

# Time Series Case Study

Group Name:

1. Surya Prakash Tripathi
2. Varun Ahalawat
3. Mukul Tamta
4. Bharath BS

“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.

## **Organization Structure:**

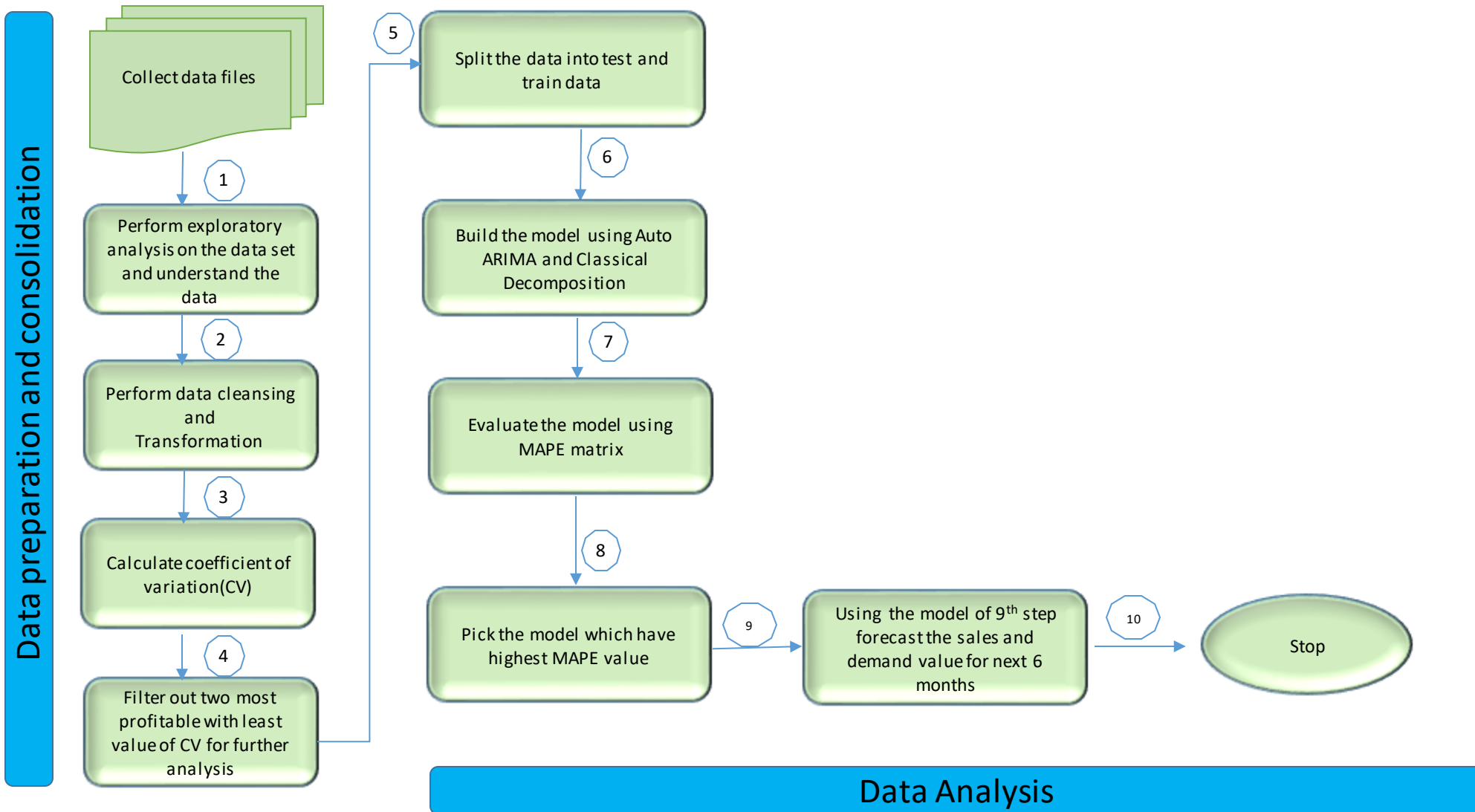
- Global Mart’s customer base is of 3 major segments-consumer, corporate and home office. GLOBAL MART deals with commodities from 3 major product categories- technology, furniture and office supplies.
- The store caters to 7 different market segments and in 3 major categories. As aim is to forecast at this granular level, so data can be subset into 21 (7\*3) buckets before analyzing these data.
- But not all of these 21 market buckets are important from the store’s point of view.

## **Goal:**

We need to find out 2 most profitable (and consistent) segment from these 21 and forecast the sales and demand for these segments.

Forecast the sales and the demand and for the next 6 months to manage the revenue and inventory accordingly.

# Decision Flow Chart



# Data Analysis

## Data Understanding

- The data currently has the transaction level data, where each row represents a particular order made on the online store. There are 24 attributes related to each such transaction. The “Market” attribute has 7-factor levels representing the geographical market sector that the customer belongs to. The “Segment” attribute tells which of the 3 segments that customer belongs to.

## Data cleansing and transformation

Following are the rules which were applied while calculating the result and same will be applicable if any incremented data processed through the designed workflow:

- We have checked NA values and found NA values in only one feature. As the NA values in this feature was more than 70% hence we have removed it from the dataset.
- Order date and ship date attributes were changed into date format(YYYY-MM-DD).
- Month and year is extracted from the order date and used as two different column.
- Region-wise and segment-wise CV value and net profit were calculated for further analysis.
- **Derived matrix:** We had extracted month and year value from order\_date column to derive new matrices

# Model building approach

We have data of around 48 months for performing forecasting.

Created the test and train data using following steps:

1. Last 6 months data used as testing data.
2. We had trained the model on last 42 months data.

Classical decomposition and Arima is used for model building.

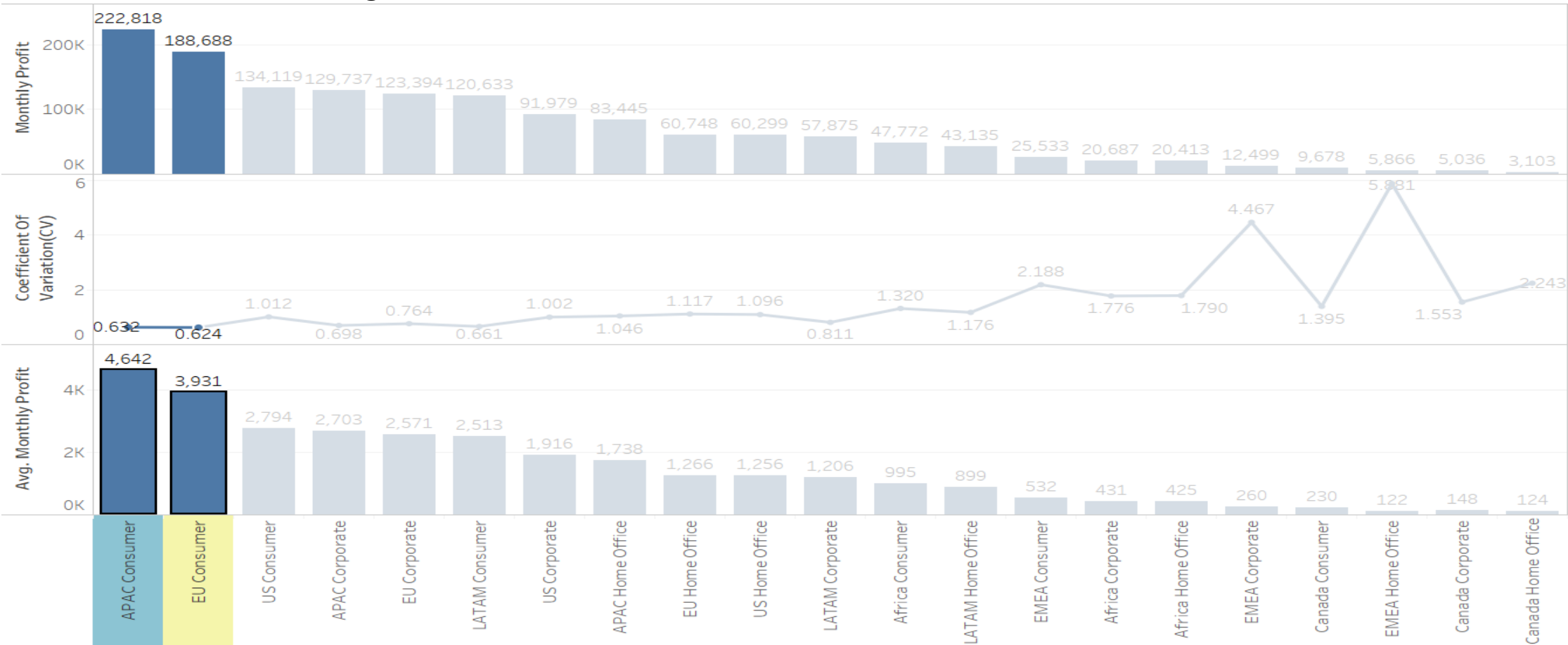
Post model building, Model is evaluated on following performance parameters : MAPE matrix

The best model is used to forecast next 6 months' sales and demand of each market segment.

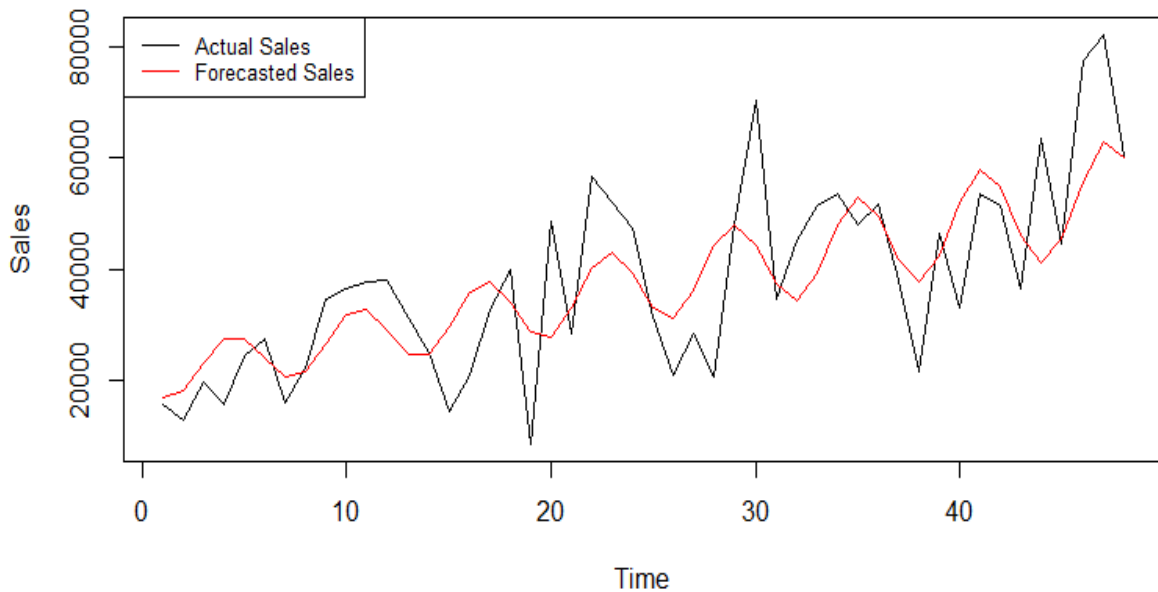
# Top 2 Market Segments

After performing our analysis, we have found following top 2 market segments among given market segments:

1. The Consumer Segment of APAC Market .
2. The Consumer Segment of EU Market.

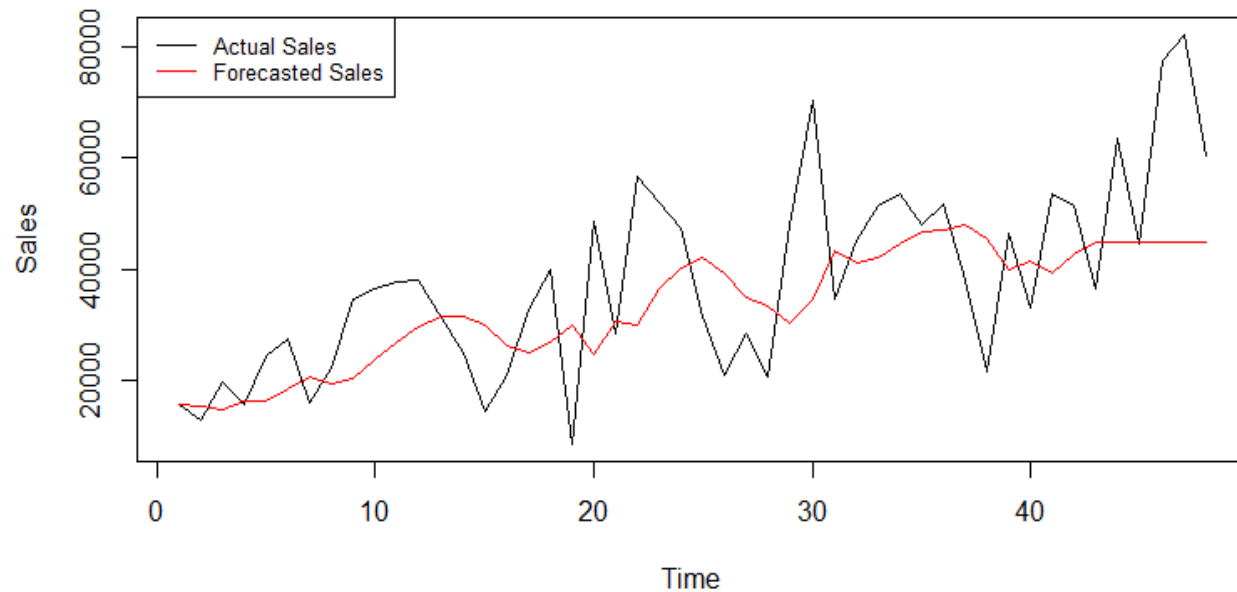


Apac Sales(Actual vs Forecasted)



Classical Decomposition  
MAPE – 19.266

Apac Sales(Actual vs Forecasted)



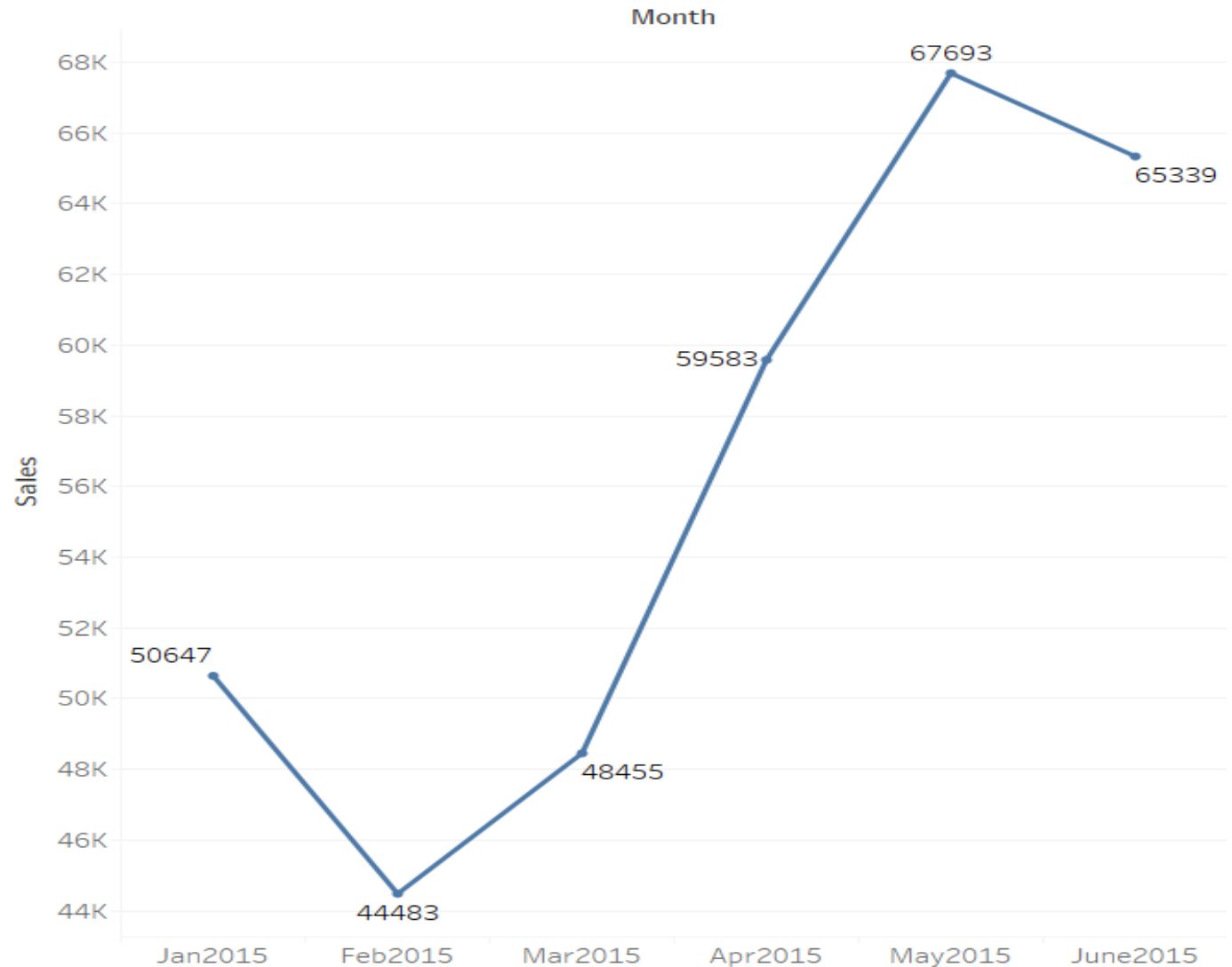
Auto Arima  
MAPE – 27.68952

Classical Decomposition Model Performs better.

Classical Decomposition Forecasting model provides a MAPE reduction of 8% on the Auto Arima model.

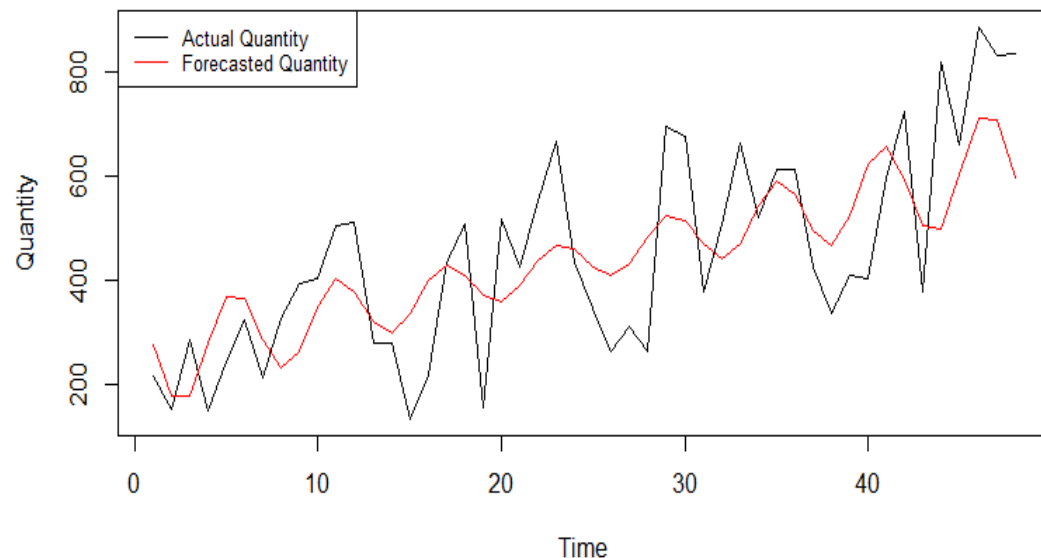
Sr No	Month	Sales
1	Jan-15	50646.76
2	Feb-15	44482.53
3	Mar-15	48454.72
4	Apr-15	59582.58
5	May-15	67693.45
6	Jun-15	65338.72

Forecasted Data for Next 6 months of Sales for APAC Consumer Segment



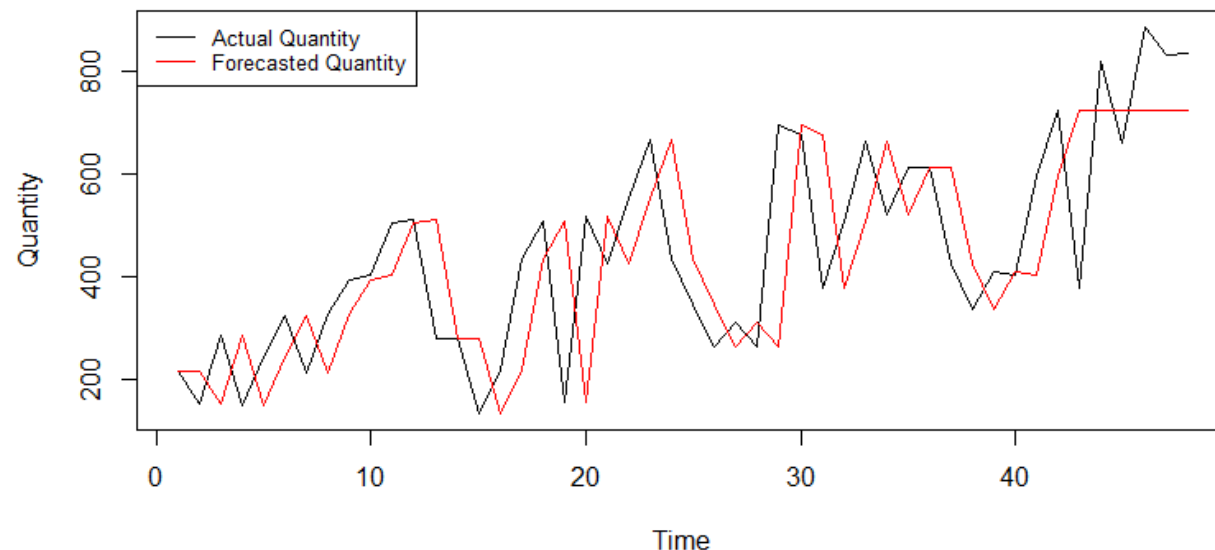


Apac Quantity(Actual vs Forecasted)



Classical Decomposition  
MAPE – 23.98944

Apac Quantity(Actual vs Forecasted)



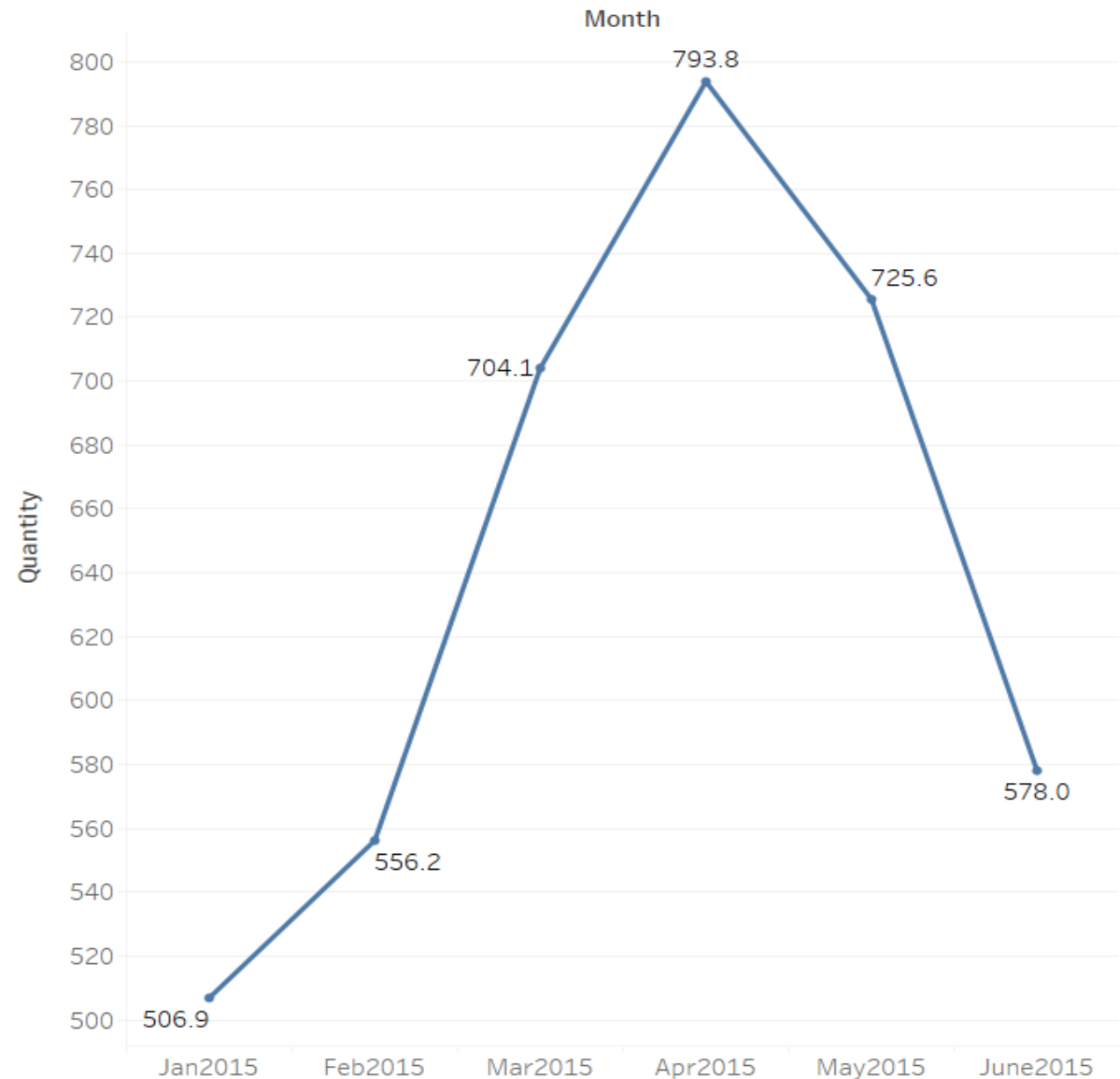
Auto Arima  
MAPE – 26.24458

Classical Decomposition Model Performs better.

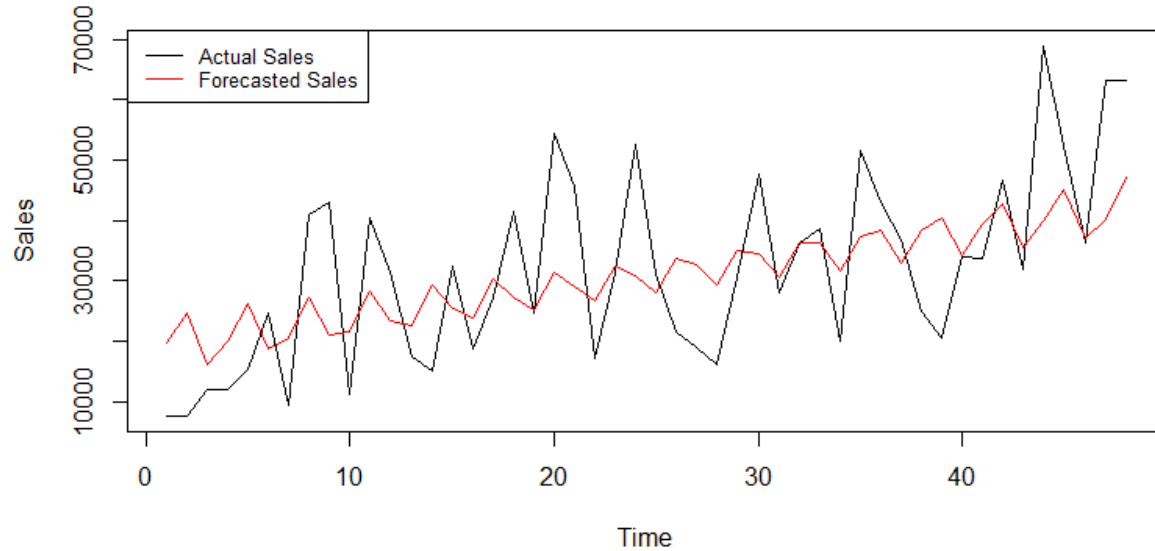
Classical Decomposition Forecasting model provides a MAPE reduction of 2% on the Auto Arima model.

Sr No	Month	Quantity
1	Jan-15	506.8535
2	Feb-15	556.1589
3	Mar-15	704.1219
4	Apr-15	793.8252
5	May-15	725.6161
6	Jun-15	578.0357

Forecasted Data for Next 6 months of Quantity for APAC Consumer Segment

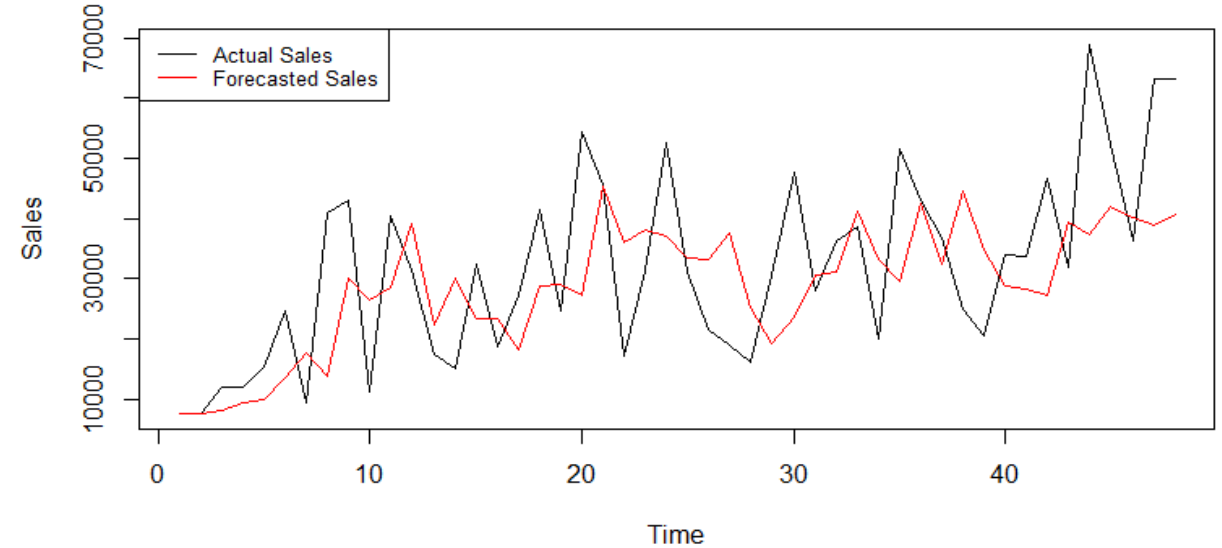


EU Sales(Actual vs Forecasted)



Classical Decomposition  
MAPE – 21.84158

EU Sales(Actual vs Forecasted)



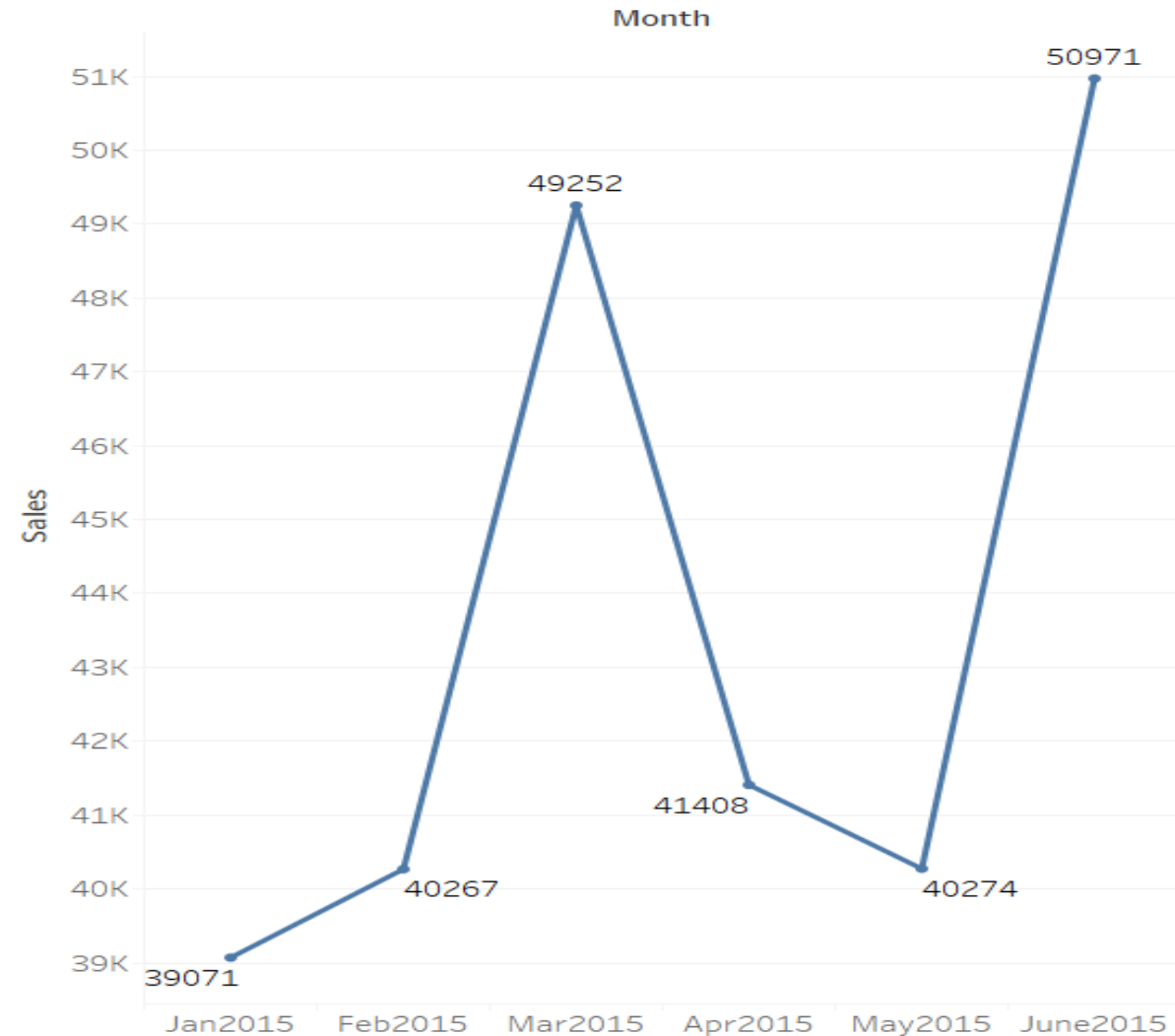
Auto Arima  
MAPE – 28.94458

Classical Decomposition Model Performs better.

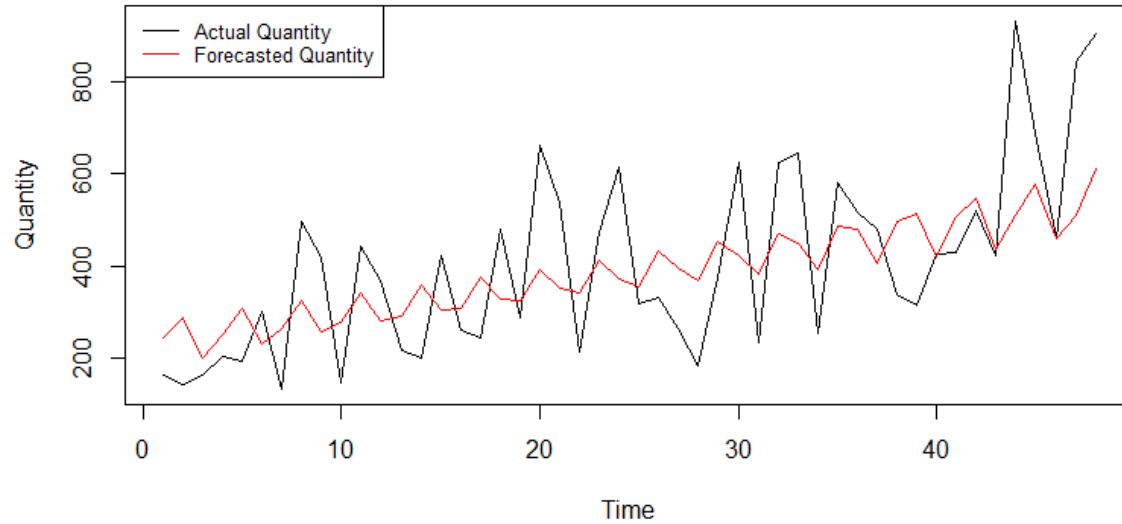
Classical Decomposition Forecasting model provides a MAPE reduction of 7% on the Auto Arima model.

Sr.No	Month	Sales
1	Jan-15	39070.54
2	Feb-15	40267.48
3	Mar -15	49252.02
4	Apr-15	41408.35
5	May-15	40273.62
6	Jun-15	50970.96

Forecasted Data for Next 6 months of Sales for EU Consumer Segment

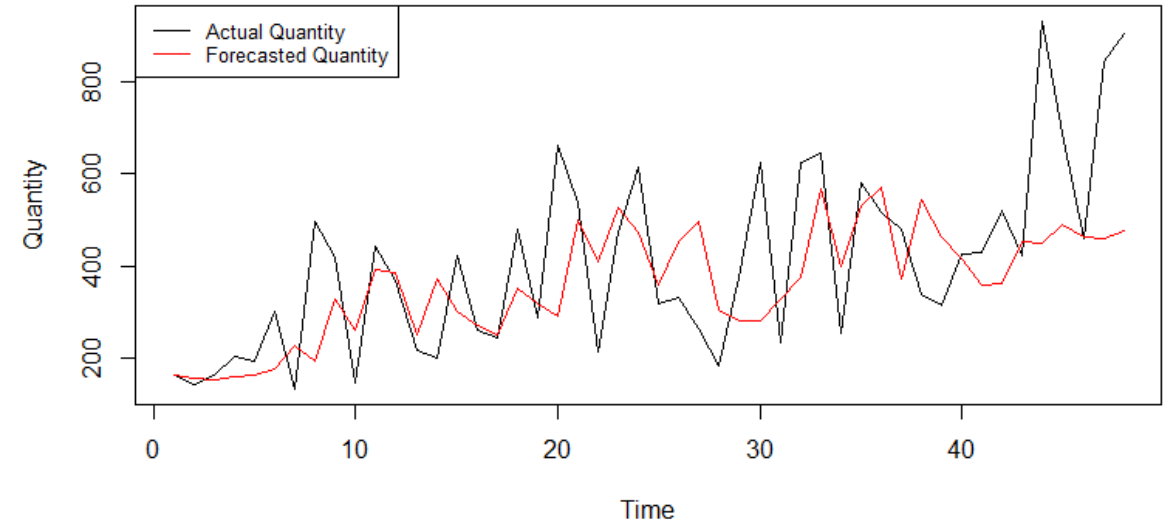


EU Quantity(Actual vs Forecasted)



Classical Decomposition  
MAPE – 22.7007

EU Quantity(Actual vs Forecasted)



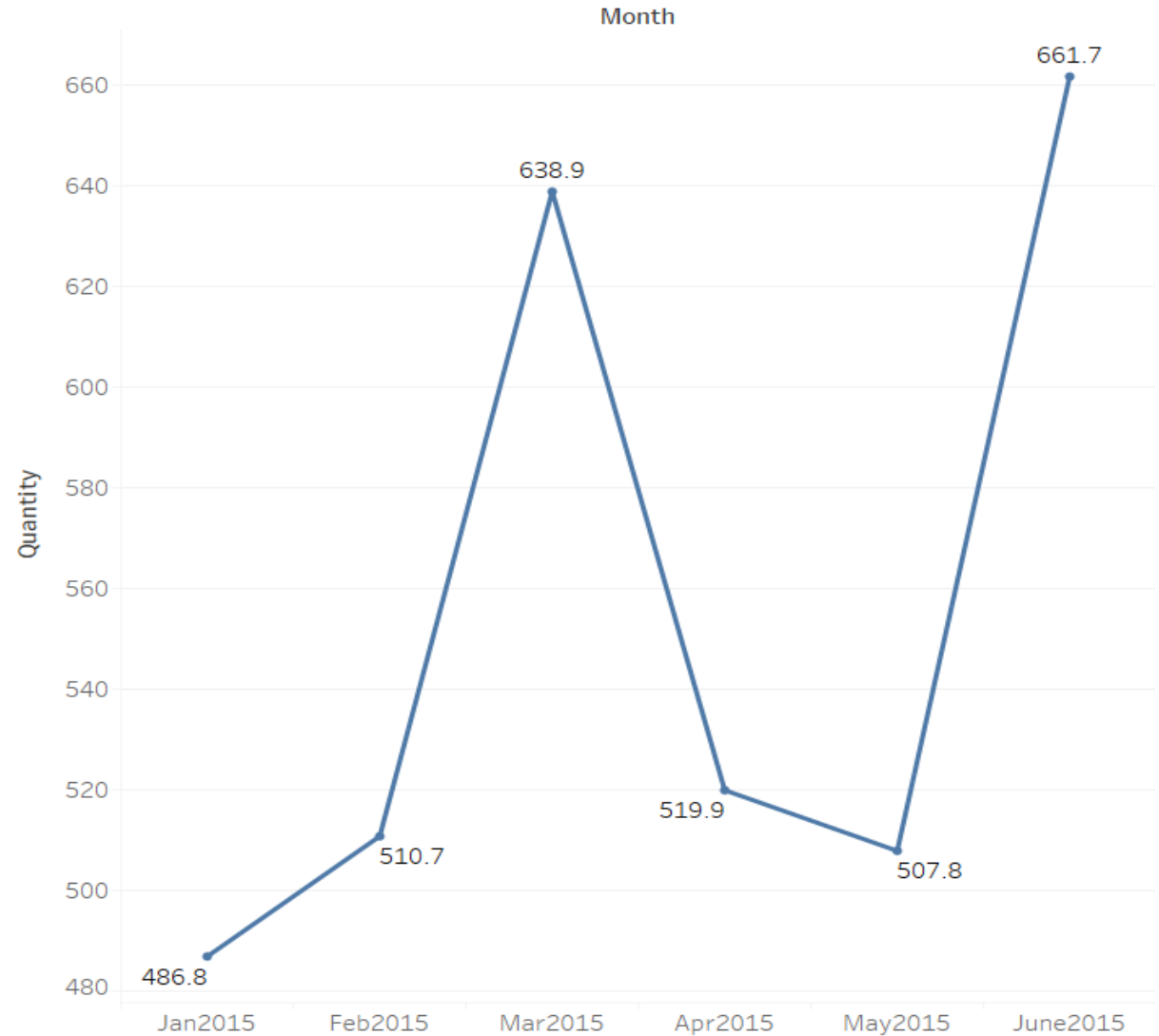
Auto Arima  
MAPE – 30.13119

Classical Decomposition Model Performs better.

Classical Decomposition Forecasting model provides a MAPE reduction of 8% on the Auto Arima model.

Sr No	Month	Quantity
1	Jan-15	486.8408
2	Feb-15	510.7291
3	Mar-15	638.8632
4	Apr-15	519.8834
5	May-15	507.8283
6	Jun-15	661.72

Forecasted Data for Next 6 months of Quantity for EU Consumer Segment



Thank You!!!!!!