TIME SERIES ANALYSIS CASE STUDY SUBMISSION

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ABSTRACT

Introduction:

- "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.

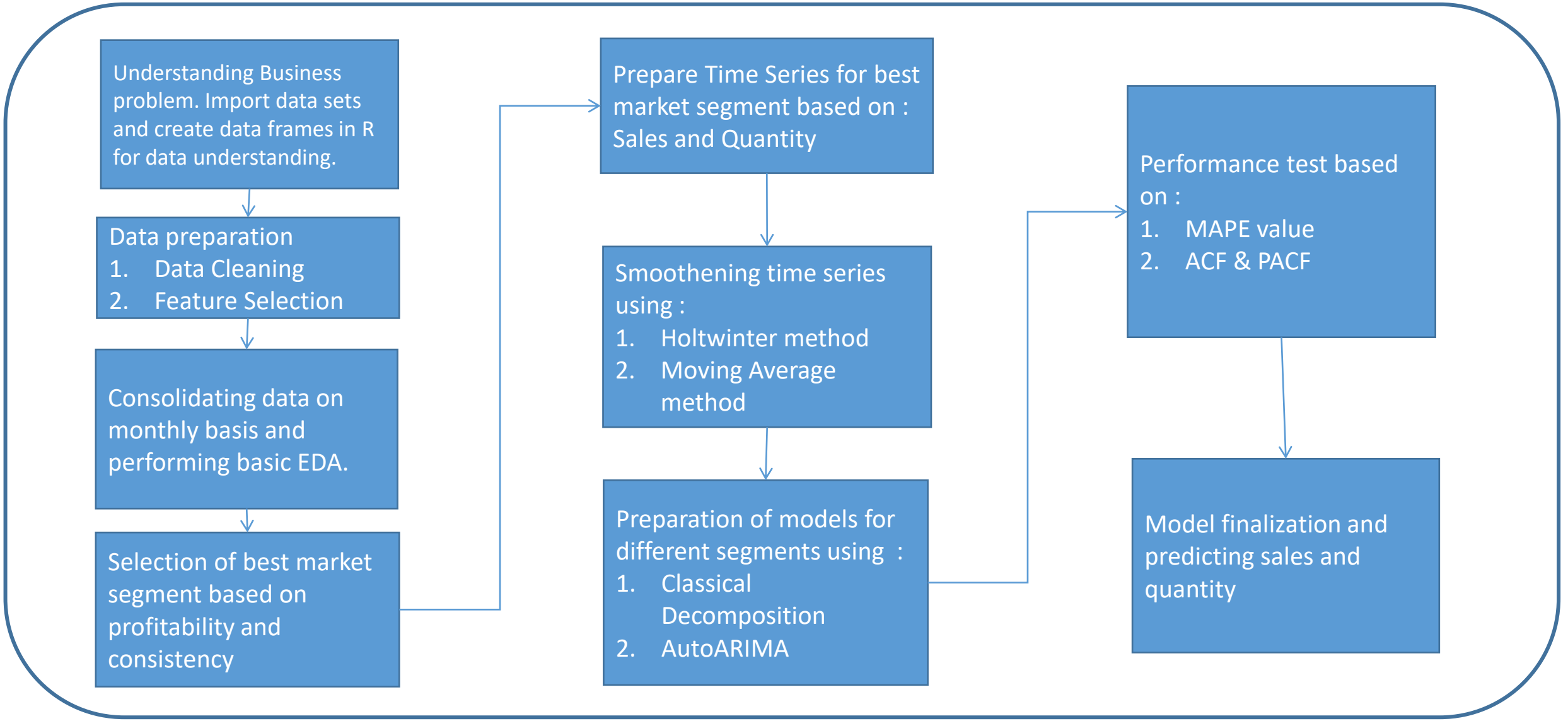
Objective:

To forecast the sales and the demand for the next 6 months, that would help to manage the revenue and inventory accordingly.

Approach:

- The store caters to 7 different market segments and in 3 major categories. Basic approach is to find out 2 most profitable (and consistent) segment from these 21 and forecast the sales and demand for these segments using EDA (Exploratory Data Analysis).
- Use Time series modeling such as smoothening , ACF & PACF, ARIMA and forecast next 6 months with the help of "Forecast" library

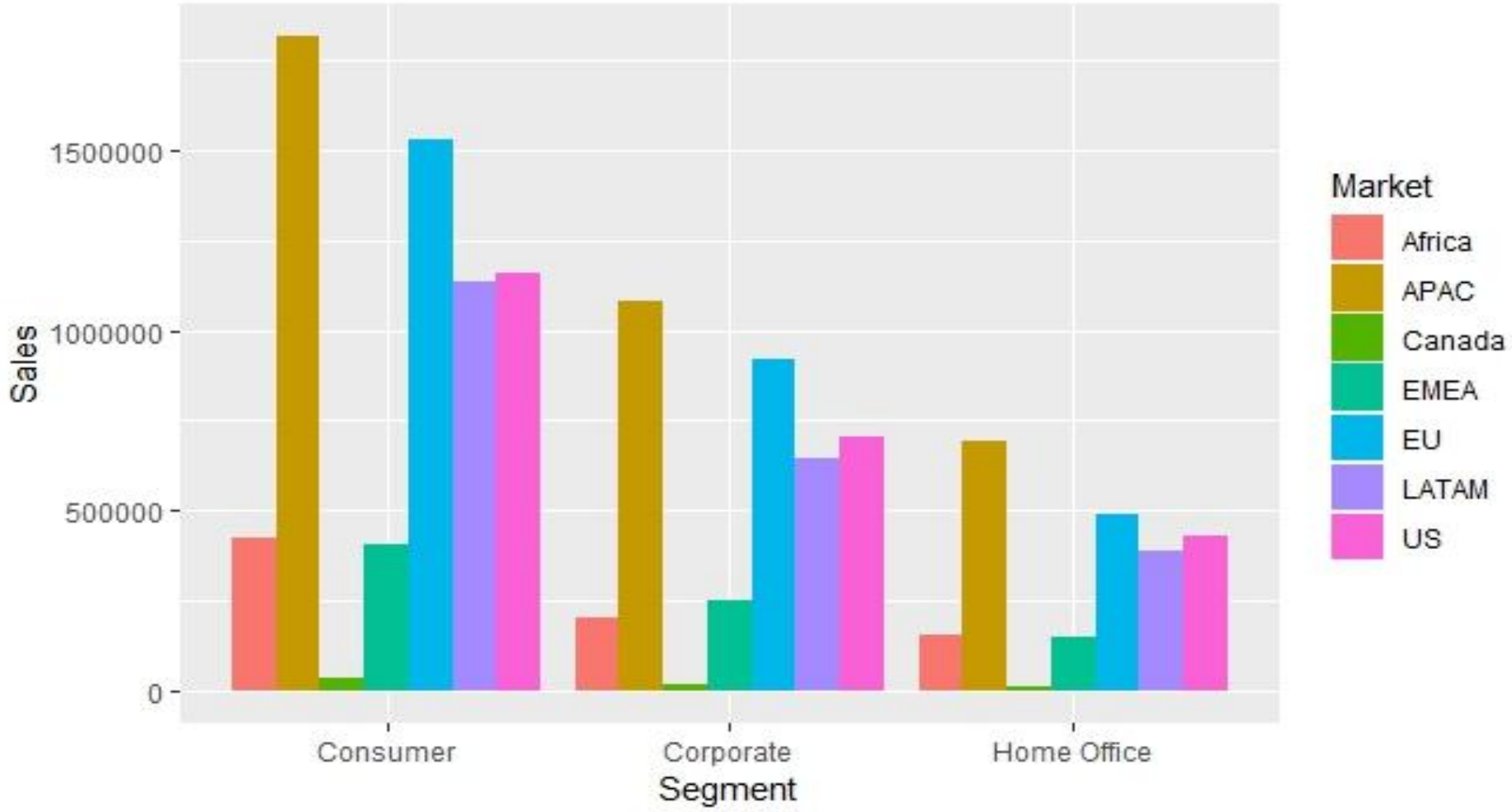
PROBLEM SOLVING METHODOLOGY



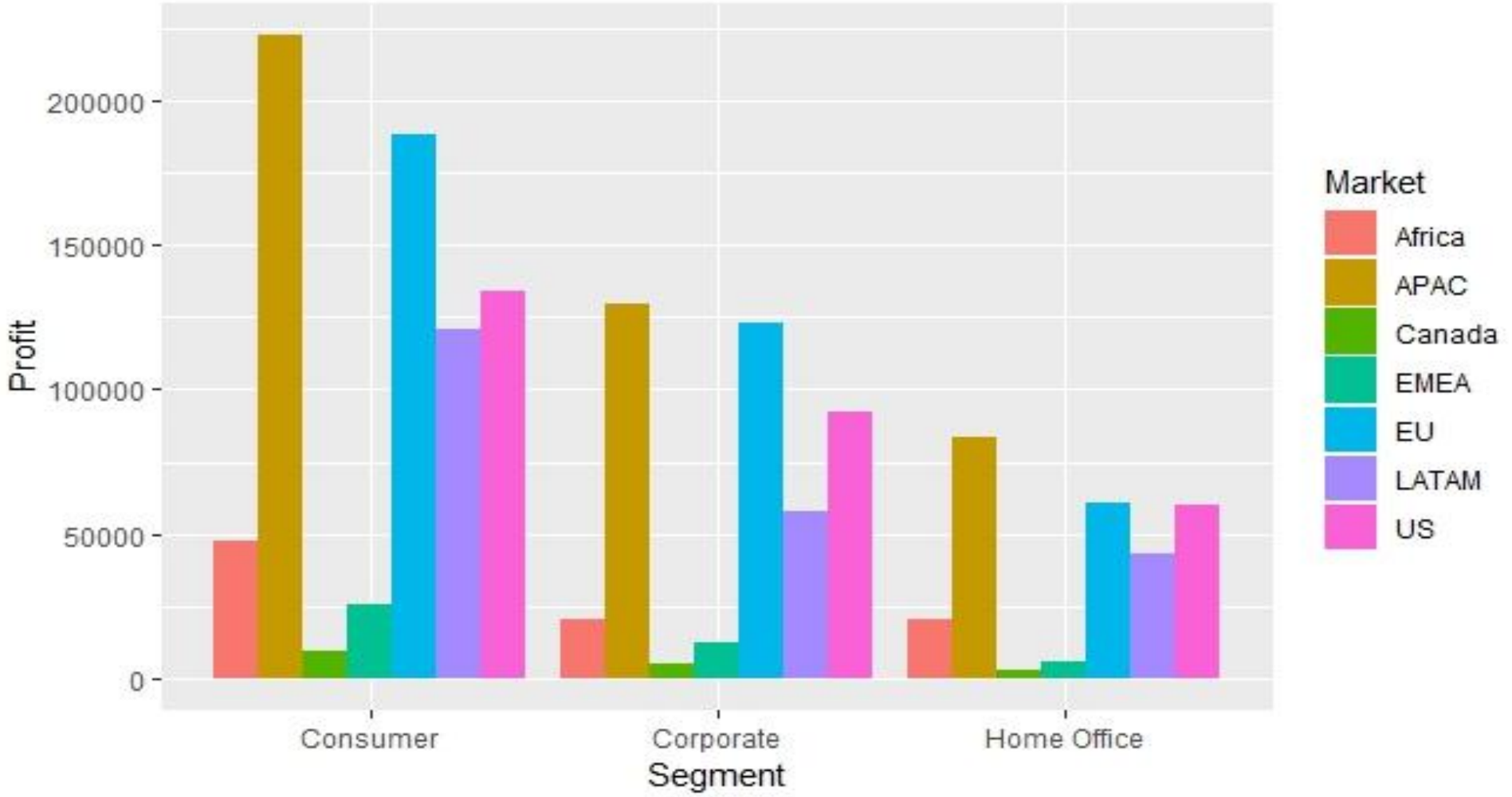
CLEANING DATA AND PERFORMING EDA

- Import data from the given data files in csv format files in R studio.
- Install and load necessary libraries required for analysis.
- Performing the EDA on the data and extracting the cleaned data.
- Performing univariate, bivariate analysis and plotting.
- Evaluating 2 most profitable segments.

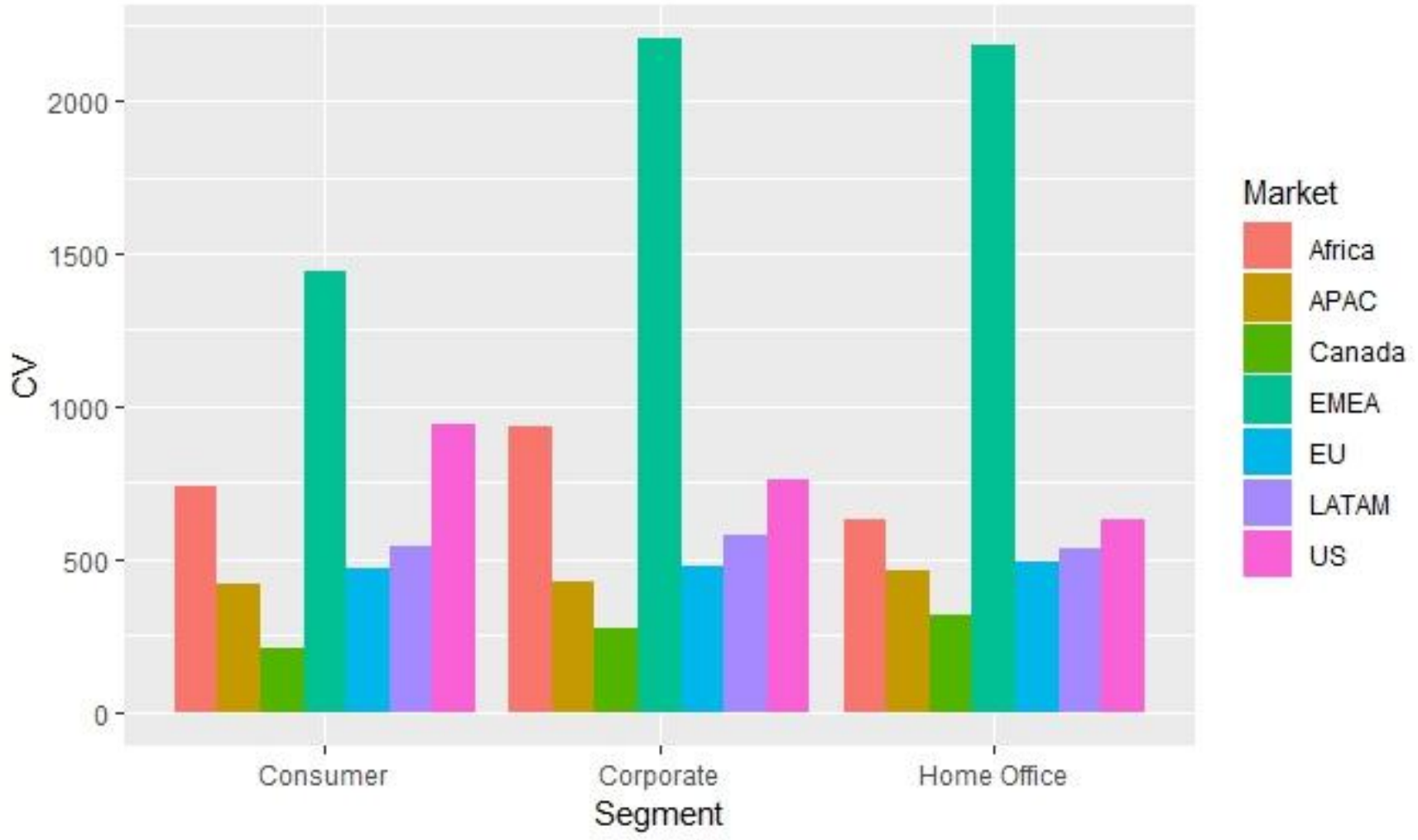
EDA – PLOTS-SEGMENT VS SALES



EDA – PLOTS-SEGMENT VS PROFIT



EDA – PLOTS-SEGMENT VS CV



OBSERVATIONS OF EDA

- No duplicate value in dataset
- Only one column :"Postal Code" which contains [41296] NA values.
- All orders are placed between 2011-01-01 to 2014-12-31
- Based on the graphs below are the findings :
  - Highest :
    1. SALES : Consumer sector - APAC
    2. Profit : Consumer sector - APAC
    3. CV : Consumer sector - Canada [Lowest value]
  - Second Highest :
    1. SALES : Consumer sector - EU
    2. PROFIT : Consumer sector - EU
    3. CV : Corporate sector – Canada

Based on the graphs plotted we arrive at the conclusion that 2 most profitable sector with respect to highest SALES & PROFIT and low CV value are :

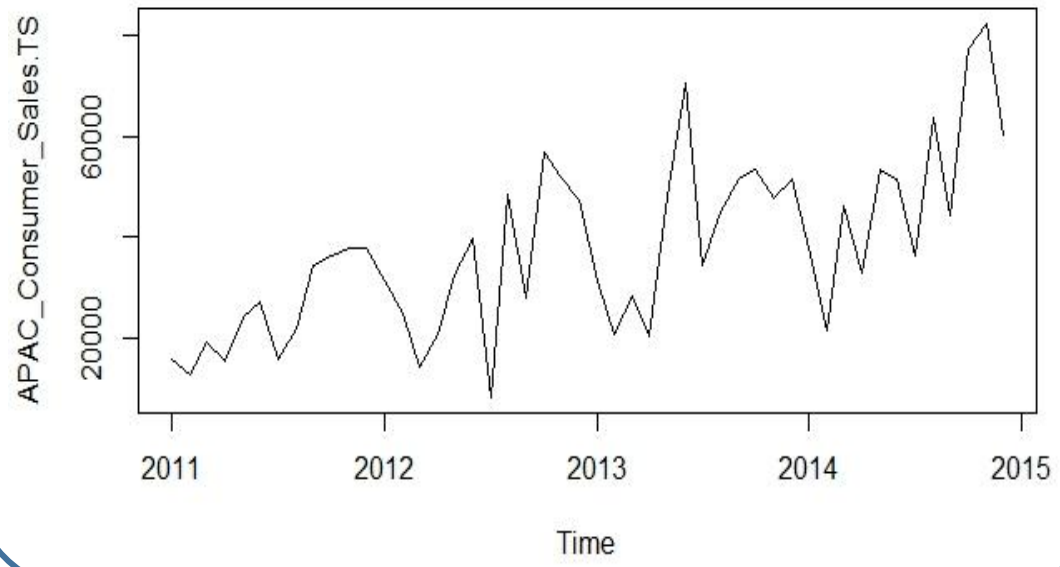
1. Consumer sector - APAC region
2. Consumer sector - EU region

MODEL OBSERVATIONS FOR APAC CONSUMER SALES

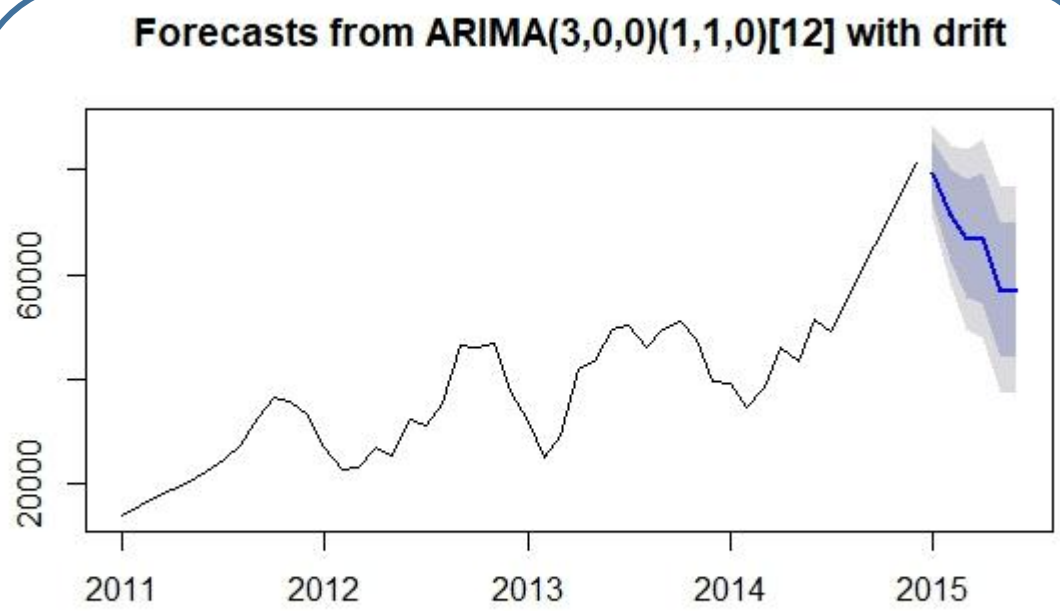
- MAPE for our linear model = 13.54141
- Values for Training and Test sets are as follows :
  MAPE :
  1. TRAINING = 5.52011
  2. TEST = 14.48387
- The forecast for APAC Consumer Sales for next 6 months is down trending.

PLOT : APAC CONSUMER SALES

APAC CONSUMER SALES DATA FREQUENCY



APAC CONSUMER SALES FORECASTED FREQUENCY

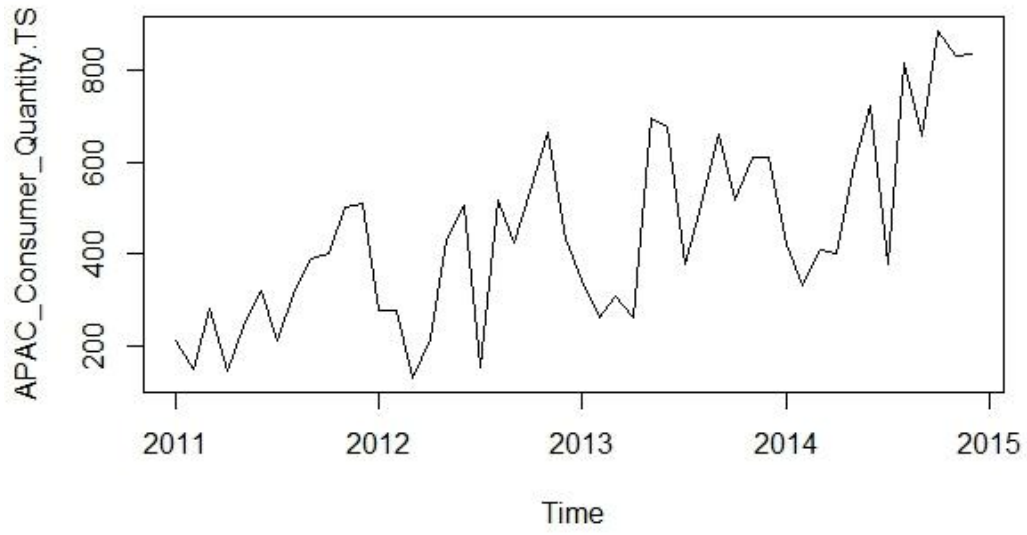


MODEL OBSERVATIONS FOR APAC CONSUMER QUANTITY

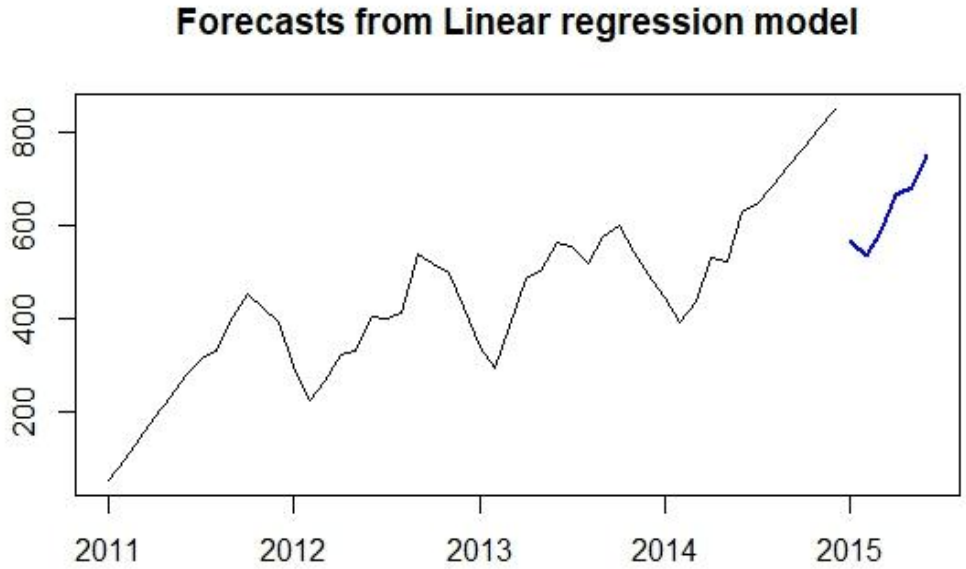
- MAPE for our linear model = 9.580049
- Values for Training and Test sets are as follows :
  MAPE :
  1. TRAINING = 4.8018
  2. TEST = 10.36941
- The forecast for APAC Consumer Quantity for next 6 months is Up trending.

PLOT : APAC CONSUMER QUANTITY

APAC CONSUMER QUANTITY DATA FREQUENCY



APAC CONSUMER QUANTITY FORECASTED FREQUENCY

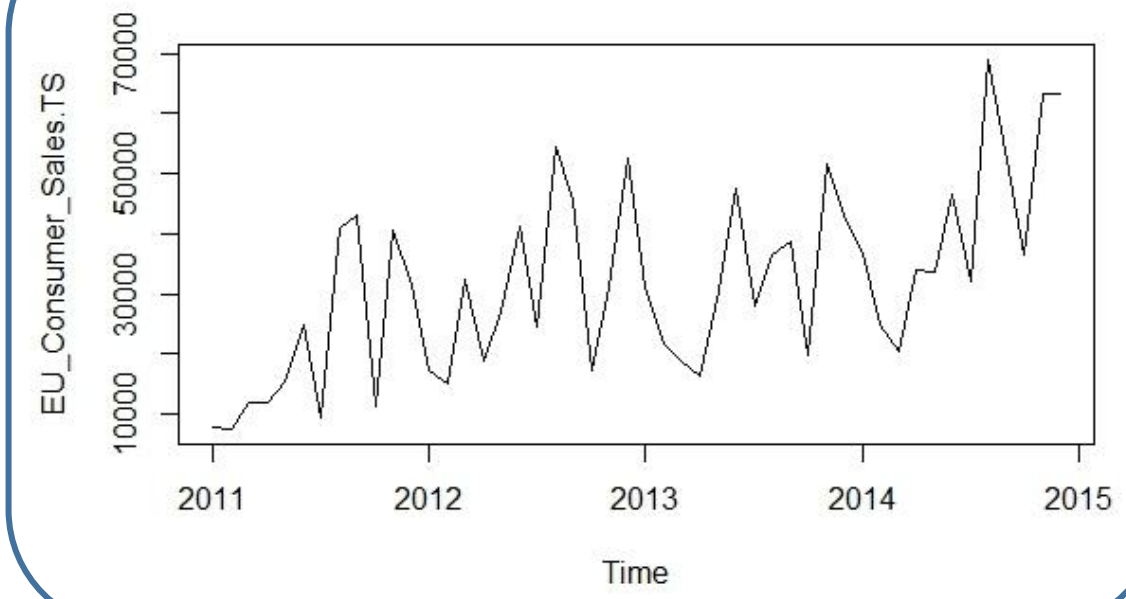


MODEL OBSERVATIONS FOR EU CONSUMER SALES

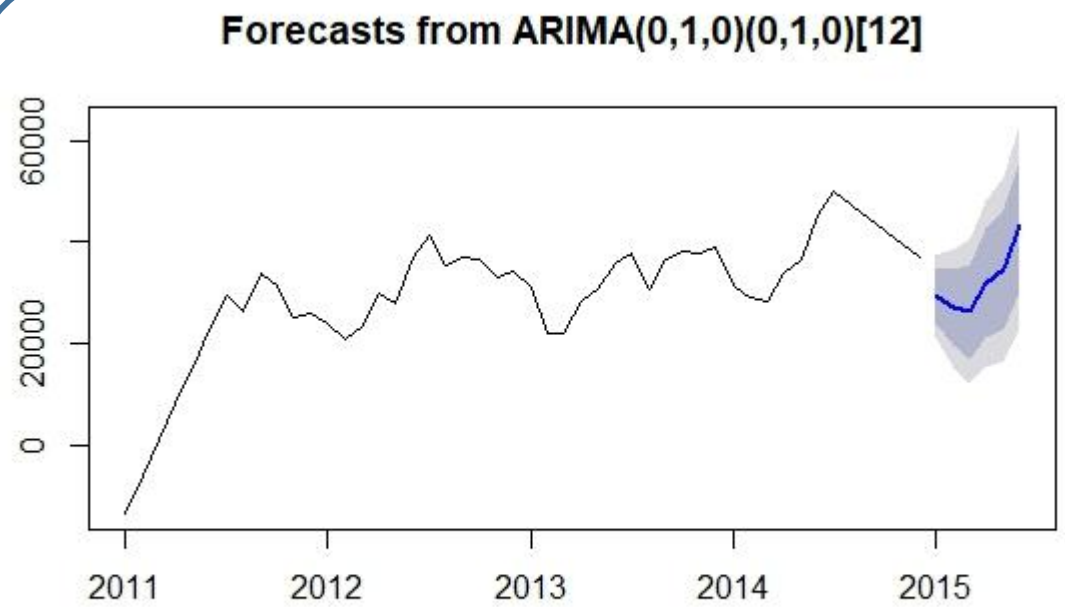
- MAPE for our linear model = 14.68292
- Values for Training and Test sets are as follows :
  MAPE :
  1. TRAINING = 6.867693
  2. TEST = 21.395597
- The forecast for EU Consumer Sales for next 6 months is Up trending.

PLOT : EU CONSUMER SALES

EU CONSUMER SALES DATA FREQUENCY



EU CONSUMER SALES FORECASTED FREQUENCY

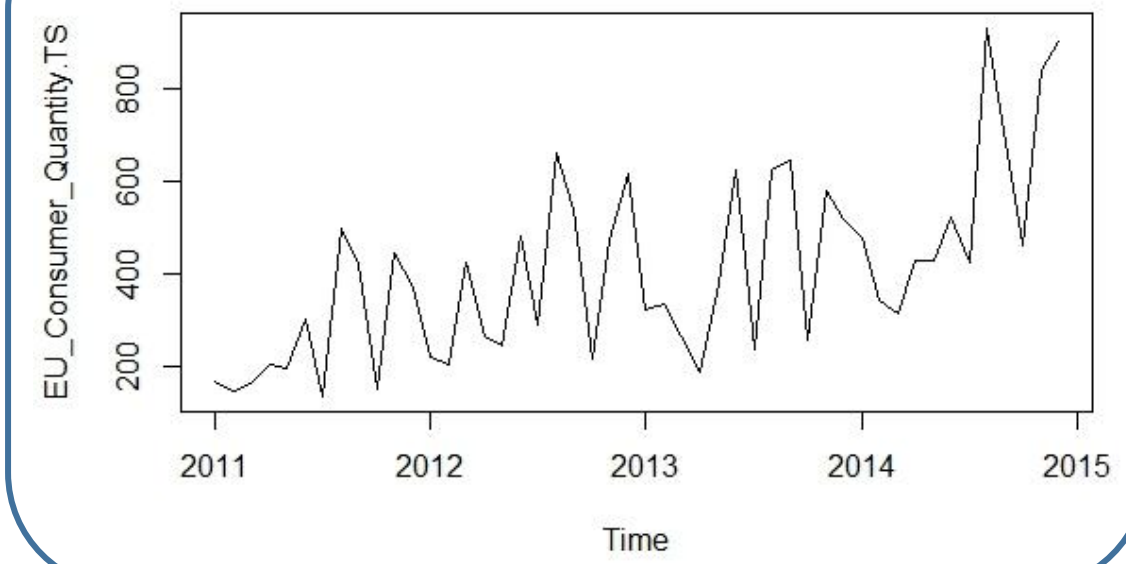


MODEL OBSERVATIONS FOR EU CONSUMER QUANTITY

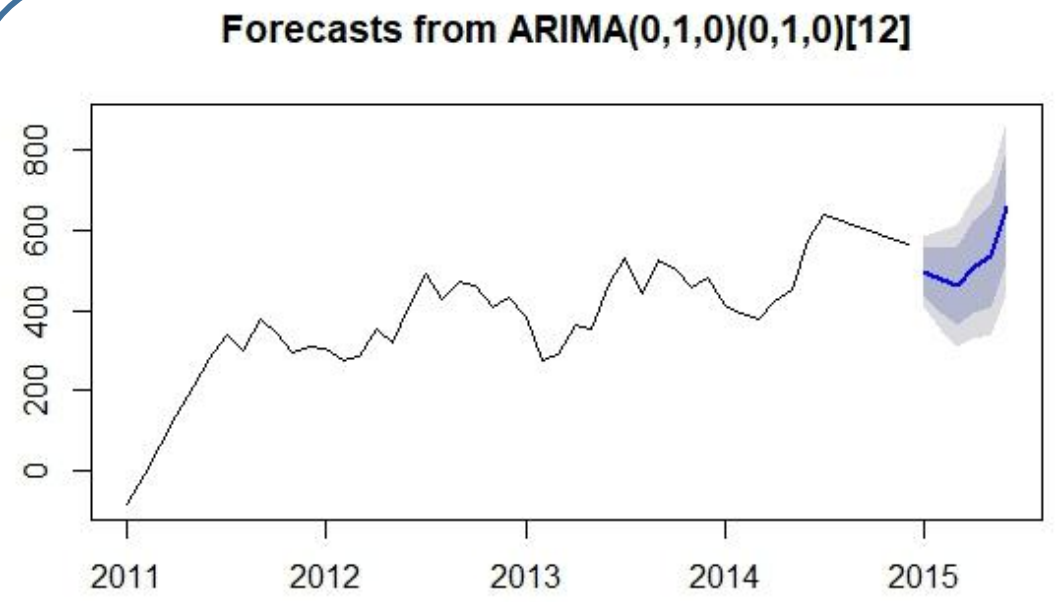
- MAPE for our linear model = 4.878414
- Values for Training and Test sets are as follows :
  MAPE :
  1. TRAINING = 5.928160
  2. TEST = 7.101892
- The forecast for EU Consumer Quantity for next 6 months is Up trending.

PLOT : EU CONSUMER QUANTITY

EU CONSUMER QUANTITY DATA FREQUENCY



EU CONSUMER QUANTITY FORECASTED FREQUENCY



CONCLUSION

- Based on the model forecasts for next 6 months sales and demand we can conclude as below :
  - APAC sales may face down trend
  - APAC demand may see preliminary down trend but the overall phase may become up trending.
  - EU sales may face a short phase of down trend but the overall phase may become up trending.
  - EU demand may face down trend for a short time period but the overall phase may become up trending.