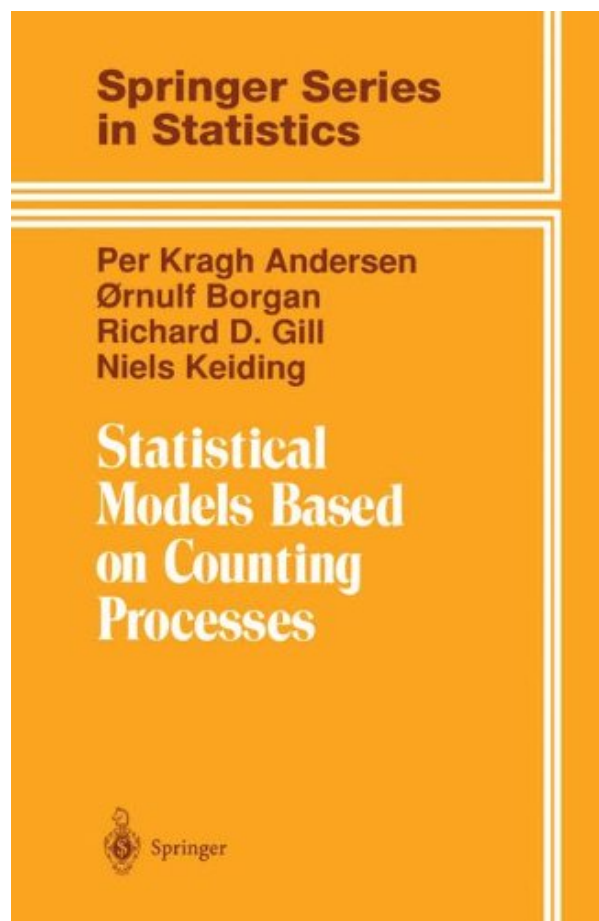


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"This book is a masterful account of the counting process approach...is certain to be the standard reference for the area, and should be on the bookshelf of anyone interested in event-history analysis." International Statistical Institute Short Book Reviews

"...this impressive reference, which contains a a wealth of powerful mathematics, practical examples, and analytic insights, as well as a complete integration of historical developments and recent advances in event history analysis." Journal of the American Statistical Association

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Modern survival analysis and more general event history analysis may be effectively handled within the mathematical framework of counting processes. This book presents this theory, which has been the subject of intense research activity over the past 15 years. The exposition of the theory is integrated with careful presentation of many practical examples, drawn almost exclusively from the authors' own experience, with detailed numerical and graphical illustrations. Although *Statistical Models Based on Counting Processes* may be viewed as a research monograph for mathematical statisticians and biostatisticians, almost all the methods are given in concrete detail for use in practice by other mathematically oriented researchers studying event histories (demographers, econometricians, epidemiologists, actuarial mathematicians, reliability engineers and biologists). Much of the material has so far only been available in the journal literature (if at all), and so a wide variety of researchers will find this an invaluable survey of the subject.

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Review

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"...this impressive reference, which contains a wealth of powerful mathematics, practical examples, and analytic insights, as well as a complete integration of historical developments and recent advances in event history analysis." *Journal of the American Statistical Association*

Most helpful customer reviews

45 of 46 people found the following review helpful.

counting process approach to survival analysis

By Michael R. Chernick

Another reviewer has given a detailed and accurate account of this book which may already be considered a classic. So I can be brief in my remarks. Odd Aalen in his thesis work developed a lot of the theory of counting processes. Since survival analysis is based on time to event data and the study of the reliability of

repairable systems involves counting recurrences point or counting processes can be used to construct statistical models that can be used in these disciplines. These results are important to inferences about survival curves, product warranties, and recurrent events that are important in clinical trials and biostatistics in general as well as in reliability engineering.

This text is not an applied book but rather a very deep theoretical book that requires sophisticated mathematics and probability theory. There are applications of this powerful theory both in univariate and multivariate survival analysis. This book can be challenging to many readers but can provide a deep understanding of the theory. For the applications the following books would be helpful (1) Nelson's life data analysis book, (2) the book by Kalbfleish and Prentice, (3) Lawless and (4) Elant-Johnson and Johnson to name a few good ones. For the theory and applications in multivariate survival analysis I recommend the book by Hougaard who is a Danish statistician with a great deal of clinical experience from his years of working on diabetes trials at Novo Nordisk.

18 of 18 people found the following review helpful.

Extremely Advanced Treatment of Multivariate Survival Analysis

By Paul Thurston

This book is the definitive text on multivariate survival analysis and takes the reader well-beyond the introductory treatment found in Hougaard's "Analysis of Multivariate Survival Data". Andersen, et al. is a good addition to the library of anyone working with data containing more than one cause of failure.

However, Andersen, et al. demand a great deal from the reader and the prerequisite list here is rather extensive. Minimal preparation for this book starts with Hosmer & Lemeshow's Applied Survival Analysis: Regression Modeling of Time to Event Data . You'll need to understand modern real analysis, at least up through the Radon-Nikodym Theorem. I recommend Rudin's Real and Complex Analysis. You'll also need good understanding of the martingale theory of univariate counting processes. I recommend Fleming & Harrington's Counting Processes and Survival Analysis. Next, you'll need a solid understanding of Markov processes. I highly recommend Stroock's An Introduction to Markov Processes. Pay particularly close attention to Stroock's treatment of non-homogeneous Markov Processes toward the end of his text. Andersen et al make extensive use of non-homogeneous Markov processes throughout. Finally, you should have a good reference for basic properties of the Volterra Product-Integral. (Andersen et al provide references to the research literature.)

The authors begin their exposition with a short Chapter 1 by introducing some practical applications of multivariate survival analysis along with concrete data sets.

Chapter 2 is another short chapter which (very) briefly outlines the mathematical prerequisites for the remainder of the book. Readers who have carefully studied the prerequisite list will be adequately prepared for this chapter. Those who have not will feel completely overwhelmed.

In Chapter 3, the authors introduce the basic semi parametric models under consideration, including the Cox proportional hazards model, the Aalen multiplicative intensity model and the additive intensity model. These are considered as base models which can then be components of a more comprehensive Markov model. Censored data and basic hypothesis on censoring distributions (in terms of the appropriate filtration) are discussed.

Chapter 4 covers nonparametric estimation and is crucial material in order to validate a parametric or semi parametric model against a given data set. Martingale properties of the Nelson-Aalen estimator, the Kaplan-Meier estimator and a Markov model estimator (called the Aalen-Johansen estimator) are thoroughly studied.

Smoothing techniques are discussed and could be used to augment classical nonparametric smoothing techniques offered in Ryan's "Modern Regression Methods".

Chapter 5 is a short chapter on nonparametric hypothesis testing and offers a survey of test statistics used, for example, to test whether two survival distributions are the same.

The authors use the next chapter, Chapter 6, to touch lightly on a number of topics, including parametric models, generalized maximum likelihood estimation, model diagnostics and goodness of fit.

Chapter 7 is really the core of the book and discusses semi parametric regression models from the Markov process point-of-view. The chapter is well-written and covers the basics of Markov model specification, estimation and assessment. The authors illustrate the techniques through the use of several examples.

The book wraps up with discussion on estimator consistency and asymptotic normality in Chapter 8, a brief introduction of subject-specific frailty models in Chapter 9 and an overview of multivariate time scales in Chapter 10.

The book is written in research monograph-style. As such, there are no formal exercises. However several of the results in the book (e.g. Theorem II.6.7) are stated without proof or literature reference and require genuine work on the part of the reader in order verify them.

6 of 11 people found the following review helpful.

Counting processes first, survival analysis second, third,..

By dobs

The book provides an elegant comprehensive approach

to survival analysis and counting processes by

making use of martingale theory. Product integrals

are used as a corner stone of this unified approach.

The treatment of the multiplicative intensity model

in Chapter 3 is especially nice.

However, lost in all of this unification and elegant

mathematical notation is the underlying physical problems,

which after all is the whole point. Unfortunately, my

feeling is that scientists who are really interested

in studying event history data (like survival analysis)

will find this book unhelpful and probably even unreadable.

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