Workshop: Fitting Flexible State-Space and Hierarchical Models Using the Laplace Approximation and Automatic Differentiation

1-3 September 2014, University of Zurich, Irchel

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Dr. Kasper Kristensen, Dept of Applied Maths and Comp Sci, Technical Univ of Denmark

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Workshop Leaders:

Hans Skaug and Mollie Brooks are members of the core development team of ADMB (Automatic Differentiation Model Builder), a powerful software package for fitting nonlinear statistical models including latent variables (http://admb-project.org). Kasper Kristensen is developing a similar package in R (TMB, Template Model Builder, https://github.com/kaskr/adcomp). Hans Skaug has also participated in developing interfaces to use ADMB from R (R2admb and glmmADMB).

Target Audience: PhD students, postdocs, professors, and researchers in applied math/stats, finance, quantitative ecology, biostatistics

Workshop Outline:

ADMB and TMB are free and open-source software for fitting statistical models using maximum likelihood estimation (MLE), automatic differentiation, and the Laplace approximation. They are as flexible as Bayesian methods for fitting hierarchical models, but faster and more robust. ADMB is 10 times faster than Bayesian methods and TMB is often 100 times faster.

The workshop will include introductions to Laplace approximation and automatic differentiation and their usefulness for MLE. The majority of class time will be spent on practical applications of software. We will begin by estimating a random walk time series with observation error. Examples will come from both ecology (e.g. population growth) and finance (e.g. stochastic volatility) and include spatial and temporal patterns.

Prerequisites:

Participants should have prior exposure to basic programming (esp. relevant: R and C++), maximum likelihood estimation, and probability distributions and link functions commonly used in generalized linear models.
Workshop participants should bring their laptop with the most recent ADMB and R installed. Installation instructions will be emailed prior to the workshop.

Time, Date, and Location:

9-17h, 1-3 of Sept (Monday-Wednesday), UZH Irchel, room to be announced

Registration/ Application:

The course is free, thanks to a GRC Grant from the UZH Graduate Campus.
Due to space limitations (40 participants), interested persons are asked to submit an application, describing your background and the course's usefulness for your research, to mollieebrooks@gmail.com. Include "state-space workshop" in the subject.