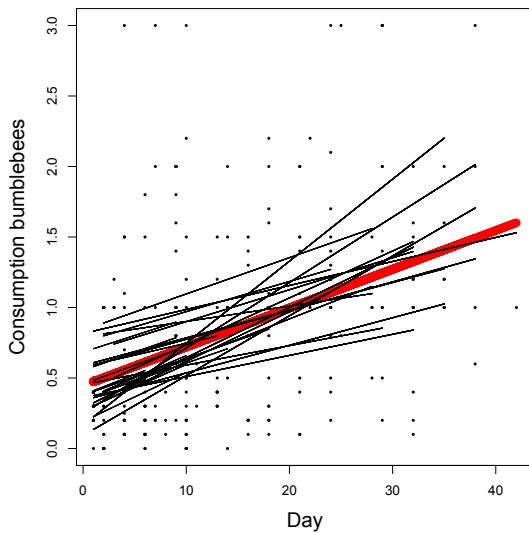


Introduction to Linear Mixed Effects Models and GLMM with R

Bayesian and frequentist approaches

Provided by: Highland Statistics Ltd

In cooperation with: National Institute of Aquatic Resources - DTU Aqua (Ole Henriksen, ohen@aqu.a.dtu.dk)



The course starts with a short revision of multiple linear regression, followed by a basic introduction to linear mixed effects models and generalised linear mixed effects models (GLMM). In the second part of the course Bayesian statistics and MCMC are used for more advanced GLMMs.

GLMMs can be used to analyse nested 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. We will use lme4, glmmTMB and JAGS (for MCMC) from within R.

Date & Venue

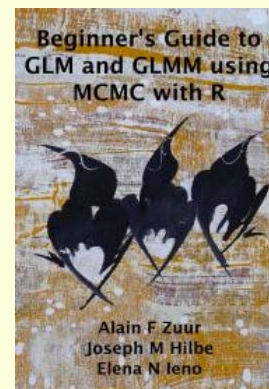
Date: 22 - 26 October 2018

Venue: National Institute of Aquatic Resources - DTU Aqua, Lyngby, Denmark

Price: £525

Instructors: Dr. Alain Zuur
Dr. Elena Ieno

Authors of 10 books and providers of over 300 courses worldwide.



KEYWORDS

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



COURSE CONTENT

Monday

- Short revision multiple linear regression.
- Theory presentation of linear mixed effects models for nested data using frequentist techniques.
- Two exercises.

Tuesday

- Short revision Poisson and negative binomial GLMs.
- Four exercises covering Poisson, negative binomial and Bernoulli GLMMs.
- Nested and crossed random effects. Random slopes.

Wednesday

- Introduction to Bayesian analysis and MCMC.
- Application of MCMC on Poisson and negative binomial GLMs.
- One exercise showing how to apply MCMC on a linear mixed effect model.

Thursday

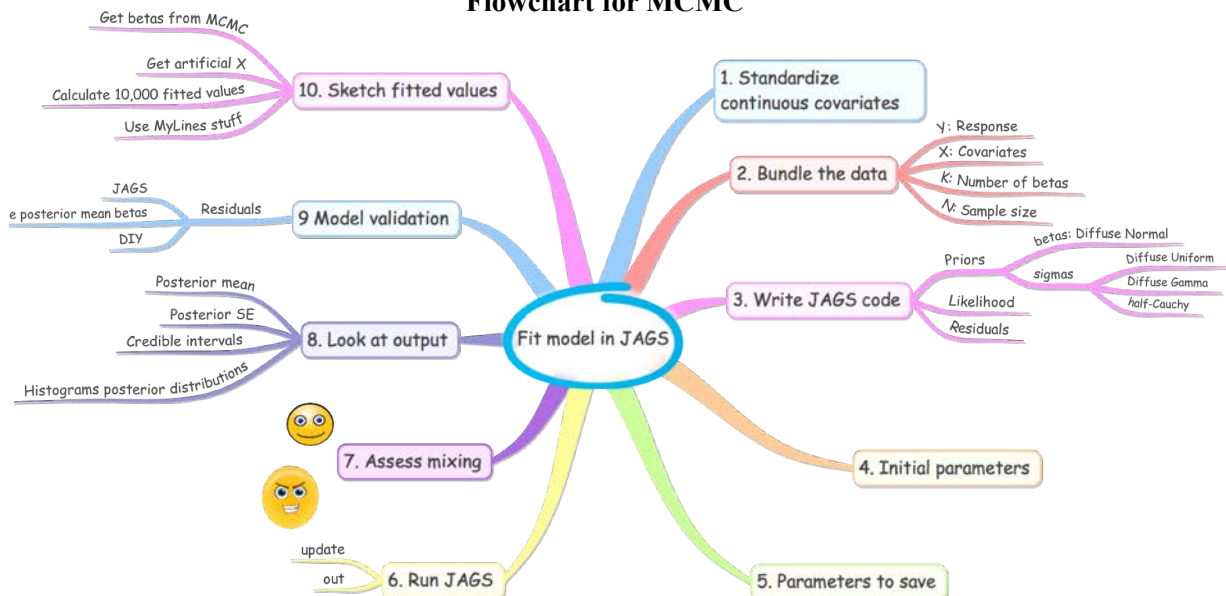
- Three exercises showing the application of Bayesian analysis (MCMC) on GLMMs.
- Introduction to Bayesian model selection (Gibbs variable selection).
- One exercise on Bayesian model selection.

Friday

- Catching up.
- 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). Four exercises. Solution files are provided.

Frequentist and Bayesian solution files of 25 - 30 exercises (based on papers) using GLMMs with Gaussian, Poisson, negative binomial, Bernoulli, binomial, beta-binomial, gamma, and beta distributions are 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.

COURSE TIMES:

- Monday - Thursday: 09.00am to 16.00 pm including 1 hour lunch break and a 20 minutes break both morning and afternoon.
- Friday: 09.00am to 13.00 pm including a 20 minutes break in the morning.

COURSE MATERIAL:

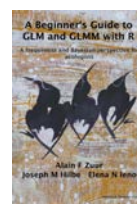
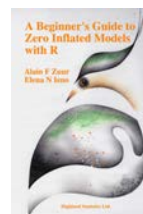
- Pdf files of all powerpoint presentations are provided
- These powerpoint files are based on various chapters from:
 - *A Beginner's Guide to GLM and GLMM using MCMC with R*. (2013).
 - *A Beginner's Guide to Zero Inflated Models with R*. (2016)
- Books are not included in the course fee. The course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

PRE-REQUIRED KNOWLEDGE:

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

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



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 certain 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/sign-up2>

GENERAL

- You need to bring your own laptop. Please ensure that you have system administration rights to install R and R packages on your computer. Instructions what to install will be provided before the start of the course.
 - You will be given access to a course website with around 25 - 30 fully worked out R exercises. These are all based on published papers and real data sets.
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REGISTRATION AND INFORMATION

<http://highstat.com/index.php/courses>

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