Retail-Giant Sales Forecasting Assignment

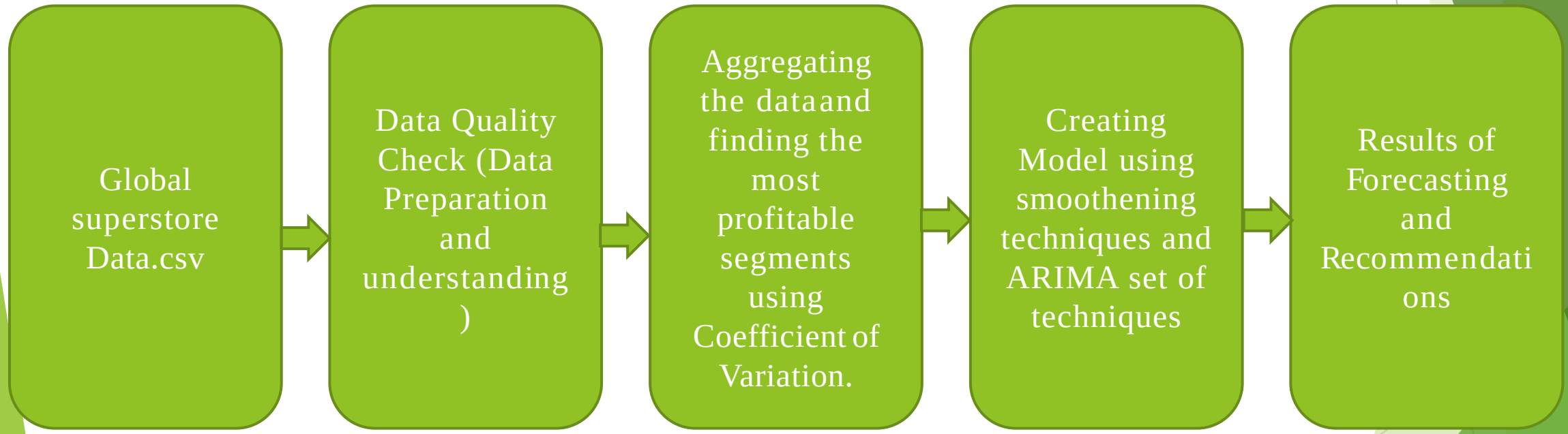
By : Gaurav Dabral

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 in seven different market regions
- The data currently has the transaction level data, where each row represents a particular order made on the online store.
- The aim is to forecast the sales for next 6 months of the most profitable markets and in respective segments, which will help in maintaining the revenue.

Problem Solving Methodology



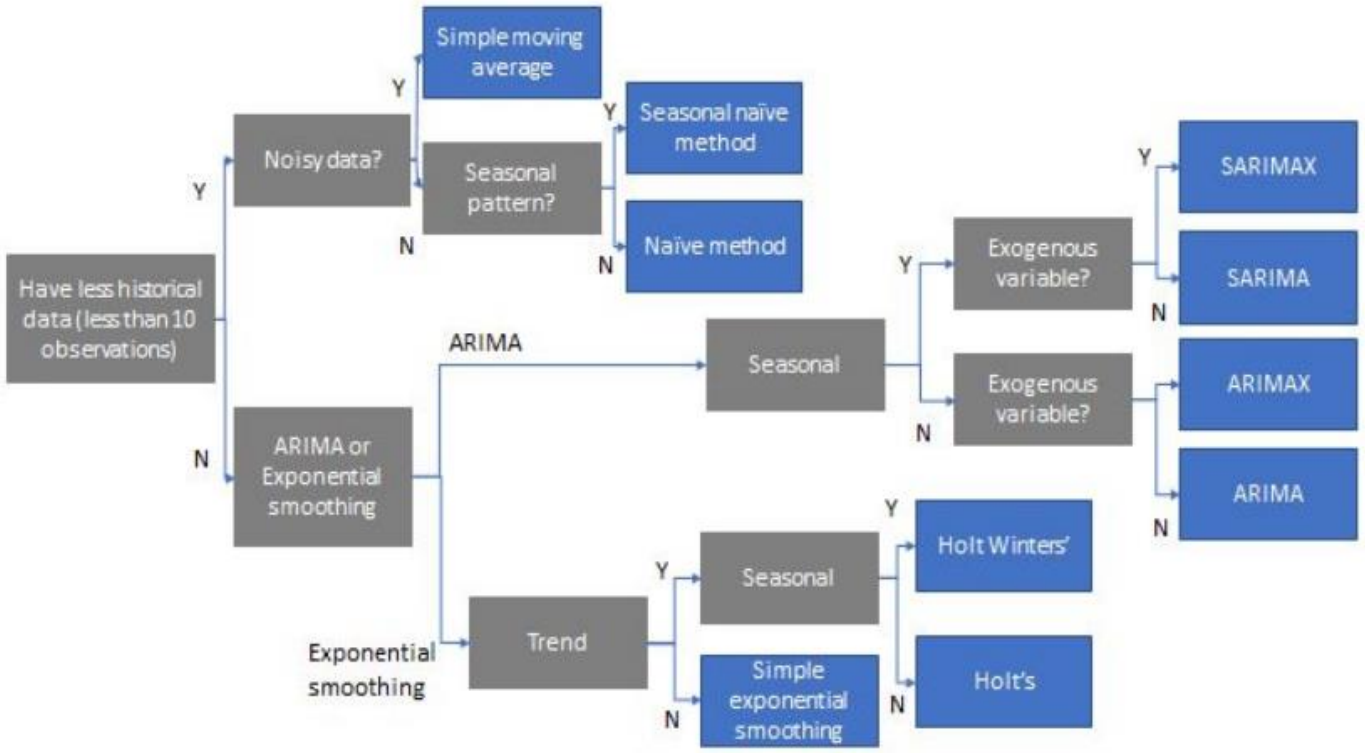
CoV for 21 segements

0.5290613481452426 Consumer-APAC
1.3262343551155784 Consumer-Africa
1.2670987817143828 Consumer-Canada
2.684648041230743 Consumer-EMEA
0.6024300983697823 Consumer-EU
0.692058673646338 Consumer-LATAM
1.0227789635225293 Consumer-US
0.5364756686843114 Corporate-APAC
1.9146751542131137 Corporate-Africa
1.812884409296696 Corporate-Canada
6.432057690698171 Corporate-EMEA
0.730828787866403 Corporate-EU
0.8928703126637055 Corporate-LATAM
1.084820951752197 Corporate-US
1.020440757194312 Home Office-APAC
2.037336997275983 Home Office-Africa
2.4206617515969757 Home Office-Canada
7.828127581786369 Home Office-EMEA
0.9494426091054606 Home Office-EU
1.183871862615309 Home Office-LATAM
1.1376556047425066 Home Office-US

APAC-Consumer : The most profitable segment

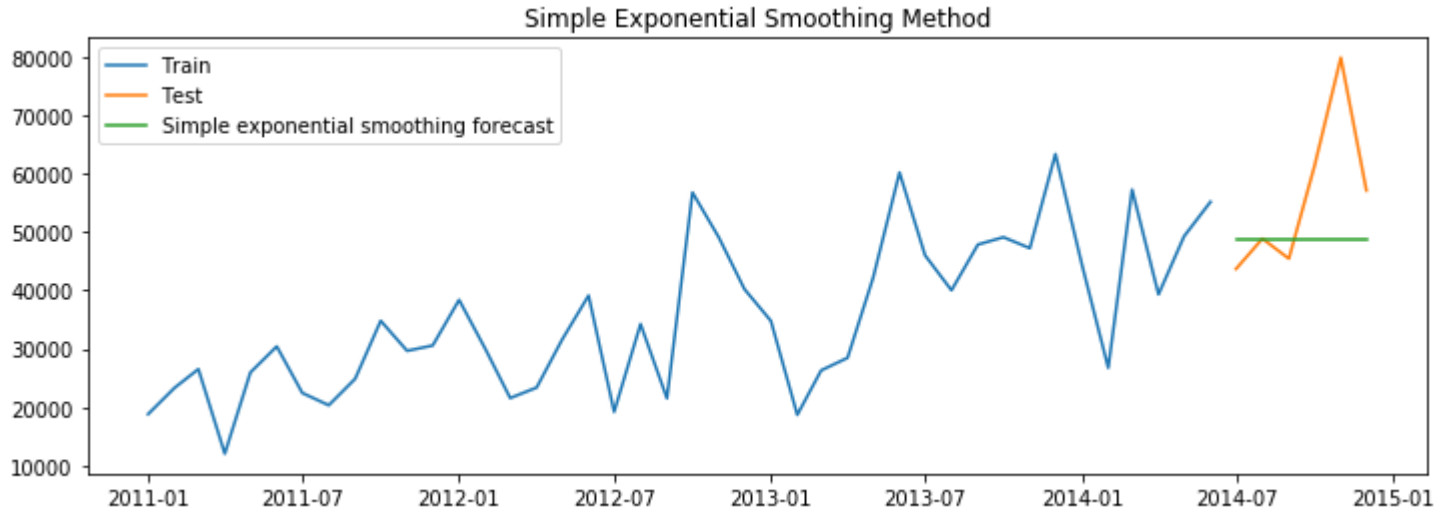
The coefficient of variation, also known as relative standard deviation, is a standardized measure of dispersion of a probability distribution or frequency distribution. It is calculated as the ratio of standard deviation to mean. The higher the coefficient of variation, the greater the level of dispersion around the mean. Here The customer segment and market composition of our interest is the one that is most stable and reliable i,e the one that shows least variance in profit. Hence we will pick the segment market combination consumer APAC because it has the least value of COV and this implies that it has least variation of profit around the mean and most reliability among others

Flow chart for choosing the correct model



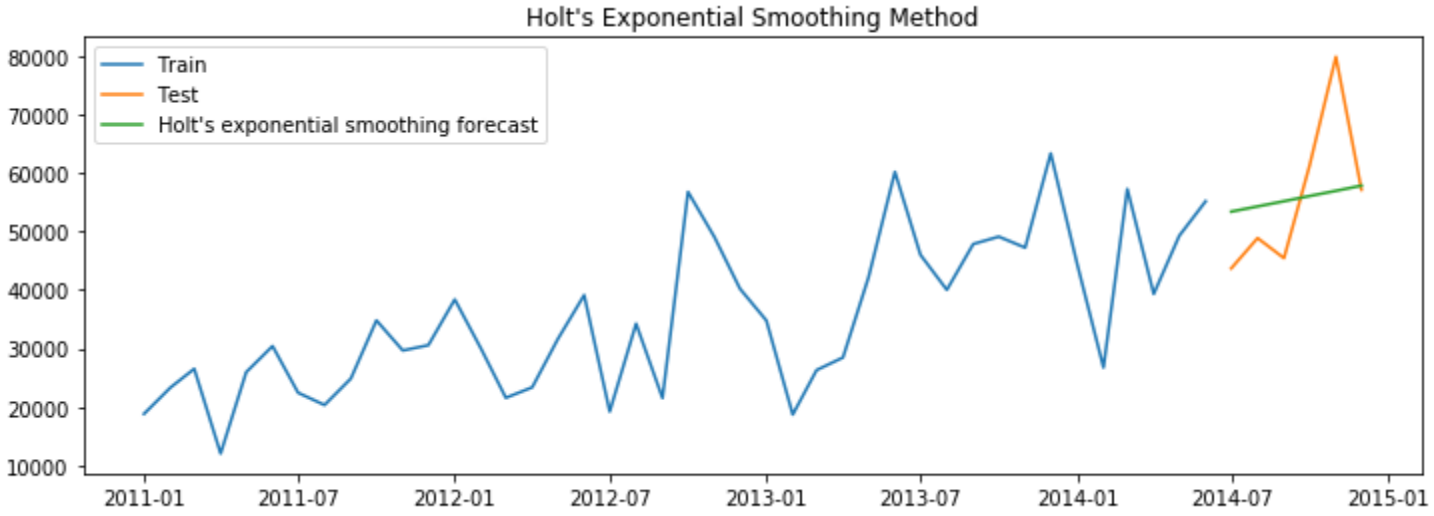
- The time series given has both trend as well as seasonal component and has no exogenous variable so according to the smoothening technique 'SARIMA' is the best Model and in smoothening technique 'Holt Winters' is the best Model.

Simple Exponential Smoothening



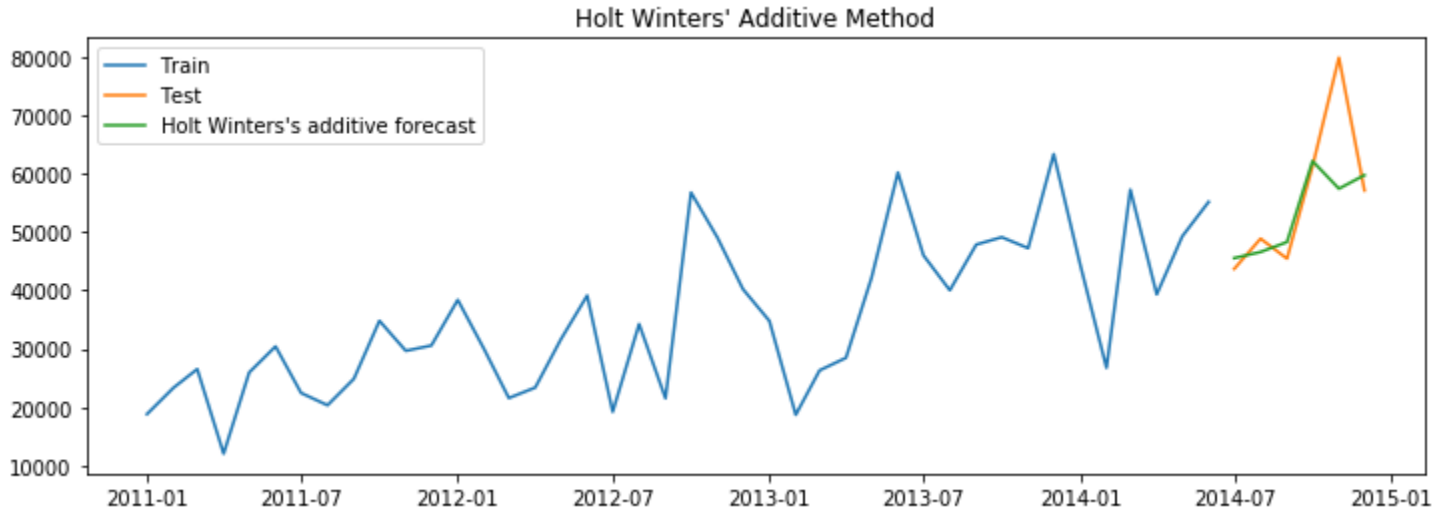
MAPE: 15.52

Holt’s Exponential Smoothening



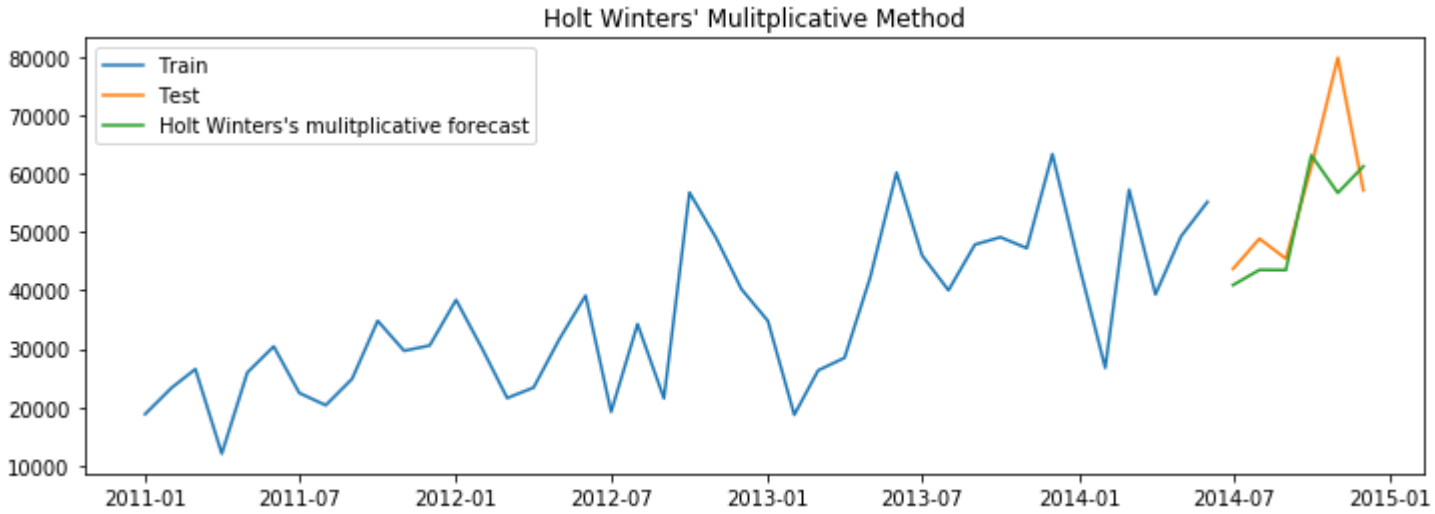
MAPE: 14.93

Holt Winter's Additive



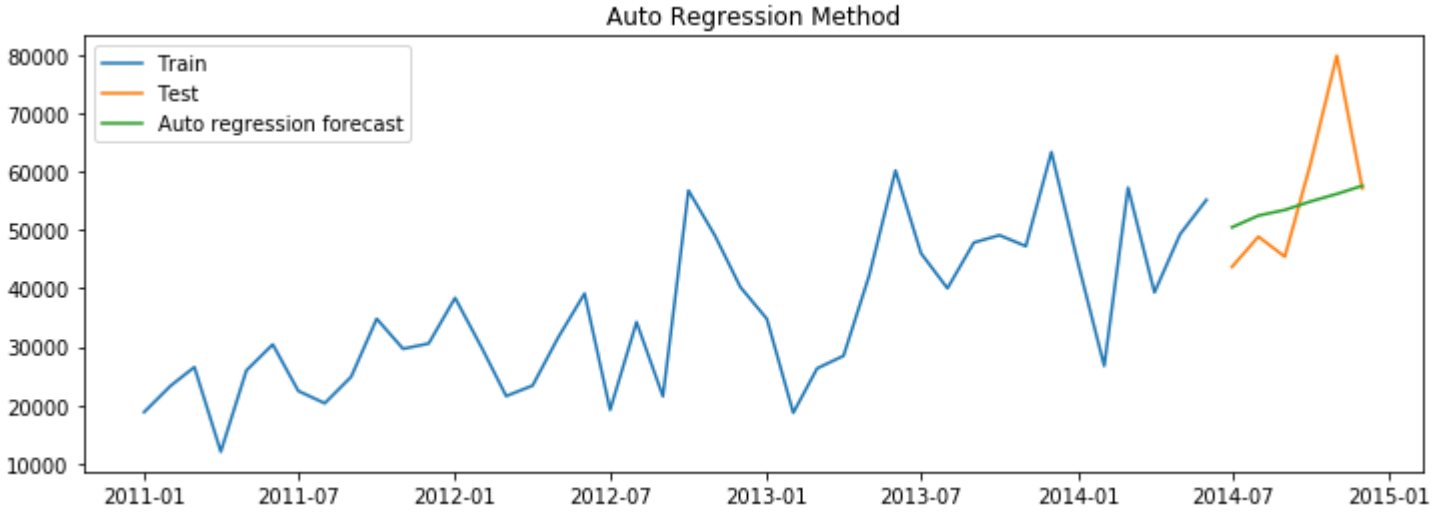
MAPE: 10.17

Holt Winter’s Multiplicative



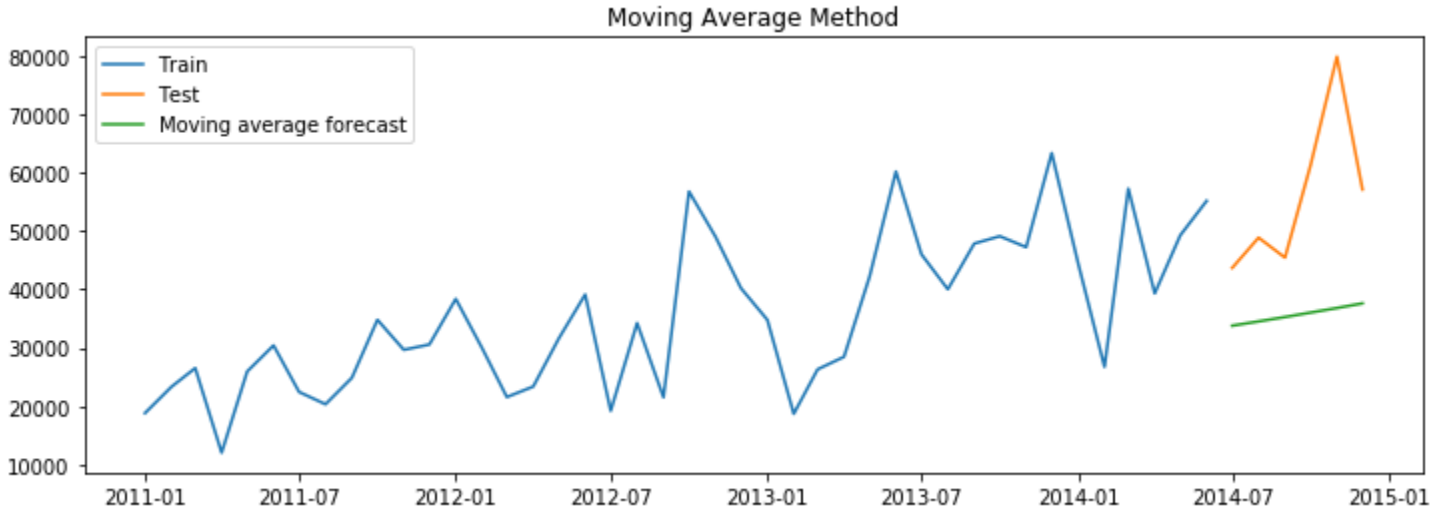
MAPE: 11.43

AR Model



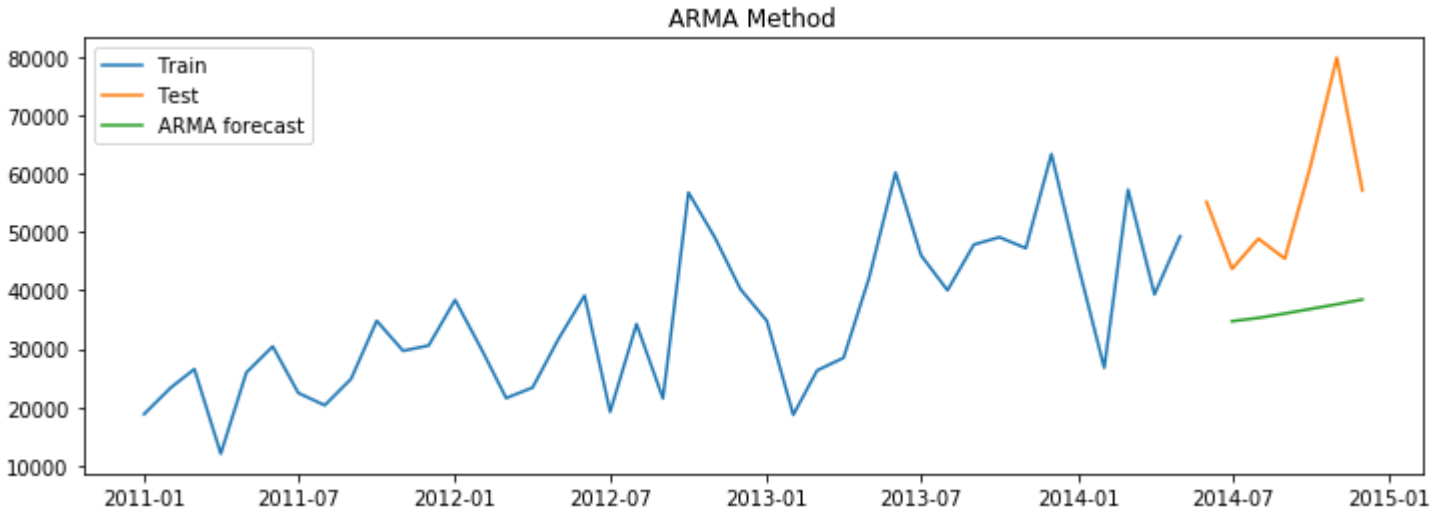
MAPE: 13.56

MA Model



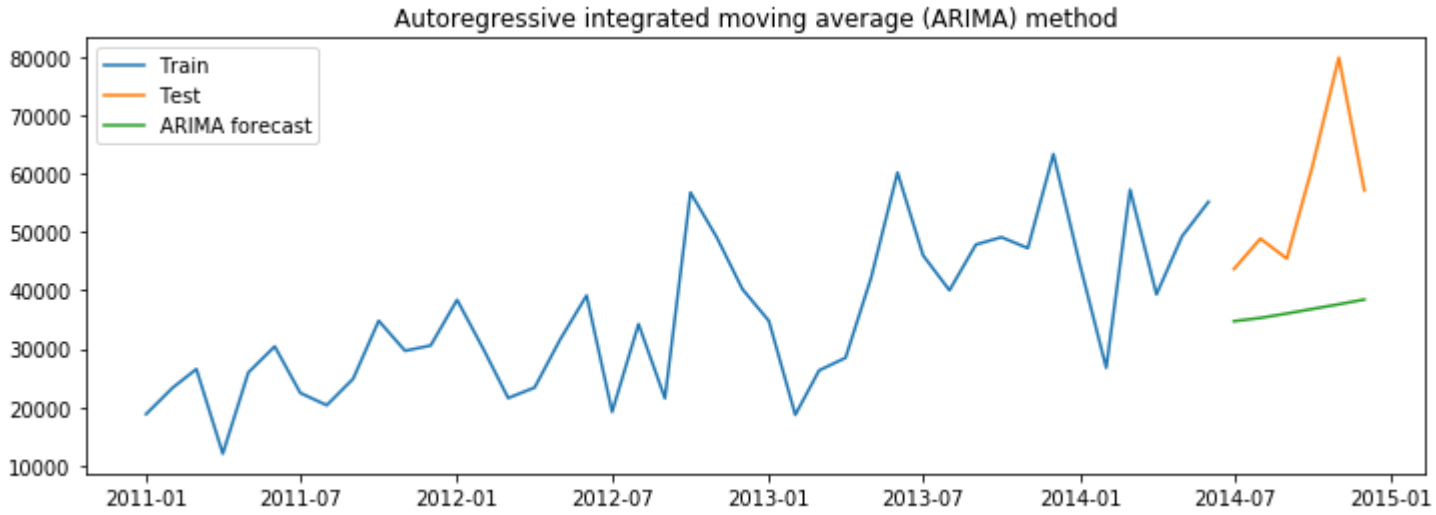
MAPE: 33.93

ARMA



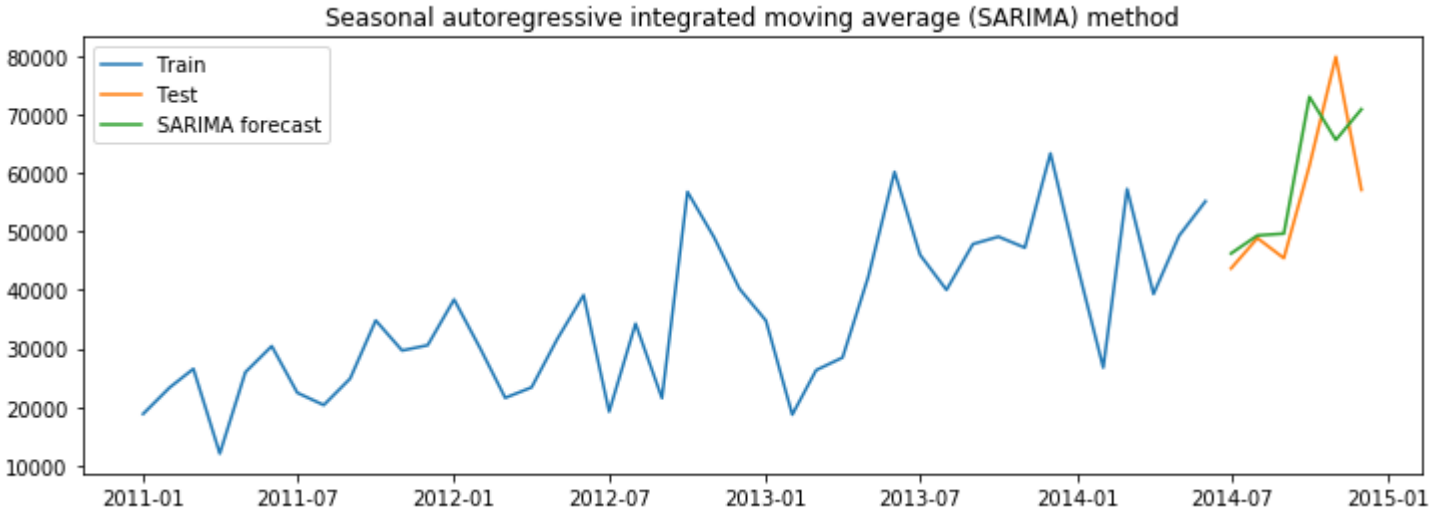
MAPE: 32.40

ARIMA



MAPE: 32.40

SARIMA



MAPE: 12.88

MAPE Value for all the models

	Method	RMSE	MAPE
0	Simple exponential smoothing forecast	14312.82	15.52
0	Holt's exponential smoothing method	12403.84	14.93
0	Holt Winters' additive method	9306.82	10.17
0	Holt Winters' multiplicative method	9423.23	11.43
0	Autoregressive (AR) method	10985.28	13.56
0	Moving Average (MA) method	23360.02	33.93
0	Autoregressive moving average (ARMA) method	22654.32	32.40
0	Autoregressive integrated moving average (ARIM...	22654.32	32.40
0	Seasonal autoregressive integrated moving aver...	9618.62	12.88

Conclusions:

- The most profitable market segment combination was the consumer APAC. IT is the most reliable consumer segment as it has the lowest coefficient of variance among all.
- Out of all the models we created Holt winter's additive method came out to be the best among the smoothening techniques with a MAPE of 10.17 which was the lowest of all the models and SARIMA cam out to be the best model mong the ARIMA techniques with a MAPE of 12.88
- These 2 models captured the trend and the seasonality well and hence were able to give close predictions.
- The single best model was Holt Winters's additive model as it has the lowest MAPE value among all. Hence this model should be used for making predictions