RETAIL GAINT SALES FORECASTING ASSIGNMENT

Presented By

THERA BHUVANA CHANDRA

BUSINESS OBJECTIVE

- Global Mart is an online supergiant store that has worldwide operations. This store takes orders and delivers across the globe and deals with all the major product categories — consumer, corporate and home office.
- As a sales manager for this store, you have to forecast the sales of the products for the next 6 months, so that you have a proper estimate and can plan your inventory and business processes accordingly.

PROBLEM STATEMENT

- We need to find out the most profitable market segments for the company
- For these segments we need to forecast the sales and demand for the next 6 months

The Total Analysis has been divided in to four parts:

- Data Understanding
- To find out the most profitable segments
- Forecasting sales and demand for each of the profitable segments
- Recommendations for the company.

TASKS PERFORMED ON DATA SET

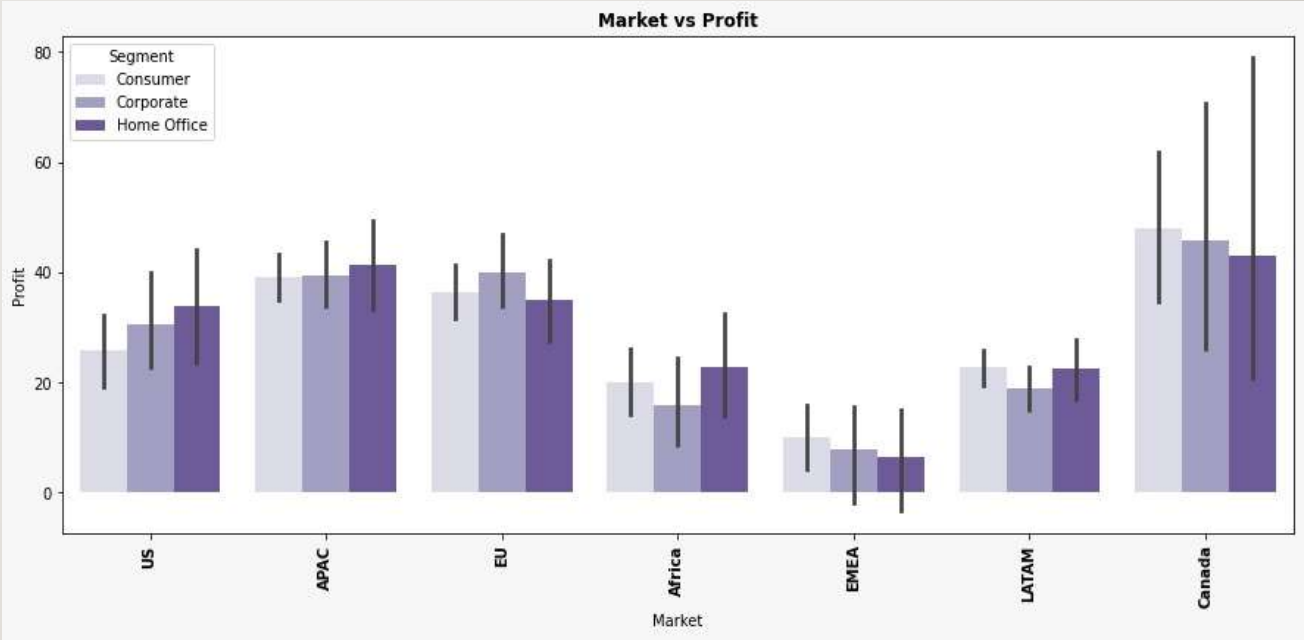
DATA UNDERSTANDING

- Global store data consists of 51290 columns and 5 rows
- Create a new column “Market segment”
- Aggregating the total values of profit for 21 market segments by its ordered month and year using pivot table.
- There are 7 Geographical Market segments.
- 3 Major Customer segments
- 21 unique market segments

MARKET VS PROFIT

- We can see that Canada and APAC markets with the segments Consumer, Corporate and Home office have more profit.

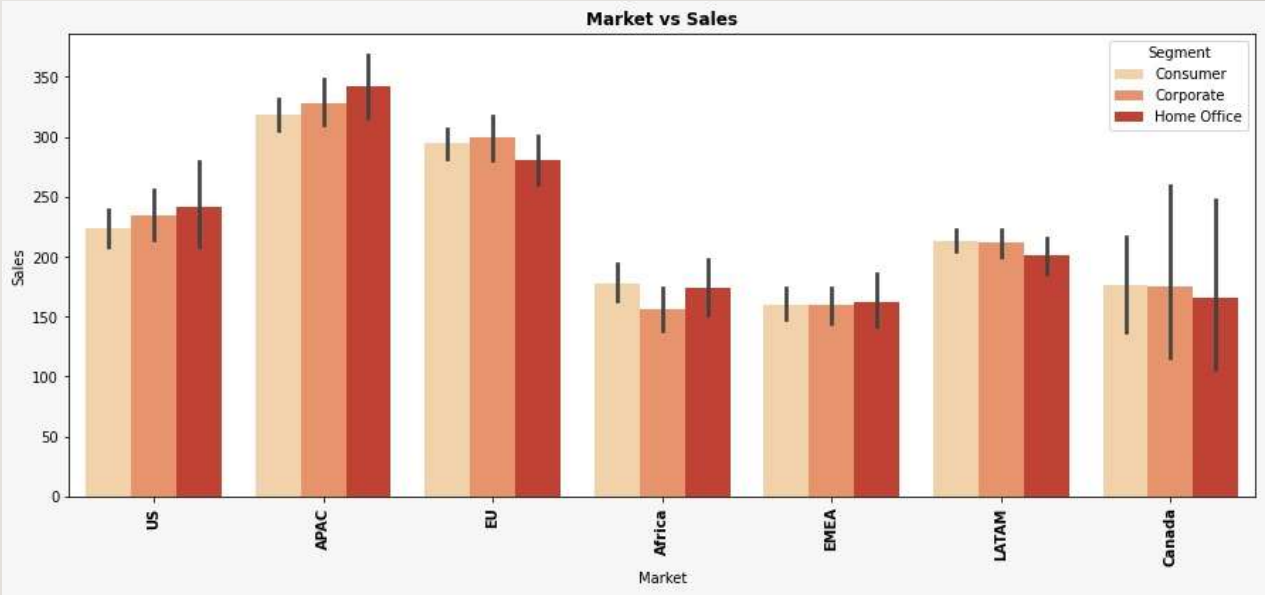
- Africa and EMEA markets have less profit



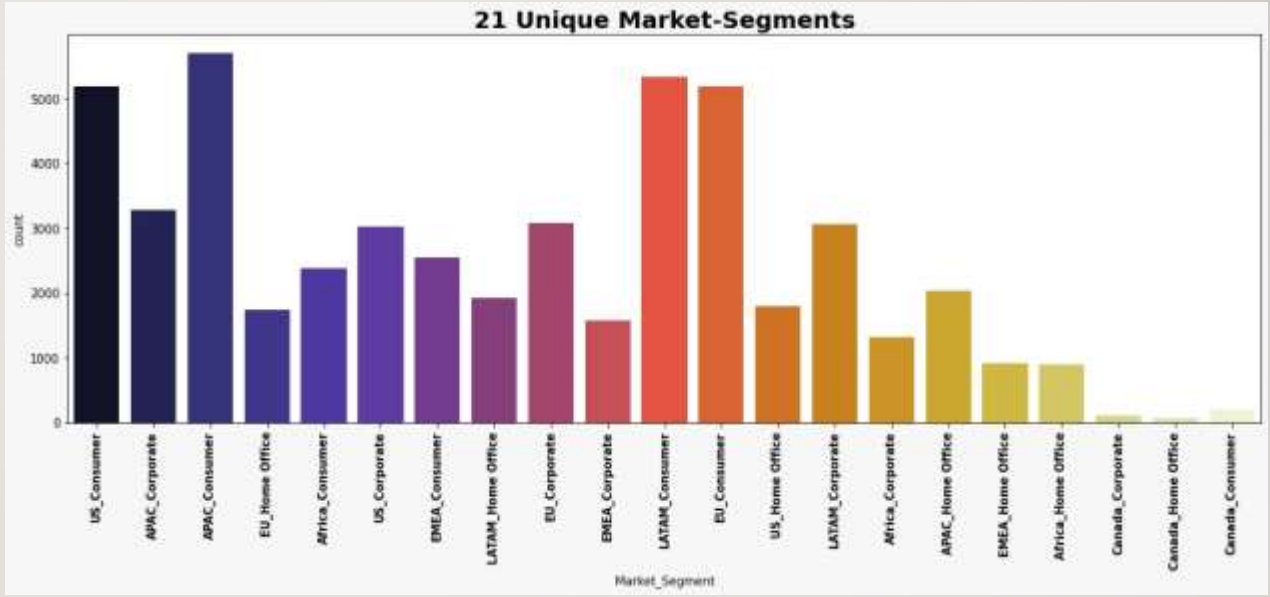
MARKET VS SALES

- APAC market is having higher Sales in all the three segments

- EMEA and Africa have less sales



SALES ANALYSIS BY EACH MARKET SEGMENT



We can see from the plot APAC_Consumer has the highest count

TRAIN – TEST SPLIT

- The Train Test split take the 42 months as the train data and 6 months as the test data.

CALCULATE THE COV ON THE PROFIT FOR EACH OF THE 21 MARKET SEGMENTS ON THE TRAIN DATA.

- Created 21 data subset buckets based on Market_Segements they belong to.
- Aggregated data in each bucket by Sales , Quantity and Profit.
- Using COV and profit found most profitable market segment as APAC_consumer

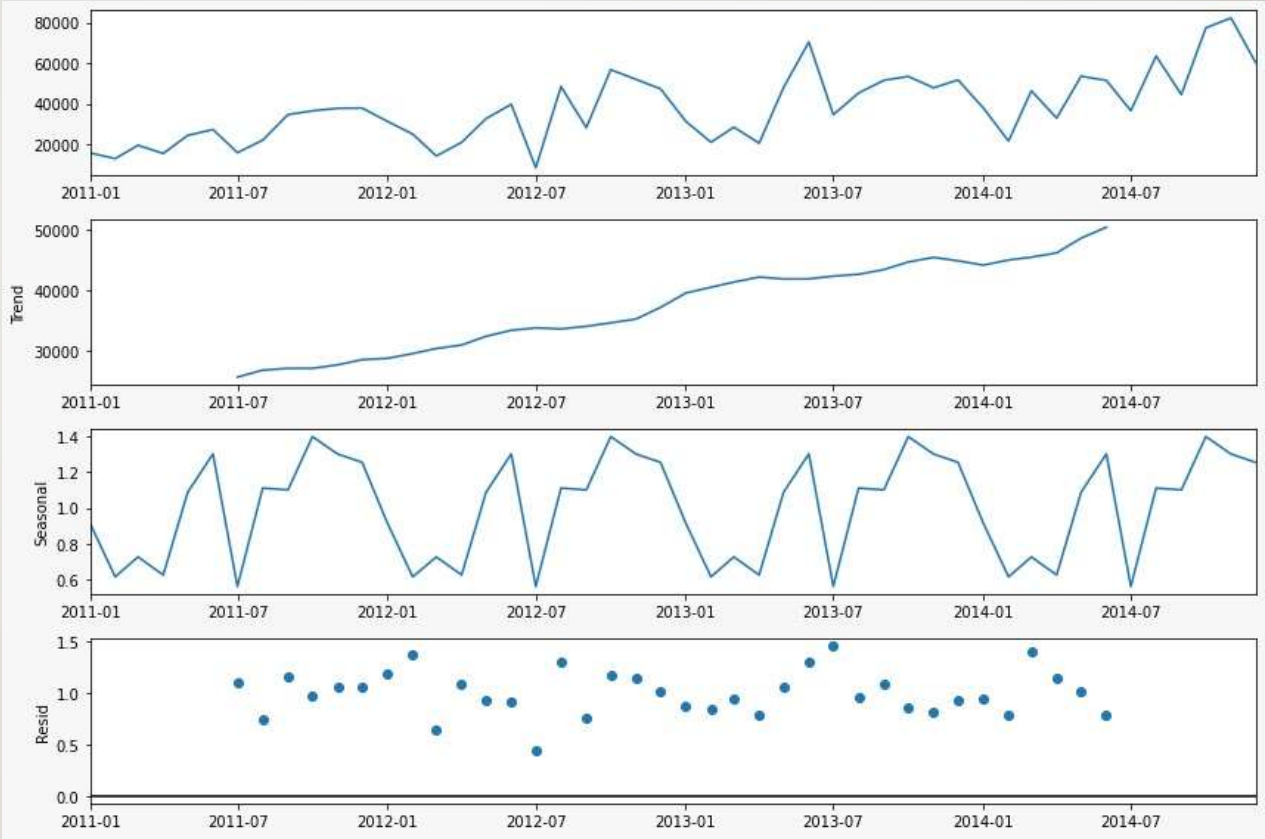
- The most profitable market segment is APAC Consumer
- It has very low COV value among all other segments.
- APAC Consumer sales will raise in next 6 months.

	Market_Segment	Mean	Std	CoV
0	APAC_Consumer	4223.553586	2518.944225	0.596404
12	EU_Consumer	3627.517036	2348.762579	0.647485
15	LATAM_Consumer	2252.677529	1533.362508	0.680684
13	EU_Corporate	2251.993036	1552.403019	0.689346
1	APAC_Corporate	2556.998957	1871.535073	0.731926
16	LATAM_Corporate	1075.994223	947.154491	0.880260
19	US_Corporate	1853.568607	1904.002356	1.027209
2	APAC_Home Office	1379.120743	1446.445137	1.048817
18	US_Consumer	2603.736252	2851.858407	1.095295
14	EU_Home Office	1097.441500	1223.296718	1.114681
7	Canada_Corporate	110.377500	132.146175	1.197220
20	US_Home Office	1062.397424	1293.079478	1.217133
17	LATAM_Home Office	788.531853	1059.547064	1.343696
3	Africa_Consumer	798.898929	1141.894252	1.429335
6	Canada_Consumer	230.067500	339.601099	1.476093
4	Africa_Corporate	426.027286	709.261893	1.664827
5	Africa_Home Office	333.002143	662.629728	1.989866
8	Canada_Home Office	138.247500	302.526945	2.188300
9	EMEA_Consumer	415.354786	1128.515779	2.716992
11	EMEA_Home Office	123.249214	747.714036	6.066684
10	EMEA_Corporate	172.274500	1167.958953	6.779639

SEASONAL DECOMPOSITION OF APAC CONSUMER SALES DATA

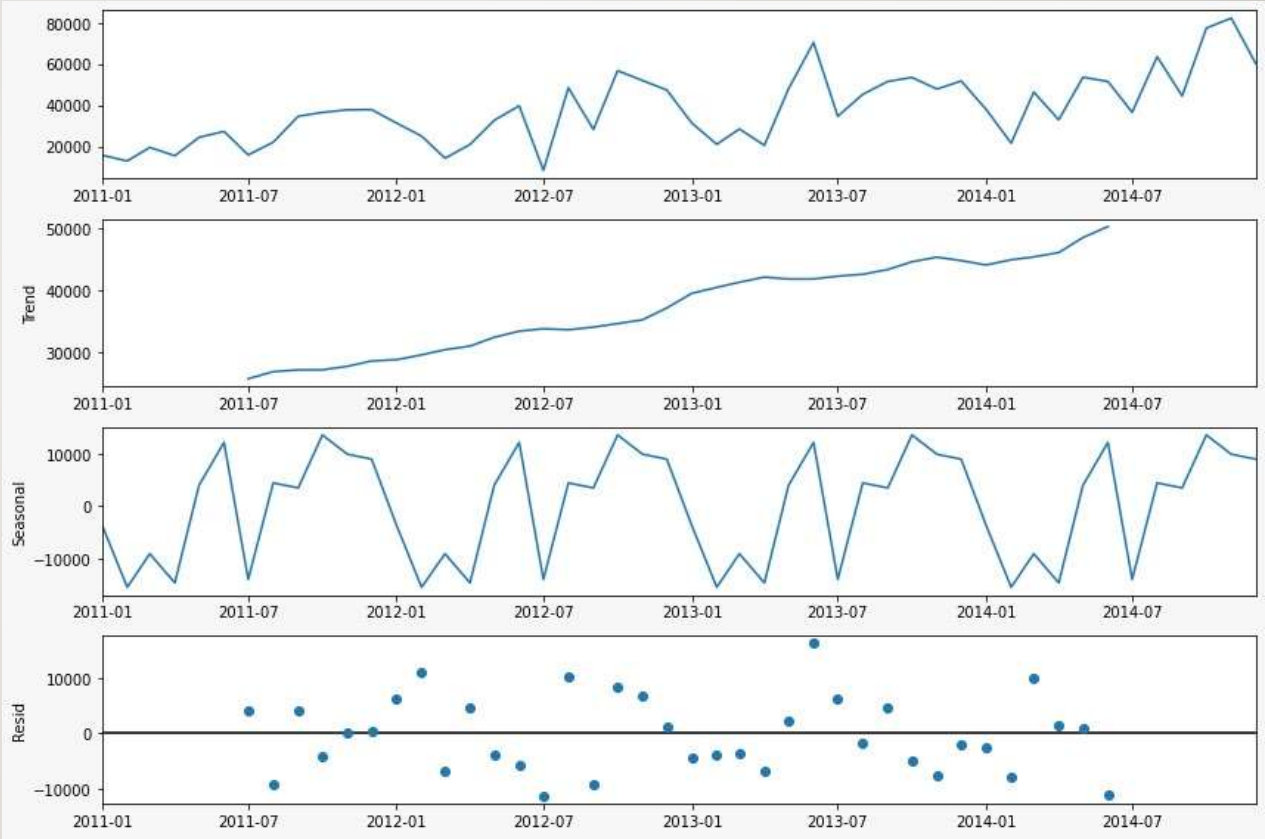
DECOMPOSED THE DATA USING ADDITIVE METHOD

- There is a clear upward trend
- There is a yearly seasonality in data



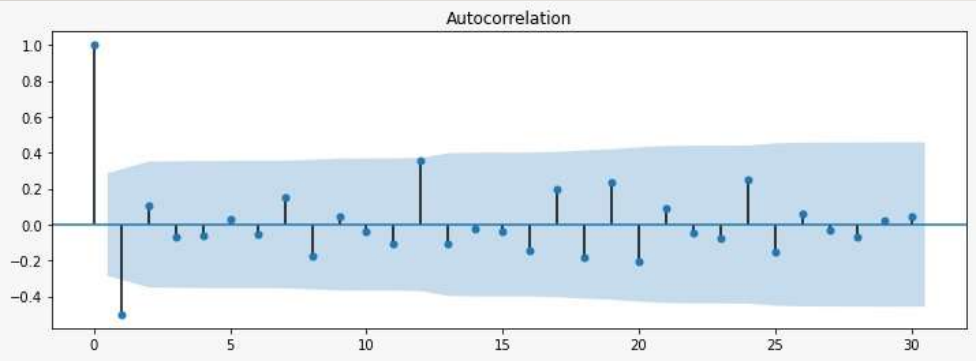
DECOMPOSED THE DATA USING MULTIPLICATIVE METHOD

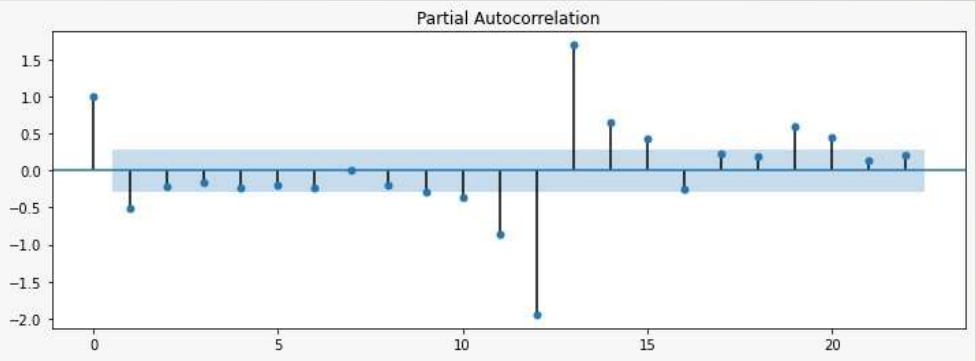
- There is a clear upward trend
- There is a yearly seasonality in data



ACF AND PACF PLOT

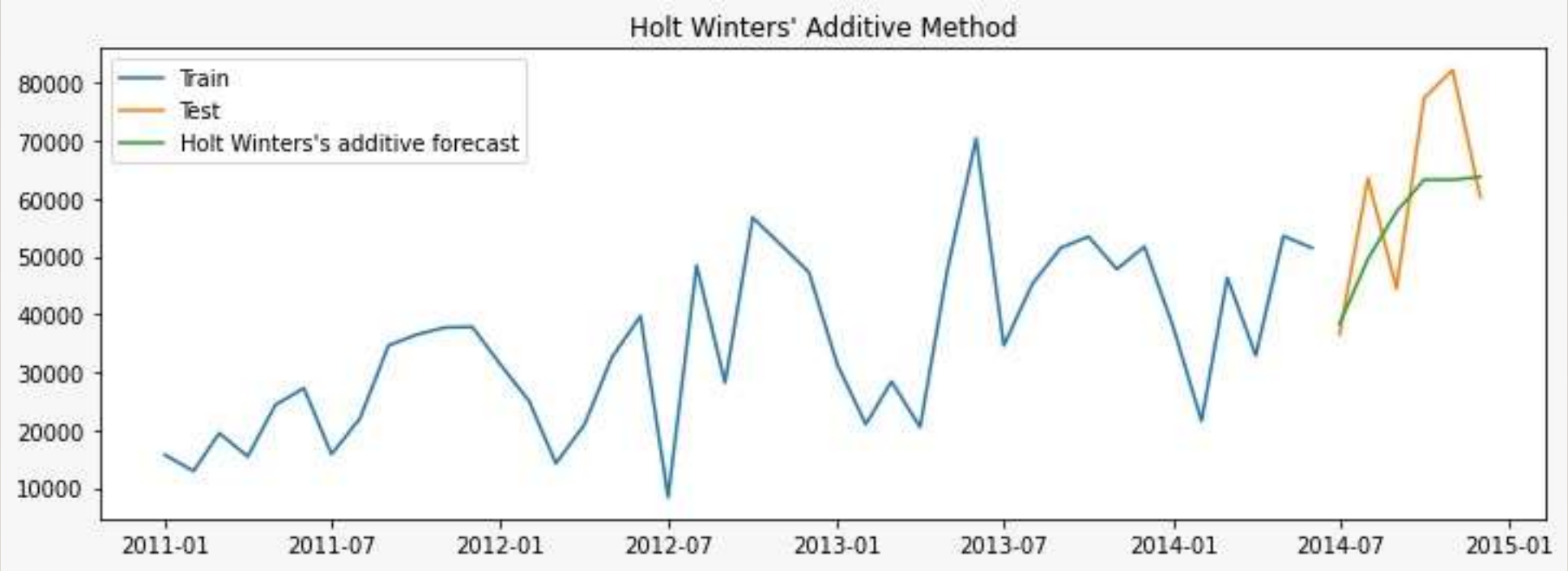
- From ACF plot we could see the dependency on the very next node which means MA should be 1.
- From PACF plot we could see there is seasonability in data.





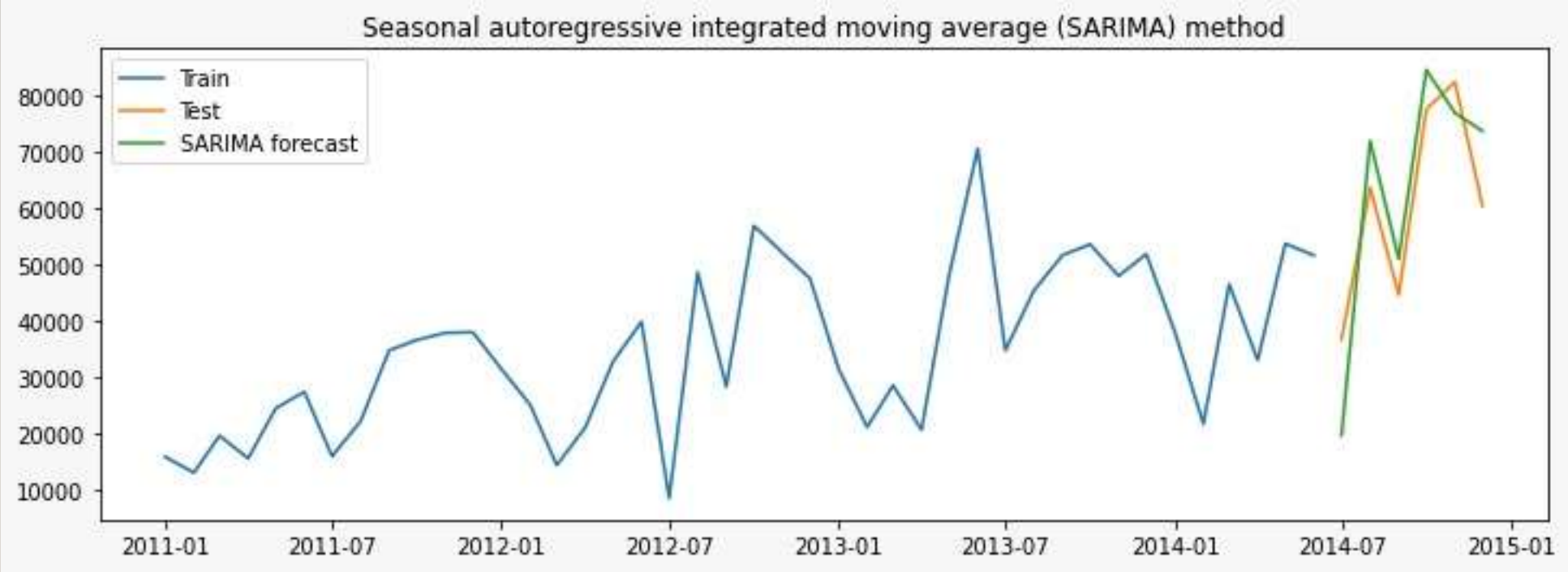
	Method	RMSE	MAPE
0	Naive method	18774.05	26.86
0	Simple average method	30846.00	38.18
0	Simple moving average forecast	22019.48	27.55
0	Simple exponential smoothing forecast	23112.16	27.82
0	Holt's exponential smoothing method	19026.09	25.60
0	Holt Winters' additive method	12565.60	17.32
0	Holt Winters' multiplicative method	10876.35	18.27
0	Autoregressive (AR) method	15505.02	27.27
0	Moving Average (MA) method	52903.35	81.64
0	Autoregressive moving average (ARMA) method	50757.70	77.66
0	Autoregressive integrated moving average (ARIM...	50757.70	77.66
0	Seasonal autoregressive integrated moving aver...	10425.94	18.59

HOLT WINTER'S ADDITIVE METHOD



- Out of 13 models Holts Winter's Additive Method is best time series model
- Based on MAPE = "17.32" value best technique for sales forecast is Holt Winter's Additive Method.
- It is the best forecasting method in the smoothing technique.

SEASONAL AUTO REGRESSIVE INTEGRATED MOVING AVERAGE (SARIMA)



- Based on RMSE – “10425.94” value best technique for sales forecast in “Seasonal Auto Regressive Integrated Moving Average(SARIMA) method”

- SARIMA is best in all ARIMA method of techniques.

CONCLUSION

- Based on data given we provided "Global Mart" that APAC_Consumer is most profitable market segments.
- APAC Consumer sales will raise in next 6 months.
- Based on MAPE = "17.32" value best technique for sales forecast is Holt Winter's Additive Method. It is the best forecasting method in the smoothing technique.
- Based on RMSE – "10425.94" value best technique for sales forecast in "Seasonal Auto Regressive Integrated Moving Average(SARIMA) method".

THANK YOU