RETAIL GIANT SALES FORECASTING ASSIGNMENT

Submitted by : Seema S B

Problem Statement

- To build a model to forecast the Sales and Quantity of the products for the next 6 months.
- The Market-Segment on which the forecast need to be made is obtained by calculating Coefficient of Variance.

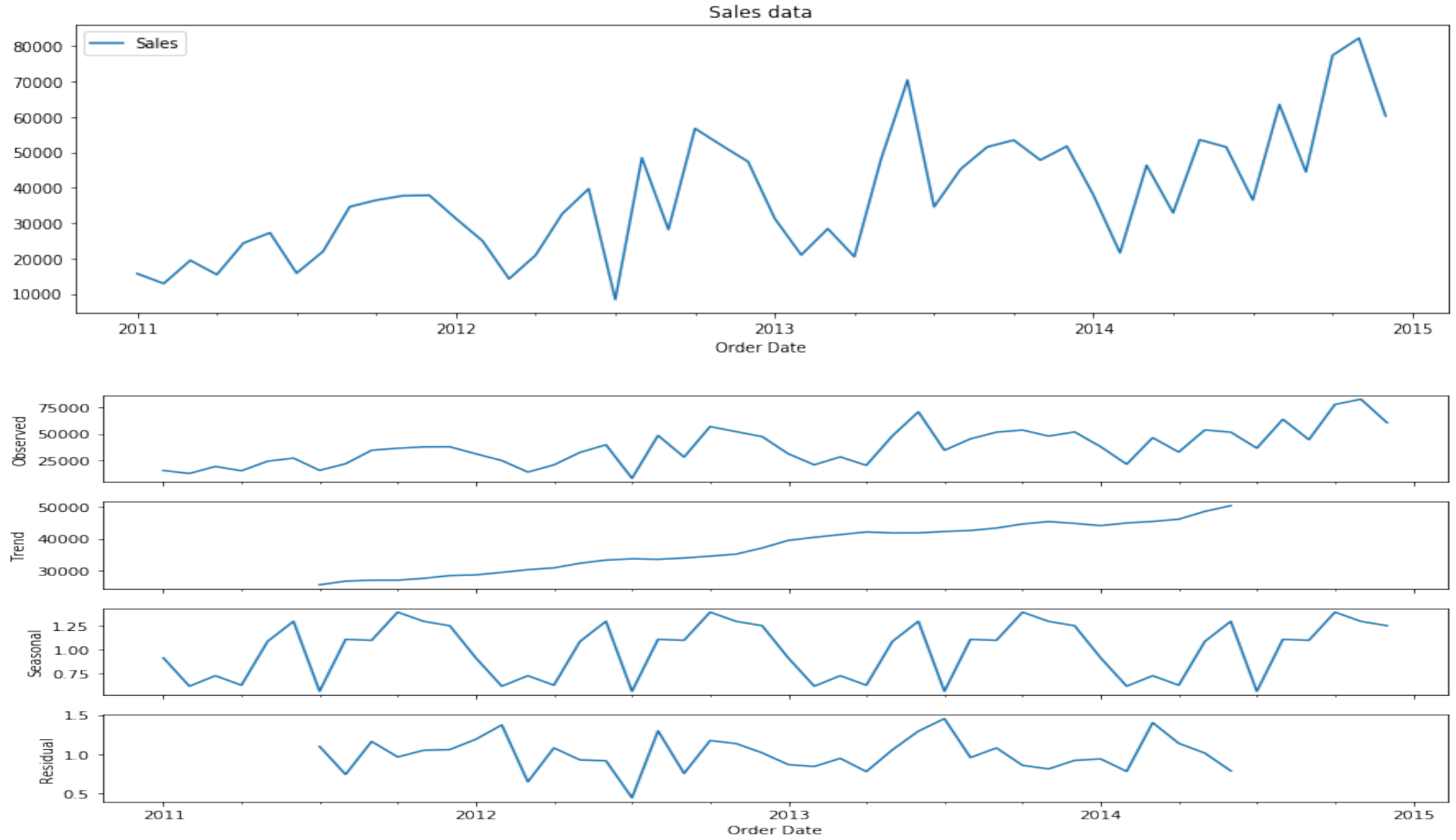
Approach

- The coefficient of variance (CoV) for each market segment on variable Profit is calculated.
- There are 21 market segments and respective CoV are,

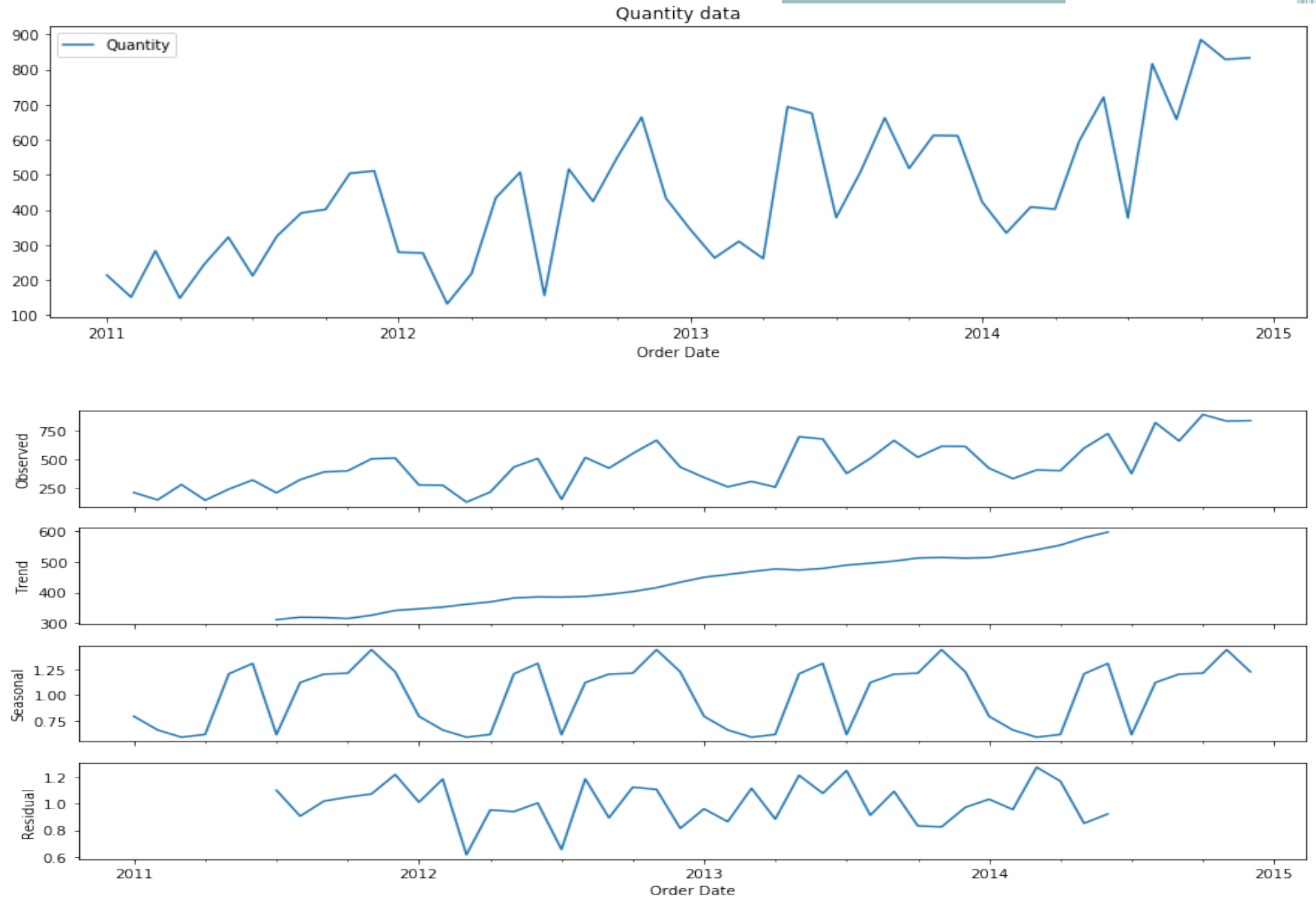
Market Segment	
APAC-Consumer	0.603633
APAC-Corporate	0.740799
APAC-Home Office	1.061530
Africa-Consumer	1.446661
Africa-Corporate	1.685008
Africa-Home Office	2.013987
Canada-Consumer	1.497032
Canada-Corporate	1.219189
Canada-Home Office	2.245148
EMEA-Consumer	2.749927
EMEA-Corporate	6.861820
EMEA-Home Office	6.140222
EU-Consumer	0.655334
EU-Corporate	0.697702
EU-Home Office	1.128192
LATAM-Consumer	0.688935
LATAM-Corporate	0.890930
LATAM-Home Office	1.359984
US-Consumer	1.108571
US-Corporate	1.039660
US-Home Office	1.231887

- The CoV is given by ratio of standard deviation to mean.
- Among the 21 market segment, the one most consistently profitable is the one having lowest CoV value.
- Here, market segment with low CoV is considered because low CoV means less fluctuations and less spread.
- The APAC-Consumer market segment has low CoV compared to all.

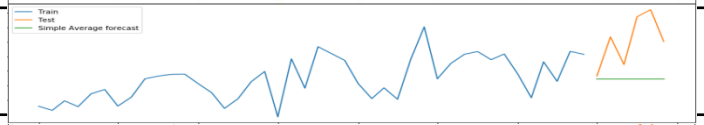
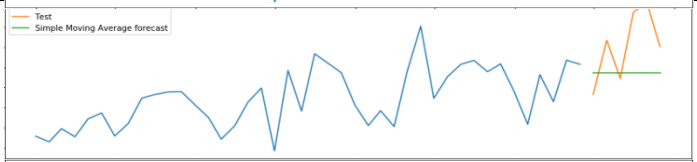
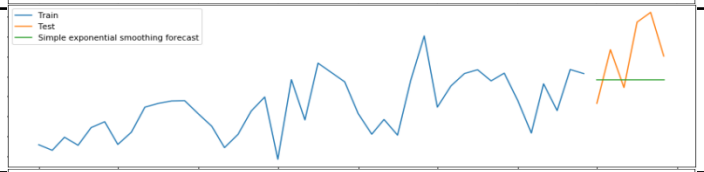
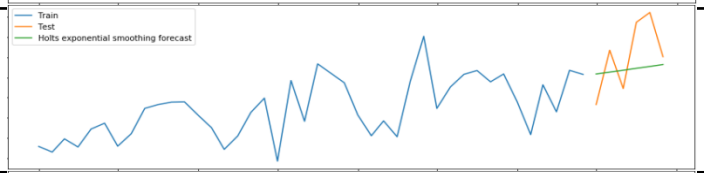
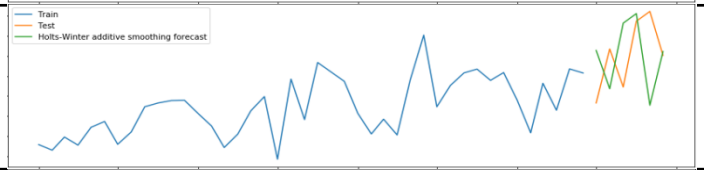
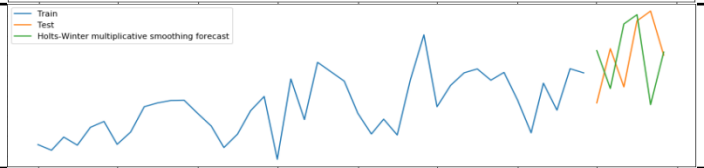
- From the graphs, we can say that the Sales data of APAC-Consumer has trend and seasonality.



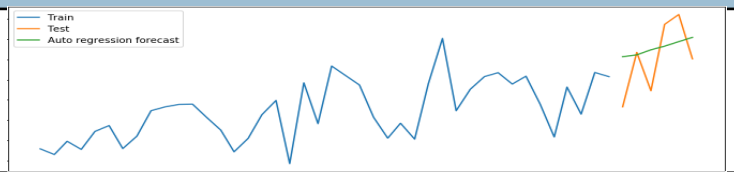
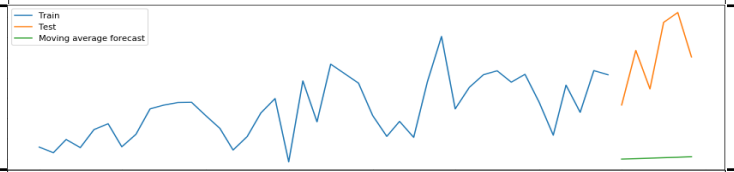
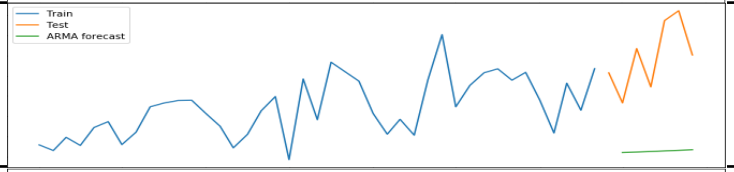
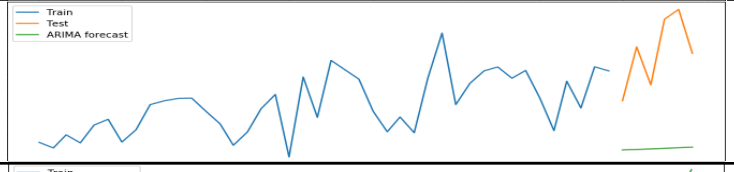
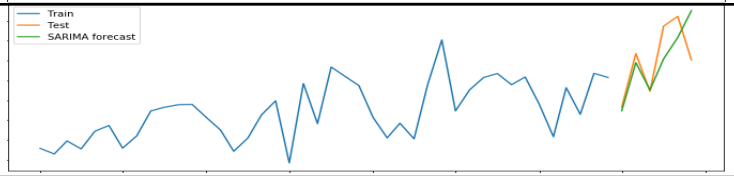
- As the sales data has both trend and seasonality, based on the flow chart we can go with Holt Winter's method or SARIMA method.
- SARIMA is better as the data points are more than 10.
- From the graphs, we say that the Quantity data of APAC-Consumer has trend and seasonality.
- On the similar lines as Sales data, we can go with Holt Winter's method or SARIMA method.
- SARIMA is better as the data points are more than 10.
- Refer the next slide for the graphs of the Quantity data.


Quantity data
Quantity
900
800
700
600
500
400
300
200
100
2011
2012
2013
2014
2015
Order Date
Observed
750
500
250
Trend
600
500
400
300
Seasonal
1.25
1.00
0.75
Residual
1.2
1.0
0.8
0.6
2011
2012
2013
2014
2015
Order Date

Smoothing Techniques and results for Sales

Method	MAPE	Graph
Naive method	26.86	
Simple Average method	38.18	
Simple Moving Average method	27.40	
Simple exponential smoothing	27.28	
Holt exponential smoothing	24.63	
Holts-Winter Additive smoothing	40.05	
Holts-Winter Multiplicative smoothing	39.39	

ARIMA set of Techniques and results for Sales

Method	MAPE	Graph
Autoregressive AR	27.27	
Moving Average MA	81.64	
Autoregressive moving average ARMA	77.66	
Autoregressive integrated moving average ARIMA	77.66	
Seasonal autoregressive integrated moving average SARIMA	14.89	

Best Technique for Sales forecast

- The technique which works best for sales forecast is SARIMA as it has less MAPE value compared to others and from graph also we can see that forecast is most accurate with SARIMA.

Smoothing Techniques and results for Quantity

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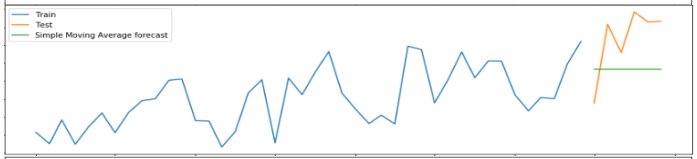
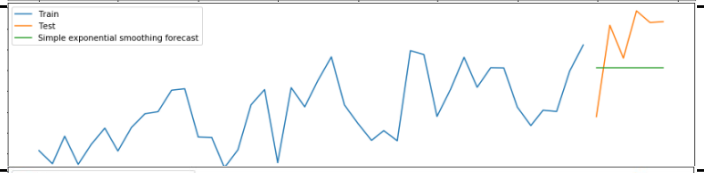
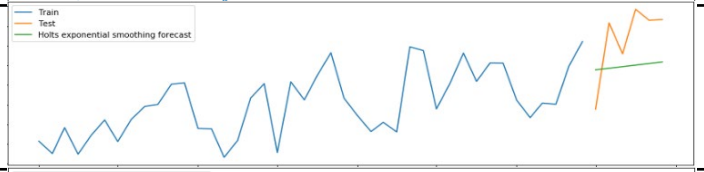
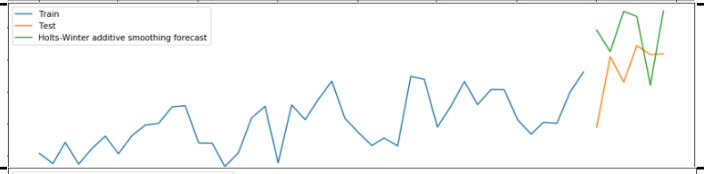
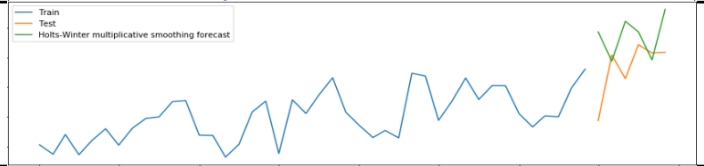
Simple Moving Average method	27.40	
Simple exponential smoothing	27.28	
Holt exponential smoothing	24.63	
Holts-Winter Additive smoothing	40.05	
Holts-Winter Multiplicative smoothing	39.39	

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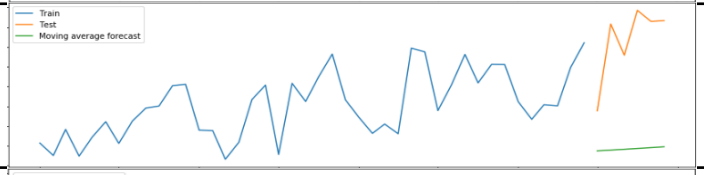
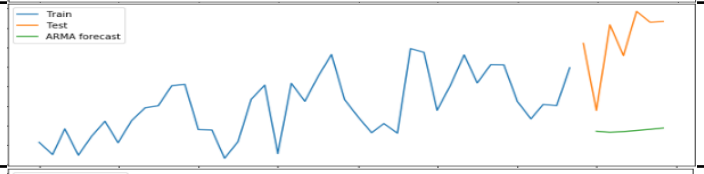
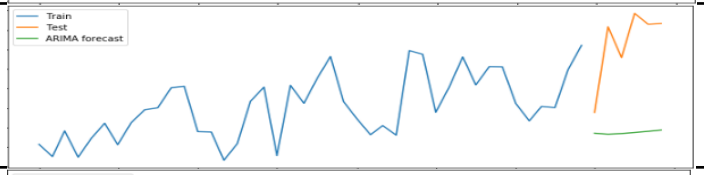
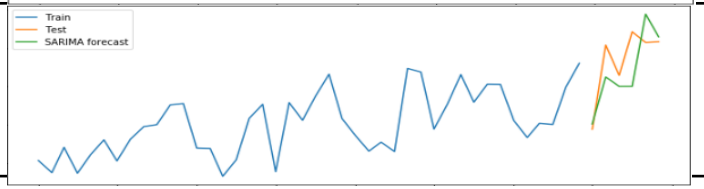
Moving Average MA	81.64	
Autoregressive moving average ARMA	77.66	
Autoregressive integrated moving average ARIMA	77.66	
Seasonal autoregressive integrated moving average SARIMA	14.89	

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