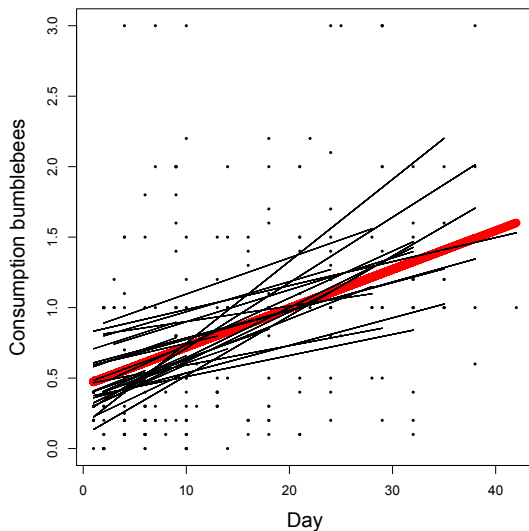


Introduction to Linear Mixed Effects Models and GLMM with R

Bayesian and frequentist approaches

Provided by: **Highland Statistics Ltd**

In cooperation with: Courtney Waugh (courtney.waugh@ntnu.no), Norwegian University of Science and Technology, Trondheim, Norway



The course starts with a basic introduction to linear mixed effects models, followed by an introduction to Bayesian statistics, MCMC and generalised linear mixed effects models (GLMM) to analyse nested (also called hierarchical or clustered) data, e.g. multiple observations from the same animal, site, area, nest, patient, hospital, vessel, lake, hive, transect, etc.

During the course several case studies are presented, in which the statistical theory for mixed models is integrated with applied analyses in a clear and understandable manner.

Throughout the course MCMC is executed in JAGS (free software) via the package R2jags from within R. Bayesian and frequentist (lme4, nlme, glmmADMB) analyses are compared.

Date & Venue

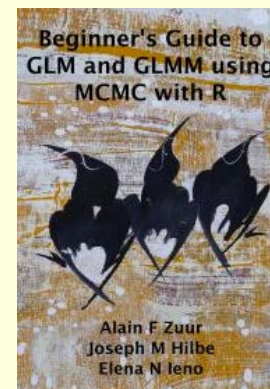
Date: 9 - 13 October 2017

Venue: Gløshaugen campus, Trondheim, Norway

Price: £525

Instructors: Dr. Alain Zuur
Dr. Elena Ieno

Authors of 8 books and providers of over 200 courses worldwide.



KEYWORDS

Introduction to Bayesian statistics and MCMC. Linear mixed effects models. GLMM. JAGS. R2jags. lme4. nlme, glmmADMB. Nested data. Dealing with pseudo-replication.



COURSE CONTENT

Monday

- Theory presentation of linear mixed effects models for nested data using frequentist techniques.
 - Random intercept models.
 - Sketching fitted values.
 - Two exercises.
 - Based on Chapter 4 in Zuur et al. (2013).

Monday afternoon and Tuesday morning

- Introduction to Bayesian statistics and MCMC.
 - Based on Chapter 10 in Zuur et al. (2016).
 - One exercise with video solution file.

Tuesday afternoon - Wednesday

- Two exercises using Bayesian and frequentist tools.
 - Comparing MCMC and lme4/nlme results.
 - Random intercept and slope models.
- Introduction to Bayesian model selection (Gibbs variable selection).
 - One exercise.

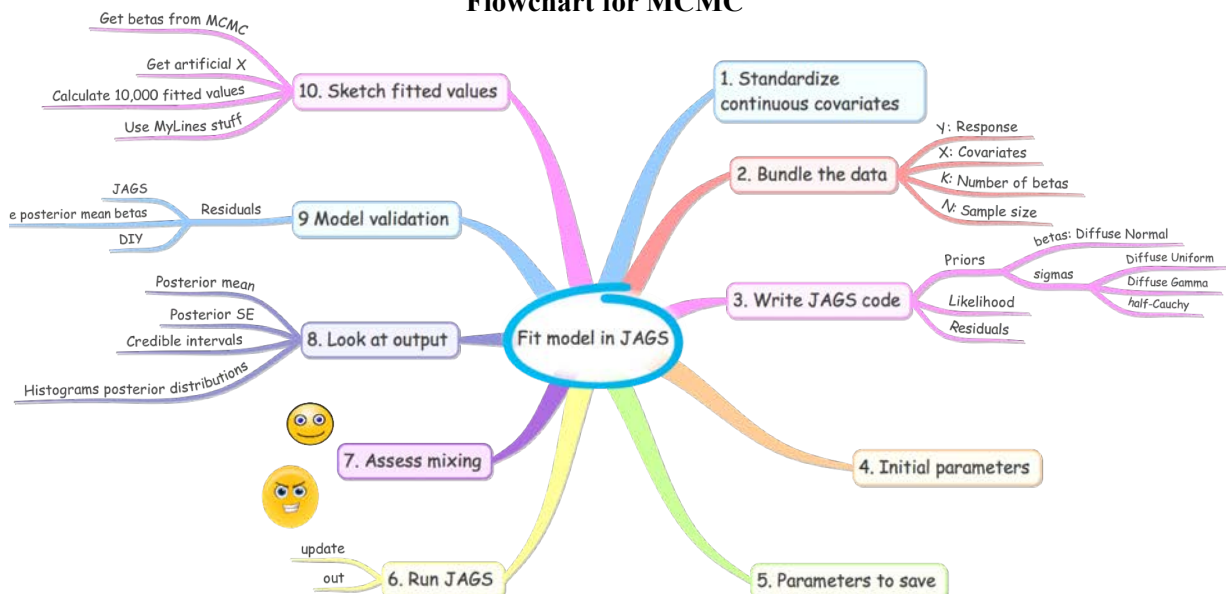
Thursday - Friday

- Short revision Poisson GLM and negative binomial GLM.
- Analysis of nested count data using Poisson, negative binomial and Bernoulli GLMM using Bayesian and frequentist tools.
 - Three exercises.

Time allowing:

- Analysis of nested data using GLMM with a gamma, binomial, beta and beta-binomial distribution (i.e. strictly positive continuous data, absence/presence data, proportional data, coverage data).
- Pointers for the analysis of spatial data.
- Frequentist and Bayesian solution files of 25 - 30 exercises (all based on papers) using GLMMs with Gaussian, Poisson, negative binomial, Bernoulli, binomial, beta-binomial, gamma, and beta distributions are provided.
- A fully worked out solution file dealing with spatial correlation is provided.

Flowchart for MCMC



GENERAL INFORMATION

COURSE FEE: £525

- Credit card payments are charged in GBP currency.
- UK participants are subject to 20% VAT.
- EU participants (but non-UK) are not subject to UK VAT, but need to provide their institutional VAT number.
- Non-EU participants are not subject to VAT.
- The course fee excludes refreshments and lunch.
- You need to bring your own laptop.

COURSE TIMES:

- 09.00am to 16.00pm including 1 hour lunch break and a 20 minutes break both morning and afternoon

COURSE MATERIAL:

- Pdf files of all powerpoint presentations are provided
- These powerpoint files are based on various chapters from:
 - *A Beginner's Guide to GLM and GLMM using MCMC with R.* (2013).
 - *A Beginner's Guide to Zero Inflated Models with R.* (2016)
 - Books are not included in the course fee. The course can be followed without purchasing these books.

PRE-REQUIRED KNOWLEDGE:

R, data exploration, multiple linear regression, generalised linear modelling (Poisson, negative binomial, Bernoulli). A short revision is provided. This is a non-technical course.

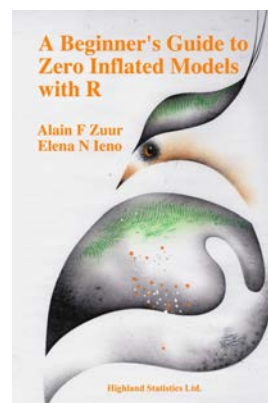
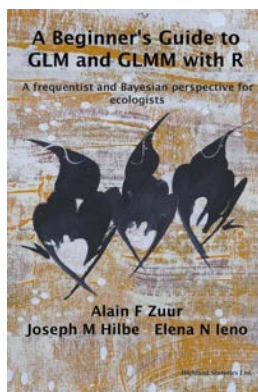
CANCELLATION POLICY:

What if you are not able to participate? Once participants are given access to course exercises with R solution codes, pdf files of book chapters, pdf files of powerpoint files and video solution files, all course fees are non-refundable. However, we will offer you the option to attend a future course or you can authorise a colleague to attend this course.

Terms and conditions see: <http://highstat.com/index.php/courses>

RECOMMEND LITERATURE:

- *A Beginner's Guide to GLM and GLMM using MCMC with R.* (2013).
- *A Beginner's Guide to Zero Inflated Models with R.* (2016).
- These books are available from www.highstat.com



REGISTRATION

<http://www.highstat.com>

Dr. Alain Zuur

Highland Statistics Ltd.

Email: highstat@highstat.com

URL: www.highstat.com

Payment via credit card or bank transfer

