Preliminary schedule

Week 1

Lect 1 Introduction and overview. Multivariate random variables.
Lect 2 Multivariate random variables. Stochastic processes.
Reading instructions: Ch. 1, 2, 3.1-3.3
Problems: 2.1, 2.2, 2.3, 3.1, 3.4

Week 2

Lect 3 Stochastic processes.
Lect 4 Stochastic processes. Identification.
Reading instructions: Ch. 3, 4.1-4.2
Problems: 3.5-3.10, 3.12-3.15

Week 3

Lect 5 Identification.
Lect 6 Estimation.
Reading instructions: Ch. 4, 5.1-5.2
Problems: 4.1-4.4

Week 4

Lect 7 Model order selection.
Lect 8 Residual analysis.
Reading instructions: Ch. 5
Problems: 5.1-5.5, 5.8, 5.10-5.11

Week 5

Lect 9 Prediction.
Lect 10 Multivariate time series.
Reading instructions: Ch. 6, 7
Problems: 6.1-6.8

Week 6

Lect 11 Recursive estimation. State-space models.
Lect 12 The Kalman filter. Project discussion.
Reading instructions: Ch. 8
Problems: 7.1-7.4, 8.1-8.2

Week 7

No lecture this week.
Problems: 8.3-8.8

Problems The above listed problems should be viewed as suggestions for students wishing to further their knowledge of the material. It is not mandatory to complete these.

Webpage The detailed schedule, material, and news related to the course can be found at the course's Canvas page.

Time Series Analysis 2023

Introductory meeting and start of course
The introductory meeting takes place on Monday, October 30, 2023, at 15.15, in MA:G. See the webpage for details on the schedule where also office hours as given; without appointment, please respect these.

Course overview
Course credits: 7.5 hp.

The course is a project course, containing lectures, computer exercises and an independent project with both oral and written presentation.

Course content
Time series analysis deals with the modeling of stochastic systems, such as the air temperature, the price and demand of electricity, radar signals, EKG or option pricing on the stock market. The model structure is chosen partly from knowledge of the physical system, and partly by examining observed data measurements. Central problems are, for instance, the predictability of the model, how to estimate the model parameters in a robust way, estimation of the spectral content of the model, or other non-parametric descriptions of the system, as well as validation of the chosen model, i.e., how one should ensure that the model well describes the observed measurements.

Course literature
Andreas Jakobsson, ”An Introduction to Time Series Modeling”, 4th ed., Studentlitteratur, 2021. The book is available at, for instance, KFS Studentbokhandel and online.

Examination
The course examination consist of mandatory computer exercises, hand-ins, as well as a project. As a part of the examination, a detailed project report should be handed in, as well as the result disseminated in an oral presentation.

Project examination will take place on **18/12**, at 13-16, or on **12/1**, at 13-16 (choose either of the times). The take-home exam (required for higher grades) will be available at 12.00 on 4/1. The exam is due on **12/1**, at 13.15. Please see the course webpage for further details.

Lecturer
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