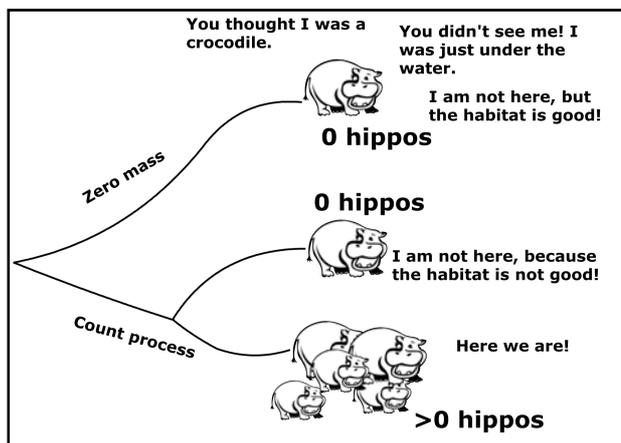


Introduction to Zero Inflated Models using R-INLA

Provided by: Highland Statistics Ltd

In cooperation with: Dr. Amanda Schoonmaker (aschoonmaker@nait.ca)
Centre for Boreal Research



What is zero inflation?

Suppose you want to study hippos and the effect of habitat variables on their distribution. When sampling, you may count zero hippos at many sites and therefore zero inflated models should be used.

During the course several case studies are presented, in which the statistical theory for zero inflated models is integrated with applied analyses in a clear and understandable manner. Zero inflated models consist of two integrated GLMs and therefore we will start with a revision of GLM.

Zero inflated GLMMs for nested data (repeated measurements, short time series, clustered data, etc.) are discussed in the second part of the course. We will focus on zero inflated count data and zero inflated continuous data.

All models are executed using R-INLA so that extensions towards zero inflated temporal, spatial and spatial-temporal data can easily be made.

Date & Venue

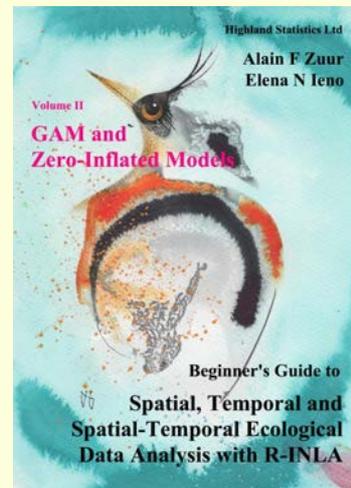
Date: Monday 23 - Thursday 26 March 2020

Venue: NAIT main campus, Edmonton, Alberta, Canada

Price: 995 CAD + 5% GST

Instructors: Dr. Alain Zuur
Dr. Elena Ieno

Authors of 11 books and providers of over 250 courses



KEYWORDS

Zero inflated GLMs. Zero inflated GLMMs with random effects. Overdispersion and solutions. Poisson, negative binomial, Bernoulli and gamma distributions for count data and continuous data with excessive number of zeros. Dependency. Pseudo-replication. Bayesian analysis. R-INLA.

COURSE CONTENT

Monday:

- General introduction.
- Revision exercise linear regression using frequentist techniques.
- Short introduction to Bayesian analysis.
- Introduction to R-INLA.
- Exercise showing how to execute a linear regression model in R-INLA.

Tuesday:

- Short revision of Poisson and negative binomial GLM for count data and Bernoulli GLM for absence and presence data.
 - Short exercise showing how to execute a Poisson and negative binomial GLM in R-INLA.
 - Short exercise showing how to execute a Bernoulli GLM in R-INLA.
- Theory presentation on models for zero inflated count data.
 - Mixture models (ZIP).
 - Hurdle models (ZAP).
- Two exercises on the analysis of zero inflated count data using R-INLA.

Wednesday:

- Models for zero-inflated continuous data (e.g. biomass data).
- One exercise on the analysis of zero-inflated continuous data using R-INLA.
- Short revision of mixed effects models.
- Fitting a Poisson GLMM in R-INLA

Thursday

- Three exercises using ZIP and ZAP GLMMs for the analysis of zero-inflated count data and zero-inflated continuous data.
- **Time allowing:** Discussion of potential extensions (e.g. adding spatial and temporal correlation).



GENERAL INFORMATION

COURSE FEE: 995 CAD + 5% GST tax

- Credit card payments are charged in CAD currency. UK participants are subject to 20% UK VAT. EU participants (but non-UK) are not subject to UKVAT, but need to provide their institutional VAT number. Non-EU participants are not subject to UKVAT.
- The course fee does not contain refreshments or lunch.

COURSE TIMES:

- Monday - Wednesday: 09.00am to 17.00pm including 1 hour lunch break and a 20 minutes break both morning and afternoon.
- Thursday: 09.00am to 15.00pm including 1 hour lunch break and a 20 minutes break in the morning.

COURSE MATERIAL:

- Pdf files of all powerpoint presentations are provided
- The powerpoint files are based on various chapters from:
 - *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA. Volume II: GAM and Zero-Inflated Models* (2018).
- This book is exclusively available from www.highstat.com
- This book is not included in the course fee. The course can be followed without purchasing this book.

PRE-REQUIRED KNOWLEDGE:

Good knowledge of R, data exploration, linear regression, GLM (Poisson, negative binomial, Bernoulli). Working knowledge of mixed effects. 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 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/courses>

RECOMMEND LITERATURE:

- *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA. Volume II: GAM and Zero-Inflated Models* (2018).
- Zuur, Ieno, Saveliev (2017). *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA*.

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 20 fully worked out R exercises. These are all based on published papers and real data sets.

REGISTRATION

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