wKey Results Interpretation

Dickey-Fuller Statistic = -4.533:

This is the test statistic for the ADF test. The more negative this value is, the more likely we are to reject the null hypothesis that the data is non-stationary.

Lag order = 12:

This indicates the number of lagged differences included in the test to account for higher-order autocorrelation.

p-value = 0.01:

The p-value indicates the probability of observing the test results under the null hypothesis. Typically, if the p-value is less than 0.05, we reject the null hypothesis. Here, the p-value is 0.01, which is very low, suggesting strong evidence against the null hypothesis.

Conclusion

Null Hypothesis (H0): The data is non-stationary.

Alternative Hypothesis (H1): The data is stationary.

Given the p-value of 0.01, which is much less than the standard threshold of 0.05, we reject the null hypothesis. This means we have significant evidence to conclude that the time series data is stationary.

A stationary time series implies that its statistical properties, such as mean, variance, and autocorrelation, are constant over time. This is a crucial assumption for many time series modeling techniques, such as ARIMA, as it generally leads to better model performance and more reliable forecasts.

The ADF test on the original data indicated that it was stationary, and the test on the differenced data also shows stationarity, with even stronger evidence (more negative Dickey-Fuller statistic). Differencing is a common technique used to achieve stationarity in a time series that is originally non-stationary. The strong stationarity observed after differencing confirms that the differencing step has effectively removed trends or seasonality, making the data suitable for further time series analysis and modeling, such as ARIMA.

Series: ts\_data

ARIMA(5,1,1)

Coefficients:

ar1 ar2 ar3 ar4 ar5 ma1

0.4755 -0.0019 -0.0729 -0.0030 -0.0525 -0.7343

s.e. 0.0631 0.0288 0.0266 0.0273 0.0272 0.0599

sigma^2 = 1497: log likelihood = -10187.17

AIC=20388.34 AICc=20388.39 BIC=20427.57

Training set error measures:

ME RMSE MAE MPE MAPE

Training set -0.7742184 38.62975 23.04702 -9.063423 25.04407

MASE ACF1

Training set 0.3394335 -0.0005766346

The results of the Ljung-Box test suggest that the residuals of your fitted ARIMA(5,1,1) model do not exhibit significant autocorrelation. This indicates that the model has adequately captured the underlying structure of the time series data. The absence of significant autocorrelation in the residuals is a good sign, suggesting that the model is a good fit for the data.