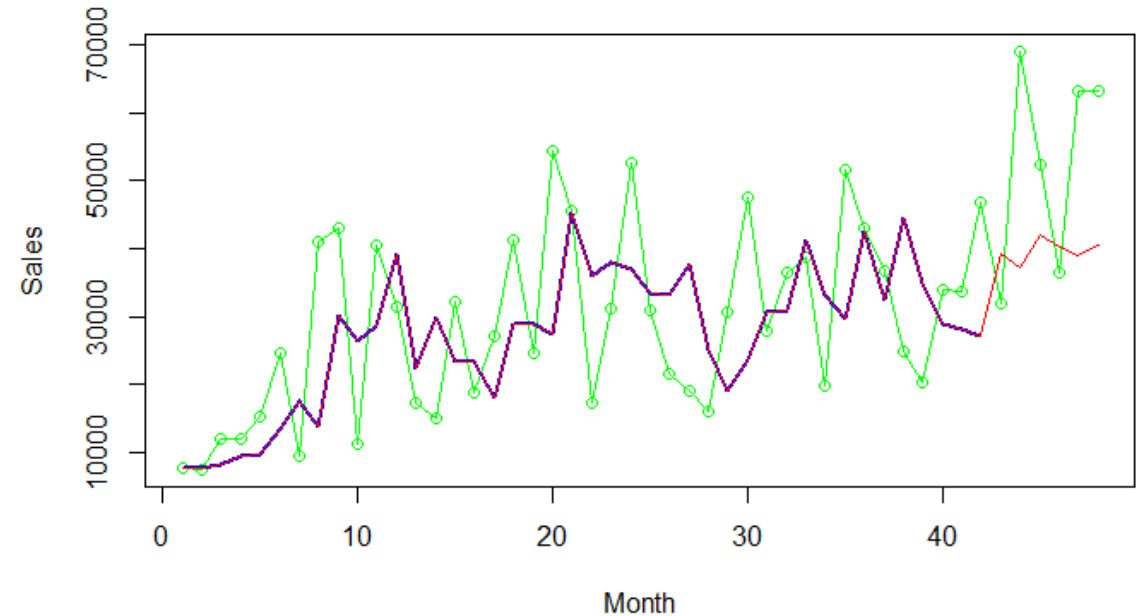
ADF Test: p-value = 0.01

KPSS Test: p-value = 0.1

AIC = 891.61

MAPE : 92.9578

EU Consumer Sales



Auto ARIMA

ARIMA(2,1,0)

ADF Test: p-value = 0.01

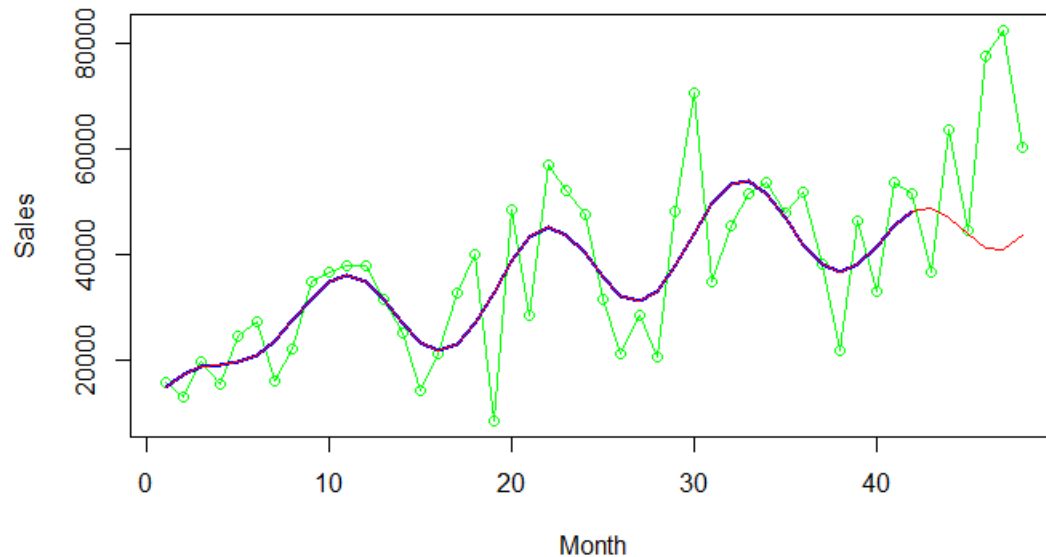
KPSS Test: p-value = 0.1

AIC = 897.67

MAPE : 28.9226

APAC CONSUMER SALES FORECASTING

APAC Consumer Sales



Classical Decomposition

ARIMA(0,0,0) with zero mean

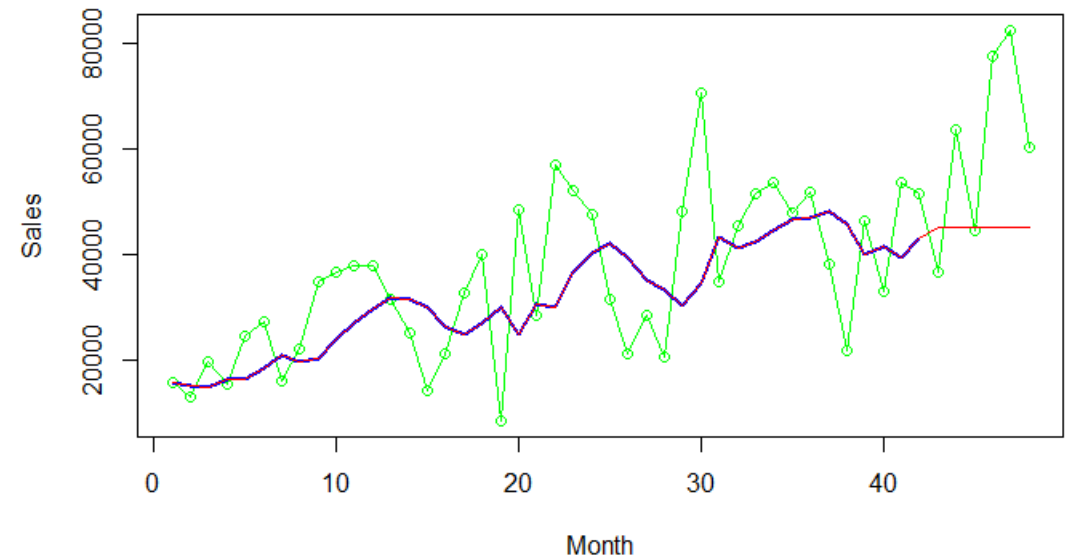
ADF Test: p-value = 0.01

KPSS Test: p-value = 0.1

AIC = 889.49

MAPE : 31.07429

APAC Consumer Sales



Auto ARIMA

ARIMA(0,1,1)

ADF Test: p-value = 0.01

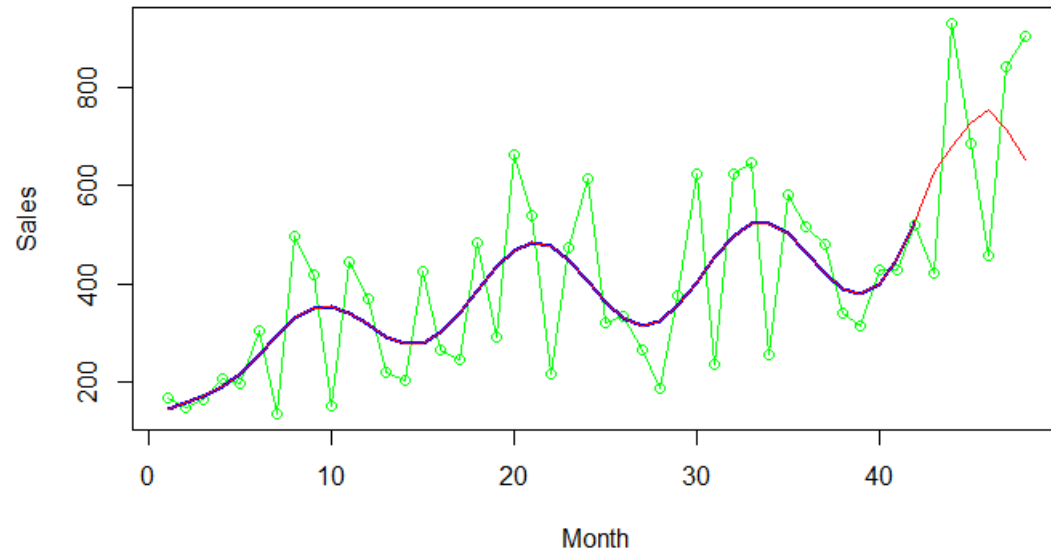
KPSS Test: p-value = 0.1

AIC = 898.23

MAPE : 27.68952

EU CONSUMER QUANTITY FORECASTING

EU Consumer Quantity



Classical Decomposition

ARIMA(2,0,0) with zero mean

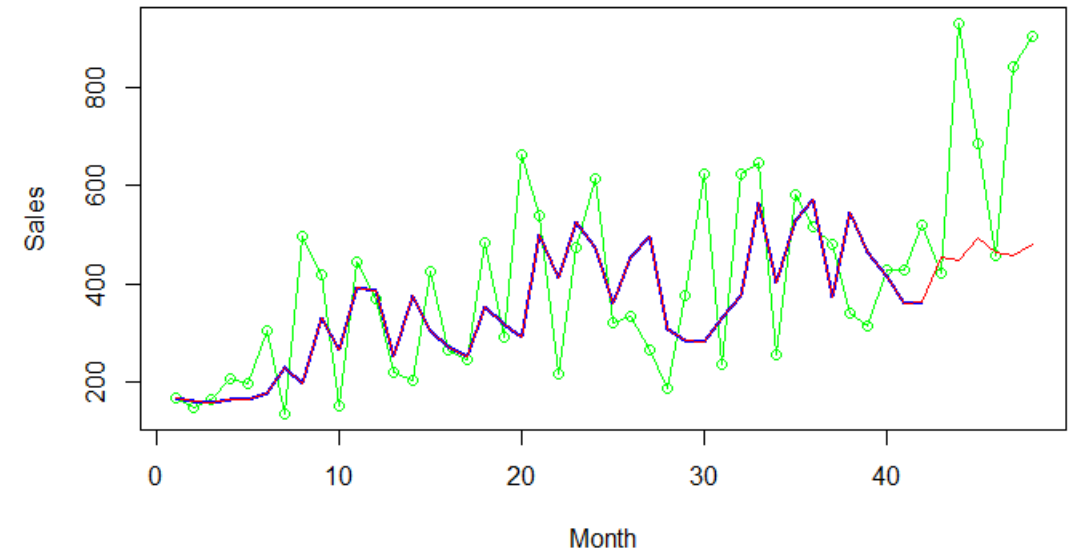
ADF Test: p-value = 0.01

KPSS Test: p-value = 0.1

AIC = 497.79

MAPE : 31.45475

EU Consumer Quantity



Auto ARIMA

ARIMA(2,1,0)

ADF Test: p-value = 0.01

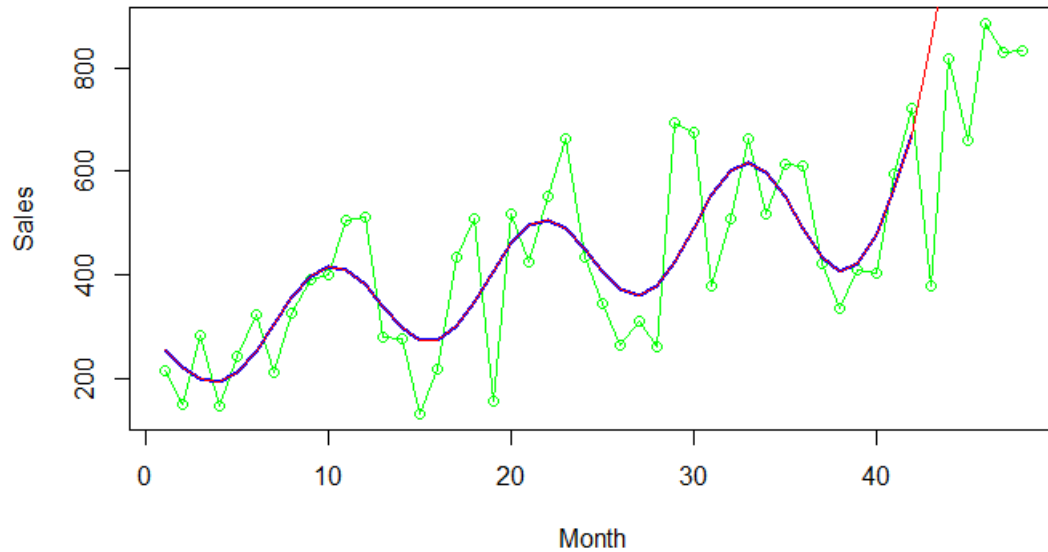
KPSS Test: p-value = 0.1

AIC = 529.8

MAPE : 30.13319

APAC CONSUMER QUANTITY FORECASTING

APAC Consumer Quantity



Classical Decomposition

ARIMA(0,0,0) with zero mean

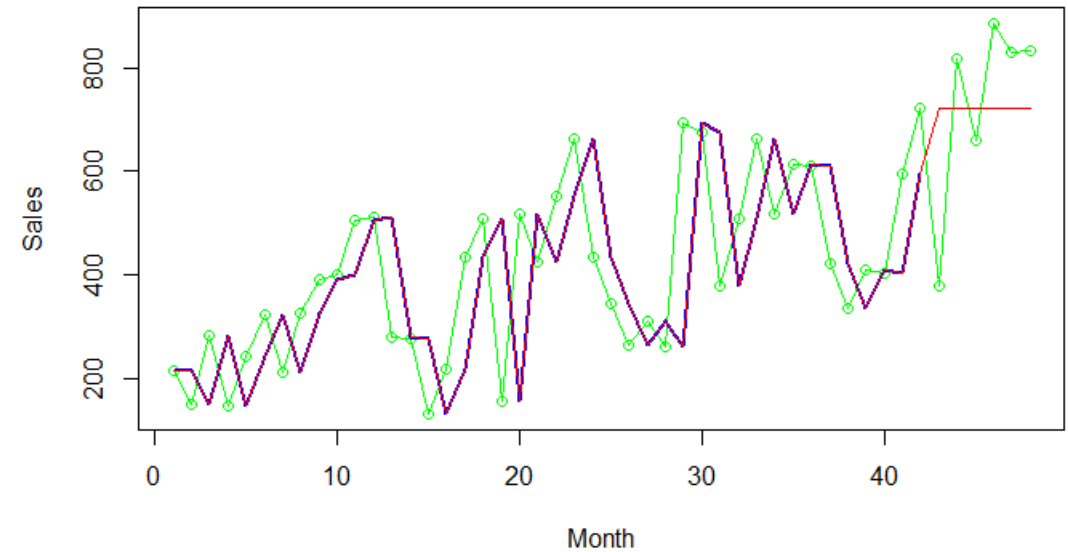
ADF Test: p-value = 0.01

KPSS Test: p-value = 0.1

AIC = 511.14

MAPE : 62.10289

APAC Consumer Quantity



Auto ARIMA

ARIMA(0,1,0)

ADF Test: p-value = 0.01

KPSS Test: p-value = 0.1

AIC = 534.14

MAPE : 26.24458

Conclusion

- The EU Consumer and APAC Consumer Market Segments are the two most consistently profitable segments.
- In all the predictions, Auto ARIMA performed better than classical decomposition method.
- MAPE values is low for all Auto ARIMA models and the residuals of all the segment predictions turned out to be white noise.

Business Implications:

- The Sales/Operations Manager can focus primarily on EU and APAC Consumer Segments to maintain profit.
- The predictions show that sales and quantity are both on the rise for the next 6 months and should be stable based on historical sales trend analysis.