Statistical Tools For Nonlinear Regression A Practical Guide With S Plus And R Examples

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Tools for Statistical Inference - Martin A. Tanner 2012-12-06

A unified introduction to a variety of computational algorithms for likelihood and

Bayesian inference. This third edition expands the discussion of many of the techniques presented, and includes additional examples as well as exercise sets at the end of each chapter.

Resampling Methods for Dependent Data - S. N. Lahiri 2013-03-09

By giving a detailed account of bootstrap methods and their properties for dependent data, this book provides illustrative numerical examples throughout. The book fills a gap in the literature covering research on re-sampling methods for dependent data that has witnessed vigorous growth over the last two decades but remains scattered in various statistics and econometrics journals. It can be used as a graduate level text and also as a research monograph for statisticians and econometricians.

Permutation Methods - Paul W. Jr. Mielke 2013-06-29

The book provides a comprehensive treatment of statistical inference using permutation techniques. It features a variety of useful and powerful data analytic tools that rely on very few distributional assumptions. Although many of these procedures have appeared in journal articles, they are not readily available to practitioners.

Multiscale Modeling - Marco A.R. Ferreira 2007-07-27

This highly useful book contains methodology for the analysis of data that arise from multiscale processes. It brings together a number of recent developments and makes them accessible to a wider audience. Taking a Bayesian approach allows for full accounting of uncertainty, and also addresses the delicate issue of uncertainty at multiple scales. These methods can handle different amounts of prior knowledge at different scales, as often occurs in practice.

The Design and Analysis of Computer Experiments - Thomas J. Santner 2013-03-09

This book describes methods for designing and analyzing experiments conducted using computer code in lieu of a

physical experiment. It discusses how to select the values of the factors at which to run the code (the design of the computer experiment). It also provides techniques for analyzing the resulting data so as to achieve these research goals.

Statistical Data Anaylsis - Milan Meloun 2011

Over the past decade, computer supported data analysis by statistical methods has been one of the fastest growth areas in chemometrics, biometrics and other related branches of natural, technical and social sciences. This has been strongly supported by the development of exploratory data analysis, testing assumptions about data, model and statistical methods and computer intensive techniques. This book presents a combination of individual topics with solved problems and a collection of experimental tasks. Methods suitable for extreme or small and large datasets are described. Presents a combination of individual topics in one complete volume featuring statistical analysis of univariate and multivariate data Interspersed throughout with solved problems and experimental tasks suitable for extreme or small and large datasets Features the interpretation of results based on the comprehensive information about data behaviour and validity of used assumptions

Reliability, Life Testing and the Prediction of Service Lives - Sam C. Saunders 2010-04-26

This book is intended for students and practitioners who have had a calculus-based statistics course and who have an interest in safety considerations such as reliability, strength, and duration-of-load or service life. Many persons studying statistical science will be employed professionally where the problems encountered are obscure, what should be analyzed is not clear, the appropriate assumptions are equivocal, and data are scant. In this book there is no

disclosure with many of the data sets what type of investigation should be made or what assumptions are to be used.

Nonlinear Regression - George A. F. Seber 2005-02-25 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. From the Reviews of Nonlinear Regression "A very good book and an important one in that it is likely to become a standard reference for all interested in nonlinear regression; and I would imagine that any statistician concerned with nonlinear regression would want a copy on his shelves." –The Statistician "Nonlinear Regression also includes a reference list of over 700 entries. The compilation of this material and cross-referencing of it is one of the most valuable aspects of the book. Nonlinear Regression can provide the researcher unfamiliar with a particular specialty area of nonlinear regression an introduction to that area of nonlinear regression and access to the appropriate references . . . Nonlinear Regression provides by far the broadest discussion of nonlinear regression models currently available and will be a valuable addition to the library of anyone interested in understanding and using such models including the statistical researcher." –Mathematical Reviews

Chaos: A Statistical Perspective - Kung-Sik Chan 2013-03-09 This book discusses dynamical systems that are typically driven by stochastic dynamic noise. It is written by two statisticians essentially for the statistically inclined readers. It covers many of the contributions made by the statisticians in the past twenty

years or so towards our understanding of estimation, the Lyapunov-like index, the nonparametric regression, and many others, many of which are motivated by their dynamical system counterparts but have now acquired a distinct statistical flavor.

Statistical Tools for Nonlinear Regression - Sylvie Huet 2013-04-17

Statistical Tools for Nonlinear Regression presents methods for analyzing data. It has been expanded to include binomial, multinomial and Poisson non-linear models. The examples are analyzed with the free software nls2 updated to deal with the new models included in the second edition. The nls2 package is implemented in S-PLUS and R. Several additional tools are included in the package for calculating confidence regions for functions of parameters or calibration intervals, using classical methodology or bootstrap.

Model-based Geostatistics - Peter Diggle 2007-05-26

This volume is the first book-length treatment of model-based geostatistics. The text is expository, emphasizing statistical methods and applications rather than the underlying mathematical theory. Analyses of datasets from a range of scientific contexts feature prominently, and simulations are used to illustrate theoretical results. Readers can reproduce most of the computational results in the book by using the authors' software package, geoR, whose usage is illustrated in a computation section at the end of each chapter. The book assumes a working knowledge of classical and Bayesian methods of inference, linear models, and generalized linear models.

ARCH Models and Financial Applications - Christian Gourieroux 2012-12-06

The classical ARMA models have limitations when applied to the field of financial and monetary economics. Financial time series present nonlinear dynamic characteristics and the ARCH models offer a more adaptive framework for this

type of problem. This book surveys the recent work in this area from the perspective of statistical theory, financial models, and applications and will be of interest to theorists and practitioners. From the view point of statistical theory, ARCH models may be considered as specific nonlinear time series models which allow for an exhaustive study of the underlying dynamics. It is possible to reexamine a number of classical questions such as the random walk hypothesis, prediction interval building, presence of latent variables etc., and to test the validity of the previously studied results. There are two main categories of potential applications. One is testing several economic or financial theories concerning the stocks, bonds, and currencies markets, or studying the links between the short and long run. The second is related to the interventions of the banks on the markets, such as choice of optimal portfolios, hedging portfolios, values at risk, and the size and times of block trading.

Fitting Models to Biological Data Using Linear and Nonlinear Regression - Harvey Motulsky 2004-05-27

Most biologists use nonlinear regression more than any other statistical technique, but there are very few places to learn about curve-fitting. This book, by the author of the very successful Intuitive Biostatistics, addresses this relatively focused need of an extraordinarily broad range of scientists.

Unified Methods for Censored Longitudinal Data and Causality - Mark J. van der Laan 2012-11-12

A fundamental statistical framework for the analysis of complex longitudinal data is provided in this book. It provides the first comprehensive description of optimal estimation techniques based on time-dependent data structures. The techniques go beyond standard statistical approaches and can be used to teach masters and Ph.D. students. The text is ideally suitable for researchers in

statistics with a strong interest in the analysis of complex longitudinal data.

Statistical Learning from a Regression Perspective - Richard A. Berk 2008-06-14

Statistical Learning from a Regression Perspective considers statistical learning applications when interest centers on the conditional distribution of the response variable, given a set of predictors, and when it is important to characterize how the predictors are related to the response. As a first approximation, this is can be seen as an extension of nonparametric regression. Among the statistical learning procedures examined are bagging, random forests, boosting, and support vector machines. Response variables may be quantitative or categorical. Real applications are emphasized, especially those with practical implications. One important theme is the need to explicitly take into account asymmetric costs in the fitting process. For example, in some situations false positives may be far less costly than false negatives. Another important theme is to not automatically cede modeling decisions to a fitting algorithm. In many settings, subject-matter knowledge should trump formal fitting criteria. Yet another important theme is to appreciate the limitation of one's data and not apply statistical learning procedures that require more than the data can provide. The material is written for graduate students in the social and life sciences and for researchers who want to apply statistical learning procedures to scientific and policy problems. Intuitive explanations and visual representations are prominent. All of the analyses included are done in R.

Statistical Tools for the Comprehensive Practice of Industrial Hygiene and Environmental Health Sciences - David L. Johnson 2017-01-17

Reviews and reinforces concepts and techniques typical of a first statistics course with additional

techniques useful to the IH/EHS practitioner. Includes both parametric and non-parametric techniques described and illustrated in a worker health and environmental protection practice context Illustrated through numerous examples presented in the context of IH/EHS field practice and research, using the statistical analysis tools available in Excel® wherever possible Emphasizes the application of statistical tools to IH/EHS-type data in order to answer IH/EHS-relevant questions Includes an instructor's manual that follows in parallel with the textbook, including PowerPoints to help prepare lectures and answers in the text as for the Exercises section of each chapter.

Nonlinear Time Series - Jianqing Fan 2008-09-11

This is the first book that integrates useful parametric and nonparametric techniques with time series modeling and prediction, the two important goals of time series analysis. Such a book will benefit researchers and practitioners in various fields such as econometricians, meteorologists, biologists, among others who wish to learn useful time series methods within a short period of time. The book also intends to serve as a reference or text book for graduate students in statistics and econometrics.

Statistical Methods in Software Engineering - Nozer D. Singpurwalla 2012-12-06

In establishing a framework for dealing with uncertainties in software engineering, and for using quantitative measures in related decision-making, this text puts into perspective the large body of work having statistical content that is relevant to software engineering. Aimed at computer scientists, software engineers, and reliability analysts who have some exposure to probability and statistics, the content is pitched at a level appropriate for research workers in software reliability, and for graduate level courses in applied statistics computer

science, operations research, and software engineering.

Fitting Models to Biological Data Using Linear and Nonlinear Regression - Harvey Motulsky 2004-06-10

Most biologists use nonlinear regression more than any other statistical technique, but there are very few places to learn about curve-fitting. This book, by the author of the very successful Intuitive Biostatistics, addresses this relavtively focused need of an extraordinarily broad range of scientists.

Statistical Inference for Ergodic Diffusion Processes - Yury A. Kutoyants 2013-03-09

The first book in inference for stochastic processes from a statistical, rather than a probabilistic, perspective. It provides a systematic exposition of theoretical results from over ten years of mathematical literature and presents, for the first time in book form, many new techniques and approaches.

Nonlinear Parameter Optimization Using R Tools - John C. Nash 2014-05-27

Nonlinear Parameter Optimization Using R John C. Nash, Telfer School of Management, University of Ottawa, Canada A systematic and comprehensive treatment of optimization software using R In recent decades, optimization techniques have been streamlined by computational and artificial intelligence methods to analyze more variables, especially under non–linear, multivariable conditions, more quickly than ever before. Optimization is an important tool for decision science and for the analysis of physical systems used in engineering. Nonlinear Parameter Optimization with R explores the principal tools available in R for function minimization, optimization, and nonlinear parameter determination and features numerous examples throughout. Nonlinear Parameter Optimization with R: Provides a comprehensive treatment of optimization techniques Examines optimization problems that arise in statistics and how to

solve them using R Enables researchers and practitioners to solve parameter determination problems Presents traditional methods as well as recent developments in R Is supported by an accompanying website featuring R code, examples and datasets Researchers and practitioners who have to solve parameter determination problems who are users of R but are novices in the field optimization or function minimization will benefit from this book. It will also be useful for scientists building and estimating nonlinear models in various fields such as hydrology, sports forecasting, ecology, chemical engineering, pharmaco-kinetics, agriculture, economics and statistics.

Statistical Tools for Nonlinear Regression - Sylvie Huet 2004

Statistical Tools for Nonlinear Regression presents methods for analyzing data. It has been expanded to include binomial, multinomial and Poisson non-linear models. The examples are analyzed with the free software nls2 updated to deal with the new models included in the second edition. The nls2 package is implemented in S-PLUS and R. Several additional tools are included in the package for calculating confidence regions for functions of parameters or calibration intervals, using classical methodology or bootstrap.

Scan Statistics - Joseph Glaz 2013-03-09

In many statistical applications, scientists have to analyze the occurrence of observed clusters of events in time or space. Scientists are especially interested in determining whether an observed cluster of events has occurred by chance if it is assumed that the events are distributed independently and uniformly over time or space. Scan statistics have relevant applications in many areas of science and technology including geology, geography, medicine, minefield detection, molecular biology, photography, quality control and reliability theory and radio-optics.

Smoothing Methods in Statistics - Jeffrey S. Simonoff 2012-12-06

Focussing on applications, this book covers a very broad range, including simple and complex univariate and multivariate density estimation, nonparametric regression estimation, categorical data smoothing, and applications of smoothing to other areas of statistics. It will thus be of particular interest to data analysts, as arguments generally proceed from actual data rather than statistical theory, while the "Background Material" sections will interest statisticians studying the field. Over 750 references allow researchers to find the original sources for more details, and the "Computational Issues" sections provide sources for statistical software that use the methods discussed. Each chapter includes exercises with a heavily computational focus based upon the data sets used in the book, making it equally suitable as a textbook for a course in smoothing.

Monte Carlo Methods in Bayesian Computation - Ming-Hui Chen 2012-12-06

Dealing with methods for sampling from posterior distributions and how to compute posterior quantities of interest using Markov chain Monte Carlo (MCMC) samples, this book addresses such topics as improving simulation accuracy, marginal posterior density estimation, estimation of normalizing constants, constrained parameter problems, highest posterior density interval calculations, computation of posterior modes, and posterior computations for proportional hazards models and Dirichlet process models. The authors also discuss model comparisons, including both nested and non-nested models, marginal likelihood methods, ratios of normalizing constants, Bayes factors, the Savage-Dickey density ratio, Stochastic Search Variable Selection, Bayesian Model Averaging, the reverse jump algorithm, and model adequacy using predictive and latent residual approaches. The book presents

an equal mixture of theory and applications involving real data, and is intended as a graduate textbook or a reference book for a one-semester course at the advanced masters or Ph.D. level. It will also serve as a useful reference for applied or theoretical researchers as well as practitioners.

Exact Statistical Methods for Data Analysis - Samaradasa Weerahandi 2013-12-01

Now available in paperback, this book covers some recent developments in statistical inference. It provides methods applicable in problems involving nuisance parameters such as those encountered in comparing two exponential distributions or in ANOVA without the assumption of equal error variances. The generalized procedures are shown to be more powerful in detecting significant experimental results and in avoiding misleading conclusions.

Robust Diagnostic Regression Analysis - Anthony Atkinson 2012-12-06

Graphs are used to understand the relationship between a regression model and the data to which it is fitted. The authors develop new, highly informative graphs for the analysis of regression data and for the detection of model inadequacies. As well as illustrating new procedures, the authors develop the theory of the models used, particularly for generalized linear models. The book provides statisticians and scientists with a new set of tools for data analysis. Software to produce the plots is available on the authors website.

Exploring Multivariate Data with the Forward Search - Anthony C. Atkinson 2013-04-17

This book is concerned with data in which the observations are independent and in which the response is multivariate. Companion book to Robust Diagnostic Regression Analysis (ISBN 0-387-95017) published by Springer in 2000.

Nonlinear Regression with R - Christian Ritz 2008-12-11

- Coherent and unified

treatment of nonlinear regression with R. - Example-based approach. - Wide area of application.

Statistical Decision Theory - F. Liese 2008-12-30

For advanced graduate students, this book is a one-stop shop that presents the main ideas of decision theory in an organized, balanced, and mathematically rigorous manner, while observing statistical relevance. All of the major topics are introduced at an elementary level, then developed incrementally to higher levels. The book is self-contained as it provides full proofs, worked-out examples, and problems. The authors present a rigorous account of the concepts and a broad treatment of the major results of classical finite sample size decision theory and modern asymptotic decision theory. With its broad coverage of decision theory, this book fills the gap between standard graduate texts in mathematical statistics and advanced monographs on modern asymptotic theory.

Growth Curve Models and Statistical Diagnostics - Jian-Xin Pan 2012-11-06

This book systematically introduces the theory of the GCM with particular emphasis on their multivariate statistical diagnostics, which are based mainly on recent developments made by the authors and their collaborators. Provided are complete proofs of theorems as well as practical data sets and MATLAB code.

Introduction to Variance Estimation - Kirk Wolter 2003-11-14

Now available in paperback, this book is organized in a way that emphasizes both the theory and applications of the various variance estimating techniques. Results are often presented in the form of theorems; proofs are deleted when trivial or when a reference is readily available. It applies to large, complex surveys; and to provide an easy reference for the survey researcher who is faced with the problem of estimating variances for real survey data.

Model Assisted Survey

Sampling - Carl-Erik Särndal 2003-10-31

Now available in paperback, this book provides a comprehensive account of survey sampling theory and methodology suitable for students and researchers across a variety of disciplines. It shows how statistical modeling is a vital component of the sampling process and in the choice of estimation technique. The first textbook that systematically extends traditional sampling theory with the aid of a modern model assisted outlook. Covers classical topics as well as areas where significant new developments have taken place.

Introduction to Rare Event Simulation - James Bucklew 2004-03-11

This book is an attempt to present a unified theory of rare event simulation and the variance reduction technique known as importance sampling from the point of view of the probabilistic theory of large deviations. This framework allows us to view a vast assortment of simulation problems from a single unified perspective. It gives a great deal of insight into the fundamental nature of rare event simulation. Unfortunately, this area has a reputation among simulation practitioners of requiring a great deal of technical and probabilistic expertise. In this text, I have tried to keep the mathematical preliminaries to a minimum; the only prerequisite is a single large deviation theorem dealing with sequences of Rd valued random variables. (This theorem and a proof are given in the text.) Large deviation theory is a burgeoning area of probability theory and many of the results in it can be applied to simulation problems. Rather than try to be as complete as possible in the exposition of all possible aspects of the available theory, I have tried to concentrate on demonstrating the methodology and the principal ideas in a fairly simple setting. Madison, Wisconsin 2003 James Antonio Bucklew Contents 1. Random

Number Generation . . . . . 1 . . . . . 1.1 Uniform Generators. . . . . 1 1.2 Nonuniform Generation . . . . . 8 1.2.1 The Inversion Method . . . . . 8 1.2.2 The Acceptance---Rejection Method . . . . . 10 . . . . . 1.3 Discrete Distributions . . . . . 13 . . . . . 1.3.1 Inversion by Truncation of a Continuous Analog. . . . . 14 1.3.2 Acceptance---Rejection . . . . . 15 . . . . . .

Nonlinear Regression Analysis and Its Applications - Douglas M. Bates 2007-04-23

Provides a presentation of the theoretical, practical, and computational aspects of nonlinear regression. There is background material on linear regression, including a geometrical development for linear and nonlinear least squares.

OECD Guidelines for the Testing of Chemicals, Section 2 Test No. 210: Fish, Early-life Stage Toxicity Test - OECD 2013-07-26

The test method described in this Test Guideline, is intended to define the lethal and sub-lethal effects of chemicals on the early life stages of the species tested. The early-life stages of fish are exposed to five concentrations of the test ...

Smoothing Spline ANOVA Models - Chong Gu 2013-03-09

Smoothing methods are an active area of research. In this book, the author presents a comprehensive treatment of penalty smoothing under a unified framework. Methods are developed for (i) regression with Gaussian and non-Gaussian responses as well as with censored life time data; (ii) density and conditional density estimation under a variety of sampling schemes; and (iii) hazard rate estimation with censored life time data and covariates. Extensive discussions are devoted to model construction, smoothing parameter selection, computation, and asymptotic

convergence. Most of the computational and data analytical tools discussed in the book are implemented in R, an open-source clone of the popular S/S- PLUS language.

Combinatorial Methods in Density Estimation - Luc Devroye 2012-12-06

Density estimation has evolved enormously since the days of bar plots and histograms, but researchers and users are still struggling with the problem of the selection of the bin widths. This book is the first to explore a new paradigm for the data-based or automatic selection of the free parameters of density estimates in general so that the expected error is within a given constant multiple of the best possible error. The paradigm can be used in nearly all density estimates and for most model selection problems, both parametric and nonparametric.

Information Criteria and Statistical Modeling - Sadanori Konishi 2008

This brilliantly structured and comprehensive volume provides exhaustive explanations of the concepts and philosophy of statistical modeling, together with a wide range of practical and numerical examples.

Elements of Multivariate Time Series Analysis - Gregory C. Reinsel 2003-10-31

Now available in paperback, this book introduces basic concepts and methods useful in the analysis and modeling of multivariate time series data. It concentrates on the time-domain analysis of multivariate time series, and assumes univariate time series analysis, while covering basic topics such as stationary processes and their covariance matrix structure, vector AR, MA, and ARMA models, forecasting, least squares and maximum likelihood estimation for ARMA models, associated likelihood ratio testing procedures.