RETAIL GIANT SALES

FORECASTING ASSIGNMENT

BY – PERINKUMAR PATEL

PROBLEM STATEMENT

- 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 & 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.

Data reading and cleaning

- import the data

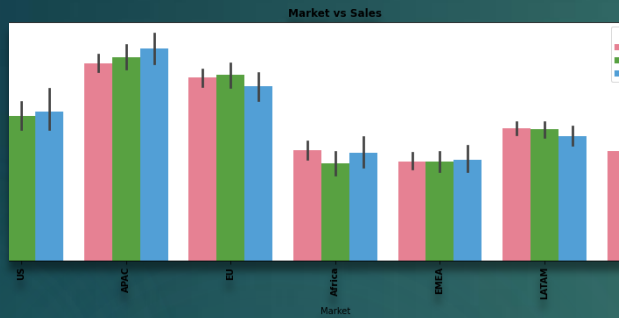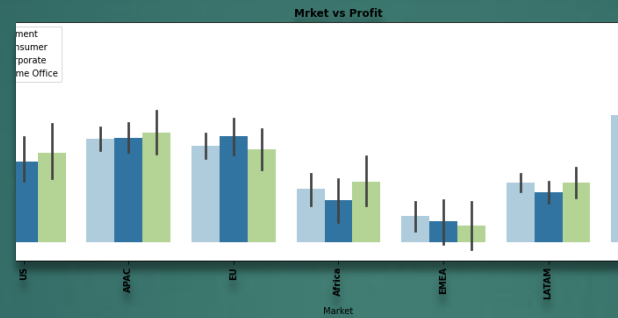- Checking Null values, shape and Describe

7 Geographical Market Segments
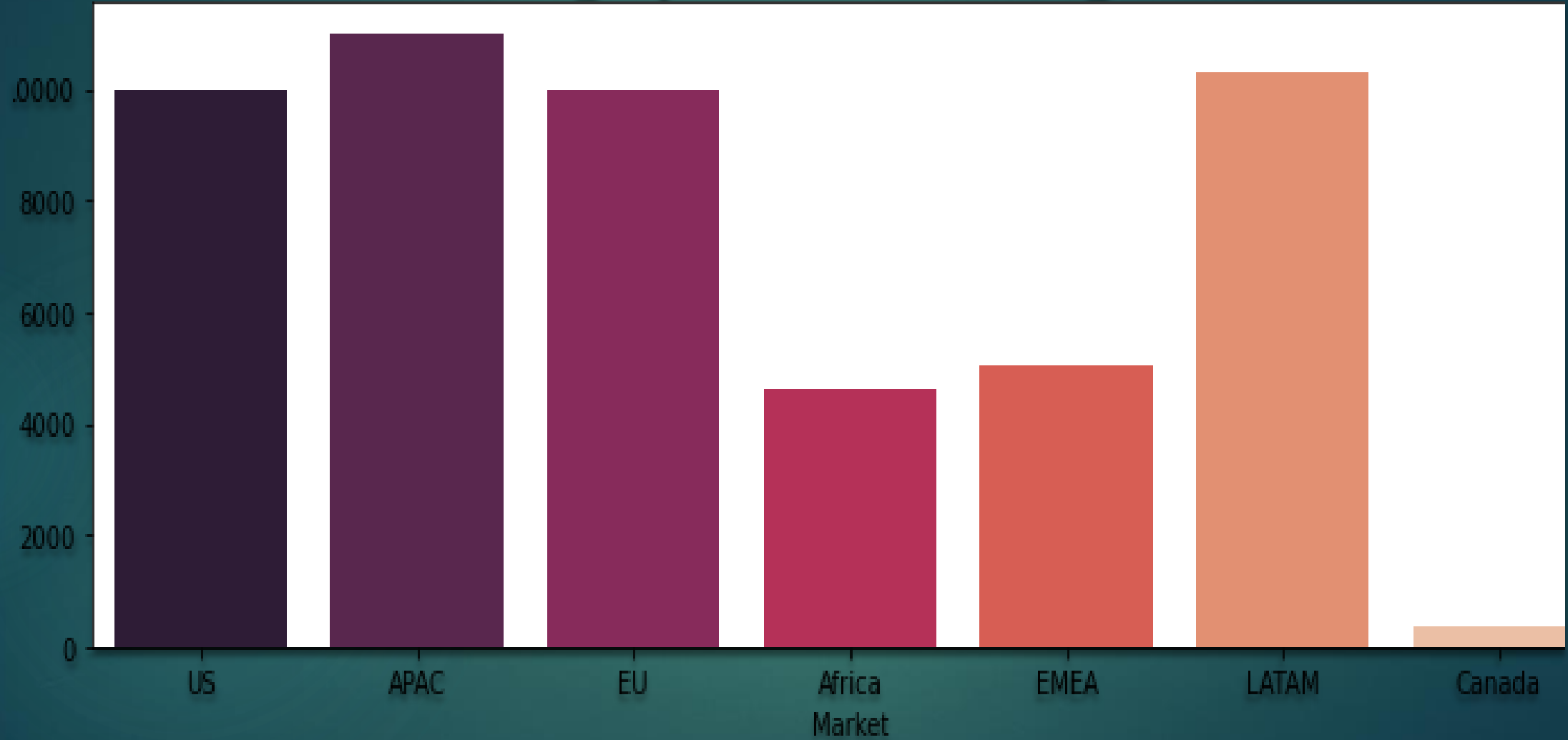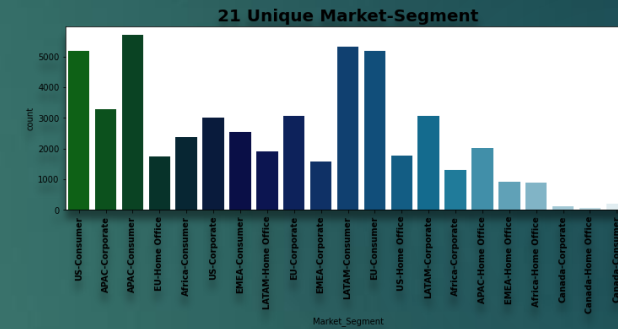
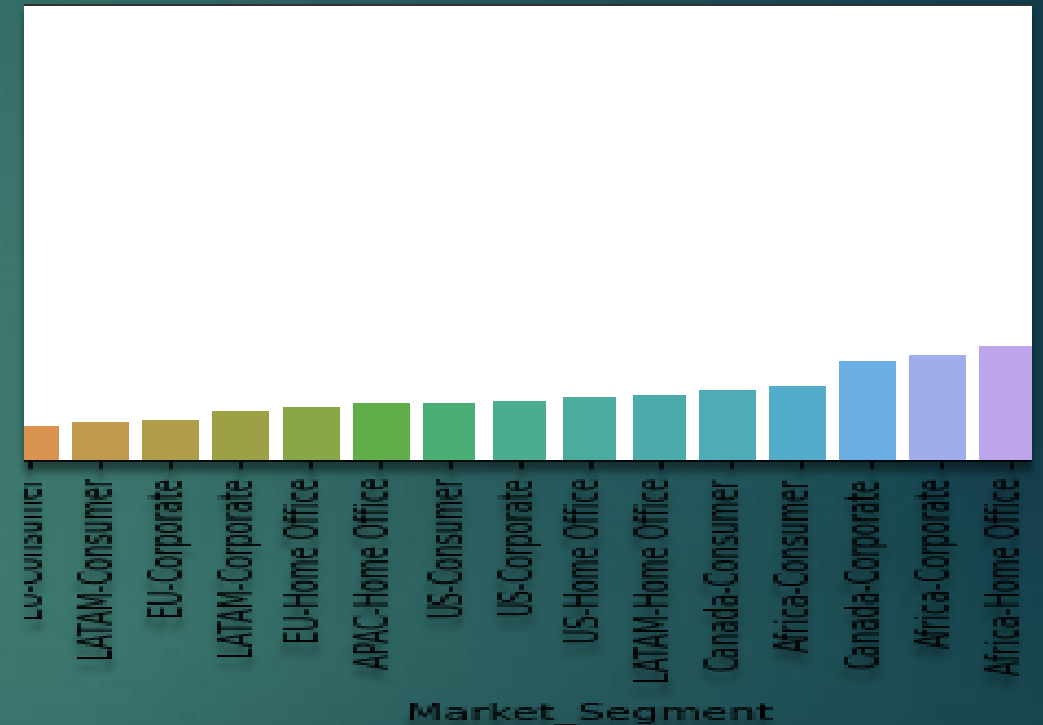# 3 Major Customer Segment

Market Segment
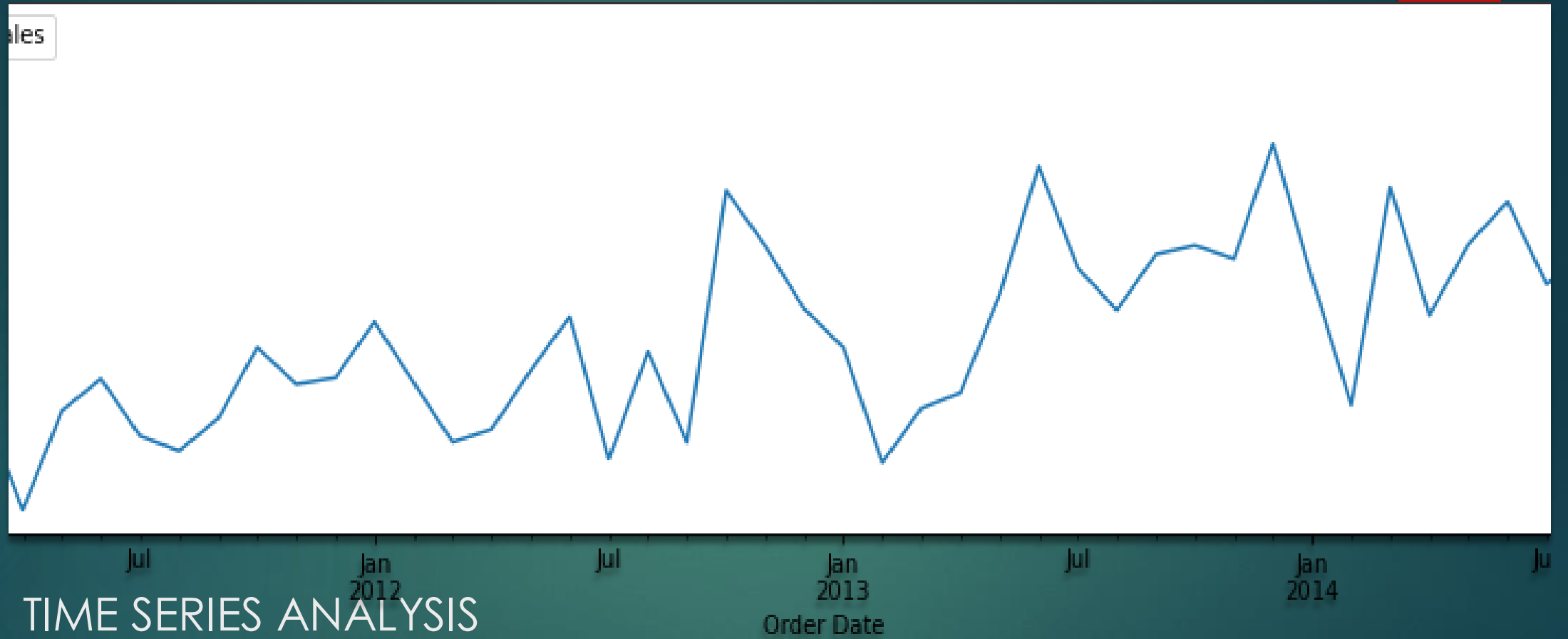

- Market vs Sales

- Market vs Profit

- Unique Market Segment

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

• So, here we can see that our lowest CoV value is 0.5227 and which corresponds to APAC_Consumer in the Bar plot.

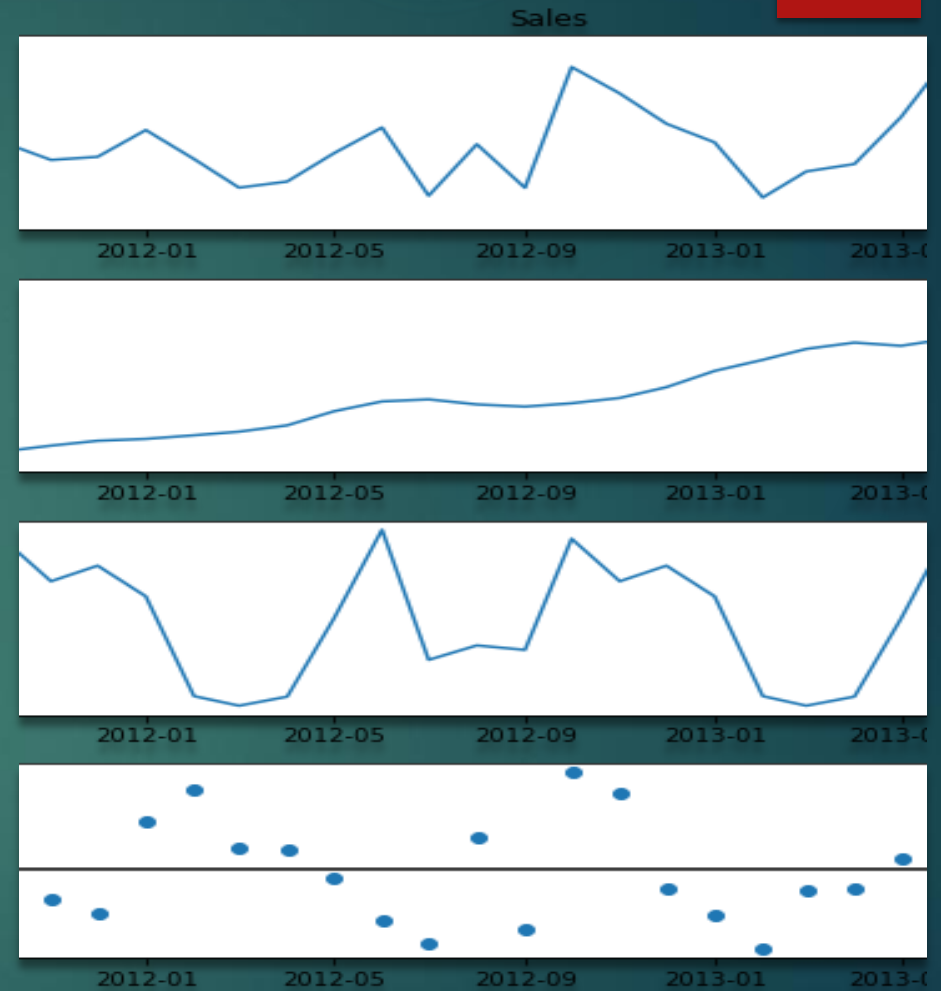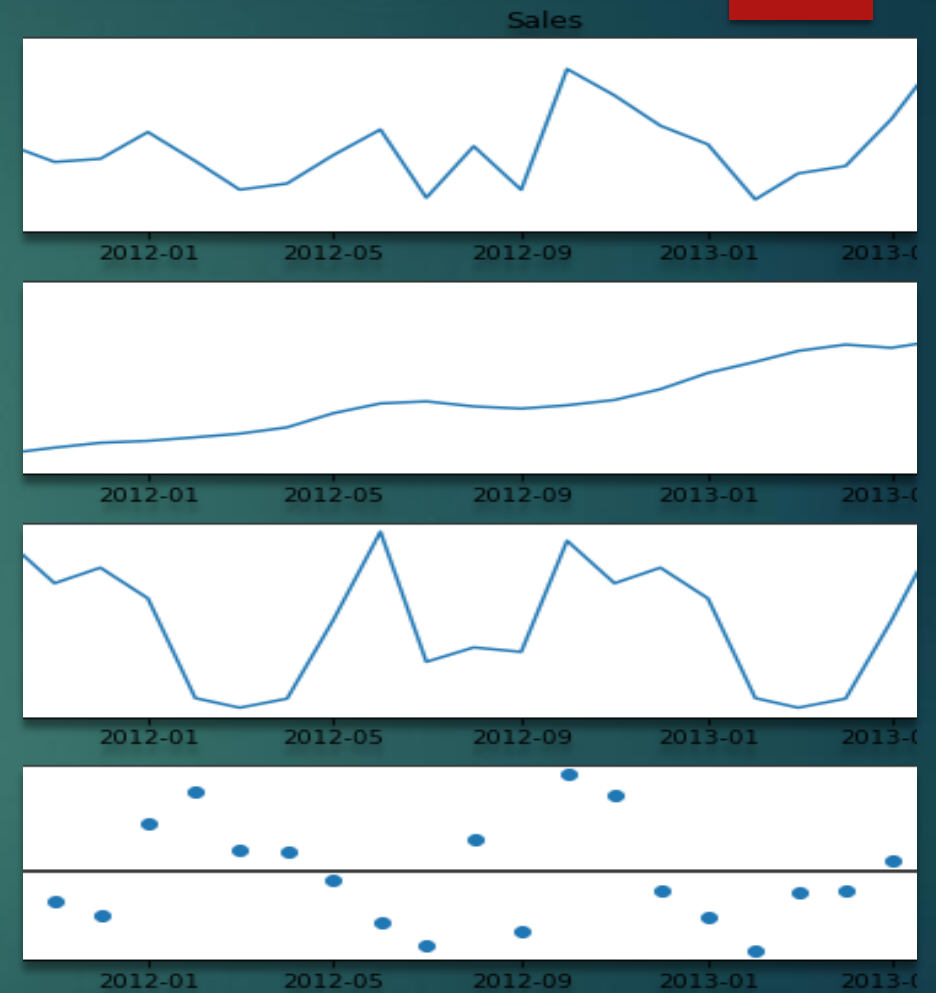• So, we can say that the APAC_Consumer is the most profitable Market Segment

Retail Giant Sales

TIME SERIES ANALYSIS

TIME SERIES DECOMPOSITION
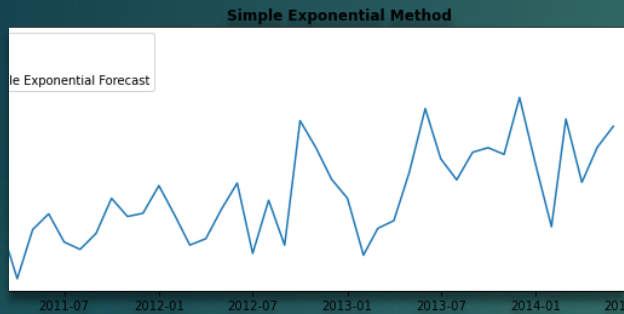
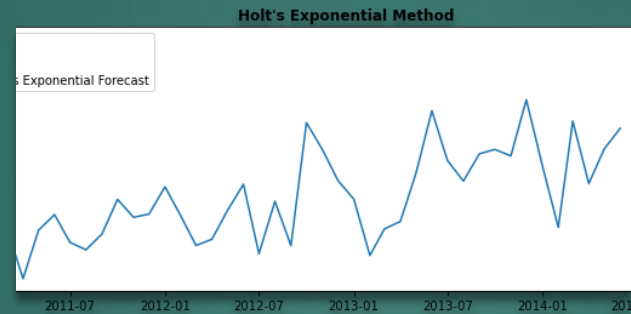- Additive seasonal Decomposition

Sales

TIME SERIES DECOMPOSITION

- Multiplicative seasonal Decomposition

Sales

EXPONENTIAL SMOOTHING METHOD

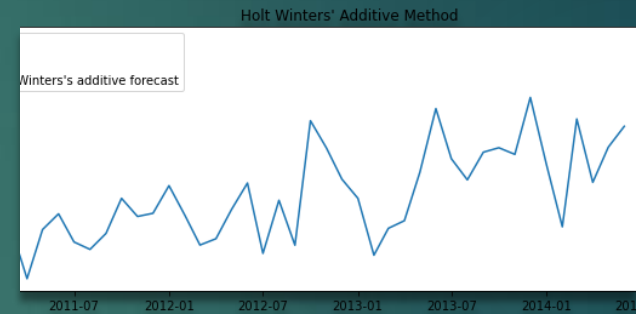
Simple Exponential Method

Holt's Exponential Method

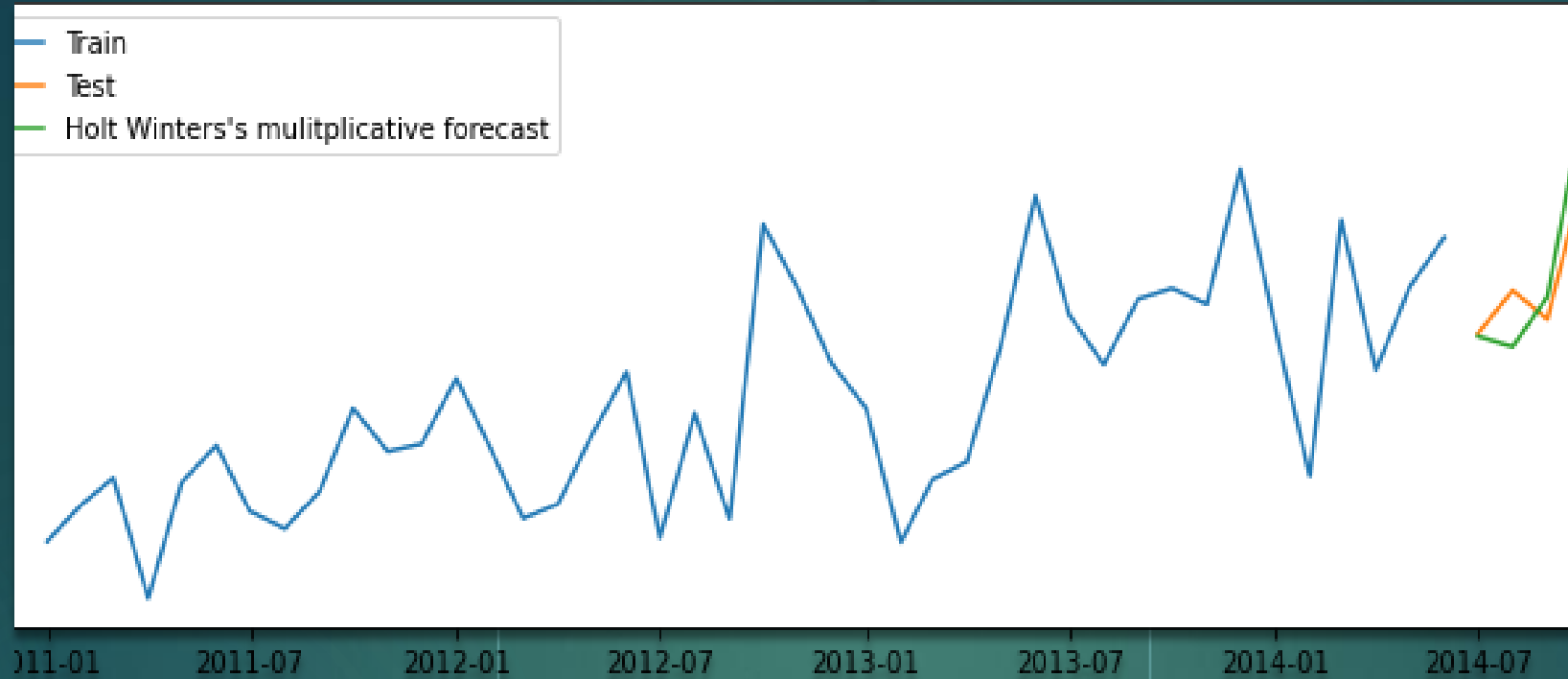Holt Winters' Additive Method

- Simple exponential smoothing

- Holt's Exponential Smoothing

- Holt Winters' additive method with trend and seasonality

Holt Winters' Mulitplicative Method

- Holt Winter's multiplicative method with trend and seasonality

Method	RMSE	MAPE
0	Naive Method	12355.97	17.47
0	Simple average method	24146.06	34.34
0	Simple moving average forecast	14756.73	15.82
0	Simple exponential smoothing forecast	14627.34	15.74
0	Holt's exponential smoothing method	18976.37	34.57
0	Holt Winters' additive method	9306.82	10.17
0	Holt Winters' multiplicative method	9423.23	11.43

EXPONENTIAL SMOOTHING METHOD
- So, Here we can clearly see that the Holt Winter's additive Method is giving the better forecast as compare to other forecast methods as it has very low RMSE and MAPE as compare to other's

AUTO REGRESSIVE METHODS

- ADF Statistics: -3.376024

- Critical Value @ 0.05: -2.93

- P-value: 0.011804

- Null Hypothesis$(H0)$(H0): The series is not stationary $p-value$>0.05p−value>0.05

- Alternate Hypothesis:$(H1)$(H1) The series is stationary $p-value$<=0.05p−value<=0.05

- Here we can see that p-value is 0.011804 which is less than 0.05 . So we can now say that it is stationary. • And Reject the Null Hypothesis(HO)

KWIATKOWSKI-PHILLIPS-SCHMIDT-SHIN (KPSS) TEST

- KPSS Statistic: 0.577076

- Critical Values @ 0.05: 0.46

- p-value: 0.024720 • • Null Hypothesis$(H0)$(H0): The series is stationary $p-value$>0.05p−value>0.05

- Alternate Hypothesis:$(H1)$(H1) The series is not stationary $p-value$<=0.05p−value<=0.05

- So, here the p-value is 0.024 which is also less than 0.05 . So it's not stationary

BOX COX TRANSFORMATION

- Box Cox transformation to make variance constant . Differencing to remove trend . Here we can see that the series is stationary

- And also the mean is centered around 0 . ADF Statistic: -4.535011 . Critical Values @ 0.05: -2.95 . p-value: 0.000170

- Here the p-value is 0.000170 which is less than 0.05 . So this series is stationary . and Rejects the NUll hypothesis(HO)

- KPSS Statistic: 0.156456 . Critical Values @ 0.05: 0.46 . p-value: 0.100000 . Here the p-value is 0.10 which is more than 0.05 . So the series is stationary. . And Fail to reject the Null Hypothesis (HO)
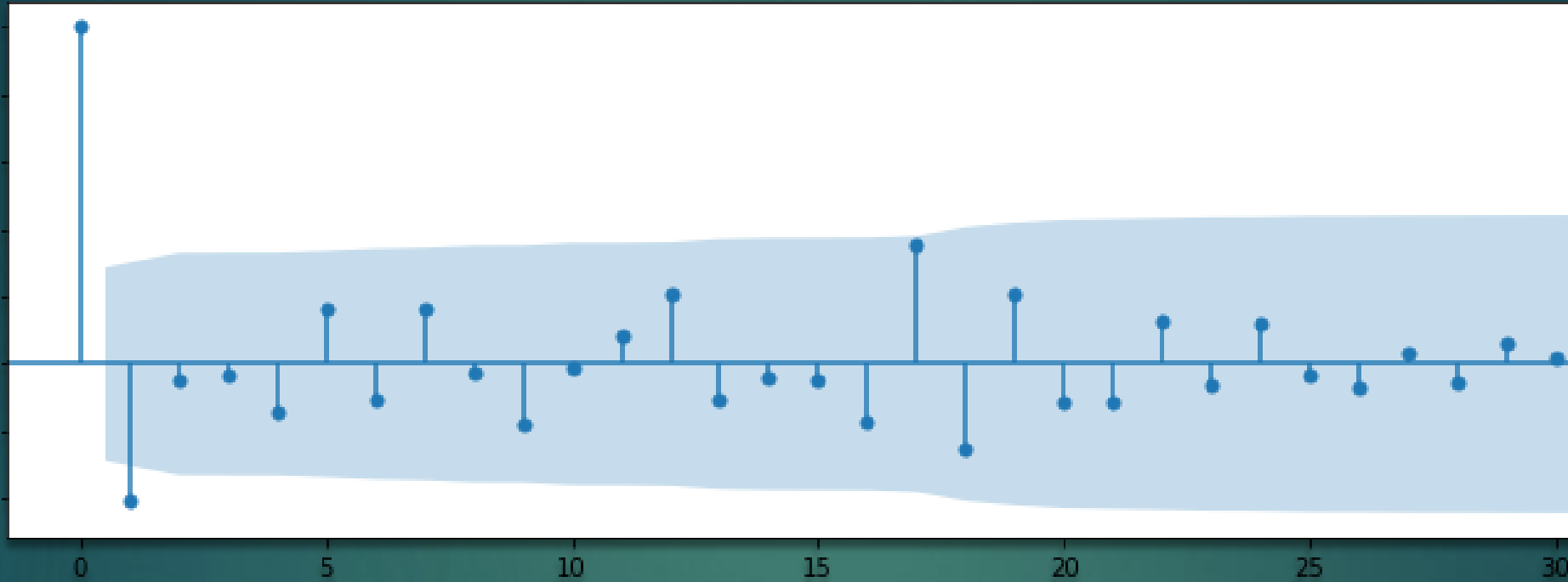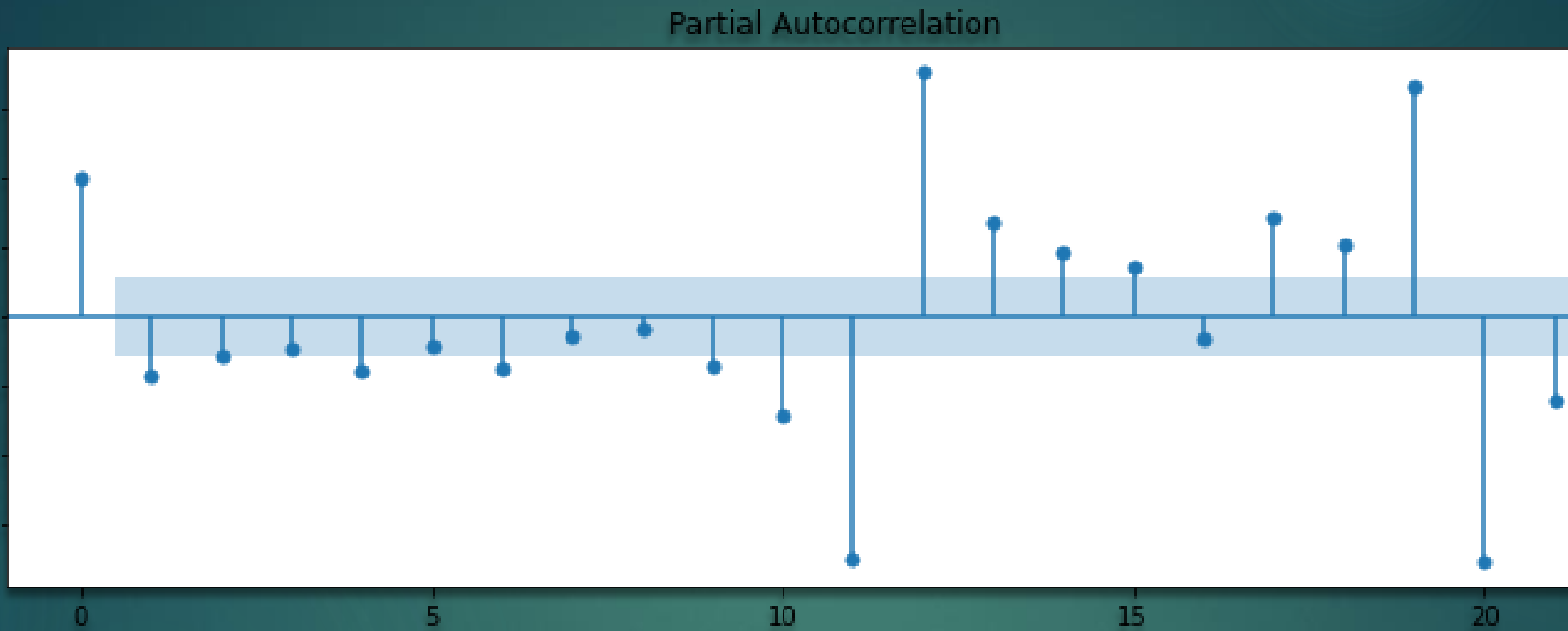
After BOX COX transformation
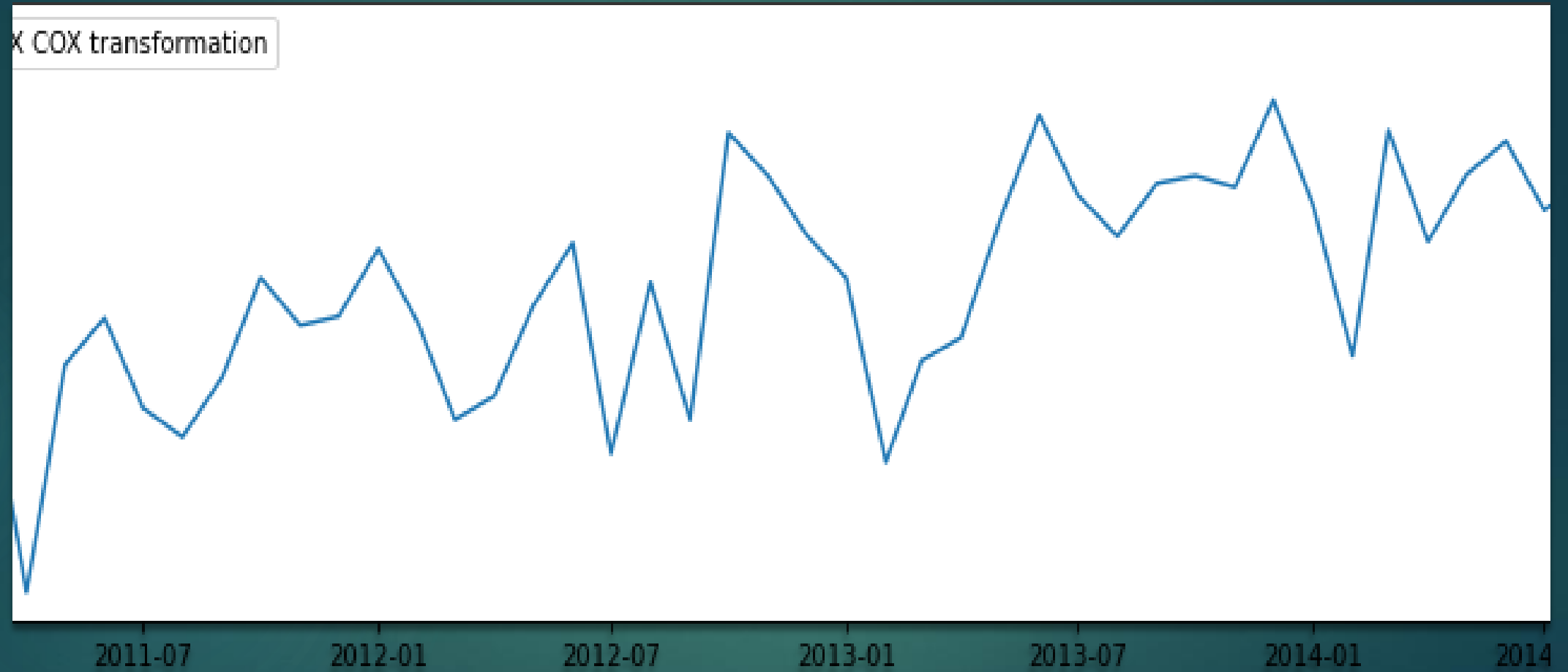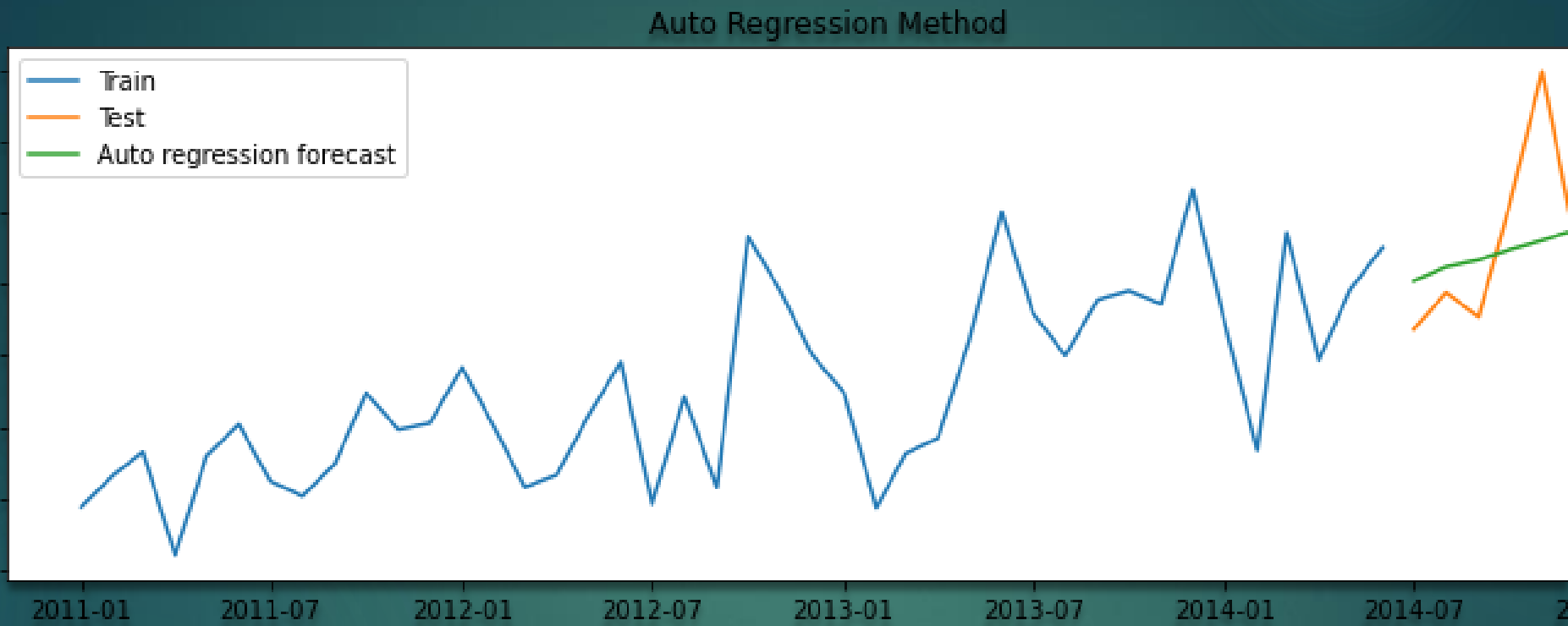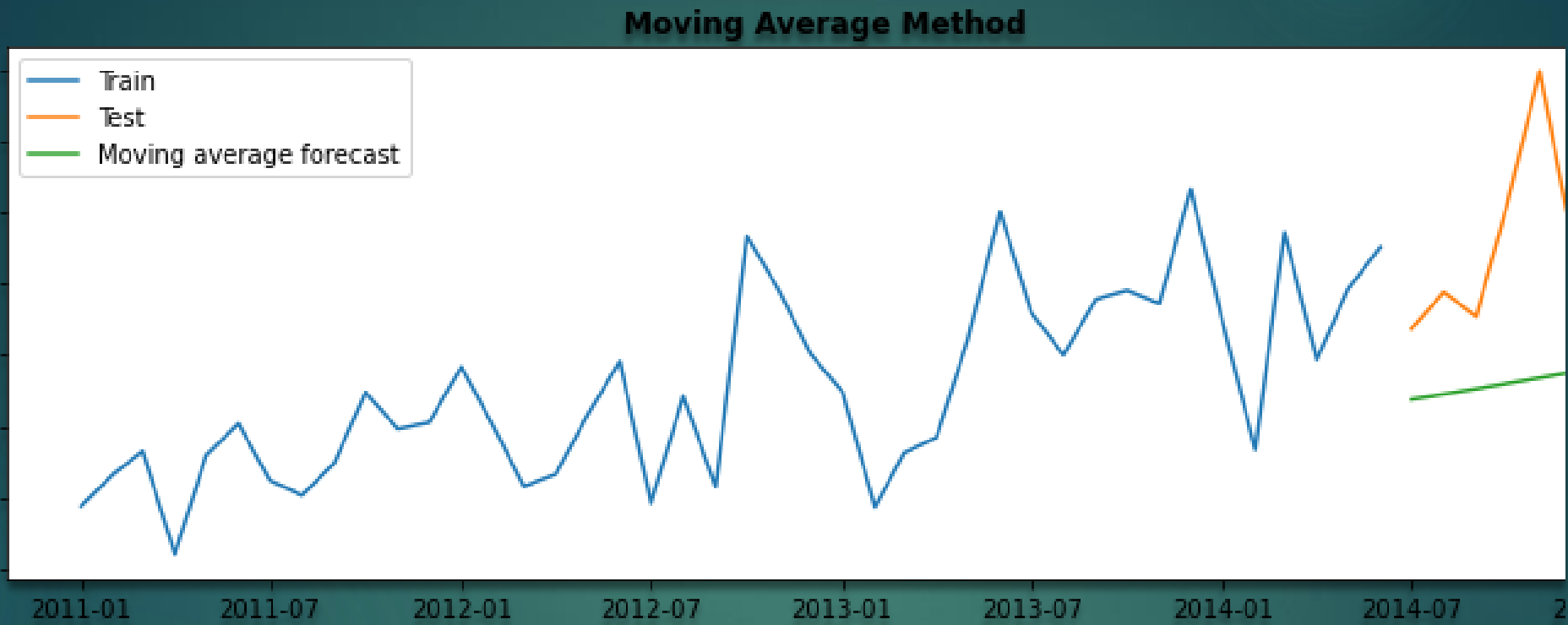
After BOX COX transformation and differencing
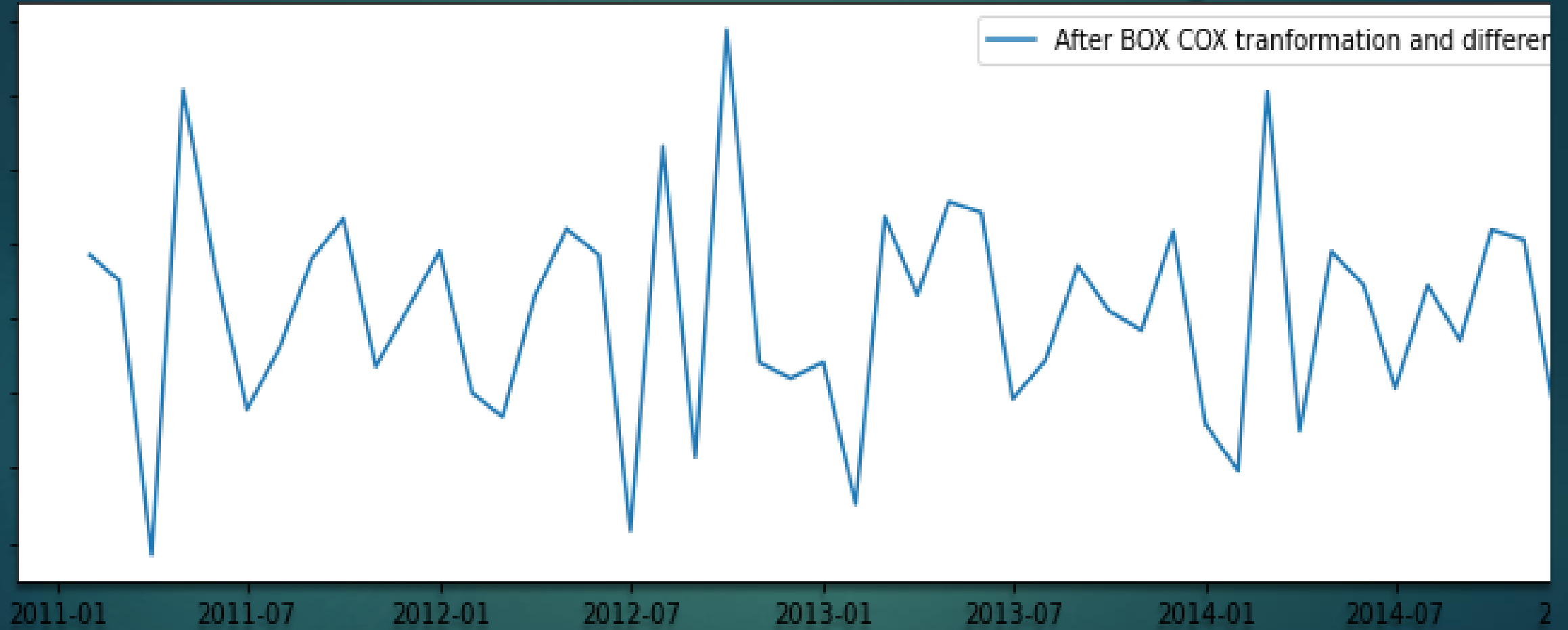
AUTOCORRELATION FUNCTION (ACF)
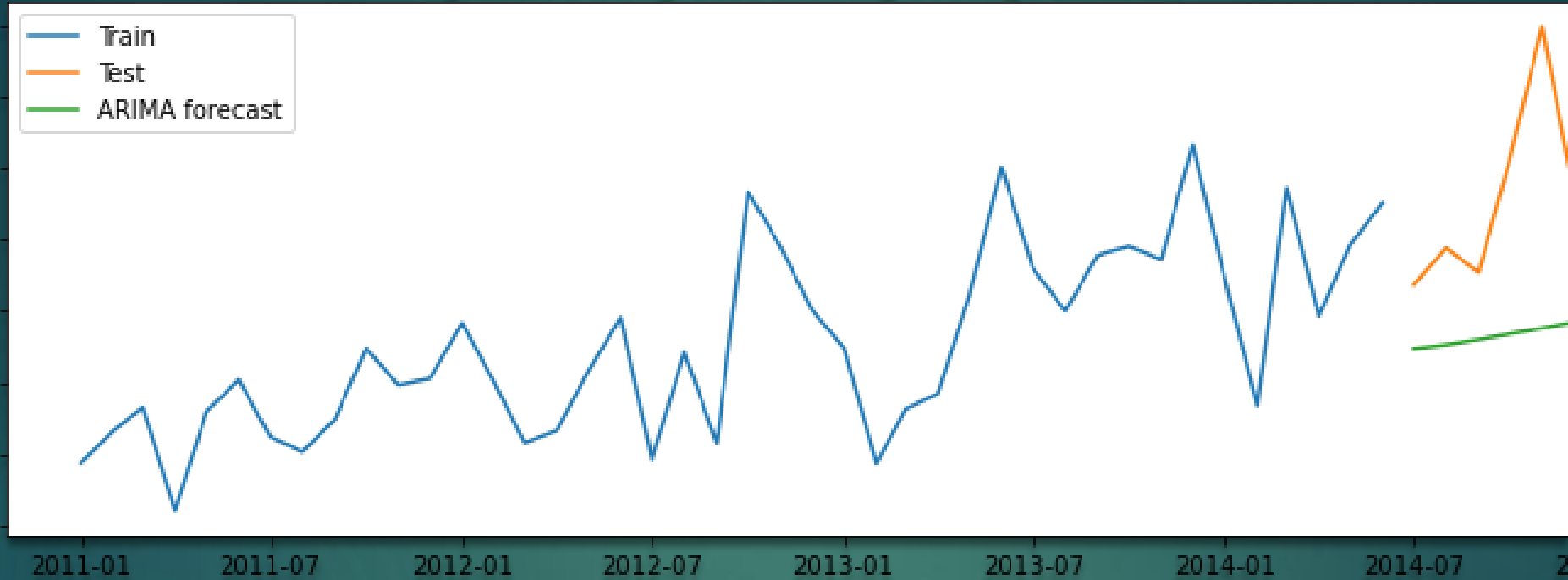
PARTIAL AUTOCORRELATION FUNCTION (PACF)
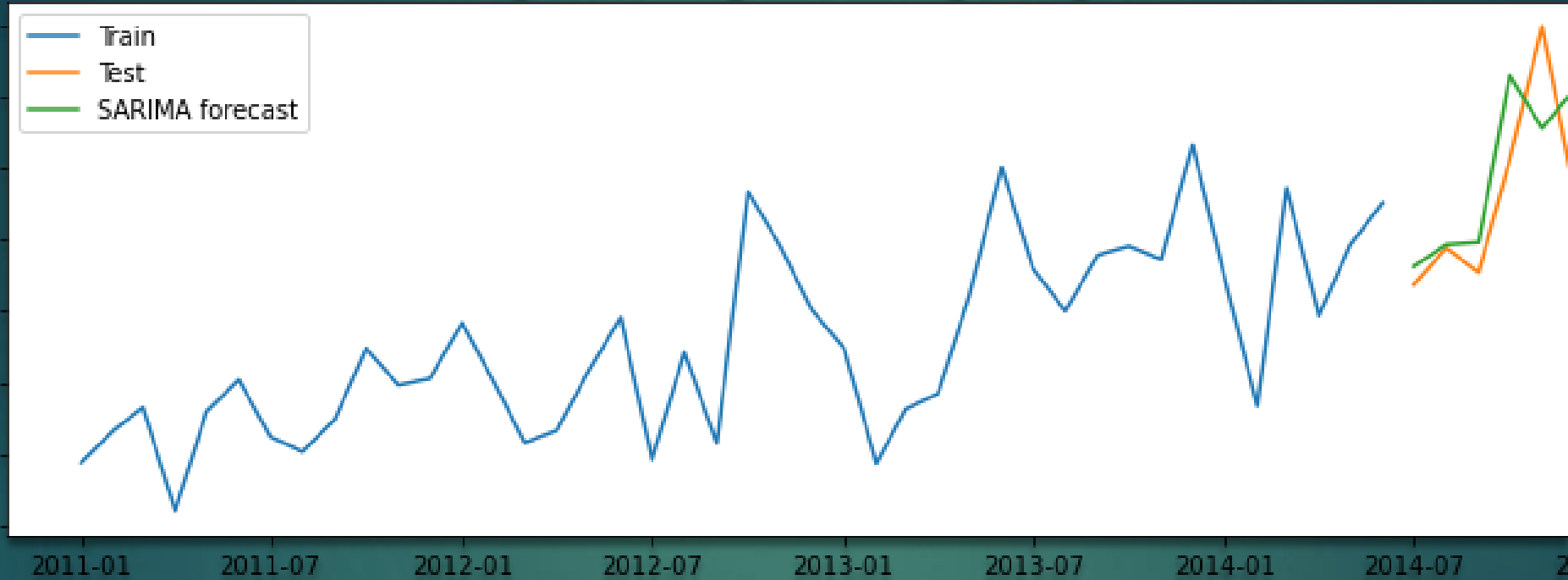
AUTO REGRESSION METHOD (AR)

MOVING AVERAGE METHOD (MA)

AUTO REGRESSIVE INTEGRATED MOVING AVERAGE (ARIMA)

Seasonal autoregressive integrated moving average (SARIMA) method

SEASONAL AUTO REGRESSIVE INTEGRATED MOVING AVERAGE (SARIMA)

CONCLUSION

▶ We Conclude the Holt Winters' additive method in the smoothing techniques whose forecast is able to predict the sales closer to the actual values and whose MAPE values is the least among all the methods done above.

▶ And also We Conclude that Seasonal autoregressive integrated moving average (SARIMA) method whose forecast is able to predict the sales closer to the actual values and whose MAPE values is the least among all the methods done in the ARIMA above.