STAT 443: Time Series and Forecasting

Course Outline

Contact Information

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Aim of the course

The course aims to provide learners with a toolkit for the understanding and application of a range of key methods in the field of time series. Fundamental ideas in both the time and frequency domain analysis of time series will be described.

Objectives

On completing the course, students should be able to demonstrate an understanding of the techniques and applications of well–known ideas in time series such as autocorrelation, stochastic models (including the ARIMA and GARCH families), popular forecasting methods and spectral analysis for univariate time series.

Teaching methods

In most lecture sessions an in–class activity followed by peer discussion and clicker questions will replace at least part of the lecture component. The in–class activities created for the course are useful tools to enhance student learning, and, as research shows, are far more effective than even the most polished traditional lectures on the same topics. Sometimes guided reading or other activities may be set at the end of one lecture to be completed prior to the next.

Textbook

Chatfield, C. (2004): *The Analysis of Time Series: An Introduction (6th edition)*. Chapman & Hall/CRC.

Assessment

- Written assignments: 14% (2 $\times$ 7% each)
- On-line WeBWorK homework: 10%
- Group project: 6%
- Labs: 5%
- In-class work (responses to clicker questions): 5%
- Mid-term: 20%
- Final exam: 40%

The usual university rules for extenuating circumstances and plagiarism apply.

Tentative course topics

Chapter 1: Exploratory techniques in time series analysis

Chapter 2: Stochastic models for time series

Chapter 3: Estimation and model fitting for time series

Chapter 4: Prediction for time series

Chapter 5: An introduction to the frequency domain

Chapter 6: Inference in the frequency domain

Chapter 7: Models for changing variance: GARCH processes (time permitting)