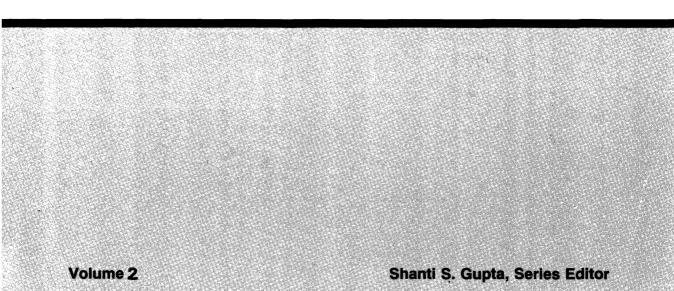
Institute of Mathematical Statistics LECTURE NOTES-MONOGRAPH SERIES

Survival Analysis

Edited by

John Crowley and Richard A. Johnson



Institute of Mathematical Statistics

LECTURE NOTES-MONOGRAPH SERIES Shanti S. Gupta, Series Editor

Volume 2

Survival Analysis

Proceedings of the Special Topics Meeting sponsored by the Institute of Mathematical Statistics, October 26–28, 1981, Columbus, Ohio

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PREFACE

The 178th meeting of the Institute of Mathematical Statistics, held at Ohio State University in Columbus, Ohio, October 26-28, 1981, was organized as a Special Topics Meeting on Survival Analysis. The intent was to gather workers interested in the analysis of life length, from both reliability and biomedical applications, and to share progress and ideas across these disciplines. Survival analysis has been an active and exciting area of research for the past several decades, and one which is still gaining momentum today. The breadth of current activity in the field is illustrated in this Proceedings Volume, which includes invited papers from the meeting covering seven main topics:

I. Counting Processes and Survival Analysis

This first paper reviews the application of counting processes and the associated martingales to the large sample theory for a broad class of problems in survival analysis, from one and two sample situations to regression.

II. Nonparametric Inference for a Single Sample

Research on the one-sample problem is represented by three papers, covering a smooth version of the product-limit estimator, a generalization of the product-limit estimator to progressive censoring schemes, and an estimator of the hazard or failure rate.

III. Proportional Hazards and Log-Linear Models

Papers in this group give a comparison of estimators of the ratio of hazard functions in the context of a proportional hazards model, and a comparison of least squares and partial likelihood approaches when a log-linear model and proportional hazards both hold.

A new algorithm for least-squares type estimation for parameters in a linear model (possibly after transformation) for censored survival data is also given and investigated.

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IV. Regression Approaches

Other research presented on regression includes an analysis of the statistical aspects of the inverse Gaussian model, and of the Box-Cox transformation toward normality with censored data. General considerations regarding the errors in variables problem are also discussed.

V. Problems in System Reliability

Inference procedures with time-truncated life-test data from an exponential model and a mixture of exponentials are given, and the properties of a system with imperfect repair of components derived. General limit theorems for a class of life-testing problems are also presented.

VI. Multivariate Distributions and Competing Risks

General notions regarding the concept of negative dependence of random variables are given, as well as some aspects of the theory of possibly dependent competing risks. Two papers present and explore estimators of the bivariate distribution function with censored observations, one using a model with exponential hazards, the other taking a nonparametric point of view.

VII. Group Sequential Methods in Clinical Trials

Both large sample and Monte Carlo approaches are used to investigate the properties of various statistics as applied at several times during the course of a clinical trial.

There were 25 invited papers as well as 6 sessions for contributed papers. The invited speakers were:

Per Kragh Andersen Statistical Research Unit Danish Medical and Social Research Councils

Richard Barlow University of California, Berkeley Asit P. Basu University of Missouri, Columbia Gouri K. Bhattacharyya University of Wisconsin, Madison Henry W. Block University of Pittsburgh Gregory Campbell Laboratory of Statistical & Mathematical Methodology National Institutes of Health John Crowley Fred Hutchinson Cancer Research Center University of Washington Kjell A. Doksum University of California, Berkeley T.R. Fleming Mayo Clinic Mitchell H. Gail National Cancer Institute Joseph C. Gardiner Michigan State University Richard A. Johnson University of Wisconsin, Madison J.D. Kalbfleisch University of Walterloo Jerome Klotz Ohio State University Sue Leurgans University of Wisconsin, Madison N.R. Mann University of California, Los Angeles Paul Meier University of Chicago Janet Myhre Claremont McKenna College Ross Prentice Fred Hutchinson Cancer Research Center University of Washington Frank Proschan Florida State University Nozer D. Singpurwalla George Washington University

V. Susarla Michigan State University

Anastasios A. Tsiatis Harvard University Sidney Farber Cancer Institute

John Van Ryzin Columbia University

Marvin Zelen Harvard University Sidney Farber Cancer Institute

In a few instances the papers included here differ somewhat from the remarks given at the meeting because of prior publication elsewhere.

ACKNOWLEDGMENTS

The Editors would first like to thank all who attended the Special Topics Meeting on Survival Analysis for making it a stimulating and rewarding experience. We gratefully acknowledge the support of the Institute of Mathematical Statistics for sponsoring the conference and for publishing this Proceedings Volume. Special thanks are due to Heebok Park and Bruce Trumbo for help with the production of the volume, and to John Klein, Mark Berliner, Doug Wolfe and Jerome Klotz for handling the arrangements at Columbus. Special credit is due the following people, who helped read and edit the manuscripts: Gouri Bhattacharyya, Shu-Mei Chen, Dennis Cox, Michael Jones, Sue Leurgans, Kung-Yee Liang, Barbara McKnight, Frances Olszewski, Barry Storer, Wei-Yann Tsai and Joseph G. Voelkel.

The excellent typing was done by Joy Hoggarth.

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