

Introduction to GLMs with spatial, and spatial-temporal correlation using R-INLA

Provided by: Highland Statistics Ltd

In cooperation with: Dr. Nestor E. Bosch (nestor.bosch@ulpgc.es) and Dr. Fernando Tuya (fernando.tuya@ulpgc.es)

We begin with an introduction how to add spatial dependency to regression models using frequentist tools. After discussing the limitations of this approach, we switch to Bayesian techniques. R-INLA is used to implement regression models and generalised linear models (GLM) with spatial, and spatial-temporal dependency.

During the course, several case studies are presented in which the statistical theory is integrated with applied analyses in a clear and understandable manner. The course also contains a short revision of generalised linear models (GLM). Additionally, we will explain the beta, Gamma, and Tweedie distributions.

Throughout the course we will use the R-INLA package in R. This is a non-technical. Provided you have the required knowledge, this is an easy-to-follow course.

Pre-required knowledge

Participants should be familiar with data exploration, linear regression and basic GLMs (i.e. Poisson, Bernoulli, negative binomial GLM) in R. The course does contain short revisions.

1 hour face-to-face

The course includes a 1-hour face-to-face video chat with the instructors (to be used after the course). You are invited to apply the statistical techniques discussed during the course on your own data and if you encounter any problems, you can ask questions during the 1-hour face-to-face chat.

A discussion board (access for 6 months) allows for interaction on course content between instructors and participants.

Onsite course in Las Palmas, Gran Canaria

Venue: Instituto EcoAqua, Parque Científico Tecnológico Marino de Taliarte, carretera de Taliarte s/n, 35214, Las Palmas.

Nearest airport: Aeropuerto de Gran Canaria (LPA).

Dates:

- Monday 30 October - Friday 3 November 2023.

Price: £500.

Included: 1 hour face-to-face video chat about your data.

Instructors:

- Dr. Alain Zuur.
- Dr. Elena Ieno.



COURSE CONTENT

Monday:

- General introduction.
- Theory presentation on adding temporal dependency, and spatial dependency to a regression model using frequentist techniques.
- One exercise showing how to add spatial dependency to a regression model using frequentist tools.
- Brief introduction to Bayesian analysis.
- Conjugate priors.
- Diffuse versus informative priors

Tuesday:

- Theory presentation on INLA.
- Exercise showing how to execute a linear regression model in R-INLA.
- Theory presentation on adding spatial correlation to a regression model using in R-INLA.

Wednesday

- Exercise showing how to add spatial correlation to a linear regression model.
- Exercise showing how to execute a Poisson GLM in R-INLA.
- Exercise showing how to add spatial correlation to a Poisson GLM.

Thursday:

- Exercise showing how to add spatial correlation to a negative binomial GLM.
- Exercise showing how to add spatial correlation to a Bernoulli GLM.
- Exercise showing how to add spatial correlation to a gamma GLM.
- Exercise showing how to add spatial correlation to a beta GLM.

Friday:

- Theory presentation on adding spatial-temporal correlation in R-INLA.
- Exercise showing how to add spatial-temporal correlation to a Poisson or negative binomial GLM.
- Exercise showing how to add spatial-temporal correlation to a Tweedie GLM.
- Exercise showing how to add spatial-temporal correlation to a Bernoulli GLM.

We reserve the right to change the exercises. Pdf files of all theory material will be provided. All exercises consists of data sets and annotated R scripts. Access to the course website is for 6 months. The Monday-Friday material does not contain on-demand video.

For terms and conditions, see:

<https://www.highstat.com/index.php/component/hikashop/checkout/termsandconditions/step-3/pos-6/tmpl-component>

GENERAL INFORMATION

COURSE FEE: £500

- Credit card payments are charged in GBP currency.
- VAT charge:
 - UK participants are charged 20% VAT.
 - Non-EU participants (including Norway and Switzerland) are not subject to VAT.
 - We do not have to charge VAT to EU participants who provide their [institutional VAT number](#).
 - EU participants who do not provide a VAT number will be charged VAT at their national rate.

Access to the course website is 12 months.

FREE 1-HOUR FACE-TO-FACE MEETING

The course fee includes a 1-hour face-to-face meeting with one or both instructors. The meeting needs to take place within 6 months after the course. You can discuss your own data, but we strongly advise that the statistical topics are within the content of the course. The 1-hour needs to be consumed in one session, and will take place at a mutual convenient time.

CANCELLATION POLICY:

Once participants are given access to course exercises with R solution codes, pdf files of certain book chapters, and pdf files of presentations, all course fees are non-refundable. Terms and conditions see: <http://highstat.com/index.php/sign-up2>

GENERAL

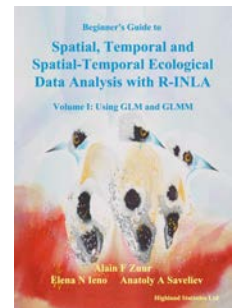
- Please ensure that you have system administration rights to install R, and R packages on your computer.
- Instructions what to install is on the course website.

PRE-REQUIRED KNOWLEDGE

Good knowledge of R, data exploration, linear regression and GLM (Poisson, negative binomial, Bernoulli). Short revisions are provided. This is a non-technical course.

RECOMMEND LITERATURE:

- Zuur, Ieno, Saveliev (2017). *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA*.
- This book is available from www.highstat.com.
- Books are not included in the course fee. The course can be followed without purchasing these books.



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

