

STA 3180 Statistical Modelling: Time Series

1. Given a time series of monthly sales data, calculate the mean and standard deviation of the series.

Solution: The mean of the series is calculated by taking the sum of all the values in the series and dividing it by the number of values in the series. The standard deviation is calculated by taking the square root of the sum of the squared differences between each value in the series and the mean, divided by the number of values in the series minus one.

2. Calculate the autocorrelation coefficient for a given time series.

Solution: The autocorrelation coefficient is calculated by taking the covariance of the series with itself at different lags, divided by the variance of the series.

3. Calculate the partial autocorrelation coefficient for a given time series.

Solution: The partial autocorrelation coefficient is calculated by taking the correlation between the series and its lagged values, controlling for the effects of the intervening lags.

4. Fit an ARIMA model to a given time series.

Solution: An ARIMA model is fitted by first determining the order of the model (p, d, q) based on the autocorrelation and partial autocorrelation functions of the series. Then, the parameters of the model are estimated using maximum likelihood estimation.

5. Calculate the forecast error for a given time series.

Solution: The forecast error is calculated by taking the difference between the actual value of the series and the forecasted value, for each period in the series.

6. Calculate the mean absolute percentage error for a given time series.

Solution: The mean absolute percentage error is calculated by taking the average of the absolute values of the forecast errors, divided by the average of the actual values of the series.

7. Calculate the root mean square error for a given time series.

Solution: The root mean square error is calculated by taking the square root of the average of the squared forecast errors.

8. Calculate the mean absolute deviation for a given time series.

Solution: The mean absolute deviation is calculated by taking the average of the absolute values of the forecast errors.

9. Calculate the mean squared error for a given time series.

Solution: The mean squared error is calculated by taking the average of the squared forecast errors.

10. Calculate the Durbin-Watson statistic for a given time series.

Solution: The Durbin-Watson statistic is calculated by taking the sum of the squared differences between consecutive values in the series, divided by the sum of the squared values in the series.