

BOOK REVIEWS

EDITOR:
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| Statistical Analysis of Environmental Processes
(N. D. Le and J. V. Zidek) | <i>Jon Wakefield</i> | Basic Statistics and Pharmaceutical Statistical Applications, 2nd edition
(J. E. De Muth) |
| Applied Mixed Models in Medicine, 2nd edition
(H. Brown and R. Prescott) | <i>Matthew J. Gurka</i> | A Handbook of Statistical Analyses Using Stata, 4th edition
(S. Rabe-Hesketh and B. S. Everitt) |
| Stochastic Modeling for Systems Biology
(D. J. Wilkinson) | <i>Olaf Wolkenhauer</i> | |
| Knowledge Discovery in Proteomics
(I. Jurisica and D. Wigle) | <i>Zhen Zhang</i> | Introduction to Randomized Controlled Clinical Trials, 2nd edition
(J. N. S. Matthews) |
| Computational Genome Analysis: An Introduction
(R. C. Deonier, S. Tavaré, and M. S. Waterman) | <i>Marc Suling</i> | Introduction to Randomized Controlled Clinical Trials, 2nd edition
(J. N. S. Matthews) |
| Stochastic Orders
(M. Shaked and J. G. Shantikumar) | <i>Subhash Kochar</i> | |
| <i>Brief Reports by the Editor</i> | | |
| Measurement Error in Nonlinear Models: A Modern Perspective, 2nd edition
(J. Carroll, D. Ruppert, L. A. Stefansky, and C. M. Crainiceanu) | | Survival and Event History Analysis
(P. K. Andersen and N. Keiding, editors) |
| | | A Pocket Guide to Epidemiology
(D. G. Kleinbaum, K. M. Sullivan, and N. D. Barker) |
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SHAKED, M. and SHANTIKUMAR, J. G. **Stochastic Orders**. Springer, New York, 2007. xvi+475 pp. US\$89.95/€74.85 ISBN 978-0387-32915-4.

The simplest way to compare two random variables is through quantities like their means, variances, correlation coefficients, and other univariate parameters. However, such methods of comparisons might not be very informative. In many cases one can express various forms of knowledge about the underlying distributions in terms of their survival functions, hazard rate functions, mean residual functions and other suitable functions of probability distributions. These methods are much more revealing than those based on comparing only a few moments of the distributions. The comparisons of random variables through such functions usually establish partial orders among them. We call them stochastic orders. There are

several kinds of stochastic orders that are used to compare different features of probability distributions like their location, variability, skewness, dependence between random variables, etc.

Stochastic orders have applications in essentially all areas of applied probability, and in particular in life sciences. For example, hazard rates and mean residual life functions are basic building blocks in models of life sciences. Some stochastic orders, such as the univariate hazard rate order and the mean residual life order, and the multivariate dynamic hazard rate order, are based on comparisons of these functions. Other stochastic orders compare the strength of positive dependence that occurs often in life sciences stochastic models. Thus these stochastic orders can help understanding and modeling various situations that arise in life sciences.

The book under review is an expanded and updated version of their popular 1994 book on this topic (Shaked and Shanthikumar, 1994). It gives an authoritative account of the work in this area and discusses developments as recent as 2006. The nine chapters of the book are devoted to different types of stochastic orders.

The book is an encyclopedic reference work, and as such it does not contain detailed applications in any area, and in particular also not in life sciences. However, some of the references in the bibliography can direct the reader towards works that apply stochastic orders in life sciences.

REFERENCE

Shaked, M. and Shanthikumar, J. G. (1994). *Stochastic Orders and Their Applications*. Boston, Massachusetts: Academic Press.

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