

1-Day Workshop

Bayesian and Penalized Regression Methods for Nonexperimental Data Analysis

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Jointly organised by
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University of Basel, Department of Environmental Sciences (V. Amrhein)
in collaboration, with
PhD Program Health Sciences (PPHS), Faculty of Medicine, University of Basel
Swiss School of Public Health (SSPH+)

February 27 2018, 09.00-17.00, Hörsaal 102, Biozentrum

Workshop Outline

Background: Bayesian methods continue to become more popular in statistical modelling, but are not often covered in the most basic teaching or used in basic analyses. This lag may in part be due to common misconceptions (encouraged by typical expositions) that Bayesian methods are conceptually distinct from frequentist methods and require special software. In reality, Bayesian methods are examples of information-penalized ("shrinkage") estimation and thus are acceptable frequentist methods. Conversely, common frequentist methods are special types of Bayesian methods in which prior distributions contain either no information or complete information, making penalties either zero or infinite. In this framework, information emerges as the central concept linking data, models, and analysis methods.

Outline: The workshop will focus on philosophy and interpretation of statistics for health and medical research, illustrating the relationship between Bayesian and frequentist perspectives with examples, and showing how penalization allows one to deal with a number of common problems that render ordinary statistical methods misleading for nonexperimental research and risk assessment. Specifically, the workshop recasts Bayesian and penalized regression methods as alternatives to standard frequentist approaches for analyzing data from observational studies in health and medical sciences. It shows how to include prior information or suitable shrinkage with ordinary software. The methods are then extended for more general regression modelling, including hierarchical (multilevel) and bias modeling, as alternatives to the parsimony-oriented approaches of standard regression analyses. These methods replace arbitrary variable-selection criteria by penalized estimation, which has many desirable frequency properties and which facilitates realistic use of vague but important prior information. The methods facilitate handling problems of sparse data, multiple comparisons, and sensitivity to bias sources.

Target audience: The course is designed for researchers with previous training in regression methods for health and medical research.

Materials: Tutorial articles will be provided with examples of computer code and data examples in Stata and SAS. Bring your own laptop with Stata or SAS installed (R code will also be available).

Registration and Contact Details:

The workshop is offered for free. Participants are required to register on the PPHS website <https://pphs.unibas.ch/curriculum/ws-bayesian-and-penalized-regression-methods-for-nonexperimental-data-analysis/> before February 19.
For registered no-shows, there will be a fee of CHF 50.-.

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