

Clinical Prediction Models: A Practical Approach to Development, Validation, and Updating

Ewout W. Steyerberg

Springer, 2009, xxviii + 497 pages, £ 53.99 / € 59.95 / US\$ 89.95, hardcover

ISBN: 978-0-387-77243-1

Table of contents

1. Introduction	14. Estimation with external information
Part I. Prediction Models in Medicine	15. Evaluation of performance
2. Applications of prediction models	16. Clinical usefulness
3. Study design for prediction models	17. Validation of prediction models
4. Statistical models for prediction	18. Presentation formats
5. Overfitting and optimism in prediction models	Part III. Generalizability of Prediction Models
6. Choosing between alternative statistical models	19. Patterns of external validity
Part II. Developing Valid Prediction Models	20. Updating for a new setting
7. Dealing with missing values	21. Updating for multiple settings
8. Case study on dealing with missing values	Part IV. Applications
9. Coding of categorical and continuous predictors	22. Prediction of a binary outcome: 30-day mortality after acute myocardial infarction
10. Restrictions on candidate predictors	23. Case study on survival analysis: Prediction of secondary cardiovascular events
11. Selection of main effects	24. Lessons from case studies
12. Assumptions in regression models: Additivity and linearity	
13. Modern estimation methods	

Readership: This book is suitable for those with a basic knowledge of biostatistics and statistical modeling. The intended audience includes epidemiologists and applied biostatisticians looking for a practical guide to developing and testing clinical prediction models, or health care professionals and health policy makers interested in critically appraising a clinical prediction model.

Clinical Prediction Models is an excellent practical guide for developing, assessing and updating clinical models both for disease prognosis and diagnosis. The book's clinical focus in this era of evidence-based medicine is refreshing and serves as a much-needed addition to statistical modelling of clinical data. The book assumes a basic familiarity with modelling using generalized linear models, focussing instead on the real challenges facing applied biostatisticians and epidemiologists wanting to create useful models: dealing with a plethora of model choices, small sample sizes, many candidate predictors and missing data. This is an example-based book illuminating the vagaries of clinical data and offering sound practical advice on data exploration, model selection and data presentation. Model selection is at the core of the text with in-depth discussion of choices of candidate predictors, pre-specified models, models with interactions, stepwise selection methods in linear models, as well as modelling using generalized additive models (GAM), fractional polynomials and restricted cubic splines. There are also a few pages devoted to more modern selection methods such as Bayesian model averaging (BMA). There is an excellent discussion of estimation bias, over-fitting and optimism in prediction models motivating the use of methods to correct for overestimation of model coefficients. Uniform shrinkage methods, penalized maximum likelihood methods, and least absolute shrinkage and selection operator (LASSO) shrinkage for selection are discussed in some detail.

The author considers many interesting examples of clinical data throughout the text, using data from rich data sources like the GUSTO-1 and the SMART studies. These data sets are made

available on the book's website (<http://www.clinicalpredictionmodels.org>) for the purposes of promoting practical experience with modelling.

The author uses simple simulations using a few reproducible R commands to motivate the use of imputation methods and shrinkage. These simple but illuminating illustrations are one of the highlights of the book and serve as excellent pedagogical tools for motivating good statistical thinking.

There is some mention of statistical software available to try out the newer estimation methods. The author shows partiality to R software and provides some R code in the book and makes full programs available of the website. This may be an impediment to some readers wedded to menu-driven packages.

Teresa Neeman: teresa.neeman@anu.edu.au

Statistical Consulting Unit, Australian National University
Canberra ACT 0200, Australia

Analysis of Messy Data Volume 1: Designed Experiments, Second Edition

George A. Milliken, Dallas E. Johnson

Chapman & Hall/CRC, 2009, xiv + 674 pages, £ 54.99 / US\$ 89.95, hardcover

ISBN: 978-1-58488-334-0

Table of contents

1. The simplest case: one-way treatment structure in a completely randomized design structure with homogeneous errors
2. One-way treatment structure in a completely randomized design structure with heterogeneous errors
3. Simultaneous inference procedures and multiple comparisons
4. Basics for designing experiments
5. Multi-level designs: split-plots, strip-plots, repeated measures, and combinations
6. Matrix form of the model
7. Balanced two-way treatment structures
8. Case study: complete analyses of balanced two-way experiments
9. Using the means model to analyze balanced two-way treatment structures with unequal subclass numbers
10. Using the effects model to analyze balanced two-way treatment structures with unequal subclass numbers
11. Analyzing large balanced two-way experiments having unequal subclass numbers
12. Case study: balanced two-way treatment structure with unequal subclass numbers
13. Using the means model to analyze two-way treatment structures with missing treatment combinations
14. Using the effects model to analyze two-way treatment structures with missing treatment combinations
15. Case study: two-way treatment structure with missing treatment combinations
16. Analyzing three-way and higher-order treatment structures
17. Case study: three-way treatment structure with many missing treatment combinations
18. Random effects models and variance components
19. Methods for estimating variance components
20. Methods for making inferences about variance components
21. Case study: analysis of a random effects model
22. Analysis of mixed models
23. Case studies of a mixed model
24. Methods for analyzing split-plot type designs
25. Methods for analyzing strip-plot type designs
26. Methods for analyzing repeated measures experiments
27. Analysis of repeated measures experiments when the ideal conditions are not satisfied
28. Case studies: complex examples having repeated measures
29. Analysis of crossover designs
30. Analysis of nested designs