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Modeling Lifetime Data With Multiple Causes Using Cause


Infrastructure Asset Management with Power System Applications is about infrastructure asset management, which can be expressed as the combination of management, financial, economic, and engineering, applied to physical assets with the objective of providing the required level of service in the most cost-effective manner. It includes management of the whole lifecycle of a physical asset from design, construction, commission, operation, maintenance, modification, decommissioning, and disposal. It covers budget issues and focuses on asset management of an infrastructure for energy—i.e., the electric power system. Features:

- Offers a comprehensive reference book providing definitions, terminology, and basic theories as well as a comprehensive set of examples from a wide range of applications for the electric power system and its components. Spans a wide range of applications for the electric power system area, including real data and pictures. Contains results from recently published research and application studies. Includes a wide range of application examples for the electric power system area from hydro, nuclear, and wind, plus shows future trends. Contributes to the overall goals of developing a sustainable energy system by providing methods and tools for a resource-efficient use of physical assets in the electric power system area. Safety and Risk Modeling presents the latest theories and methods of safety and risk with an emphasis on safety and risk in modeling. It covers applications in several areas—excluding transportation and security risk assessment—as well as applications related to current topics in safety and risk. Safety and Risk Modeling is a valuable resource for understanding the latest developments in both qualitative and quantitative methods of safety and risk analysis and their applications in operating environments. Each chapter has been written by active researchers or experienced practitioners to bridge the gap between theory and practice and to trigger new research challenges in safety and risk. Topics include safety engineering, system maintenance, safety in design, failure analysis, and risk concept and modeling.

Postgraduate students, researchers, and practitioners in many fields of engineering, operations research, management, and statistics will find Safety and Risk Modeling a state-of-the-art survey of reliability and quality in design and practice. This book focuses on the statistical aspects of the analysis of degradation data. In recent years, degradation data analysis has come to play an increasingly important role in different disciplines such as reliability, public health sciences, and finance. For example, information on products’ reliability can be obtained by analyzing degradation data. In addition, statistical modeling and inference techniques have been developed on the basis of different degradation measures. The book brings together experts engaged in statistical modeling and inference, presenting and discussing important recent advances in degradation data analysis and related applications. The topics covered are timely and have considerable potential to impact both statistics and reliability engineering. The main focus of this edited volume is on three major areas of statistical quality control: statistical process control (SPC), acceptance sampling and design of experiments. The majority of the papers deal with statistical process control, while acceptance sampling and design of experiments are also treated to a lesser extent. The book is organized into four thematic parts, with Part I addressing statistical process control. Part II is devoted to acceptance sampling. Part III covers the design of experiments, while Part IV discusses related fields. The twenty-three papers in this volume stem from The 11th International Workshop on Intelligent Statistical Quality Control, which was held in Sydney, Australia from August 20 to August 23, 2013. The event was hosted by Professor Ross Sparks, CSMO Mathematics, Informatics and Statistics, North Ryde, Australia and was jointly organized by Professors S. Knoth, W. Schmidt and Ross Sparks. The papers presented here were carefully selected and reviewed by the scientific program committee, before being revised and adapted for this volume. Warranty Data Collection and Analysis deals with warranty data collection and analysis and the problems associated with these activities. The book is a both a research monograph and a handbook for practitioners. As a research monograph, it unifies the literature on warranty data collection and analysis, and presents the important results in an integrated manner. In the process, it highlights topics that require further research. As a handbook, it provides the essential methodology needed by practitioners involved with warranty data collection and analysis, along with extensive references to further results. Models and techniques needed for proper and effective analysis of data are included, together with guidelines for their use in warranty management, product improvement, and new product development. Warranty Data Collection and Analysis will be of interest to researchers (engineers and statisticians) and practitioners (engineers, applied statisticians, and managers).
involved with product warranty and reliability. It is also suitable for use as a reference text for graduate-level reliability programs in engineering, applied statistics, operations research, and management. This book is for actuaries and financial analysts developing their expertise in statistics and who wish to become familiar with concrete examples of predictive modeling. This volume describes how to develop Bayesian thinking, modelling and computation both from philosophical, methodological and application point of view. It further describes parametric and nonparametric Bayesian methods for modelling and how to use modern computational methods to summarize inferences using simulation. The book covers wide range of topics including objective and subjective Bayesian inferences with a variety of applications in modelling categorical, survival, spatial, spatiotemporal, epidemiological, software reliability, small area and micro array data. The book concludes with a chapter on how to teach Bayesian methods to nonstatisticians. Critical thinking on causal effects Objective Bayesian philosophy Nonparametric Bayesian methodology Simulation based computing techniques Bioinformatics and Biostatistics This publication presents currently available evidence about the extent to which dermatological diseases may, through their own nature as well as a multitude of comorbidities and their important interactions with social life, impair the life course of patients. Divided into four parts, the book starts with a brilliant introduction that highlights the importance of a life course approach in medicine from a medical as well as from a psychosocial point of view. The second part provides a basic presentation of the theoretical aspects of life course research and, more specifically, to the concepts of allometric load and cumulative life course impairment (CLCI). The third part examines concepts related to CLCI, such as the ‘quality of life in dermatology’ or the ‘major life changing decisions’ influenced by dermatological diseases. The book concludes with an in-depth investigation of specific diseases where the concept of CLCI strikes as particularly relevant. The new and innovative evidence presented in this publication makes it essential reading to anyone who has to take social implications of skin diseases into account in their decision making: dermatologists, allergologists, pediatricians and general practitioners as well as researchers in medical sociology or opinion leaders in public health. This book aims to promote regression methods for analyzing lifetime (or time to event) data that are based on a representation of the underlying process, and are therefore likely to offer greater scientific insight compared to purely empirical methods. In contrast to the rich statistical literature, the regression methods actually employed in lifetime data analysis are limited, particularly in the biomedical field where D. R. Cox’s famous semi-parametric proportional hazards model predominates. Practitioners should become familiar with more flexible models. The first hitting time regression models (or threshold regression) presented here represent observed events as the outcome of an underlying stochastic process. One example is death occurring when the patient’s health status falls to zero, but the idea has wide applicability – in biology, engineering, banking and finance, and elsewhere. The central topic is the model based on an underlying Wiener process, leading to lifetimes following the inverse Gaussian distribution. Introducing time varying covariates and many other extensions are considered. Various applications are presented in detail. A comprehensive text and reference bringing together advances in the theory of probability and statistics and relating them to applications. The three major categories of statistical models that relate dependent variables to explanatory variables are covered: univariate regression models, multivariate regression models, and simultaneous equations models. Methods are illustrated with worked examples, complete with figures that display code and output. Predictive modeling involves the use of data to forecast future events. It relies on capturing relationships between explanatory variables and the predicted variables from past occurrences and exploiting this to predict future outcomes. Forecasting future financial events is a core actuarial skill – actuaries routinely apply predictive modeling techniques in insurance and other risk-management applications. This book is for actuaries and other financial analysts who are developing their expertise in statistics and wish to become familiar with concrete examples of predictive modeling. The book also addresses the needs of more seasoned practising analysts who would like an overview of advanced statistical topics that are particularly relevant in actuarial practice. Predictive Modeling in Actuarial Science emphasizes lifelong learning by developing tools in an insurance context, providing the relevant actuarial applications, and introducing advanced statistical techniques that can be used by analysts to gain a competitive advantage in situations with complex data. WILEY-INTERSCIENCE PAPERBACK SERIES The Wiley-Interscience Paperback Series consists of selected books that have been made more accessible to consumers in an effort to increase global appeal and general circulation. With these new unabridged softcover volumes, Wiley hopes to extend the lives of these works by making them available to future generations of statisticians, mathematicians, and scientists. "...this is a very competently written and useful addition to the statistical literature; a book every statistician should look at and that many should study!" — Short Book Reviews, International Statistical Institute "... reading this book was an enjoyable learning experience. The suggestions and recommendations on the methods [make] this book an excellent reference for anyone interested in simulation. With its compact structure and good coverage of material, it is an excellent textbook for a simulation course." — Technometrics "...this work is an excellent comprehensive guide to simulation methods, written by a very competent author. It is especially recommended for those users of simulation methods who want more than a 'cook book'." — Mathematics Abstracts This book is a comprehensive guide to simulation methods with explicit recommendations of methods and algorithms. It covers both the technical aspects of the subject, such as the generation of random numbers, non-uniform random variables and stochastic processes, and the use of simulation. Supported by the relevant mathematical theory, the text contains a great deal of unpublished research material, including coverage of the analysis of shift-register generators, sensitivity analysis of normal variate generators, analysis of simulation output, and more. Probability, Statistics and Modelling in Public Health consists of referred contributions by expert biostatisticians that discuss various probabilistic and statistical models used in public health. Many of them are based on the work of Marvin Zelen of the Harvard School of Public Health. Topics discussed include models based on Markov and semi-Markov processes, multi-state models, models and methods in lifetime data analysis, accelerated failure models, design and analysis of clinical trials, Bayesian methods, pharmaceutical and environmental statistics, degradation models, epidemiological methods, screening programs, early detection of diseases, and measurement and analysis of quality of life. Absolute Risk: Methods and
Applications in Clinical Management and Public Health provides theory and examples to demonstrate the importance of absolute risk in counseling patients, devising public health strategies, and clinical management. The book provides sufficient technical detail to allow statisticians, epidemiologists, and clinicians to build, test, and apply models of absolute risk. Features: Provides theoretical basis for modeling absolute risk, including competing risks and cause-specific and cumulative incidence regression Discusses various sampling designs for estimating absolute risk and criteria to evaluate models Provides details on statistical inference for the various sampling designs Discusses criteria for evaluating risk models and comparing risk models, including both general criteria and problem-specific expected losses in well-defined clinical and public health applications. Describes many applications encompassing both disease prevention and prognosis, and ranging from counseling individual patients, to clinical decision making, to assessing the impact of risk-based public health strategies. Discusses model updating, family-based designs, dynamic projections, and other topics. Ruth M. Pfeiffer is a mathematical statistician and Fellow of the American Statistical Association, with interests in risk modeling, dimension reduction, and applications in epidemiology. She developed absolute risk models for breast cancer, colon cancer, melanoma, and second primary thyroid cancer following a childhood cancer diagnosis. Mitchell H. Gail developed the widely used “Gail model” for projecting the absolute risk of invasive breast cancer. He is a medical statistician with interests in statistical methods and applications in epidemiology and molecular medicine. He is a member of the National Academy of Medicine and former President of the American Statistical Association. Both are Senior Investigators in the Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health. This volume is a collection of invited chapters covering recent advances in accelerated life testing and degradation models. The book covers a wide range of applications to areas such as reliability, quality control, the health sciences, economics and finance. It is an excellent reference for researchers and practitioners in applied probability and statistics, industrial statistics, the health sciences, quality control, economics, and finance. The safe and reliable performance of many systems with which we interact daily has been achieved through the analysis and management of risk. From complex infrastructures to consumer durables, from engineering systems and technologies used in transportation, health, energy, chemical, oil, gas, aerospace, maritime, defence and other sectors, the management of risk during design, manufacture, operation and decommissioning is vital. Methods and models to support risk-informed decision-making are well established but are continually challenged by technology innovations, increasing interdependencies, and changes in societal expectations. Risk, Reliability and Safety contains papers describing innovations in theory and practice contributed to the scientific programme of the European Safety and Reliability conference (ESREL 2016), held at the University of Strathclyde in Glasgow, Scotland (25-29 September 2016). Authors include scientists, academics, practitioners, regulators and other key individuals with expertise and experience relevant to specific areas. Papers include domain specific applications as well as general modeling methods. Papers cover evaluation of contemporary solutions, exploration of future challenges, and exposition of concepts, methods and processes. Topics include human factors, occupational health and safety, dynamic and systems reliability modeling, maintenance optimization, uncertainty analysis, resilience assessment, risk and crisis management. Multistate Models for the Analysis of Life History Data provides the first comprehensive treatment of multistate modeling and analysis, including parametric, nonparametric, and semiparametric methods applicable to many types of life history data. Special models such as illness-death, competing risks and progressive processes are considered, as well as more complex models. The book provides both theoretical development and illustrations of analysis based on data from randomized trials and observational cohort studies in health research. Features: Discusses a wide range of applications of multistate models Presents methods for both continuously and intermittently observed life history processes. Gives a thorough discussion of conditionally independent censoring and observation processes Discusses models with random effects and joint models for two or more multistate processes Discusses and illustrates software for multistate analysis that is available in R. Target audience includes those engaged in research and applications involving multistate models. Richard Cook is Canada Research Chair in Statistical Methods for Health Research at the University of Waterloo. He has received the Gold Medal of the Statistical Society of Canada and is a Fellow of the American Statistical Association. He collaborates and consults widely on health research and has given many short courses. He and Dr. Lawless previously coauthored the influential book, The Statistical Analysis of Recurrent Events (Springer, 2007). Jerald Lawless is Distinguished Professor Emeritus at the University of Waterloo. He is a Fellow of the Royal Society of Canada, a Gold Medal recipient of the Statistical Society of Canada and Fellow of the American Statistical Association. He is an expert in reliability and risk management. He is a past editor of Technometrics and has collaborated and consulted in numerous areas. He has presented many short courses, with Dr. Cook and individually. “The authors of the book are internationally renowned experts in the field of multi-state modeling and have written an extremely clear and comprehensive book on the topic that covers many different aspects, from the fundamental theory to the practical side of analyzing data and interpreting results. The examples are well chosen to represent the most common types of multi-state processes that public health researchers could encounter. The inclusion of software code to illustrate how the models can be fit and interpreted is especially helpful to readers.” (Mimi Kim, Albert Einstein College of Medicine) This book collects and unifies statistical models and methods that have been proposed for analyzing interval-censored failure time data. It provides the first comprehensive coverage of the topic of interval-censored data and complements the books on right-censored data. The focus of the book is on nonparametric and semiparametric inferences, but it also describes parametric and imputation approaches. This book provides an up-to-date reference for people who are conducting research on the analysis of interval-censored failure time data as well as for those who need to analyze interval-censored data to answer substantive questions. Methods of risk analysis and the outcome of particular evaluations and predictions are covered in detail in this proceedings volume, whose contributions are based on invited presentations from Professor Mei-Ling Ting Lee’s 2011 symposium on Risk Analysis and the Evaluation of Predictions. This symposium was held at the University of Maryland in October of 2011. Risk analysis is the science of evaluating health, environmental, and engineering risks resulting from past, current, or anticipated, future activities. The use of these evaluations...
include to provide information for determining regulatory actions to limit risk, present scientific evidence in legal settings, evaluate products and potential liabilities within an organization, resolve World Trade disputes amongst nations, and educate the public concerning particular risk issues. Risk analysis is an interdisciplinary science that relies on epidemiology and laboratory studies, collection of exposure and other field data, computer modeling, and related social, economic, and communication considerations. In addition, social dimensions of risk are addressed by social scientists. The concept of frailty offers a convenient way to introduce unobserved heterogeneity and associations into models for survival data. In its simplest form, frailty is an unobserved random proportionality factor that modifies the hazard function of an individual or a group of related individuals. Frailty Models in Survival Analysis presents a comprehensive overview of the fundamental approaches in the area of frailty models. The book extensively explores how univariate frailty models can represent unobserved heterogeneity. It also emphasizes correlated frailty models as extensions of univariate and shared frailty models. The author analyzes similarities and differences between frailty and copula models; discusses problems related to frailty models, such as tests for homogeneity; and describes parametric and semiparametric models using both frequentist and Bayesian approaches. He also shows how to apply the models to real data using the statistical packages of R, SAS, and Stata. The appendix provides the technical mathematical results used throughout. Written in nontechnical terms accessible to nonexperts, this book explains the basic ideas in frailty modeling and statistical techniques, with a focus on real-world data application and interpretation of the results. By applying several models to the same data, it allows for the comparison of their advantages and disadvantages under varying model assumptions. The book also employs simulations to analyze the finite sample size performance of the models. The Statistical Analysis of Multivariate Failure Time Data: A Marginal Modeling Approach provides an innovative look at methods for the analysis of correlated failure times. The focus is on the use of marginal single and marginal double failure hazard rate estimators for the extraction of regression information. For example, in a context of randomized trial or cohort studies, the results go beyond that obtained by analyzing each failure time outcome in a univariate fashion. The book is addressed to researchers, practitioners, and graduate students, and can be used as a reference or as a graduate course text. Much of the literature on analysis of censored correlated failure time data uses frailty or copula models to allow for residual dependencies among failure times, given covariates. In contrast, this book provides a detailed account of recently developed methods for the simultaneous estimation of marginal single and dual outcome hazard rate regression parameters, with emphasis on multiplicative (Cox) models. Illustrations are provided of the utility of these methods using Women's Health Initiative randomized controlled trial data of menopausal hormones and of a low-fat dietary pattern intervention. As byproducts, these methods provide flexible parametric estimators of pairwise bivariate survivor functions at specified covariate histories, as well as semiparametric estimators of cross ratio and concordance functions given covariates. The presentation also describes how these innovative methods may extend to handle issues of dependent censorship, missing and mismeasured covariates, and joint modeling of failure times and covariates, setting the stage for additional theoretical and applied developments. This book extends and continues the style of the classic Statistical Analysis of Failure Time Data by Kalbflesch and Prentice, Ross L. Prentice is Professor of Biostatistics at the Fred Hutchinson Cancer Research Center and University of Washington in Seattle, Washington. He is the recipient of COPSS Presidents and Fisher awards, the AACR Epidemiology/Prevention and Team Science awards, and is a member of the National Academy of Medicine. Shanshan Zhao is a Principal Investigator at the National Institute of Environmental Health Sciences in Research Triangle Park, North Carolina. Offers a holistic approach to guiding product design, manufacturing, and after-sales support as the manufacturing industry transitions from a product-centric model to a service-oriented paradigm. This book provides fundamental knowledge and best industry practices in reliability modeling, maintenance optimization, and service parts logistics planning. It aims to develop an integrated product-service system (IPPS) synthesizing design for reliability, performance-based maintenance, and service parts inventory. It also presents a lifecycle reliability-inventory optimization framework where reliability, redundancy, maintenance, and service parts are jointly coordinated. Additionally, the book aims to report the latest advances in reliability growth planning, maintenance contracting and spares inventory logistics under non-stationary demand conditions. Reliability Engineering and Service provides in-depth chapter coverage of topics such as Reliability Concepts and Models; Mean and Variance of Reliability Estimates; Design for Reliability; Reliability Growth Planning; Accelerated Life Testing and Its Economics; Renewal Theory and Superimposed Renewals; Maintenance and Performance-Based Logistics; Warranty Service Models; Basic Spare Parts Inventory Models; Repairable Inventory Systems; Integrated Product-Service Systems (IPPS); and Resilience Modeling and Planning. Guides engineers to design reliable products at a lower cost. Assists service engineers in providing superior after-sales support. Enables managers to respond to the changing market and customer needs. Uses end-of-chapter cases studies to illustrate industry best practice. Lifecycle approach to reliability, maintenance and spares provision. Reliability Engineering and Service is an important book for graduate engineering students, researchers, and industry-based reliability practitioners and consultants. Statistical models and methods for lifetime and other time-to-event data are widely used in many fields, including medicine, the environmental sciences, actuarial science, engineering, economics, management, and the social sciences. For example, closely related statistical methods have been applied to the study of the incubation period of diseases such as AIDS, the remission time of cancers, life tables, the time-to-failure of engineering systems, employment duration, and the length of marriages. This volume contains a selection of papers based on the 1994 International Research Conference on Lifetime Data Models in Reliability and Survival Analysis, held at Harvard University. The conference brought together a varied group of researchers and practitioners to advance and promote statistical science in the many fields that deal with lifetime and other time-to-event data. The volume illustrates the depth and diversity of the field. A few of the authors have published their conference presentations in the new journal Lifetime Data Analysis (Kluwer Academic Publishers). Longitudinal studies often incur several problems that challenge standard statistical methods for data analysis. These problems include non-ignorable missing data in longitudinal measurements of one or more response variables, informative observation times of longitudinal data, and survival
analysis with intermittently measured time-dependent covariates that are subject to measurement error and/or substantial biological variation. Joint modeling of longitudinal and time-to-event data has emerged as a novel approach to handle these issues. Joint Modeling of Longitudinal and Time-to-Event Data provides a systematic introduction and review of state-of-the-art statistical methodology in this active research field. The methods are illustrated by real data examples from a wide range of clinical research topics. A collection of data sets and software for practical implementation of the joint modeling methodologies are available through the book website. This book serves as a reference book for scientific investigators who need to analyze longitudinal and/or survival data, as well as researchers developing methodology in this field. It may also be used as a textbook for a graduate level course in biostatistics or statistics. This edited collection discusses the emerging topics in statistical modeling for biomedical research. Leading experts in the frontiers of biostatistics and biomedical research discuss the statistical procedures, useful methods, and their novel applications in biostatistics research. Interdisciplinary in scope, the volume as a whole reflects the latest advances in statistical modeling in biomedical research, identifies impactful new directions, and seeks to drive the field forward. It also fosters the interaction of scholars in the arena, offering great opportunities to stimulate further collaborations. This book will appeal to industry data scientists and statisticians, researchers, and graduate students in biostatistics and biomedical science. It covers topics in: Next generation sequence data analysis Deep learning, precision medicine, and their applications Large scale data analysis and its applications Biomedical research and modeling Survival analysis with complex data structure and its applications.Bayesian methods combine the evidence from the data at hand with previous quantitative knowledge to analyse practical problems in a wide range of areas. The calculations were previously complex, but it is now possible to routinely apply Bayesian methods due to advances in computing technology and the use of new sampling methods for estimating parameters. Such developments together with the availability of freeware such as WINBUGS and R have facilitated a rapid growth in the use of Bayesian methods, allowing their application in many scientific disciplines, including applied statistics, public health research, medical science, the social sciences and economics. Following the success of the first edition, this reworked and updated book provides an accessible approach to Bayesian computing and analysis, with an emphasis on the principles of prior selection, identification and the interpretation of real data sets. The second edition: Provides an integrated presentation of theory, examples, applications and computer algorithms. Discusses the role of Markov Chain Monte Carlo methods in computing and estimation. Includes a wide range of interdisciplinary applications, and a large selection of worked examples from the health and social sciences. Features a comprehensive range of methodologies and modelling techniques, and examines model fitting in practice using Bayesian principles. Provides exercises designed to help reinforce the reader’s knowledge and a supplementary website containing data sets and relevant programs. Bayesian Statistical Modelling is ideal for researchers in applied statistics, medical science, public health and the social sciences, who will benefit greatly from the examples and applications featured. The book will also appeal to graduate students of applied statistics, data analysis and Bayesian methods, and will provide a great source of reference for both researchers and students. Praise for the First Edition: “ It is a remarkable achievement to have carried out such a range of analysis on such a range of data sets. I found this book comprehensive and stimulating, and was thoroughly impressed with both the depth and the range of the discussions it contains.” – IAR - Short Book Reviews “ This is an excellent introductory book on Bayesian modelling techniques and data analysis” – Biometrics “ The book fills an important niche in the statistical literature and should be a very valuable resource for students and professionals who are utilizing Bayesian methods.” – Journal of Mathematical Psychology Survival Analysis with Interval-Censored Data: A Practical Approach with Examples in R, SAS, and BUGS provides the reader with a practical introduction into the analysis of interval-censored survival times. Although many theoretical developments have appeared in the last fifty years, interval censoring is often ignored in practice. Many are unaware of the impact of inappropriately dealing with interval censoring. In addition, the necessary software is at times difficult to trace. This book fills in the gap between theory and practice. Features: Provides an overview of frequentist as well as Bayesian methods. Includes a focus on practical aspects and applications. Extensively illustrates the methods with examples using R, SAS, and BUGS. Full programs are available on a supplementary website. The authors: Kris Bogaerts is professor of biostatistics, I-BioStat, KU Leuven. He received his PhD in science (statistics) at KU Leuven on the analysis of interval-censored data. He has gained expertise in a great variety of statistical topics with a focus on the design and analysis of clinical trials. Arnošt Komárek is associate professor of statistics at Charles University, Prague. His subject area of expertise covers mainly survival analysis with the emphasis on interval-censored data and classification based on longitudinal data. He is past chair of the Statistical Modelling Society and editor of?Statistical Modelling: An International Journal. Emmanuel Lesaffre is professor of biostatistics at I-BioStat, KU Leuven. His research interests include Bayesian methods, longitudinal data analysis, statistical modelling, analysis of dental data, interval-censored data, misclassification issues, and clinical trials. He is the founding chair of the Statistical Modelling Society, past-president of the International Society for Clinical Biostatistics, and fellow of both IS?Biostat and ASA. Provides state-of-the-art coverage for the researcher confronted with designing and executing a simulation study using continuous multivariate distributions. Concise writing style makes the book accessible to a wide audience. Well-known multivariate distributions are described, emphasizing a few representative cases from each distribution. Coverage includes Pearson Types II and VII elliptically contoured distributions, KHantchine distributions, and the unifying class for the Pareto, and logistic distributions. Extensively illustrated- the figures are unique, attractive, and reveal very nicely what distributions “look like.” Contains an extensive and up-to-date bibliography culled from journals in statistics, operations research, mathematics, and computer science. Handbook of Survival Analysis presents modern techniques and research problems in lifetime data analysis. This area of statistics deals with time-to-event data that is complicated by censoring and the dynamic nature of events occurring in time. With chapters written by leading researchers in the field, the handbook focuses on advances in survival analysis techniques, covering classical and Bayesian approaches. It gives a complete overview of the current status of survival analysis and should inspire further research in the field. Accessible to a wide
range of readers, the book provides: An introduction to various areas in survival analysis for graduate students and novices. A reference to modern investigations into survival analysis for more established researchers. A text or supplement for a second or advanced course in survival analysis. A useful guide to statistical methods for analyzing survival data experiments for practicing statisticians. Diverse methodological and statistical approaches for investigating the role of gene-environment interactions in a range of complex diseases and traits. Findings from the Human Genome Project and from Genome-Wide Association (GWA) studies indicate that many diseases and traits manifest a more complex genomic pattern than previously assumed. These findings, and advances in high-throughput sequencing, suggest that there are many sources of influence—genetic, epigenetic, and environmental. This volume investigates the role of the interactions of genes and environment (G × E) in diseases and traits (referred to by the contributors as complex phenotypes) including depression, diabetes, obesity, and substance use. The contributors first present different statistical approaches or strategies to address G × E and G × G interactions with high-throughput sequenced data, including two-stage procedures to identify G × E and G × G interactions, marker-set approaches to assessing interactions at the gene level, and the use of a partial-likelihood (PLS) approach. The contributors then turn to specific complex phenotypes, research designs, or combined methods that may advance the study of G × E interactions, considering such topics as randomized clinical trials in obesity research, longitudinal research designs and statistical models, and the development of polygenic scores to investigate G × E interactions. Contributors: Fatima Umber Ahmed, Yin-Hsiu Chen, James Y. Dai, Caroline Y. Doyle, Zhihui He, Li Hsu, Shuo Jiao, Erin Loraine Kinnally, Yi-An Ko, Charles Kooperberg, Seunggeun Lee, Armin Mäty, Jeanne M. McCaffrey, Bhramar Mukherjee, Sung Kyun Park, Duncan C. Thomas, Alexandre Todorov, Jung-Ying Tseng, Tao Wang, Michael Windle, Min Zhang. This book covers competing risks and multistate models, sometimes summarized as event history analysis. These models generalize the analysis of time to a single event (survival analysis) to analyzing the timing of distinct terminal events (competing risks) and possible intermediate events (multistate models). Both R and multistate methods are promoted with a focus on nonparametric methods. This undergraduate and graduate textbook provides a practical and comprehensive overview of reliability and risk analysis techniques. Written for engineering students and practicing engineers, the book is multidisciplinary in scope. The new edition has new topics in classical confidence interval estimation; Bayesian uncertainty analysis; models for physics-of-failure approach to life estimation; extended discussions on the generalized renewal process and optimal maintenance, and further modifications, updates, and discussions. The book includes examples to clarify technical subjects and many end of chapter exercises. PowerPoint slides and a Solutions Manual are also available. Safety and Reliability of Complex Engineered Systems contains the Proceedings of the 25th European Safety and Reliability Conference, ESREL 2015, held 7-10 September 2015 in Zurich, Switzerland. It includes about 570 papers accepted for presentation at the conference. These contributions focus on theories and methods in the area of risk, safety, and reliability. Praise for the First Edition: "An indispensable addition to any serious collection on lifetime data analysis and... a valuable contribution to the statistical literature... Highly recommended..." - Choice "This is an important book, which will appeal to statisticians working on survival analysis problems..." - Biometrics "A thorough, unified treatment of statistical models and methods used in the analysis of lifetime data... this is a highly competent and agreeable statistical textbook..." - Statistics in Medicine The statistical analysis of lifetime or response time data is a key tool in engineering, medicine, and many other scientific and technological areas. This book provides a unified treatment of the models and statistical methods used to analyze lifetime data. Equally useful as a reference for individuals interested in the analysis of lifetime data and as a text for advanced students, Statistical Models and Methods for Lifetime Data, Second Edition provides broad coverage of the area without concentrating on any single field of application. Extensive illustrations and examples drawn from engineering and the biomedical sciences provide readers with a clear understanding of key concepts. New and expanded coverage in this edition includes: * Observation schemes for lifetime data * Multiple failure modes * Counting process-martingale tools * Both special lifetime data and general optimization software * Mixture models * Treatment of interval-censored and truncated data * Multiple event times and event history models * Resampling and simulation methodology * Multivariate Survival Analysis and Competing Risks introduces univariate survival analysis and extends it to the multivariate case. It covers competing risks and counting processes and provides many real-world examples, exercises, and R code. The text discusses survival data, survival distributions, frailty models, parametric methods, multivariate Multi-State Survival Models for Interval-Censored Data introduces methods to describe stochastic processes that consist of transitions between states over time. It is targeted at researchers in medical statistics, epidemiology, demography, and social statistics. One of the applications in the book is a three-state process for dementia and survival in the older population. This process is described by an illness-death model with a dementia-free state, a dementia state, and a dead state. Statistical modeling of a multi-state process can investigate potential associations between the risk of moving to the next state and variables such as age, gender, or education. A model can also be used to predict the multi-state process. The methods are for longitudinal data subject to interval censoring. Depending on the definition of a state, it is possible that the time of the transition into a state is not observed exactly. However, when longitudinal data are available the transition time may be known to lie in the time interval defined by two successive observations. Such an interval-censored observation scheme can be taken into account in the statistical inference. Multi-state modeling is an elegant combination of statistical inference and the theory of stochastic processes. Multi-State Survival Models for Interval-Censored Data shows that the statistical modeling is versatile and allows for a wide range of applications. This book focuses on statistical methods for the analysis of discrete failure times. Failure time analysis is one of the most important fields in statistical research, with applications affecting a wide range of disciplines, in particular, demography, econometrics, epidemiology, and clinical research. Although there are a large variety of statistical methods for failure time analysis, many techniques are designed for failure times that are measured on a continuous scale. In empirical studies, however, failure times are often discrete, either because they have been measured in intervals (e.g., quarterly or yearly) or because they have been rounded or grouped. The book covers well-established methods like life table.
analysis and discrete hazard regression models, but also introduces state-of-the-art techniques for model evaluation, nonparametric estimation and variable selection. Throughout, the methods are illustrated by real-life applications, and relationships to survival analysis in continuous time are explained. Each section includes a set of exercises on the respective topics. Various functions and tools for the analysis of discrete survival data are collected in the R package discSurv that accompanies the book. An intermediate-level treatment of Bayesian hierarchical models and their applications, this book demonstrates the advantages of a Bayesian approach to data sets involving inferences for collections of related units or variables, and in methods where parameters can be treated as random collections. Through illustrative data analysis and attention to statistical computing, this book facilitates practical implementation of Bayesian hierarchical methods. The new edition is a revision of the book Applied Bayesian Hierarchical Methods. It maintains a focus on applied modelling and data analysis, but now using entirely R-based Bayesian computing options. It has been updated with a new chapter on regression for causal effects, and one on computing options and strategies. This latter chapter is particularly important, due to recent advances in Bayesian computing and estimation, including the development of rjags and rstan. It also features updates throughout with new examples. The examples exploit and illustrate the broader advantages of the R computing environment, while allowing readers to explore alternative likelihood assumptions, regression structures, and assumptions on prior densities. Features: Provides a comprehensive and accessible overview of applied Bayesian hierarchical modelling Includes many real-data examples to illustrate topics R code (based on rjags, jagsUI, R2OpenBUGS, and rstan) is integrated into the book, emphasizing implementation Software options and coding principles are introduced in new chapter on computing Programs and data sets available on the book’s website Copyright code: f4a79f9c4f9b99d11da4f6322b7fe68