

Preface

This volume covers a broad range of contemporary topics in statistical modeling and inference. There have been many exciting developments in the field of Statistics over the last quarter century, stimulated by the rapid advances in computing and data-measurement technologies. The increased computing power and availability of large datasets have led to considerable new research in flexible modeling, semiparametric and nonparametric methods, and computationally-intensive techniques. These developments have allowed us to move away from parametric techniques that rely on restrictive assumptions to much more flexible methods for modeling and analysis of data. There is also extensive use of simulation and Monte Carlo techniques for doing statistical inference. This book provides an overview of some of these advances as well as description of new research in methodology and theory.

There are 32 chapters written by leading international researchers on a broad range of topics: semiparametric methods, transformation models, nonparametric regression, rank-based inference, mixture models, survival and reliability analysis, Bayesian inference, resampling methods, and inference under constraints. Researchers, graduate students, as well as practitioners will find the volume to be useful.

The book was prepared in honor of Professor Kjell A. Doksum to celebrate his 65th birthday. Authors include Kjell's friends, colleagues, and former students from all over the world. In recognition of Kjell's passion for soccer, the volume begins with a chapter by Brillinger that deals with modeling ordinal data and application to Norwegian soccer.

Part 1 covers topics in survival analysis. Aalen and Gjessing provide a modern perspective on the role of stochastic processes in modeling random phenomena in survival and event history analysis. Jewell examines the correspondence between complex survival models and categorical regression models for polytomous data, generalizing earlier connections between binary regression models and survival analysis. Borgan and Langholz de-

velop methods for assessing the goodness-of-fit for sample risk set data using martingale residuals.

Part 2 deals with reliability techniques and related applications. Singpurwalla examines relationships between reliability/survival analysis and the mathematical theory of finance and uses them to characterize asset pricing formula, model interest rates, etc. Block, Dugas, and Samaniego study new applications of the “system-signature” concept to reliability analysis of system lifetimes. Li and Shaked review generalizations of the total-time-on-test transforms, stochastic orders based on these transforms, and their applications.

Part 3 includes five chapters on advances in semiparametric methods. Beran develops a very flexible modeling and estimation strategy, called Adaptive Shrinkage on Penalty bases, for discrete two-way layouts and studies its large-sample behavior. You and Jiang consider varying-coefficient partially-linear models and propose a penalized spline-based least-squares estimation methodology for serially correlated data. In related work, Chong, Wang, and Zhu develop a semi-linear index model for flexible dimension reduction that incorporates both discrete and continuous predictors. Chaudhuri explores extensions of semiparametric single-index models for multivariate lifetime data and related inference methods. The chapter by Samarov and Tsybakov proposes and examines a data-based method for selecting the best estimator from a collection of arbitrary density estimators.

Part 4 is concerned with the related area of transformation models. Klassen considers a general class of semiparametric transformation models and determines the semiparametric information for the Euclidean parameter in the model. Scheike also considers semiparametric transformation models and examines the modified partial likelihood estimators in this context. Taylor and Liu examine the effect of embedding a standard model in a larger family of models indexed by an additional parameter and discuss parameter interpretations, variance inflation, predictions, and so on.

The three chapters in Part 5 cover topics in nonparametric regression. Müller examines smooth nonparametric estimation of conditional moments and correlation functions and proposes a general linear unbiased estimation scheme. Hallin, Jureckova and Koul study the asymptotic properties of rank score statistics for regression and serial autoregression. Støve and Tjøstheim develop a new convolution smoother for nonparametric regression that outperforms standard kernel estimators.

Part 6 deals with clustering and mixture models. Zou, Yandell, and Fine review gene mapping in the context of semiparametric and nonparametric inference for mixture models and discuss estimation and model selection issues. Lau and Lo consider model-based clustering and Bayesian nonparametric methods for mixture models, and develop Monte Carlo methods using a weighted Chinese restaurant process for inference. James describes a class of species-sampling mixture models that can be derived from Doksum's neutral-to-the-right processes.

The two chapters in Part 7 develop Bayesian nonparametric inference for quantiles using Dirichlet process priors. Johnson and Sim obtain an asymptotic expansion for the posterior distribution of a percentile with a leading normal term. Hjort and Petrone develop Bayesian inference for the quantile function and related quantities such as the Lorenz curve and Doksum's shift function.

Part 8 is concerned with rank-based methods. Aaberge studies empirical rank-dependent family of inequality measures, motivated by applications to modeling income distributions. Zheng and Lo develop a modified Kendall rank-order test for evaluating repeatability of studies with very large data sets when only a small proportion of "interesting or important" objects. Miura uses rank statistics of the geometric Brownian motion to define some new concepts in finance and studies their stochastic properties.

Part 9 covers inference based on Monte Carlo and resampling methods. Lindqvist and Taraldsen review and extend a general approach for Monte Carlo computations of conditional expectations given a sufficient statistic. Kong, McCullagh, Meng, and Nicolae explore the use of a likelihood-based theory for Monte Carlo integration, following up on their earlier work. Schweder studies confidence nets, a family of nested confidence regions, and uses bootstrapping to get product confidence nets for high-dimensional parameters.

Part 10 deals with topics in constrained inference. Koenker and Mizera examine a unified approach to density estimation using total variation regularization and develop methods that are capable of identifying features such as sharp peaks. Fan and Zhang study the bounded normal mean problem and develop a better approximation to the minimax risk. The final chapter by Rojo and Batún-Cutz examines estimation of symmetric distributions under a peakedness constraint.

The volume spans a broad range of areas in statistical modeling and inference. It is worth noting that Professor Kjell Doksum has made significant contributions to all of these topics.

Several people have made important contributions during the preparation of this volume. First, I want to thank the authors for their enthusiastic support for a volume to honor Kjell Doksum and for their patience during the editing and publication process. The initial plans for a festschrift for Kjell were conceived in collaboration with Dorota Dabrowska. I am greatly indebted to Dorota for the tremendous amount of time and effort she invested on the original project. I wish we could have completed it. Thanks are also due to the many referees for their help with the reviewing process. Anupap (Paul) Somboonsavatdee did an extraordinary job with the technical aspects of editing and proof-reading this volume. He really rescued me! Sheela Nair, Aijun Zhang, Mary Ann King, and Matthew Linn also helped out with editing at various points. I am grateful to Joan Fujimura and Teresa Doksum for background information, pictures, and encouragement.

I have known Kjell Doksum for more than 30 years as a teacher, mentor, and, best of all, friend. On behalf of his friends, colleagues, and students, I am pleased to dedicate this volume in Kjell's honor and to celebrate his 65-th birthday!

Vijay Nair
Ann Arbor, MI, USA
August 15, 2006