



Organization

Venue

The course will take place in Heidelberg at the University Campus 'Im Neuenheimer Feld'.

Registration

Deadline for registration is January 16, 2020.

Course fee

The fee for the course is € 645; discounted rate for affiliated with a university € 430.

Cancellation

The cancellation policy is as follows: 75% refund for cancellations after January 23, no refund for cancellations after January 30, 2020.

Attendee substitutes may be made at any time.

Public Transport

Costs and schedule: www.vrn.de

Information

<http://www.biometrie.uni-heidelberg.de/datascience>

Concept and Contents

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MEDIZINISCHE
FAKULTÄT
HEIDELBERG

Bayesian Statistics

06. - 08. February 2020



Aims

Most statisticians are well trained in frequentist statistical analyses, with a toolbox that covers techniques from simple testing procedures up to complex modeling approaches. This course aims to teach basic and advanced techniques in a Bayesian framework. We will start with the basic Bayesian principles and the way of thinking. After that, classical linear and generalized linear regression models will be discussed and applied in a Bayesian context. On Friday, we will dive into hierarchical models, before we briefly touch more advanced topics and complex modeling techniques by case studies on Saturday. At the end of the course, the participants will be able to understand the Bayesian idea of statistical modeling and will know how to apply these models to various data problems. Furthermore, the participants will be trained in the correct interpretation of the resulting parameter estimates.

Course content

The course will cover the following topics:

- Introduction to Bayesian statistics: The basic idea and techniques will be presented.
- Bayesian linear and generalized regression models: Starting from a simple linear model, the regression techniques will be extended to different data situations.
- Markov Chain Monte Carlo Methods and Gibbs sampling: These techniques are crucial to obtain posterior distributions and estimates in complex models.
- Implementation in R and JAGS: The theory is important to understand. However, with application to datasets the models come to life.

Pre-requisites

The participants must have

- Basic knowledge of statistics and probability theory
- Basic knowledge in (generalized) regression models
- Basic knowledge in R

Preliminary schedule

Thursday (6th of February)

9:00 – 10:30 Introduction to Bayesian statistics I

11:00 – 12:30 Introduction to Bayesian statistics II

13:30 – 15:00 Bayesian linear models

15:30 – 17:00 Practical 1: Bayesian linear models

Friday (7th of February)

9:00 – 10:30 Bayesian generalized linear models

11:00- 12:30 Practical 2: Bayesian generalized linear models

13:30-15:00 Bayesian hierarchical models

15:30-17:00 Practical 3: Bayesian hierarchical models

Saturday (8th of February)

9:00 – 10:30 Advanced Topics I – Case study

11:00- 12:30 Advanced Topics II – Case study

Number of Participants

The number of participants is limited to 20.

Course instructors

Dr. Lorenz Uhlmann

Svenja Seide

Moritz Pohl

Further information

Participants are asked to bring their laptop. Interactive hands-on lessons will be part of the course. As we will need to use numerical estimation procedures, we will hand out instructions on necessary software and packages before the course. Laptops with full administrative access are therefore needed.

Basic Reading

Christensen, R., Johnson, W. Branscum, A.Hanson, T.E. *Bayesian Ideas and Data Analysis - An Introduction for Scientists and Statisticians*. 2011.

Kruschke, JK. *Doing Bayesian Data Analysis: A Tutorial with R, JAGS, and Stan*. 2015.