

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

A complete guide to cutting-edge techniques and best practices for applying covariance analysis methods The Second Edition of Analysis of Covariance and Alternatives sheds new light on its topic, offering in-depth discussions of underlying assumptions, comprehensive interpretations of results, and comparisons of distinct approaches. The book has been extensively revised and updated to feature an in-depth review of prerequisites and the latest developments in the field. The author begins with a discussion of essential topics relating to experimental design and analysis, including analysis of variance, multiple regression, effect size measures and newly developed methods of communicating statistical results. Subsequent chapters feature newly added methods for the analysis of experiments with ordered treatments, including two parametric and nonparametric monotone analyses as well as approaches based on the robust general linear model and reversed ordinal logistic regression. Four groundbreaking chapters on single-case designs introduce powerful new analyses for simple and complex single-case experiments. This Second Edition also features coverage of advanced methods including: Simple and multiple analysis of covariance using both the Fisher approach and the general linear model approach Methods to manage assumption departures, including heterogeneous slopes, nonlinear functions, dichotomous dependent variables, and covariates affected by treatments Power analysis and the application of covariance analysis to randomized-block designs, two-factor designs, pre- and post-test designs, and multiple dependent variable designs Measurement error correction and propensity score methods developed for quasi-experiments, observational studies, and uncontrolled clinical trials Thoroughly updated to reflect the growing nature of the field, Analysis of Covariance and Alternatives is a suitable book for behavioral and medical sciences courses on design of experiments and regression and the upper-undergraduate and graduate levels. It also serves as an authoritative reference work for researchers and academics in the fields of medicine, clinical trials, epidemiology, public health, sociology, and engineering.

Of related interest. Nonlinear Regression Analysis and its Applications Douglas M. Bates and Donald G. Watts ". an extraordinary presentation of concepts and methods concerning the use and analysis of nonlinear regression models.highly recommend[ed],for anyone needing to use and/or understand issues concerning the analysis of nonlinear regression models." --Technometrics This book provides a balance between theory and practice supported by extensive displays of instructive geometrical constructs. Numerous in-depth case studies illustrate the use of nonlinear regression analysis--with all data sets real. Topics include: multi-response parameter estimation; models defined by systems of differential equations; and improved methods for presenting inferential results of nonlinear analysis. 1988 (0-471-81643-4) 365 pp. Nonlinear Regression G. A. F. Seber and C. J. Wild ".[a] comprehensive and scholarly work.impressively thorough with attention given to every aspect of the modeling process." --Short Book Reviews of the International Statistical Institute In this introduction to nonlinear modeling, the authors examine a wide range of estimation techniques including least squares, quasi-likelihood, and Bayesian methods, and discuss some of the problems associated with estimation. The book presents new and important material relating to the concept of curvature and its growing role in statistical inference. It also covers three useful classes of models --growth, compartmental, and multiphase --and emphasizes the limitations involved in fitting these models. Packed with examples and graphs, it offers statisticians, statistical consultants, and statistically oriented research scientists up-to-date access to their fields. 1989 (0-471-61760-1) 768 pp.

Mathematical Programming in Statistics T. S. Arthanari and Yadolah Dodge "The authors have achieved their stated intention.in an outstanding and usefl manner for both students and researchers.Contains a superb synthesis of references linked to the special topics and formulations by a succinct set of bibliographical notes.Should be in the hands of all system analysts and computer system architects." --Computing Reviews This unique book brings together most of the available results on applications of mathematical programming in statistics, and also develops the necessary statistical and programming theory and methods. 1981 (0-471-08073-X) 413 pp.

Combining a modern, data-analytic perspective with a focus on applications in the social sciences, the Third Edition of Applied Regression Analysis and Generalized Linear Models provides in-depth coverage of regression analysis, generalized linear models, and closely related methods, such as bootstrapping and missing data. Updated throughout, this Third Edition includes new chapters on mixed-effects models for hierarchical and longitudinal data. Although the text is largely accessible to readers with a modest background in statistics and mathematics, author John Fox also presents more advanced material in optional sections and chapters throughout the book. Available with Perusal—an eBook that makes it easier to prepare for class Perusal is an award-winning eBook platform featuring social annotation tools that allow students and instructors to collaboratively mark up and discuss their SAGE textbook. Backed by research and supported by technological innovations developed at Harvard University, this process of learning through collaborative annotation keeps your students engaged and makes teaching easier and more effective. Learn more.

As one of the classical statistical regression techniques, and often the first to be taught to new students, least squares fitting can be a very effective tool in data analysis. Given measured data, we establish a relationship between independent and dependent variables so that we can use the data predictively. The main concern of Least Squares Data Fitting with Applications is how to do this on a computer with efficient and robust computational methods for linear and nonlinear relationships. The presentation also establishes a link between the statistical setting and the computational issues. In a number of applications, the accuracy and efficiency of the least squares fit is central, and Per Christian Hansen, Victor Pereyra, and Godola Scherer survey modern computational methods and illustrate them in fields ranging from engineering and environmental sciences to geophysics.

Anyone working with problems of linear and nonlinear least squares fitting will find this book invaluable as a hands-on guide, with accessible text and carefully explained problems. Included are • an overview of computational methods together with their properties and advantages • topics from statistical regression analysis that help readers to understand and evaluate the computed solutions • many examples that illustrate the techniques and algorithms Least Squares Data Fitting with Applications can be used as a textbook for advanced undergraduate or graduate courses and professionals in the sciences and in engineering.

Handbook of Statistical Methods for Case-Control Studies

The Analysis of Covariance and Alternatives

An R and S-Plus Companion to Applied Regression

A Practical Guide

A Practical Guide with S-PLUS Examples

Methods and Applications of Longitudinal Data Analysis describes methods for the analysis of longitudinal data in the medical, biological and behavioral sciences. It introduces basic concepts and functions including a variety of regression models, and their practical applications across many areas of research. Statistical procedures featured within the text include: descriptive methods for delineating trends over time linear mixed regression models with both fixed and random effects covariance pattern models on correlated errors generalized estimating equations nonlinear regression models for categorical repeated measurements techniques for analyzing longitudinal data with non-ignorable missing observations Emphasis is given to applications of these methods, using substantial empirical illustrations, designed to help users of statistics better analyze and understand longitudinal data. Methods and Applications of Longitudinal Data Analysis equips both graduate students and professionals to confidently apply longitudinal data analysis to their particular discipline. It also provides a valuable reference source for applied statisticians, demographers and other quantitative methodologists. From novice to professional: this book starts with the introduction of basic models and ends with the description of some of the most advanced models in longitudinal data analysis Enables students to select the correct statistical methods to apply to their longitudinal data and avoid the pitfalls associated with incorrect selection Identifies the limitations of classical repeated measures models and describes newly developed techniques, along with real-world examples.

The essential introduction to the theory and application of linear models—now in a valuable new edition Since most advanced statistical tools are generalizations of the linear model, it is neces-sary to first master the linear model in order to move forward to more advanced concepts. The linear model remains the main tool of the applied statistician and is central to the training of any statistician regardless of whether the focus is applied or theoretical. This completely revised and updated new edition successfully develops the basic theory of linear models for regression, analysis of variance, analysis of covariance, and linear mixed models. Recent advances in the methodology related to linear mixed models, generalized linear models, and the Bayesian linear model are also addressed. Linear Models in Statistics, Second Edition includes full coverage of advanced topics, such as mixed and generalized linear models, Bayesian linear models, two-way models with empty cells, geometry of least squares, vector-matrix calculus, simultaneous inference, and logistic and nonlinear regression. Algebraic, geometrical, frequentist, and Bayesian approaches to both the inference of linear models and the analysis of variance are also illustrated. Through the expansion of relevant material and the inclusion of the latest technological developments in the field, this book provides readers with the theoretical foundation to correctly interpret computer software output as well as effectively use, customize, and understand linear models. This modern Second Edition features: New chapters on Bayesian linear models as well as random and mixed linear models Expanded discussion of two-way models with empty cells Additional sections on the geometry of least squares Updated coverage of simultaneous inference The book is complemented with easy-to-read proofs, real data sets, and an extensive bibliography. A thorough review of the requisite matrix algebra has been addedfor transitional purposes, and numerous theoretical and applied problems have been incorporated with selected answers provided at the end of the book. A related Web site includes additional data sets and SAS® code for all numerical examples. Linear Model in Statistics, Second Edition is a must-have book for courses in statistics, biostatistics, and mathematics at the upper-undergraduate and graduate levels. It is also an invaluable reference for researchers who need to gain a better understanding of regression and analysis of variance.

Bayesian and Frequentist Regression Methods provides a modern account of both Bayesian and frequentist methods of regression analysis. Many texts cover one or the other of the approaches, but this is the most comprehensive combination of Bayesian and frequentist methods that exists in one place. The two philosophical approaches to regression methodology are featured here as complementary techniques, with theory and data analysis providing supplementary components of the discussion. In particular, methods are illustrated using a variety of data sets. The majority of the data sets are drawn from biostatistics but the techniques are generalizable to a wide range of other disciplines.

Handbook of Regression Methods concisely covers numerous traditional, contemporary, and nonstandard regression methods. The handbook provides a broad overview of regression models, diagnostic procedures, and inference procedures, with emphasis on how these methods are applied. The organization of the handbook benefits both practitioners and researchers, who seek either to obtain a quick understanding of regression methods for specialized problems or to expand their own breadth of knowledge of regression topics. This handbook covers classic material about simple linear regression and multiple linear regression, including assumptions, effective visualizations, and inference procedures. It presents an overview of advanced diagnostic tests, remedial strategies, and model selection procedures. Finally, many chapters are devoted to a diverse range of topics, including censored regression, nonlinear regression, generalized linear models, and semiparametric regression. Features Presents a concise overview of a wide range of regression topics not usually covered in a single text Includes over 80 examples using nearly 70 real datasets, with results obtained using R Offers a Shiny app containing all examples, thus allowing access to the source code and the ability to interact with the analyses

Alternative Methods of Regression

Nonlinear Statistical Models

Bayesian and Frequentist Regression Methods

Applied Regression Analysis

Nonlinear Regression with R

Integrates the latest theory, methodology and applications related to the design and analysis of repeated measurement. The text covers a broad range of topics, including the analysis of repeated measures design, general crossover designs, and linear and nonlinear regression models. It also contains a 3.5 IBM compatible disk, with software to implement immediately the techniques.

Nonlinear Bayesian modelling is a relatively new field, but one that has seen a recent explosion of interest. Nonlinear models offer more flexibility than those with linear assumptions, and their implementation has now become much easier due to increases in computational power. Bayesian methods allow for the incorporation of prior information, allowing the user to make coherent inference. Bayesian Methods for Nonlinear Classification and Regression is the first book to bring together, in a consistent statistical framework, the ideas of nonlinear modelling and Bayesian methods. * Focuses on the problems of classification and regression using flexible, data-driven approaches. * Demonstrates how Bayesian ideas can be used to improve existing statistical methods. * Includes coverage of Bayesian additive models, decision trees, nearest-neighbour, wavelets, regression splines, and neural networks. * Emphasis is placed on sound implementation of nonlinear models. * Discusses medical, spatial, and economic applications. * Includes problems at the end of most of the chapters. * Supported by a web site featuring implementation code and data sets. Primarily of interest to researchers of nonlinear statistical modelling, the book will also be suitable for graduate students of statistics. The book will benefit researchers involved in regression and classification modelling from electrical engineering, economics, machine learning and computer science.

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.

Univariate nonlinear regression; Univariate nonlinear regression: special situations; A unified asymptotic theory of nonlinear models with regression structure; Univariate nonlinear regression: asymptotic theory; Multivariate nonlinear regression; Nonlinear simultaneous equations models; A unified asymptotic theory for dynamic nonlinear models.

Methods and Applications of Longitudinal Data Analysis

Applied Linear Regression

with Applications using R

With Applications to Linear Models, Logistic Regression, and Survival Analysis

Nonlinear Regression Analysis and Its Applications

The first book to discuss robust aspects of nonlinear regression—with applications using R software Robust Nonlinear Regression: with Applications using R covers a variety of theories and applications of nonlinear robust regression. It discusses both parts of the classic and robust aspects of nonlinear regression and focuses on outlier effects. It develops new methods in robust nonlinear regression and implements a set of objects and functions in S-language under SPLUS and R software. The software covers a wide range of robust nonlinear fitting and inferences, and is designed to provide facilities for computer users to define their own nonlinear models as an object, and fit models using classic and robust methods as well as detect outliers. The implemented objects and functions can be applied by practitioners as well as researchers. The book offers comprehensive coverage of the subject in 9 chapters: Theories of Nonlinear Regression and Inference; Introduction to R; Optimization; Theories of Robust Nonlinear Methods; Robust and Classical Nonlinear Regression with Autocorrelated and Heteroscedastic errors; Outlier Detection; R Packages in Nonlinear Regression; A New R Package in Robust Nonlinear Regression; and Object Sets. The first comprehensive coverage of this field covers a variety of both theoretical and applied topics surrounding robust nonlinear regression Addresses some commonly mishandled aspects of modeling R packages for both classical and robust nonlinear regression are presented in detail in the book and on an accompanying website Robust Nonlinear Regression: with Applications using R is an ideal text for statisticians, biostatisticians, and statistical consultants, as well as advanced level students of statistics.

Statistical Methods, Third Edition, provides students with a working introduction to statistical methods offering a wide range of applications that emphasize the quantitative skills useful across many academic disciplines. This text takes a classic approach that emphasizes concepts and techniques for working out problems and interpreting results. The book includes research projects, real-world case studies, numerous examples, and data exercises organized by level of difficulty. Students are required to be familiar with algebra. This updated edition includes new exercises applying different techniques and methods; new examples and datasets using current real-world data; new text organization to create a more natural connection between regression and the Analysis of the Variance; new material on generalized linear models; new expansion of nonparametric techniques; new student research projects; and new case studies for gathering, summarizing, and analyzing data. Integrates the classical conceptual approach with modern day computerized data manipulation and computer applications Accessible to students who may not have a background in probability or calculus Offers reader-friendly exposition, without sacrificing statistical rigor Includes many new data sets in various applied fields such as Psychology, Education, Biostatistics, Agriculture, Economics

Better experimental design and statistical analysis make for more robust science. A thorough understanding of modern statistical methods can mean the difference between discovering and missing crucial results and conclusions in your research, and can shape the course of your entire research career. With Applied Statistics, Barry Glaz and Kathleen M. Yeater have worked with a team of expert authors to create a comprehensive text for graduate students and practicing scientists in the agricultural, biological, and environmental sciences. The contributors cover fundamental concepts and methodologies of experimental design and analysis, and also delve into advanced statistical topics, all explored by analyzing real agronomic data with practical and creative approaches using available software tools. IN PRESS! This book is being published according to the “Just Published” model, with more chapters to be published online as they are completed.

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.

Statistical Methods of Model Building: Nonlinear regression, functional relations, and robust methods

Robust Diagnostic Regression Analysis

Nonlinear Regression Modeling for Engineering Applications

Nonlinear Regression

Linear and Nonlinear Modeling

A comprehensive resource that draws a balance between theory and applications of nonlinear time series analysis Nonlinear Time Series Analysis offers an important guide to both parametric and nonparametric methods, nonlinear state-space models, and Bayesian as well as classical approaches to nonlinear time series analysis. The authors—noted experts in the field—explore the advantages and improvements upon linear time series models. The need for this book is based on the recent developments in nonlinear time series analysis, statistical learning, dynamic systems and advanced computational methods. Parametric and nonparametric methods and nonlinear and non-Gaussian state space models provide a much wider range of tools for time series analysis. In addition, advances in core and high-frequency data. These new data make it not only feasible, but also necessary to take into consideration the nonlinearity embedded in most real-world time series. This vital guide: • Offers research developed by leading scholars of time series analysis • Presents R commands making it possible to reproduce all the analyses included in the text • Contains real-world examples throughout presented • Includes an instructor solutions manual and companion website Written for students, researchers, and practitioners who are interested in exploring nonlinearity in time series, Nonlinear Time Series Analysis offers a comprehensive text that explores the advantages and limitations of the nonlinear models and methods and demonstrates the improvements upon linear time series model Handbook of Statistical Methods for Case-Control Studies is written by leading researchers in the field. It provides an in-depth treatment of up-to-date and currently developing statistical methods for the design and analysis of case-control studies, as well as a review of classical principles and methods. The handbook is designed to serve as a reference text for biostatisticians and quantitatively of case-control studies or on related statistical methods research. Though not specifically intended as a textbook, it may also be used as a backup reference text for graduate level courses. Book Sections Classical designs and causal inference, measurement error, power, and small-sample inference Designs that use full-cohort information Time-to-event data Genetic epidemiology About the Editor book with Andersen, Gill and Keiding on counting processes in survival analysis is a world classic. Norman E. Breslow was, at the time of his death, Professor Emeritus in Biostatistics, University of Washington. For decades, his book with Nick Day has been the authoritative text on case-control methodology. Nilanjan Chatterjee is Bloomberg Distinguished Professor, Johns Hopkins University. He led modern large scale biomedical studies. Mitchell H. Gail is a Senior Investigator at the National Cancer Institute. His research includes modeling absolute risk of disease, intervention trials, and statistical methods for epidemiology. Alastair Scott was, at the time of his death, Professor Emeritus of Statistics, University of Auckland. He was a major contributor to using survey sampling methods for a Statistics, University of Auckland. His research includes nonlinear regression and methods for fitting models to response-selective data.

This book provides an elementary-level introduction to R, targeting both non-statistician scientists in various fields and students of statistics. The main mode of presentation is via code examples with liberal commenting of the code and the output, from the computational as well as the statistical viewpoint. Brief sections introduce the statistical methods before they are used. A supplementary are directly runnable and all graphics in the text are generated from the examples. The statistical methodology covered includes statistical standard distributions, one- and two-sample tests with continuous data, regression analysis, one-and two-way analysis of variance, regression analysis, analysis of tabular data, and sample size calculations. In addition, the last four chapters contain introductory logistic regression, and survival analysis.

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 calibration intervals, using classical methodology or bootstrap.

Bayesian Methods for Nonlinear Classification and Regression

Statistical Tools for Nonlinear Regression

Modern Regression Methods

Linear and Nonlinear Models for the Analysis of Repeated Measurements
Statistical Regression and Classification

- **Coherent and unified treatment of nonlinear regression with R. - Example-based approach. - Wide area of application.**

Least squares estimation, when used appropriately, is a powerful research tool. A deeper understanding of the regression concepts is essential for achieving optimal benefits from a least squares analysis. This book builds on the fundamentals of statistical methods and provides appropriate concepts that will allow a scientist to use least squares as an effective research tool. Applied Regression Analysis is aimed at the scientist who wishes to gain a working knowledge of regression analysis. The basic purpose of this book is to develop an understanding of least squares and related statistical methods without becoming excessively mathematical. It is the outgrowth of more than 30 years of consulting experience with scientists and many years of teaching an applied regression course to graduate students. Applied Regression Analysis serves as an excellent text for a service course on regression for non-statisticians and as a reference for researchers. It also provides a bridge between a two-semester introduction to statistical methods and a theoretical linear models course. Applied Regression Analysis emphasizes the concepts and the analysis of data sets. It provides a review of the key concepts in simple linear regression, matrix operations, and multiple regression. Methods and criteria for selecting regression variables and geometric interpretations are discussed. Polynomial, trigonometric, analysis of variance, nonlinear, time series, logistic, random effects, and mixed effects models are also discussed. Detailed case studies and exercises based on real data sets are used to reinforce the concepts. The data sets used in the book are available on the Internet.

Applied Linear Statistical Models 5e is the long established leading authoritative text and reference on statistical modeling. For students in most any discipline where statistical analysis or interpretation is used, **ALSM** serves as the standard work. The text includes brief introductory and review material, and then proceeds through regression and modeling for the first half, and through ANOVA and Experimental Design in the second half. All topics are presented in a precise and clear style supported with solved examples, numbered formulae, graphic illustrations, and "Notes" to provide depth and statistical accuracy and precision. Applications used within the text and the hallmark problems, exercises, and projects are drawn from virtually all disciplines and fields providing motivation for students in virtually any college. The Fifth edition provides an increased use of computing and graphical analysis throughout, without sacrificing concepts or rigor. In general, the 5e uses larger data sets in examples and exercises, and where methods can be automated within software without loss of understanding, it is so done.

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

Applied Linear Statistical Models

Fitting Models to Biological Data Using Linear and Nonlinear Regression

Applied Regression Analysis and Generalized Linear Models

Statistical Data Anaylsis

Robust Nonlinear Regression

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

Since mathematical models express our understanding of how nature behaves, we use them to validate our understanding of the fundamentals about systems (which could be processes, equipment, procedures, devices, or products). Also, when validated, the model is useful for engineering applications related to diagnosis, design, and optimization. First, we postulate a mechanism, then derive a model grounded in that mechanistic understanding. If the model does not fit the data, our understanding of the mechanism was wrong or incomplete. Patterns in the residuals can guide model improvement. Alternately, when the model fits the data, our understanding is sufficient and confidently functional for engineering applications. This book details methods of nonlinear regression, computational algorithms,model validation, interpretation of residuals, and useful experimental design. The focus is on practical applications, with relevant methods supported by fundamental analysis. This book will assist either the academic or industrial practitioner to properly classify the system, choose between the various available modeling options and regression objectives, design experiments to obtain data capturing critical system behaviors, fit the model parameters based on that data, and statistically characterize the resulting model. The author has used the material in the undergraduate unit operations lab course and in advanced control applications.

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.

Statistical Tools for Nonlinear RegressionA Practical Guide with S-PLUS ExamplesSpringer Science & Business Media

Statistical Methods

Nonlinear Time Series Analysis

Linear and Non-Linear System Theory

Introduction to Multivariate Analysis

Applied Statistics in Agricultural, Biological, and Environmental Sciences

"This book fits right into a needed niche: rigorous enough to give full explanation of the power of the S language, yet accessible enough to assign to social science graduate students without fear of intimidation. It is a tremendous balance of applied statistical "firepower" and thoughtful explanation. It meets all of the important mechanical needs: each example is given, models are given rather than just the bare essentials. It also meets some important theoretical needs: linear models, categorical data analysis, an introduction to applying GLMs, a discussion of model diagnostics, and useful instructions on writing customized functions. " —JEFF GILL, University of Florida, Gainesville

Many texts are excellent sources of knowledge about individual statistical tools, but the art of data analysis is about choosing and using multiple tools. Instead of presenting isolated techniques, this text emphasizes problem solving strategies that address the many issues arising when developing multivariable models using real data and not standard textbook examples effectively, methods for dealing with nonlinear relationships and for making the estimation of transformations a formal part of the modeling process, methods for dealing with "too many variables to analyze and not enough observations," and powerful model validation techniques based on the bootstrap. This text realistically deals with model uncertainty and its effects.

Statistical Regression and Classification: From Linear Models to Machine Learning takes an innovative look at the traditional statistical regression course, presenting a contemporary treatment in line with today's applications and users. The text takes a modern look at regression: * A thorough treatment of classical linear and generalized linear models, supplemented with modern extensions * Includes a chapter on generalized linear models * Includes a chapter on classification is the focus of many contemporary applications, the book covers this topic in detail, especially the multiclass case. * In view of the voluminous nature of many modern datasets, there is a chapter on Big Data. * Has special Mathematical and Computational Complements sections at ends of chapters, and exercises are partitioned into Data, Math and Computation. * Includes a chapter on generalized linear models * Includes a chapter on classification audiences such as majors in Statistics, Computer Science, or Economics. * More than 75 examples using real data. The book treats classical regression methods in an innovative, contemporary manner. Though some statistical learning methods are introduced, the primary methodology used is linear and generalized linear parametric models, covering both the Description and Classification. * Includes a chapter on generalized linear models * Includes a chapter on classification interested in Description applications of regression, such as measuring the gender wage gap in Silicon Valley, as in forecasting tomorrow's demand for bike rentals. An entire chapter is devoted to measuring such effects, including discussion of Simpson's Paradox, multiple inference, and causation issues. Similarly, there is an entire chapter of parametric model fit, making it a comprehensive introduction to the field of regression analysis. Norman Matloff is a professor of computer science at the University of California, Davis, and was a founder of the Statistics Department at that institution. His current research focus is on recommender systems, and applications of regression methods to small area estimation and bias reduction in observational studies. He is on the editorial boards of the Journal of the American Statistical Association, the Journal of the Royal Statistical Society, and the Journal of the American Statistical Association. He is also the author of The Art of R Programming and Parallel Computation in Data Science: With Examples in R, C++ and CUDA.

Linear and Non-Linear System Theory focuses on the basics of linear and non-linear systems, optimal control and optimal estimation with an objective to understand the basics of state space approach linear and non-linear systems and its analysis thereof. Divided into eight chapters, materials cover an introduction to the advanced topics in the field of linear and non-linear systems, detailed case studies and numerical and exercise problems. This book is aimed at senior undergraduate and graduate students in electrical, instrumentation, electronics, chemical, control engineering and other allied branches of engineering. Features Covers both linear and non-linear system theory Explores state feedback control and state estimation

Includes non-linear system stability and bifurcation behaviour Elaborates optimal control and estimation

Handbook of Regression Methods

A Research Tool

Least Squares Data Fitting with Applications

Modeling, Model Validation, and Enabling Design of Experiments

Select the Optimal Model for Interpreting Multivariate Data Introduction to Multivariate Analysis: Linear and Nonlinear Modeling shows how multivariate analysis is widely used for extracting useful information and patterns from multivariate data and for understanding the structure of random phenomena. Along with the basic concepts of various procedures in traditional multivariate analysis, the book covers nonlinear techniques for clarifying phenomena behind observed multivariate data. It primarily focuses on regression modeling, classification and discrimination, dimension reduction, and clustering. The text thoroughly explains the concepts and derivations of the AIC, BIC, and related criteria and includes a wide range of practical examples of model selection and evaluation criteria. To estimate and evaluate models with a large number of predictor variables, the author presents regularization methods, including the L1 norm regularization that gives simultaneous model estimation and variable selection. For advanced undergraduate and graduate students in statistical science, this text provides a systematic description of both traditional and newer techniques in multivariate analysis and machine learning. It also introduces linear and nonlinear statistical modeling for researchers and practitioners in industrial and systems engineering, information science, life science, and other areas.

An outstanding introduction to the fundamentals of regression analysis—updated and expanded The methods of regression analysis are the most widely used statistical tools for discovering the relationships among variables. This classic text, with its emphasis on clear, thorough presentation of concepts and applications, offers a complete, easily accessible introduction to the fundamentals of regression analysis. Assuming only a basic knowledge of elementary statistics, Applied Regression Analysis, Third Edition focuses on the fitting and checking of both linear and nonlinear regression models, using small and large data sets, with pocket calculators or computers. This Third Edition features separate chapters on multicollinearity, generalized linear models, mixture ingredients, geometry of regression, robust regression, and resampling procedures. Extensive support materials include sets of carefully designed exercises with full or partial solutions and a series of true/false questions with answers. All data sets used in both the text and the exercises can be found on the companion disk at the back of the book. For analysts, researchers, and students in university, industrial, and government courses on regression, this text is an excellent introduction to the subject and an efficient means of learning how to use a valuable analytical tool. It will also prove an invaluable reference resource for applied scientists and statisticians.

"Over the years, I have had the opportunity to teach several regression courses, and I cannot think of a better undergraduate text than this one." (The American Statistician) "The book is well written and has many exercises. It can serve as a very good textbook for scientists and engineers, with only basic statistics as a prerequisite. I also highly recommend it to practitioners who want to solve real-life prediction problems." (Computing Reviews) Modern Regression Methods, Second Edition maintains the accessible organization, breadth of coverage, and cutting-edge appeal that earned its predecessor the title of being one of the top five books for statisticians by an Amstat News book editor in 2003. This new edition has been updated and enhanced to include all-new information on the latest advances and research in the evolving field of regression analysis. The book provides a unique treatment of fundamental regression methods, such as diagnostics, transformations, robust regression, and ridge regression. Unifying key concepts and procedures, this new edition emphasizes applications to provide a more hands-on and comprehensive understanding of regression diagnostics. New features of the Second Edition include: A revised chapter on logistic regression, including improved methods of parameter estimation A new chapter focusing on additional topics of study in regression, including quantile regression, semiparametric regression, and Poisson regression A wealth of new and updated exercises with worked solutions An extensive FTP site complete with Minitab macros, which allow the reader to compute analyses, and specialized procedures Updated references at the end of each chapter that direct the reader to the appropriate resources for further study An accessible guide to state-of-the-art regression techniques, Modern Regression Methods, Second Edition is an excellent book for courses in regression analysis at the upper-undergraduate and graduate levels. It is also a valuable reference for practicing statisticians, engineers, and physical scientists.

Sharpen your statistical skills practically overnight! To meet today's stringent quality standards—including ISO 9000 and QS9000—you need solid statistical know-how. Here's the one tool that makes complex statistical methods easier and more accessible than ever. Handbook of Statistical Methods for Engineers and Scientists, Second Edition. Harry M. Wadsworth walks you step-by-step through the full range of statistical techniques—matching how-to procedures to specific applications—making it a breeze to: master such important procedures as acceptance sampling and survey sampling; exploit advanced statistical techniques including multicollinearity and biased estimation in regression, nonlinear regression and time series analysis; take advantage of cutting-edge computer simulation methods and robust design techniques; and much more.

From Linear Models to Machine Learning

Linear Models in Statistics

Handbook of Statistical Methods for Engineers and Scientists

Statistical Methods for Experiments, Quasi-Experiments, and Single-Case Studies

Introductory Statistics with R