Generalised Additive Models for the analysis of spatial and spatial-temporal data

Provided by: Highland Statistics Ltd

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We will start with a non-technical introduction to generalised additive models (GAM). Using a series of exercises, we show how GAMs can be used to allow for non-linear covariate effects. Once we are familiar with GAM, we will apply them to various spatial, and spatial-temporal data sets.

During the course, GAMs are applied to count data, absence-presence data, proportional data, and continuous data using the Gaussian, Poisson, negative binomial, Bernoulli, beta, gamma and Tweedie distributions.

We will apply GAMs with 2-dimensional smoothers to analyse spatial data. To allow for natural barriers (e.g. an island in the sea), soap-film smoothers are used. On the 4th day of the course, spatial-temporal data sets are analysed.

The course contains a short revision of generalised linear models (GLM). During the course we will explain the beta, Gamma and Tweedie distributions. Preparation material on data exploration and linear regression with on-demand video is supplied.

Throughout the course we will use the `mgcv` package in R. This is a non-technical, and easy-to-follow course.

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). A discussion board (access for 12 months) allows for interaction on course content between instructors and participants. 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.

Onsite course in Trondheim, Norway

Venue: Gløshaugen campus, Trondheim, Norway.

Dates:
- 4 - 7 September 2023.

Price: £550.

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

Instructors:
- Dr. Alain Zuur.
- Dr. Elena Ieno.

Authors of 12 books and providers of over 250 courses.

COURSE CONTENT

Preparation material (containing on-demand video):
- Revision exercise on multiple linear regression.
- Introduction to matrix notation.
- Introduction to DHARMa.
- What is a variogram.

Monday 4 September 2023
- General introduction.
- Theory presentation on GAM.
- Three introductory GAM exercises.
- Key phrases: How to fit a GAM using mgcv, how to read its output, model selection, model validation, smoother interactions, what to present in a paper.

Tuesday 5 September 2023
- Revision of Poisson and negative binomial GLM.
- Two revision exercises on Poisson and negative binomial GLM.
- One exercise on negative binomial GAM.
- Two exercises on GAMs applied to spatial data.

Wednesday 6 September 2023
- Catching up.
- Two exercises showing how to use GAM with a spatial smoother in case the study area contains a natural barrier (e.g. an island in the sea).
- Time allowing: GAM applied to areal data.
- Time allowing: GAM applied to data measured on a sphere.

Thursday 7 September 2023
- Four exercises GAM applied to spatial-temporal data using a variety of distributions (e.g. Poisson, negative binomial, Bernoulli, Tweedie, Gamma, beta).

The course material consists of relevant pdf files of presentations, data sets and clearly documented R code.

Course participants will be given access to the course website with all data sets, R solution code and course material 1 week before the start of the course.

PRE-REQUIRED KNOWLEDGE:
Working knowledge of R and linear regression. This is a non-technical course.

GENERAL INFORMATION

COURSE FEE: £550

- Credit card payments are charged in GBP currency.
- VAT charge:
  - Non-EU participants (including Norway) are not subject to VAT.
  - UK participants are charged 20% 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.

COURSE TIMES:

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

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 12 months after the last live zoom meeting. You can discuss your own data, but we strongly advice 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:

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.

GENERAL

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

REGISTRATION

https://www.highstat.com/

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