LTCC Basic Course

Title: Applied Bayesian Methods

Basic Details:

- Core Audience: Statistics
- Course Format: Basic/Core (10h)

Course Description:

- This course will introduce the Bayesian approach to statistical inference and develop relevant theory, methodology and computational techniques for its implementation.

- Syllabus:
  1. Introduction to Bayesian statistics
  2. Bayesian inference
  3. Prior distributions
  4. Graphical models
  5. Hierarchical models
  6. Markov chain Monte Carlo (MCMC: Gibbs sampling, Metropolis-Hastings)

- Recommended reading:
  1. P.M. Lee, Bayesian Statistics: An Introduction (Chapters 1-3, 2004, 3rd Edition: Arnold).
  2. J. Whittaker, Graphical Models in Applied Multivariate Statistics (Chapters 1-3, 1990, John Wiley & Sons).
  3. C.M. Bishop, Pattern Recognition and Machine Learning (Chapter 8 "Graphical models", 2006, Springer).
  4. A. Gelman, J.B. Carlin, H.S. Stern & D.B. Rubin, Bayesian Data Analysis (Chapter 5 "Hierarchical models", 2003, 2nd Edition: Chapman and Hall/CRC).
  5. W.R. Gilks, S. Richardson & D.J. Spiegelhalter (eds), Markov Chain Monte Carlo in Practice (Chapters 1, 2 and 5, 1996, Chapman & Hall/CRC).

- Prerequisites:
  1. Basic knowledge of probability, random variables, probability distributions (including joint and conditional distributions), frequentist hypothesis tests and confidence intervals.
  2. Preliminary reading (if not already familiar with prerequisite concepts):
     J.A.Rice, Mathematical Statistics and Data Analysis (3rd edition, Duxbury, 2007).
     Sections 1.0-3.6 (probability, random variables, distributions), 4.1-4.4 (expectation, variance, correlation) and 9.1-9.3 (hypothesis testing, confidence intervals).

Format:

- No. of discussion/problem sheets: 4
- Electronic lecture notes: copies of lecture slides will be provided
- Necessary support facilities: data projector, black- or white-board

Lecturer details:

- Lecturer: Petros Dellaportas
- Lecturer home institution: University College London
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