

Zero-inflated GAMs and GAMMs for the analysis of spatial and spatial-temporal correlated data using R-INLA

Provided by: Highland Statistics Ltd

In cooperation with: NIOZ, Texel, The Netherlands



We will start explaining how to deal with zero inflated data. We will introduce so-called zero-inflated Poisson (ZIP) models, zero-inflated negative binomial (ZINB) models, zero-altered Poisson (ZAP) models and zero-altered negative binomial (ZANB) models. We will show how to execute these models in R-INLA, and we will also extend them with random effects and spatial correlation.

In the second part of the course we will introduce generalised additive models (GAM) and generalised additive mixed effects models (GAMM) to model non-linear relationships. We will execute these models in R-INLA. We will also extend the GAMs to analyse spatial correlated data.

In the third part of the course we will combine the zero inflated models and the GAMs.

In the fourth part of the course, we will implement GAMs and GAMMs for the analysis of zero-inflated spatial-temporal correlated data.

A lot of misery comes together in the last exercise: smoothers, zero-inflation and spatial dependency that should not cross land as benthic species that live in a coral reef do not walk over land! We will discuss barrier models which ensure that spatial correlation seeps around a barrier (in this case an island).

IMPORTANT

We strongly recommend that you only join this course if you either attended one of our spatial (or spatial-temporal) INLA courses, or are familiar with R-INLA.

Date & Venue

Date: 20 - 24 April 2020

Venue: NIOZ, Texel, The Netherlands

Price: 995 GBP

Instructors: Dr. Alain Zuur
Dr. Elena Ieno

Authors of 10 books and
providers of over 250
courses



KEY WORDS

Zero inflation, GLM, GLMM, GAM, GAMM, spatial correlation, spatial-temporal correlation, barrier models, R-INLA.

COURSE CONTENT

Monday:

- Revision exercise showing how to execute a linear regression model with spatial correlation in R-INLA.
- Theory presentation on models for zero inflated count data; mixture models (ZIP) and hurdle models (ZAP).
- Two exercises on the analysis of zero inflated count data using R-INLA.

Tuesday:

- Theory presentation on GAM.
- One exercises showing how to execute a GAM with a Gaussian distribution in R-INLA.
- Interactions between a smoother and a categorical covariate.
- One exercise.

Wednesday:

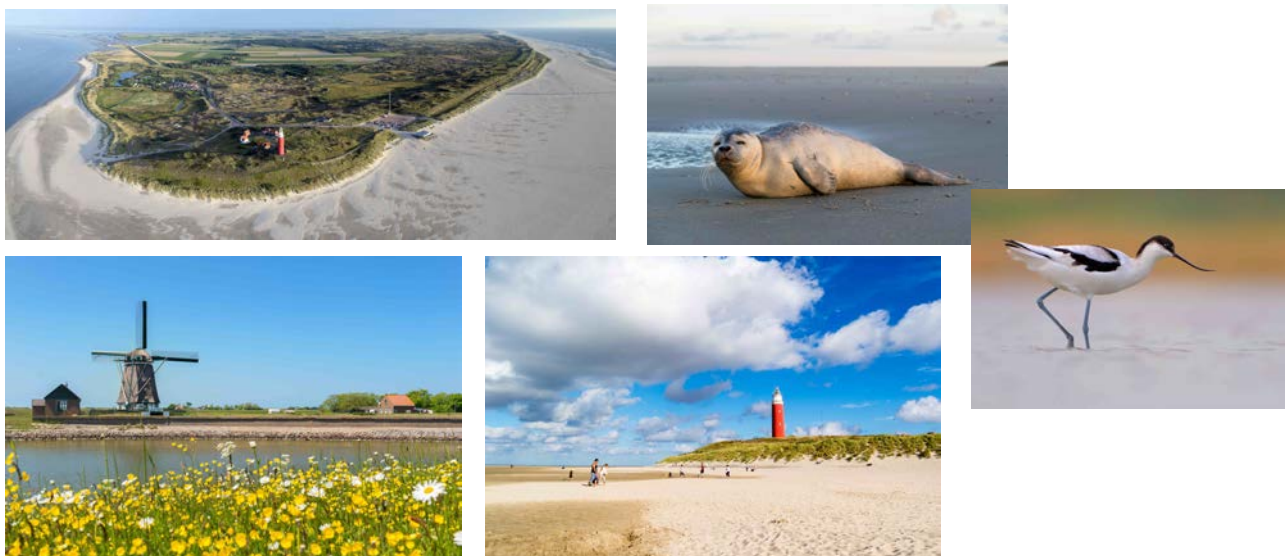
- Three exercises showing how to execute Poisson, negative binomial and Bernoulli GAMs in R-INLA.
- Short revision exercise on linear mixed effects models (no theory is presented) in R-INLA.

Thursday :

- Three exercises showing how to execute zero-inflated GAMs and GAMMs with spatial correlation in R-INLA.

Friday

- Two exercises showing how to execute zero-inflated GAMs and GAMMs with spatial-temporal correlation in R-INLA.
- One exercise showing how to apply a GAM with spatial correlation and a barrier.



GENERAL INFORMATION

COURSE FEE: 995 GBP

- 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 does not contain refreshments or lunch.

COURSE TIMES:

- Monday - Thursday: 09.00am to 16.00pm including 1 hour lunch break and a 20 minutes break both morning and afternoon.
- Friday: 09.00am to 15.00pm including a 20 minutes break.

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). Zuur, Ieno. ISBN: 9780957174146.
 - 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 and GLM (Poisson, negative binomial, Bernoulli). Working knowledge of mixed effects models. Short revisions are 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 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 and Ieno.
- *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA. Volume I: Using GM and GLMM*. Zuur, Ieno, Saveliev (2017).
- These books are exclusively available from www.highstat.com

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 15 - 20 fully worked out R exercises. These are all based on published papers and real data sets.

REGISTRATION

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

Dr. Alain F. Zuur
Highland Statistics Ltd.
9 St Clair Wynd, AB41 6DZ Newburgh, UK

And:
NIOZ Royal Netherlands Institute for Sea Research,
Department of Coastal Systems, and Utrecht University,
P.O. Box 59, 1790 AB Den Burg, Texel, The Netherlands

