

The background is a dark blue-grey color. It features several thin, gold-colored lines that form abstract geometric shapes, including triangles and polygons, scattered across the slide. A central gold-bordered rectangle contains the title text.

TIME SERIES ANALYSIS

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CONTENTS

1

ABOUT THE DATASET

2

TIME SERIES PLOT

3

HOLT & WINTER'S
TRIPLE EXPONENTIAL
SMOOTHING

4

ACF AND PACF PLOTS

5

SEASONAL ARIMA
MODEL

6

RESULTS &
CONCLUSION



PROBLEM STATEMENT

Using the Walmart data for (store 2 department 16), the objective here is to forecast weekly sales.

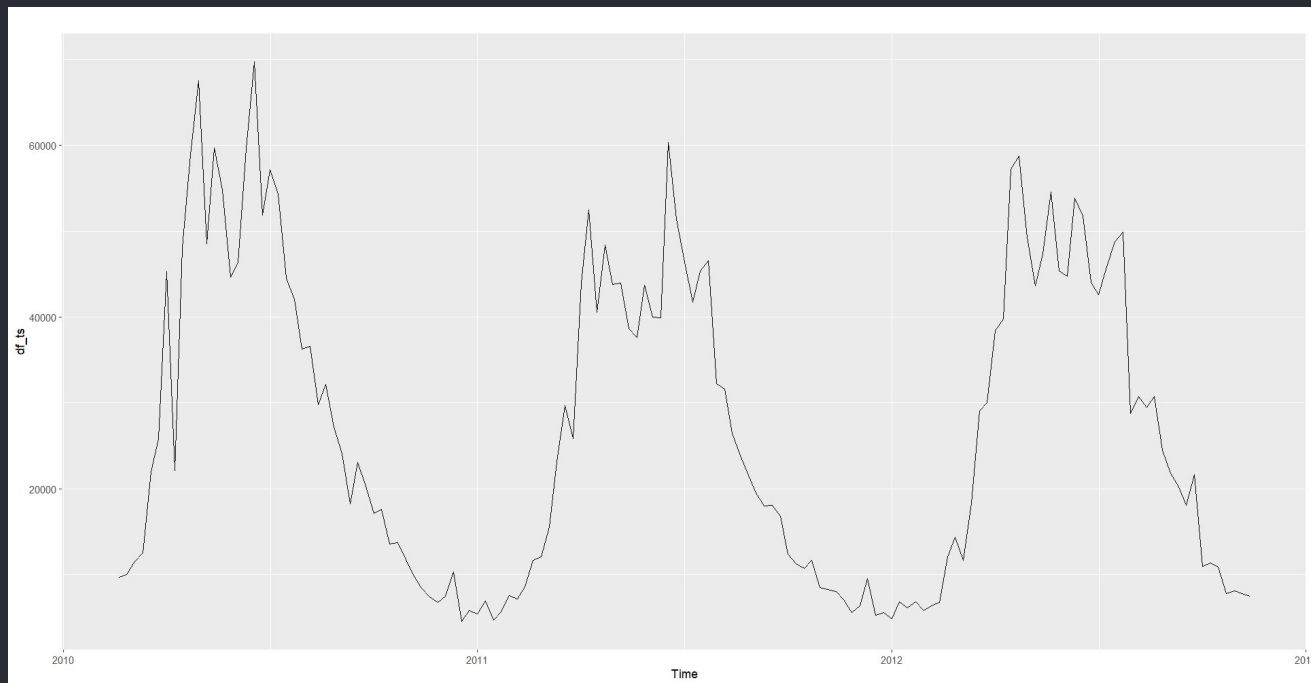
ABOUT THE DATASET

- The dataset is based on historical sales from 45 Walmart locations across the country.
- There are numerous departments in each store.
- For time series analysis, we choose Store 2 department 16 from among these departments.

OBSERVATIONS WITH HOLIDAY

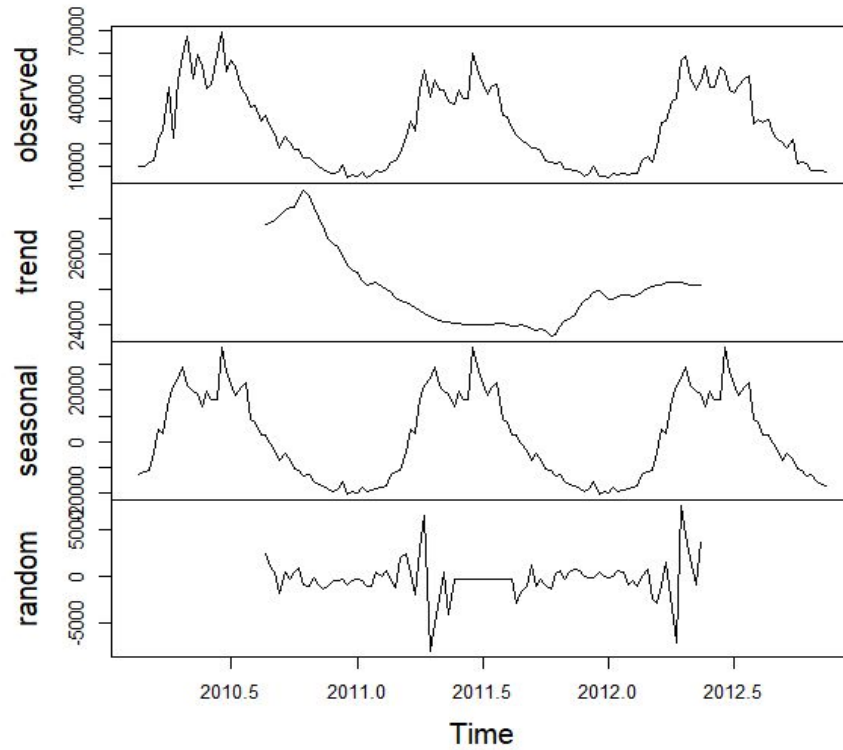
Store	Dept	Date	Weekly_Sales	IsHoliday
2	16	11-02-2011	12075.76	TRUE
2	16	09-09-2011	16794.46	TRUE
2	16	25-11-2011	9528.26	TRUE
2	16	30-12-2011	6120.69	TRUE

TIME SERIES PLOT

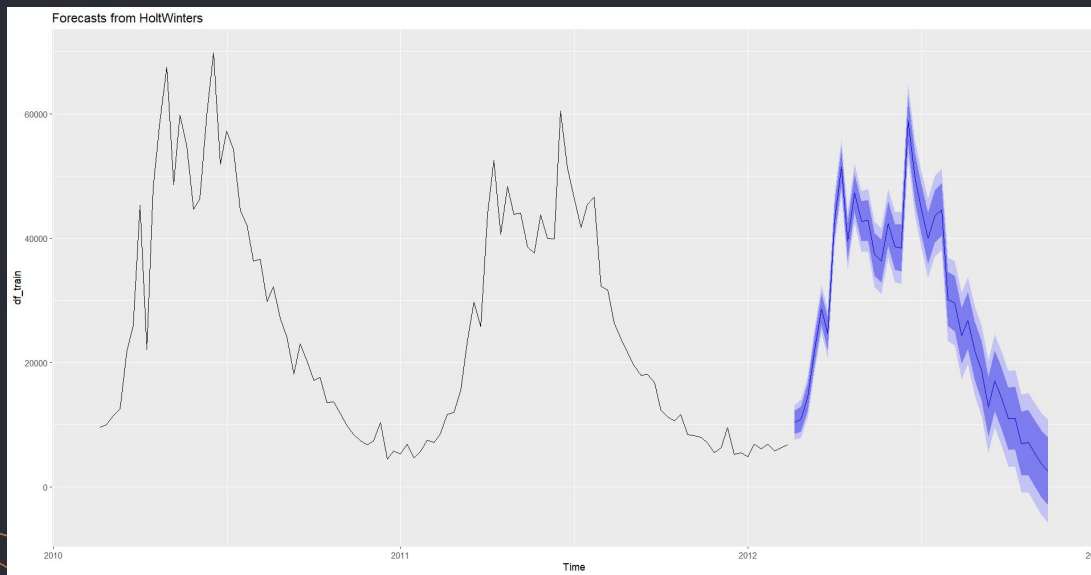


- Visible decreasing trend.
- Seasonality present.

Decomposition of additive time series



HOLT AND WINTER'S TRIPLE EXPONENTIAL SMOOTHING



KPSS TEST FOR STATIONARITY

The KPSS test, short for, Kwiatkowski-Phillips-Schmidt-Shin (KPSS), is a type of Unit root test that tests for the stationarity of a given series around a deterministic trend.

Null Hypothesis (H_0): Series is trend stationary or series has no unit root.

Alternate Hypothesis (H_A): Series is non-stationary or series has a unit root.

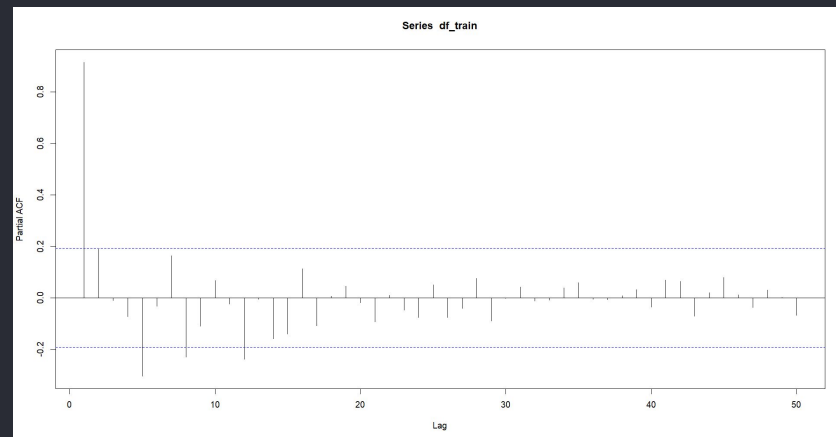
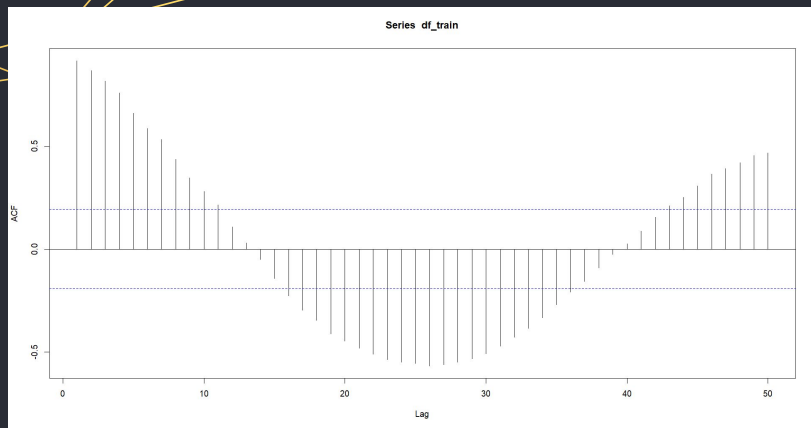
If Test statistic < Critical Value and p-value > 0.05 – Fail to Reject Null Hypothesis(H_0) i.e., time series does not have a unit root, meaning it is trend stationary.

Results

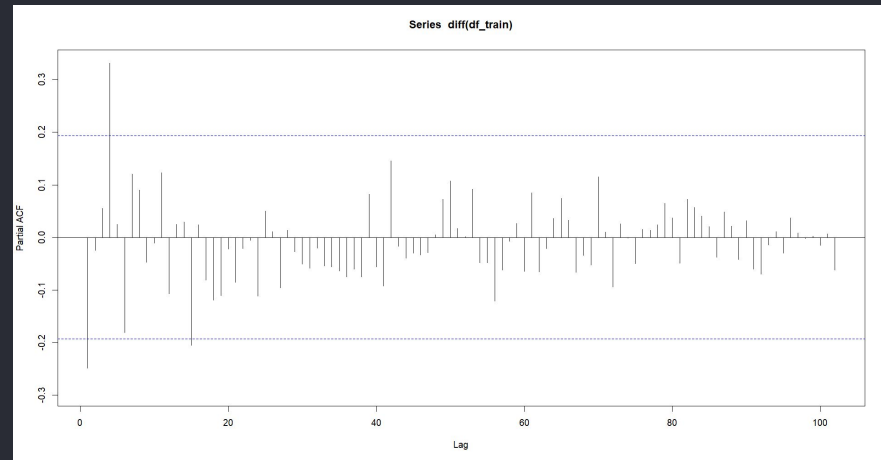
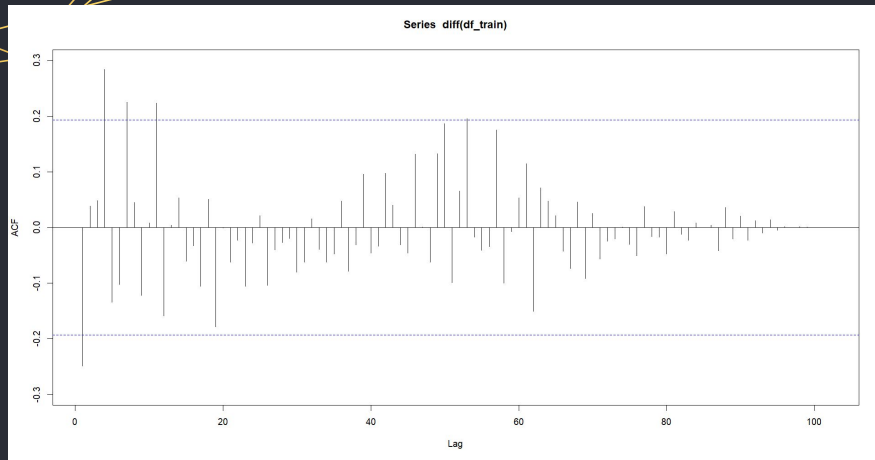
```
> st$p.value  
[1] 0.06688851
```

Here, the p value is greater than 0.05 so we fail to reject the null hypothesis and conclude that the series is stationary.

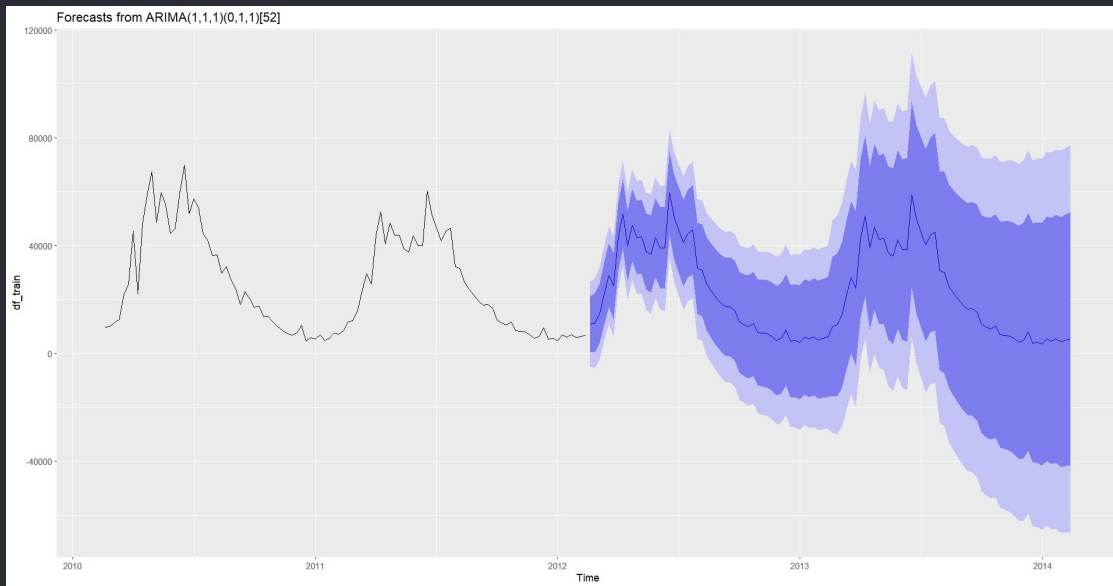
ACF AND PACF PLOTS



ACF AND PACF PLOTS WITH DIFFERENCING



SEASONAL ARIMA MODEL



- seasonal Arima order (1,1,1)
- seasonal (0,1,1)
- With differencing of order 1

RESULTS

Holt-Winter's Triple Exponential Smoothing

```
> accuracy(forecasthw)
```

	ME	RMSE	MAE	MPE	MAPE	MASE	ACF1
Training set	14.45152	1427.172	836.5723	0.1802655	7.641235	0.1546329	0.08606039

Seasonal Arima Model

```
> accuracy(aa_m)
```

	ME	RMSE	MAE	MPE	MAPE	MASE	ACF1
Training set	-546.5133	5341.613	2326.585	-1.696656	8.481877	0.4300485	0.005704768

CONCLUSION

For the chosen dataset, the best model suggested will be Holt Winter's Triple exponential Smoothing.

From the model we predict that the sales will have a sudden increase in the months of March to July.

Our Recommendation

- We recommend the store manager to increase the stocks in the inventory during the months of March to July.
- Spend marketing, offers can be raised during this period.

REFERENCES

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THANK YOU !