ISA 444: Business Forecasting

19 - ARIMA Models

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Outline

Recap of What we Have Covered Last Two Classes

ARMA Models: Models we considered may have two components, an autoregressive component (AR) and a moving average component (MA).

Main Learning Outcomes from Last Class

- **Describe the behavior of the ACF and PACF of an AR(p) process.**
- **Describe the behavior of the ACF and PACF of an MA(q) process.**
- **Describe the behavior of the ACF and PACF of an ARMA (p,q) process.**
- **Fit an ARMA model to a time series, evaluate the residuals of a fitted ARMA model to assess goodness of fit, use the Ljung-Box test for correlation among the residuals of an ARIMA model.**

Learning Outcomes for Today's Class

Main Learning Outcomes

- **Use nonseasonal differencing to attain stationarity for a time series.**
- **Fit an AIRMA model to a time series, evaluate the residuals of a fitted ARMA model to assess goodness of fit, use the Ljung-Box test for correlation among the residuals of an ARIMA model.**
- **R: Convert data into a time-series (xts insead of ts objects), and forecast future values of a time-series**

Outline

Exam 2 Walk-Through

In class, we will go through each of the questions for Exam 2 to make sure that everyone has a good understanding of the concepts that I evaluated in Exam 2.

Outline

ARIMA Models for Nonstationary Processes

When the time series is nonstationary, differencing can be used to transform the series. The ADF or KPSS tests can be used to test for stationarity, and the `ndiffs()` function is useful for determining the number of differences necessary to achieve stationarity.

A Live-Example

In class, we will use the GNP Data to highlight how ARIMA models can be fit and used for forecasting.

Things to Do to Prepare for Next Class

- Thoroughly read Chapters 6.2 of our textbook.
- Go through the slides, examples and make sure you have a good understanding of what we have covered.
- **Practice:** For the file titled: 18 - inclass ARMA Practice.csv, please identify: (a) whether Series 1-20, fit the appropriate ARIMA(p, d, q) model and use the `checkresiduals()` to ensure that your residuals are uncorrelated.

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