

## Book reviews

### *Books for review*

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**Statistical Methods for Spatial Data Analysis**

O. SCHABENBERGER AND C. A. GOTWAY, 2005  
 Boca Raton, Chapman and Hall–CRC  
 xviii + 488 pp., \$89.95  
 ISBN 1-58488-322-7

This book tackles spatial data analysis from a statistician's point of view. It provides a very natural bridge to spatial data analysis for the classically trained statistician who is familiar with linear models and the like. In terms of detail, it is at a very good level for its stated audience of a graduate class in spatial statistics; there is much useful information, and only one or two sections that seem excessive to needs.

The chapters are arranged intelligently, with a useful flow of material in terms of complexity and relevance. Some of the material appears in a few places, which is either useful or distracting, depending on how you take it.

Chapter 1 introduces the problems that the book will tackle and provides a useful set of motivating examples. The authors assess the effect of ignoring autocorrelation in estimation and inference. Simple tools and tests, such as the Geary and Moran statistics, are introduced and connected.

Chapter 2 provides a reasonably light coverage of the relevant theory of random fields from a spatial and a spectral point of view. Relevant concepts such as the various flavours of stationarity are (re)introduced here.

Chapter 3 considers estimation and inference of the properties of a discrete random field, focusing on point processes. The tools for simple cases are clearly laid out, but there seems a lack of follow-up. Examination, analysis and reporting of inhomogeneous point processes, marked point processes and multivariate point processes are cursory. More information on what we should do when the simple models fail would have been useful.

Chapter 4 considers estimation and inference of the properties of a continuous random field. This involves choosing a suitable strategy (covariance or semivariance), choosing a suitable model and estimating the parameters. This chapter provides useful and interesting discussions, such as 'binning *versus* not binning', a subsection to help the analyst to decide whether to use least squares on bin totals or maximum likelihood on data for estimating the parameters of a model of spatial dependence. More of this kind of guidance would have been welcome, although the authors do not stint us.

Chapter 5 introduces spatial prediction and the tools and techniques that surround it. It covers the various flavours of kriging and ties them in with estimation of the semivariance function parameters. This is another area for which I would have liked to

have seen more practical advice; we are approaching close to the heart of good spatial analysis, and decisions will be made that seem arbitrary. The authors' experience and thoughtfulness are valuable here.

Chapter 6 launches into a more formal treatment of fitting surfaces and correlation models. It flips the focus of interest from the covariance function to the mean function, and how to deal with the effect of spatial correlation on the assumptions that are required for regression. Modern estimation techniques are briefly surveyed.

The last three chapters are significantly less detailed, covering about a tenth of the book. Chapter 7 covers conditional and unconditional simulation of random fields. Chapters 8 and 9 develop the material in the direction of non-stationarity and the addition of temporal elements to the process respectively. The authors characterize these last two chapters as supplemental overviews.

Overall, the book is very well written, with an unflustered and matter-of-fact style. I found it perhaps a little too vernacular at points, e.g. the use of 'moniker' was distracting.

The authors have made a tightly written and well-planned contribution that updates much relevant material and provides welcome and thoughtful advice. Their book is deeper and more thorough than the very useful Isaaks and Srivastava (1989), less comprehensive and more focused than the lucid and compendious Cressie (1993) and very readable. I have no hesitation in recommending it for a graduate class in spatial statistics, and it is a welcome addition to my library.

*References*

- Cressie, N. A. C. (1993) *Statistics for Spatial Data*. New York: Wiley Interscience.  
 Isaaks, E. H. and Srivastava, R. M. (1989) *Applied Geostatistics*. New York: Oxford University Press.

Andrew Robinson  
 University of Melbourne

**Regression Methods in Biostatistics**

E. VITTINGHOFF, D. V. GLIDDEN, S. C. SHIBOSKI AND C. E. McCULLOCH, 2005  
 New York, Springer  
 xvi + 344 pp., \$79.95  
 ISBN 0-387-20275-7

This book is designed for those who want to use statistical tools in the biosciences. Mathematical derivations are kept to a minimum but, as the authors warn in the preface,

'A prerequisite for the book is a good first course in statistics...'

Those who are without this background may find it difficult in places.

It provides an excellent exposition of the application of different tools of regression analysis in biostatistics. It starts at an elementary level and progresses higher, with most topics accompanied by data analysed by using STATA. The material is set out clearly in 11 chapters. The first three chapters cover elementary topics and Chapter 4 deals with linear regression, and looks at different aspects including confounding, mediation, interaction and residual analysis. Chapter 5 covers the problem of how to choose the variables in linear regression. Concepts in both these chapters are well illustrated by using data-based examples. Binary dependent variables are studied via logistic regression in Chapter 6, followed by survival analysis in Chapter 7.

This chapter gives a very good idea of the interrelationships between regression analysis and survival analysis. Models for repeated measures and longitudinal data are described in Chapter 8. A brief discussion of generalized linear models and non-linear regression models appears in Chapter 9. Other aspects which are related to data are described in Chapters 10 and 11.

This book can be a bridge between biostatistics and regression analysis and will be useful to those with a good background. Survival analysis, repeated measurement analysis and generalized linear models are covered comprehensively. It could be used as a text-book for an advanced course in biostatistics, and it will also be helpful to biostatisticians who wish to ascertain which tools can be used in their own experimental conditions.

Shalabh  
Indian Institute of Technology Kanpur

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