Current Issues in Statistical Inference: Essays in Honor of D. Basu

edited by M. Ghosh & P. K. Pathak

D. Basu's emphasis has always been on foundations and underlying concepts rather than on technicalities. In keeping with his philosophy, essays in this festschrift volume, dedicated to Basu on the occasion of his 65th birthday, place the major emphasis on the foundational issues of statistical inference. Most of the papers in this volume are review articles written by his friends and colleagues in those areas of statistics that have interested Basu most during his active research career—information, likelihood, ancillarity, randomization, fiducial probabilities, logical foundations of survey sampling, and many related concepts. These papers are also written in a narrative style which has typified so much of Basu's own writings in statistics.

Contents

Conditional inference from confidence sets by G. Casella; Intervention experiments, randomization and inference by O. Kempthorne; Ancillarity by E. L. Lehmann & F. W. Scholz; The Pitman closeness of statistical estimators: Latent years and the renaissance by P. K. Sen; Unbiased sequential binomial estimation by Bimal K. Sinha & Bikas K. Sinha; Sufficiency by S. Yamada & H. Morimoto; Foundations of statistical quality control by R. E. Barlow & T. Z. Irony; Prequential data analysis by A. P. Dawid; Bayesian nonparametric inference by T. S. Ferguson, E. G. Phadia, & R. C. Tiwari; Hierarchical and empirical Bayes multivariate estimation by M. Ghosh; Basu's contributions to the foundations of sample survey by G. Meeden; Survey sampling—As I understand it by V. P. Godambe; Two basic partial orderings for distributions derived from Schur functions and majorization by K. Joag-Dev & J. Sethuraman; Optimal integration of surveys by P. K. Pathak & M. Fahimi; The model based (prediction) approach to finite population sampling theory by R. M. Royall; Sampling theory using experimental design concepts by J. Srivastava & Z. Ouyang

Pagesviii+264
List price\$25
IMS member price\$15

Order prepaid from:
Institute of Mathematical Statistics
3401 Investment Boulevard, Suite 7
Hayward, California 94545 (USA)

IMS Lecture Notes-Monograph Series

18 SELECTED PROCEEDINGS OF THE SHEFFIELD SYMPOSIUM ON APPLIED PROBABILITY

edited by I. V. Basawa & R. L. Taylor

Proceedings of the Symposium on Applied Probability, Sheffield, August 1989.

The purpose of this Symposium was to focus attention on some of the prominent directions in applied probability. This volume contains several major papers covering models in epidemiology, genetics, random fields, branching processes, random walks, directed polymers and evolution time-scales. A broad array of interesting problems are discussed in the eighteen technical articles included in this volume.

288 pages List price \$15 IMS members \$9

19 STOCHASTIC ORDERS AND DECISION UNDER RISK

edited by K. Mosler & M. Scarsini

A selection of papers presented at the International Workshop on Stochastic Orders and Decision Under Risk, Hamburg, May 1989.

The aim of this workshop was to contribute to the theory and applications of stochastic orders and to gather scientists from probability theory, statistics, reliability, queueing, economics, finance, insurance, and mathematical physics who are using similar mathematical tools. The twenty-three papers in this volume represent a selection of those presented in Hamburg.

406 pages List price \$30 IMS members \$18

20 SPATIAL STATISTICS AND IMAGING

edited by A. Possolo

Proceedings of the Joint IMS-AMS-SIAM Summer Research Conference on Spatial Statistics and Imaging, Brunswick, Maine, June 1988.

The conference assembled an international and interdisciplinary panel of mathematicians, statisticians, astronomers, physicists, electrical engineers, geophysicists, and medical doctors. The twenty-eight papers in this volume report on advancements in the theory and practice of spatial statistics and the technology of digital image restoration and reconstruction.

434 pages List price \$35 IMS members \$21

ADDITIONAL TITLES

Vol. 1, Essays on the Prediction Process by F. Knight (\$15/members \$9); Vol. 2, Survival Analysis edited by J. Crowley & R. A. Johnson (\$25/members \$15); Vol. 3, Empirical Processes by P. Gaenssler (\$20/members \$12); Vol. 4, Zonal Polynomials by A. Takemura (\$15/members \$9); Vol. 5, Inequalities in Statistics and Probability edited by Y. L. Tong (\$25/members \$15); Vol. 6, The Likelihood Principle (2nd ed.) by J. Berger & R. Wolpert (\$25/members \$15); Vol. 7, Approximate Computation of Expectations by C. Stein (\$20/members \$12); Vol. 8, Adaptive Statistical Procedures and Related Topics edited by J. Van Ryzin (\$40/members \$24); Vol. 9, Fundamentals of Statistical Exponential Families by L. D. Brown (\$25/members \$15); Vol. 10, Differential Geometry in Statistical Inference by S.-I. Amari, O. E. Barndorff-Nielsen, R. E. Kass, S. L. Lauritzen, & C. R. Rao (\$25/member \$15); Vol. 11, Group Representations in Probability and Statistics by P. Diaconis (\$30/member \$18); Vol. 12, An Introduction to Continuity, Extrema, and Related Topics for General Gaussian Processes by R. J. Adler (\$25/member \$15); Vol. 13, Small Sample Asymptotics by C. Field & E. Ronchetti (\$25/member \$15); Vol. 14, Invariant Measures on Groups and Their Use in Statistics by R. A. Wijsman (\$30/member \$18); Vol. 15, Analytic Statistical Models by I. M. Skovgaard (\$25/member \$15); Vol. 16, Topics in Statistical Dependence edited by H. W. Block, A. R. Sampson, & T. H. Savits (\$45/member \$27); Vol. 17, Current Issues in Statistical Inference: Essays in Honor of D. Basu edited by M. Ghosh & P. K. Pathak (\$25/member \$15).

Order prepaid from:

Institute of Mathematical Statistics 3401 Investment Boulevard, Suite 7 Hayward, California 94545 (USA)

INSTITUTE OF MATHEMATICAL STATISTICS

(Organized September 12, 1935)

The purpose of the Institute is to foster the development and dissemination of the theory and applications of statistics and probability.

OFFICERS AND EDITORS

President:

Lawrence D. Brown, Department of Mathematics, White Hall, Cornell University, Ithaca, New York 14853-7901 President-Elect:

Stephen M. Stigler, Department of Statistics, University of Chicago, 5734 University Avenue, Chicago, Illinois 60637 Past President:

Willem R. van Zwet, Department of Mathematics, University of Leiden, P.O. Box 9512, 2300 RA Leiden, The Netherlands Executive Secretary:

Diane M. Lambert, AT&T Bell Laboratories, 600 Mountain Avenue, Room 2C-256, Murray Hill, New Jersey 07974
Treasurer:

Jessica Utts, Division of Statistics, University of California, Davis. *Please send correspondence to:* IMS Business Office, 3401 Investment Boulevard #7, Hayward, California 94545

Program Secretary:

Iain M. Johnstone, Division of Biostatistics, HRP Building, Room 10, Stanford University, Stanford, California 94305-5092

Editor: The Annals of Statistics

Michael Woodroofe, Department of Statistics, Mason Hall, University of Michigan, Ann Arbor, Michigan 48109-1027 Editor: The Annals of Probability

Burgess Davis, Departments of Mathematics and Statistics, Purdue University, West Lafayette, Indiana 47907 Editor: The Annals of Applied Probability

J. Michael Steele, Department of Statistics, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6302 Executive Editor: Statistical Science

Robert E. Kass, Department of Statistics, Carnegie Mellon University, Pittsburgh, Pennsylvania 15213 Editor: The IMS Bulletin

George P. H. Styan, Department of Mathematics and Statistics, Burnside Hall, McGill University, 805 Sherbrooke Street West, Montreal PQ, Canada H3A 2K6

Editor: The IMS Lecture Notes - Monograph Series

Robert J. Serfling, Department of Mathematical Sciences, Johns Hopkins University, Baltimore, Maryland 21218 Managing Editor:

 ${\bf John\,R.\,Collins,\,Department\,of\,Mathematics\,and\,Statistics,\,University\,of\,Calgary,\,2500\,University\,Drive\,NW,\,Calgary,\,Canada\,T2N\,\,1N4}$

Managing Editor:

Robert Smythe, Department of Statistics, George Washington University, 2201 G Street N.W., Washington, D.C. 20052

Journals. The scientific journals of the Institute are The Annals of Applied Probability, The Annals of Probability, The Annals of Statistics and Statistical Science. The news organ of the Institute is The Institute of Mathematical Statistics Bulletin.

Individual and Organizational Memberships. All individual members pay basic membership dues of \$40 plus \$10 for The IMS Bulletin. Each regular member must elect to receive at least one scientific journal for an additional amount, as follows: The Annals of Applied Probability (\$10), The Annals of Probability (\$20), The Annals of Statistics (\$20) or Statistical Science (\$10). Of the total dues paid, \$24 is allocated to The IMS Bulletin and the remaining amount is allocated equally among the scientific journal(s) received. Reduced membership dues are available to full-time students, permanent residents of countries designated by the IMS Council and retired members. Retired members may elect to receive The IMS Bulletin only for \$20. Organizational memberships are available to nonprofit organizations at \$425 per year and to for-profit organizations at \$700 per year. Organizational memberships include two multiple-readership copies of all IMS journals in addition to other benefits specified for each category (details available from the IMS Business Office).

Individual and General Subscriptions. Subscriptions are available on a calendar-year basis. Individual subscriptions are for the personal use of the subscriber and must be in the name of, paid directly by, and mailed to an individual. Individual subscriptions for 1992 are available to The Annals of Applied Probability (\$70), The Annals of Probability (\$80), The Annals of Statistics (\$80), The IMS Bulletin (\$45) and Statistical Science (\$70). General subscriptions are for libraries, institutions and any multiple-readership use. General subscriptions for 1992 are available for The Annals of Applied Probability (\$70), The Annals of Probability and The Annals of Applied Probability (\$180), The Annals of Statistics (\$130), The IMS Bulletin (\$50) and Statistical Science (\$75). Air mail rates for delivery outside North America are \$80 per title (excluding The IMS Bulletin).

Permissions policy. Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by the Institute of Mathematical Statistics, provided that the base fee of \$7.50 per copy, plus \$.00 per page is paid directly to the Copyright Clearance Center, 27 Congress Street, Salem, Massachusetts 01970. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is 0883-4237/92 \$7.50 + .00.

Correspondence. Mail to IMS should be sent to the IMS Business Office (membership, subscriptions, claims, copyright permissions, advertising, back issues), the Editor of the appropriate journal (submissions, editorial content) or the Production Editor, Patrick Kelly, Department of Statistics, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6302.

SPRINGER FOR STATISTICS



P.G. HALL, Australian National University, Canberra, Australia

THE BOOTSTRAP AND EDGEWORTH EXPANSION

Presents a readable introduction to the theory of bootstrap methods suitable for graduate students and research workers in statistics. Discusses the application of bootstrap methods to linear regression, non-parametric regression, and density estimation. The first chapters introduce the basic concepts of bootstrap methods and the Edgeworth expansion. Subsequent chapters explore the interaction between the two subjects and their application to statistical techniques. Technical details are deferred to the last chapter enabling a reader with a relatively small exposure to theoretical statistics to enjoy this account of a rapidly growing branch of statistical research.

1992/352 PP., 6 ILLUS./HARDCOVER/\$49.00 ISBN 0-387-97720-1 SPRINGER SERIES IN STATISTICS

R.D. JENKS and **R.S. SUTOR**, both at the IBM Thomas J. Watson Research Center Yorktown Heights, NY

AXIOM: THE SCIENTIFIC COMPUTATION SYSTEM

Originating as IBM Research's Scratchpad project, AXIOM is the powerful new symbolic, numerical, and graphical system developed at the IBM Thomas J. Watson Research Center. AXIOM's scope, structure, and organization are outstanding among scientific computation systems. As the only authorized documentation of the AXIOM system, this book is written for both AXIOM users and readers interested in AXIOM's unique structure, new symbolic computation algorithms, and advanced programming and problem solving techniques. Eighty illustrations and eight pages of spectacular color inserts accompany text detailing methods used in the 2D and 3D interactive graphics system. Over 2500 example input lines help the reader solve formerly intractable problems.

For additional information on the AXIOM system, please contact John Zurawski at Numerical Algorithms Group, Inc., Downer's Grove, Illinois (E-mail: naginc!jz@sunbird. central.sun.com), or The Numerical Algorithms Group, Ltd., Oxford, Great Britain.

1992/742 PP., 80 ILLUS./HARDCOVER/\$45.00 ISBN 0-387-97855-0

New from the Lecture Notes in Statistics

P.K. GOEL and N.S. IYENGAR (Eds.)

BAYESIAN ANALYSIS IN STATISTICS AND ECONOMETRICS

1992/410 PP./SOFTCOVER/\$58.00 ISBN 0-387-97863-1 LECTURE NOTES IN STATISTICS, VOLUME 75

L. BONDESSON

GENERALIZED GAMMA CONVOLUTIONS AND RELATED CLASSES OF DISTRIBUTIONS AND DENSITIES

1992/173 PP./SOFTCOVER/\$30.00 ISBN 0-387-97866-6 LECTURE NOTES IN STATISTICS, VOLUME 76

E. MAMMAN

WHEN DOES BOOTSTRAP WORK?

Asymptotic Results and Simulations

1992/196 PP./SOFTCOVER/\$30.00 ISBN 0-387-97867-4 LECTURE NOTES IN STATISTICS, VOLUME 77

L. FAHRMEIR, B. FRANCIS, R. GILCHRIST and G. TUTZ (Eds.)

ADVANCES IN GLIM AND STATISTICAL MODELLING

1992/225 PP./SOFTCOVER/\$36.00 ISBN 0-387-97873-9 LECTURE NOTES IN STATISTIO6, VOLUME 78



Y. DODGE, University of Neuchâtel, Switzerland; J. WHITTAKER, Lancaster University, Great Britain (Eds.)

COMPUTATIONAL STATISTICS

Volumes 1&2

The papers assembled in these volumes were presented at the biannual symposium of International Association for Statistical Computing in Neuchâtel, Switzerland, in August of 1992. The papers have been grouped together according to subject matter classification. Volume 1 leans towards statistics and modelling while volume 2 is focussed more on computation. The volumes are meant to be thought of as the result of a single enterprise.

TABLE OF CONTENTS:

Volume 1

- Statistical Modelling
- Multivariate Analysis
- Classification and Discrimination
- Symbolic and Relational Data
- · Graphical Models
- Time Series Models
- Nonlinear Regression
- Robustness and Smoothing Techniques
- Industrial Applications: Pharmaceutics and Quality Control
- Bayesian Statistics

Volume 2

- Programming Environments
- Computational Inference
- Package Developments
- Experimental Design
- Image Processing and Neural Networks
- Meta Data
- Survey Design
- Data Base

VOLUME 1: 1992/578 PP., 102 ILLUS./HARDCOVER

\$138.00/ISBN 0-387-91429-3

VOLUME 2: 1992/440 PP., 97 ILLUS./HARDCOVER \$98.00/ISBN 0-387-91430-7



Three Easy Ways to Order:

Call Toll Free 1-800-SPRINGER (NJ call 201-348-4033) or FAX 201-348-4505. Please mention S231 when ordering by phone.

Write to Springer-Verlag New York, Inc., Attn: P. Manning, Dept. S231, 175 Fifth Avenue, New York, NY 10010.

Visit your local scientific bookstore or urge your librarian to order for your department.

Payment can be made by check, purchase order, or credit card. Please enclose \$2.50 for shipping (\$1.00 additional books) & add appropriate sales tax if you reside in NY, NJ, MA, VT, CA or PA. Canadian residents please add 7% GST.

Remember...your 30-day return privilege is always guaranteed!

11/92

REFERENCE #: S231