

# Applications of Mathematics

---

## Book Reviews

*Applications of Mathematics*, Vol. 39 (1994), No. 6, 479–480

Persistent URL: <http://dml.cz/dmlcz/134272>

## Terms of use:

© Institute of Mathematics AS CR, 1994

Institute of Mathematics of the Czech Academy of Sciences provides access to digitized documents strictly for personal use. Each copy of any part of this document must contain these *Terms of use*.



This document has been digitized, optimized for electronic delivery and stamped with digital signature within the project *DML-CZ: The Czech Digital Mathematics Library* <http://dml.cz>

## BOOK REVIEWS

*M. M. Rao*: **CONDITIONAL MEASURES AND APPLICATIONS**. Marcel Dekker, Inc., New York, 1993, 424 pp., price US\$ 135,-.

Though any decent textbook on more advanced probability presents a chapter or two on conditioning procedures, no reference textbook has been available up to now to cover this important subject systematically, to present both its mathematical background and applications. M. M. Rao wrote such a book and the reviewer has no doubts about its future popularity among researchers as a stimulating reference while university students and teachers will appreciate a detailed and well motivated presentation designed primarily to assist a beginner to overleap a rather difficult gap between the classical conditional probabilities and their measure-theoretic counterparts.

A more standard material, though from a broad perspective, is included in chapters 1–5. These present motivations, the discrete and continuous classics, the abstract definition and basic properties of the conditional expectation operator, a variety of disintegration theorems for obtaining regular conditional distributions, and finally a generalized Jessen, Marcinkiewicz, Zygmund's differentiation theory that presents conditional expectations as Moore-Smith limits of the classical ones. The latter limiting procedure is used in an elegant and instructive way to explain well known paradoxes of classical probability calculus that may arise when conditioning by an event of zero probability.

Specialized topics as Rényi model, projective limit theorems and conditioning in function algebras are treated in chapters 7, 8 and 9. On the other hand, the text avoids useful and important extensions of the concept of conditional expectations to locally convex linear spaces.

The above theory is applied to treat mathematical problems centered around the concept of sufficiency (Chapter 6), to present an extended account of martingale theory and Markov processes (Chapter 9), and finally to link some connections to potential theory (Chapter 10).

The book may be well recommended for specialists as well as for the general reader.

*Josef Štěpán*

*Jaromír Antoch, Dana Vorlíčková*: **VYBRANÉ METODY STATISTICKÉ ANALÝZY DAT**. (Selected methods of statistical data analysis.) Academia, Praha, 1992, pp. 279, price Kč 135,-.

As it is indicated by the title the book is indeed a collection of selected methods, most of them very frequently used in applications of statistics. It crosses the usual borders of typical areas studied separately in statistical monographs. And let us emphasize for readers who want to learn rapidly but not without deeper understanding useful methods of data processing that this is very valuable and helpful. The experience of the authors with teaching statistics allowed them to create the text which is easy to read and understand but which stresses the appropriate interpretation of theoretical conclusions at proper places. On the other hand, the experience of the authors with applications, which they have gained during a wide cooperation of their department with many other groups of (applied) statisticians in Czech and Slovak republics as well as abroad, gave them the ability to warn the reader of the most frequent or the most dangerous misapplications of the methods.

Let us give now to a potential buyer of the book a detailed information on its contents. Chapter 1 brings basic notations and recalls basic tasks of statistics. The chapter is concluded by a large list of classical families of distributions together with their statistical characterizations and graphs.

Chapter 2 is devoted to the linear model. The regression model is briefly introduced, and then specified for the analysis of variance. One-way as well as many-way classifications are considered. The exposition continues by Greek-Latin squares and by a paragraph returning to regression and correlation. Special methods as discriminant analysis, design of experiments, method of least squares accompanied by numerical techniques (Gram-Schmidt, Householder, Givens, QR-decomposition, method of weighted squares) are also included. The chapter ends with a very useful paragraph on detection of the influential points in regression analysis.

Chapter 3 explains in the first three paragraphs nonparametric methods including tests based on ranks (listing the most frequent tests of Wilcoxon and van der Warden), tests based on empirical distribution functions (discussing, of course, alternatives in location, testing symmetry and independence) and finally, the tests of goodness of fit. The chapter continues by robust methods, explaining basic notions and enlightening heuristic ideas (of breaking classical statistical assumptions), as well as the most important tools (influence function) and the characteristics derived from it (gross-error sensitivity, local-shift sensitivity, rejection point). The definition and explanation of the breakdown point was not, naturally, omitted. The most popular methods ( $L$ -,  $R$ -,  $M$ -) are discussed in detail including special cases of location and scale. Other robust methods ( $P$ -,  $W$ -,  $D$ -) are at least briefly explained. Nonparametric methods of estimation of a density and of a regression function (such as kernel estimators, Fourier estimators) are described, too. Adaptive methods are mentioned only for a rather special case, however, in contrast to other methods included in the book, they are (still) of less importance for applications.

Chapter 4 (exceeding 40 pages) is devoted to simulations and their applications in statistics. General methods for generating random numbers being realizations of continuous as well as discrete random variables are demonstrated (including the symbolic software). Algorithms for sampling from finite populations finish the chapter.

The last Chapter 5 discussed briefly the history of computational methods and their characteristics. A large table listing available software packages together with their authors/sources, the possibility of obtaining demonstration versions, the computer required, and brief characterizations conclude the text.

An appendix contains a collection of useful tables and a list of references containing nearly two hundred items.

The book is recommendable to all (theoretical as well as applied) statisticians and as a textbook for appropriate level of courses.

The book is written so well, that is difficult to say a critical word. Of course, one may discuss that something more was to be included, but it is a matter of taste and opinion. So only a very small thing is left. The translation of the notion "breakdown point" as "bod zvratu" instead of "bod selhání" seems to me to be a little strange. However, it is again a matter of taste.

I recommend strongly to all statisticians at least to skim through the book and to keep in mind its existence. Earlier or later they will need to use something from the areas which the book is devoted to. Then they will have a reliable ally.

*Jan Ámos Víšek*