

Book Reviews

Meta-Analysis in Medical Research

Gioacchino Leandro

Oxford, Blackwell Publishing, 2005

pp. xii + 98, £39.50, ISBN 1 4051 2733 3

Meta-analysis has a very important place in today's world of evidence-based medicine. It is a powerful analytical method for pooling the results of several studies into a single common analysis. The usefulness and applicability of, and reliance on, meta-analysis have dramatically increased over the last decade due to an exponential increase in research studies, especially clinical trials. Thus it is a hot and current topic, and physicians need to understand the methodology and results so that they can apply the same in their clinical practice.

This is a concise and easy-to-read book written by a clinician so it takes into account problems faced by non-statisticians when dealing with tools such as meta-analysis. It is a short manual, not a detailed textbook, on the topic so readers should have a basic knowledge and understanding of statistical terminologies and methods. The book is more to do with the practicalities rather than description of meta-analysis but it is valuable for understanding the commonalities related to meta-analysis.

It starts with a historical overview of meta-analysis, followed by planning, analysis, presentation and evaluation of results phases. Statistical methods relevant to meta-analysis and their interpretation have been described in good detail and this is a particular strength of the book. Statistical formulae are given where relevant along with worked examples, which are helpful and easy to understand but require prior knowledge of statistics in general. Biases in meta-analytical research are dealt with adequately and the author has given a nice overview on their detection and avoidance while planning and undertaking meta-analysis. A glossary is given at the end and is helpful in understanding some of the key terminologies.

I feel that methodology for the selection of studies is given too briefly despite it being a very important and foremost requirement. It would have been useful to have some details on how to develop exclusion/inclusion criteria, and what basic points need to be considered before selecting a particular study for analysis etc. The book comes in spiral/ring binding, which may not be a very suitable feature as the pages are likely to become loose. No mention was made of any relevant web links or resources for further study on the topic.

The added bonus of the book is that it comes with METANALYSIS – a windows-based software program, which is quite handy to get a feel of meta-analysis methodology and is very user-friendly. The use of this software is described in detail along with computer system requirements for running the program. It has procedures such as publication bias assessment, test of asymmetry of funnel plots and graphics, like Galbraith's plots, not usually available in other programs.

In short, it gives a refreshing outline of meta-analysis and is appropriate for quick revision but is not particularly suitable for in-depth understanding. I would recommend it to all statisticians or clinicians who aspire to be/are involved in clinical research. In addition, it will be a useful book for any health sciences library.

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Functional Data Analysis (second 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). The 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 non-parametric 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 on the use of tools from ordinary and partial differential equations for describing dynamic changes in functional data, and these readers should especially pay attention to the last chapter: 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, although 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, although I found that the reference to Grenander (1980) at the 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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Sharpening Your SAS Skills

S. Gupta

Boca Raton, Chapman & Hall/CRC, 2005

pp. xvii + 278, £24.99 or \$59.95, ISBN 1 58488 501 7

This book, if not to be considered as a complete reference, is a very good resource for intermediate SAS programmers like me. The author of this review has benefited from some of the key points, the simple format of the sample code, the annotated output, and the step-by-step explanation of the code.

As with any other book, there are pros and cons in this six-chapter volume. Chapter 1: Set, Merge statement, and SQL Proc for combining data sets are very enlightening. However, the data input sections are rather repetitive. Chapter 2 is very informative. The discussion of Where/If is simple and clear. One section, regarding the data step compilation is good to know but not a must-have section for this book. Chapter 3 is a balanced chapter for data managing. The lively discussion is devoted to Using SAS Arrays. Chapter 4 is a little too busy due to covering every procedure that creates reports. It would be better to focus more on Proc Report since that procedure is more powerful than any other for report generating. Chapter 5 is the must-read one. Not only does it give details on error handling, but also categorises the field of error checking and handling, which might not be well organised by inexperienced programmers. Chapter 6 could have been replaced with some other tips, such as graphic procedures. The enhancements on previous versions are either not a concern for entry level programmers, or are already-known knowledge for experienced programmers.

The book is very easy to read even though there are some typos. It should be a very good resource for the entry to intermediate level SAS programmers at whom it is targeted. Of course the book is well worth putting on the library shelves.

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Mathematics of Financial Markets (second edition)

Robert J. Elliott & P. Ekkehard Kopp

Berlin, Springer-Verlag, 2004

pp. xi + 352, £69.00, ISBN 0 387 21292 2

Financial derivatives markets worldwide have become one of the most remarkable growth industries and now constitute a major source of employment for graduates with high levels of mathematical expertise. The emphasis of the first edition of this book was on developing the mathematical concepts for the rapidly expanding field of mathematical finance. This second edition contains a significant number of changes and additions, including substantial material from the current areas of active research, such as coherent risk measures (with applications to hedging) and arbitrage intervals for incomplete discrete-time models. The book consists of 11 chapters: 'Pricing by Arbitrage'; 'Martingale Measures'; 'The First Fundamental Theorem'; 'Complete Markets'; 'Discrete-Time American Options'; 'Continuous-Time Stochastic Calculus'; 'Continuous-Time European Options'; 'The American Put Option'; 'Bonds and Term Structure'; 'Consumption-Investment Strategies'; and 'Measures of Risk'. It also contains 20 or so pages of relevant references. In addition, a subject index is provided.

The book is designed as a text for courses aimed at advanced undergraduates and graduate students in mathematical finance. The target audience is readers with a sound mathematical background on elementary concepts from measure-theoretic probability, wishing to understand the mathematics that underpins pricing models for derivatives securities, options, futures and swaps in modern financial markets. It should be an equally valuable resource to practitioners interested in the mathematical tools for modern pricing and hedging strategies. I believe it will be a very useful addition to any scholarly library.

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Regression Methods in Biostatistics

E. Vittinghoff, D.V. Glidden, S.C. Shiboski & C.E. McCulloch

New York, Springer-Verlag, 2005

pp. xv + 340, £54.00; ISBN 0 387 20275 7

The authors have written a very readable book focusing on the most widely used regression models in biostatistics: Multiple linear regression, logistic regression and Cox regression. An introductory chapter covers simple statistical methods, and the concluding chapters introduce more advanced material such as models for repeated measures, generalised linear models and complex surveys. Each chapter finishes with notes, problems and learning objectives. Quite advanced material – selection of regressors and collinearity, confounding and mediating – is discussed in the context of the three regression models. All topics are illustrated by simple but real examples taken from biostatistics.

The book is written for a non-statistical audience, focusing on ideas and how to interpret results rather than on the theory underlying the models and methods discussed. Thus, the book will be more useful as a reference to give to a non-statistical colleague rather than as a book for the applied statistician who will probably prefer a more detailed treatment.

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