

Book Reviews

Modeling Longitudinal Data

Robert E. Weiss

Berlin, Springer-Verlag 2005

pp. xxiv + 432, £51.50, ISBN 0 387 40271 3

This book represents a very appealing and interesting guide on the topic of modern longitudinal data analysis. The purpose of this book is to teach readers how to think about and analyse longitudinal data. It is indeed an ideal and carefully written text to be used as a reference guide for practitioners and applied researchers, emphasising issues related to the specification, understanding and interpretation of longitudinal data models. Conclusions are based on graphical analysis of the data, analysis of time trends and covariates, and modelling of the covariance matrix. This book is an up to date and very complete textbook for a graduate-level course for students in statistics and/or biostatistics. It could also be a valuable reference for quantitatively oriented graduate students in other disciplines such as, education, public health, psychology, biology or sociology. It is required that readers have a solid background in regression analysis.

The book presents a detailed discussion of different models for covariance structure and the improper analysis of some longitudinal data sets. Additionally, it introduces the necessary theoretical background to understand the proposed models, clarifying their assumptions and relative merits. One key feature that makes this book different to other existing books in longitudinal data is that it includes specific chapters dedicated to graphical methods (Chapter 2), covariance modelling (Chapter 8), and modelling the effects of covariates (Chapter 7). This, in my view, is something that was required in a textbook on longitudinal data and that the author has presented in an outstanding way. The author proposes a challenging and very interesting “learn by doing it” way of reading this book by suggesting that readers could have their own data set available and they should try drawing all the relevant plots and fit all the relevant models they read about to their own data. One additional issue relates to the overviews and the discussions the author provides at the beginning and at the end of each single chapter with the exception of Chapter 1, a very helpful idea for students.

The book contains fourteen chapters, as well as an appendix with the description of the data sets used in the book. In addition there is an accompanying website where readers can access data sets, sample SAS and R code, errata and some links to sites related to longitudinal data. Chapter one provides a very good introduction to longitudinal data; chapter 2 discusses graphical analysis; chapters 3 and 4 introduce a critical view of the simpler analyses that have been applied to this type of data; chapter 5 describes the multivariate normal linear model; chapter 6 covers basic tools and concepts for dealing with longitudinal data; chapters 7 and 8 deal with specifying covariates and modelling covariance; chapter 9 discusses random effects models as hierarchical models; chapter 10 describes the main ideas related to residuals and case diagnostics; chapters 11, 12 and 13 deal

with discrete longitudinal data, missing data and the analysis of two longitudinal variables. Finally, chapter 14 includes some further reading recommendations. The concepts are illustrated with clear, very well selected and motivated real examples and homework problems. Some of them, I must say, are very challenging and test if the reader has understood the main ideas. Therefore, this is indeed a very valuable contribution to the existing literature in this area of research. There are a number of minor typos and recommendations that have been sent to the author.

In summary, this book is extremely well presented and it has been written in a style that makes its reading really pleasant and enjoyable. It can easily be seen as a good reference book on statistical methods or a textbook for an graduate-level course. In this sense, I completely agree with the statement the author made about the usefulness of this book for applied researchers in various disciplines. In conclusion, I highly recommend *Modeling Longitudinal Data* as a good reference book for anyone interested in looking into the art and statistical science of modern longitudinal data analysis.

VICENTE NÚÑEZ-ANTÓN
Universidad del País Vasco, Spain

Functional Data Analysis (2nd edition)

James O. Ramsay & Bernard W. Silverman
Berlin, Springer-Verlag, 2005
pp. xix + 426, £48.50, ISBN 0 387 40080 X

This book is a second edition of the authors' 1997 book under the same title. Functional data analysis (FDA) is obviously a very active research area in statistics and this book reflects these new developments with a significant expansion of previous work, with six new chapters and 116 more pages. Reviews of the first edition are uniformly positive and enthusiastic (e.g. Price 1999, Marron 1998). Anticipated impact of the 1997 book seems to be clearly justified. It appears that more and more data can be analysed with benefit from the viewpoint offered by the FDA approach. The new edition is an excellent summary of recent work on FDA, emphasising the aspects of data exploration and data analytic methods that are so far most developed. The basic content of the book covers topics roughly classifiable into three areas: Part one (Chapters 3 to 7) is on representing data via smooth functions using B-spline and other basis functions, functional fitting using least squares (for parametric models) and other nonparametric regression methods, such as smoothing spline, kernel density and local polynomial methods, and data registration; Part two (Chapters 8 to 11) is on dimension reduction using principal components, canonical correlation, and discriminant analysis; and Part three (Chapters 12 to 17) is on various generalisations of linear models for data involving functional covariates or response.

Curious readers who are looking for research topics should welcome the last few chapters (Chapters 18 to 21), which cover some fairly recent developments on derivative estimation, and in the use of tools from ordinary and partial differential equations for describing dynamic changes in functional data, and should especially pay attention to the last one: Chapter 22 "Some Perspectives on FDA". The appendices are valuable and helpful. The references (14 pages) are also quite adequate and up to date for readers who have time to explore in more depth. Ramsay also maintains a website on functional data analysis which should provide a valuable and dynamic resource. Recently, Insightful Corporation has released an S-PLUS library on FDA based on the authors' original software (Clarkson *et al.* 2005), which should help researchers who want to

play and experiment with their own data. I personally think practical workers will gain most by analysing their own data using the philosophy represented in this book, namely by looking at the high-dimensional measurement in its entirety and by focusing on extracting the most interesting global, geometric and shape information from data.

The mathematical level of the book is at the US graduate statistics level, and so some chapters of the book can be challenging, though a practical worker with a good background in engineering or physics will probably appreciate the rigour of a mathematical statistical treatment of many modern data problems. My quick glance has not revealed many obvious typographical errors, though I found that the reference to Grenander (1980) on bottom of page 34 probably means Grenander's Abstract Inference in 1981, which is listed in the bibliography.

True to Parzen (1983)'s prediction 20 years ago, in order to handle massive data problems from modern science and technology, statisticians in the 21st century need to do functional statistical inference, and this book is a good start for a modern statistician.

References

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 Marron, J. S. (1998) *Journal of the American Statistical Association*, 93, p. 1232.
 Clarkson, D. B. *et al.* (2005) *S + Functional Data Analysis: User's Manual for Window*. (Berlin: Springer-Verlag).
 Parzen, E. (1983) Review of Abstract Inference by Ulf Grenander, *Journal of the American Statistical Association*, 78, p. 731.

Z.Q. JOHN LU

National Institute of Standards and Technology, USA

Statistical Thinking in Business (2nd edition)

J.A. John, D. Whitaker & D.G. Johnson

Boca Raton, Chapman & Hall/CRC, 2005

pp. xiv + 394 + CD-ROM, £29.99, ISBN 1 58488 495 9

This is an interesting book for managerial decision makers, which does not concentrate on mathematical or statistical formulae and instead takes a literary and explanatory position with many tables, figures and graphics. These visual illustrations clarify the content of the book. Its approach is introductory and conceptual with the help of statistical thinking and ideas with a minimum of arithmetical work and reasoned formulae.

The book makes use of an included CD-ROM within the text, which includes graphical and computational possibilities of Microsoft Excel and other features of *STiBstat*, both of them incorporated on the CD-ROM. Some experiments are provided in the book and they can be seen in a spreadsheet that will run in Excel. Most of the examples in the book are based on the authors' experience working with a range of organisations and businesses in New Zealand and United Kingdom; the names of these organisations have been hidden for confidentiality reasons, but they preserve the realism of the experiences. The interest of the authors is in showing and understanding the role of statistics in business, rather than concentrating on the arithmetic details.

The content of the book includes a preface, thirteen chapters, a postscript, six appendices, a bibliography and a joint index for authors and terms. Particularly interesting are chapter six "Sampling", chapter seven "Estimation", chapter eleven "Statistical Process Control" and chapter thirteen "Improvement Strategies".

We recommend this book for all people interested in learning the basic ideas of modern statistics applied to business, but do not recommend the book for the people who like a strict mathematical or statistical basis of the subject. The book is a friendly introduction to the statistical ideas and managerial thinking, but it is very limited for a business statistician. A positive aspect of the book is the use of simple statistical and graphical software which helps to understand the statistical and practical ideas. The reader would be well informed on statistical ideas and concepts but he/she would not be informed on the logical arguments behind them.

MARIANO RUIZ ESPEJO & MIGUEL DELGADO PINEDA
Universidad Nacional de Educación a Distancia, Spain

Discovering Statistics Using SPSS (2nd edition)

Andy Field

London, Sage Publications, 2005

pp. 816, £80.00 (hbk), £27.99 (pbk), ISBN 0 7619 4452 4

At first glance, the second edition of *Discovering Statistics Using SPSS* may look rigid or simply a text book that could easily become obsolete because of its software-specific nature. A closer look, however, reveals that it is a perfect reference for students on most undergraduate non-statistical courses. Characterised by the author's humorous writing style, simplicity of the material and elaborative graphical illustrations, the book is clearly appealing even to those who might otherwise find statistics intimidating.

The book covers a wide range of statistical topics and, as the title may suggest, it focuses more on statistics than on the software in which the examples are implemented. Indeed, a user with a moderate working knowledge of any other statistical software should easily be able to adapt the examples. As a non SPSS user, I found the book quite easy to read and the examples easy to follow. The topics covered would be beneficial to anyone learning statistics for practical use; more so for SPSS users particularly those using version 13.

A few weaknesses can be noted – in particular, a number of typographical flaws still exist in this edition, as for instance, the omission of “to” in the phrase “...are likely have...” in paragraph 2 on page 151. There is scope for improving other aspects of the book; for example, the chapters on the accompanied disk could be matched with its hilarious contents by linking and animating them. Further, software-wise, the book is version-specific and although the author refers to this issue in Chapter 2 as non-significant, it clearly impinges on book's lifespan and to some novice it may mean buying a new book.

KASSIM S. MWITONDI
Sheffield Hallam University, UK