Log Linear Models And Logistic Regression By Ronald Christensen

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Logistic Regression Scott Menard 2010 Logistic Regression is designed for readers who have a background in statistics at least up to multiple linear regression, who want to analyze dichotomous, nominal, and ordinal dependent variables cross-sectionally and longitudinally.

Categorical Data Analysis Keming Yang 2014-07-16 These four volumes provide a collection of key publications on categorical data analysis, carefully put together so that the reader can easily navigate, understand and put in context the major concepts and methods of analysing categorical data. The major work opens with a series of papers that address general issues in CDA, and progresses with publications which follow a logical movement from the statistics for analysing a single categorical variable, to those for studying the relationships between two and more categorical variables, and to categorical variables in some of more advanced methods, such as latent class analysis. Edited and introduced by a leading voice in the field, this collection helpfully includes both theoretical and applied items on its theme, in order to help the reader understand the methods and use them in empirical research. Volume 1: Basic Concepts and Principles Volume 2: Statistical Methods for Analysing Associations Volume 3: Log-Linear and Logistic Regression Models Volume 4: Advanced and Graphical Statistical Methods

Best Practices in Quantitative Methods Jason W. Osborne 2008 The contributors to Best Practices in Quantitative Methods envision quantitative methods in the 21st century, identify the best practices, and, where possible, demonstrate the superiority of their recommendations empirically. Editor Jason W. Osborne designed this book with the goal of providing readers with the most effective, evidence-based, modern quantitative methods and quantitative data analysis across the social and behavioral sciences. The text is divided into five main sections covering select best practices in Measurement, Research Design, Basics of Data Analysis, Quantitative Methods, and Advanced Quantitative Methods. Each chapter contains a current and expansive review of the literature, a case for best practices in terms of method, outcomes, inferences, etc., and broad-ranging examples along with any empirical evidence to show why certain techniques are better. Key Features: Describes important implicit knowledge to readers: The chapters in this volume explain the important details of seemingly mundane aspects of quantitative research, making them accessible to readers and demonstrating why it is important to pay attention to these details. Compares and contrasts analytic techniques: The book examines instances where there are multiple options for doing things, and make recommendations as to what is the "best" choice—or choices, as what is best often depends on the circumstances. Offers new procedures to update and explicate traditional techniques: The featured scholars present and explain new options for data analysis, discussing the advantages and disadvantages of the new procedures in depth, describing how to perform them, and demonstrating their use. Intended Audience: Representing the vanguard of research methods for the 21st century, this book is an invaluable resource for graduate students and researchers who want a comprehensive, authoritative resource for practical and sound advice from leading experts in quantitative methods.

Log-Linear Models and Logistic Regression Ronald Christensen 2006-04-06 The primary focus here is on log-linear models for contingency tables, but in this second edition, greater emphasis has been placed on logistic regression. The book explores topics such as logistic discrimination and generalised linear models, and builds upon the relationships between these basic models for continuous data and the analogous log-linear and logistic regression models for discrete data. It also carefully examines the differences in model interpretations and evaluations that occur due to the discrete nature of the data. Sample commands are given for analyses in SAS, BMFP, and GLIM, while numerous data sets from fields as diverse as engineering, education, sociology, and medicine are used to illustrate procedures and provide exercises. Throughout the book, the treatment is designed for students with prior knowledge of analysis of variance and regression.

Hands-On Machine Learning with R Brad Boehmke 2019-11-07 Hands-on Machine Learning with R provides a practical and applied approach to learning and developing intuition into today's most popular machine learning methods. This book serves as a practitioner's guide to the machine learning process and is meant to help the reader learn to apply the machine learning stack within R, which includes using various R packages such as glmnet, h2o, ranger, xgboost, keras, and others to effectively model and gain insight from their data. The book favors a hands-on approach, providing an intuitive understanding of machine learning concepts through concrete examples and just a little bit of theory. Throughout this book, the reader will be exposed to the entire machine learning process including feature engineering, resampling, hyperparameter tuning, model evaluation, and interpretation. The reader will be exposed to powerful algorithms such as regularized regression, random forests, gradient boosting machines, deep learning, generalized low rank models, and more! By favoring a hands-on approach and using real word data, the reader will gain an intuitive understanding of the architectures and engines that drive these algorithms and packages, understand when and how to tune the various hyperparameters, and be able to interpret model results. By the end of this book, the reader should have a firm grasp of R's machine learning stack and be able to implement a systematic approach for producing high quality modeling results. Features: · Offers a practical and applied introduction to the most popular machine learning methods. · Topics covered include feature engineering, resampling, deep learning and more. · Uses a hands-on approach and real world data.

Introduction to Data Science Rafael A. Irizarry 2019-11-20 Introduction to Data Science: Data Analysis and Prediction Algorithms with R introduces concepts and skills that can help you tackle real-world data analysis challenges. It covers concepts from probability, statistical inference, linear regression, and machine learning. It also helps you develop skills such as R programming, data wrangling, data visualization, predictive algorithm building, file organization with UNIX/Linux shell, version control with Git and GitHub, and reproducible document preparation. This book is a textbook for a first course in data science. No previous knowledge of R is necessary, although some experience with programming may be helpful. The book is divided into six parts: R, data visualization, statistics with R, data wrangling, machine learning, and productivity tools. Each part has several chapters meant to be presented as one lecture. The author uses motivating case studies that realistically mimic a data scientist's experience. He starts by asking specific questions and answers these through data analysis so concepts are learned as a means to answering the questions. Examples of the case studies included are: US murder rates by state, self-reported student heights, trends in world health and economics, the impact of vaccines on infectious disease rates, the financial crisis of 2007-2008, election forecasting, building a baseball team, image processing of hand-written digits, and movie recommendation systems. The statistical concepts used to answer the case study questions are only briefly introduced, so complementing with a probability and statistics textbook is highly recommended for in-depth understanding of these concepts. If you read and understand the chapters and complete the exercises, you will be prepared to learn the more advanced concepts and skills needed to become an expert.

Logistic Regression Models Joseph M. Hilbe 2009-05-11 Logistic Regression Models presents an overview of the full range of logistic models, including binary, proportional, ordered, partially ordered, and unordered categorical response regression procedures. Other topics discussed include panel, survey, skewed, penalized, and exact logistic models. The text illustrates how to apply the various models to health, environmental, physical, and social science data. Examples illustrate successful modeling The text first provides basic terminology and concepts, before explaining the foremost methods of estimation (maximum likelihood and IRLS) appropriate for logistic models. It then presents an in-depth discussion of related terminology and examines logistic regression model development and interpretation of the results. After focusing on the construction and interpretation of various interactions, the author evaluates assumptions and goodness-of-fit tests that can be used for model assessment. He also covers binomial logistic regression, varieties of overdispersion, and a number of extensions to the basic binary and binomial logistic model. Both real and simulated data are used to explain and test the concepts involved. The appendices give an overview of marginal effects and discrete change as well as a 30-page tutorial on using Stata commands related to the examples used in the text. Stata is used for most examples while R is provided at the end of the chapters to replicate examples in the text. Apply the models to your own data Data files for examples and questions used in the text as well as code for user-authored commands are provided on the book's website, formatted in Stata, R, Excel, SAS, SPSS, and Limdep. See Professor Hilbe discuss the book.

Statistical Learning with Sparsity Trevor Hastie 2015-05-07 Discover New Methods for Dealing with High-Dimensional Data A sparse statistical model has only a small number of nonzero parameters or weights; therefore, it is much easier to estimate and interpret than a dense model. Statistical Learning with Sparsity: The Lasso and Generalizations presents methods that exploit sparsity to help recover the underlying signal in a set of data. Top experts in this rapidly evolving field, the authors describe the lasso for linear regression and a simple coordinate descent algorithm for its computation. They discuss the application of l1 penalties to generalized linear models and support vector machines, cover generalized penalties such as the elastic net and group lasso, and review numerical methods for optimization. They also present statistical inference methods for fitted (lasso) models, including the bootstrap, Bayesian methods, and recently developed approaches. In addition, the book examines matrix decomposition, sparse multivariate analysis, graphical models, and compressed sensing. It concludes with a survey of theoretical results for the lasso. In this age of big data, the number of features measured on a person or object can be large and might be larger than the number of observations. This book shows how the sparsity assumption allows us to tackle these problems and extract useful and reproducible patterns from big datasets. Data analysts, computer scientists, and theorists will appreciate this thorough and up-to-date treatment of sparse statistical modeling.

Encyclopedia of Research Design Neil J. Salkind 2010-06-22 "Comprising more than 500 entries, the Encyclopedia of Research Design explains how to make decisions about research design, undertake research projects in an ethical manner, interpret and draw valid inferences from data, and evaluate experiment design strategies and results. Two additional features carry this encyclopedia far above other works in the field: bibliographic entries devoted to significant articles in the history of research design and reviews of contemporary tools, such as software and statistical procedures, used to analyze results. It covers the spectrum of research design strategies, from material presented in introductory classes to topics necessary in graduate research; it addresses cross- and multidisciplinary research needs, with many examples drawn from the social and behavioral sciences, neurosciences, and biomedical and life sciences; it provides summaries of advantages and disadvantages of often-used strategies; and it uses hundreds of sample tables, figures, and equations based on real-life cases."--Publisher's description.

An Introduction to Generalized Linear Models Annette J. Dobson 2008-05-12 Continuing to emphasize numerical and graphical methods, An Introduction to Generalized Linear Models, Third Edition provides a cohesive framework for statistical modeling. This new edition of a bestseller has been updated with Stata, R, and WinBUGS code as well as three new chapters on Bayesian analysis. Like its predecessor, this edition presents the theoretical background of generalized linear models (GLMs) before focusing on methods for analyzing particular kinds of data. It covers normal, Poisson, and binomial distributions; linear regression models; classical estimation and model fitting methods; and frequentist methods of statistical inference. After forming this foundation, the authors explore multiple linear regression, analysis of variance (ANOVA), logistic regression, log-linear models, survival analysis, multilevel modeling, Bayesian models, and Markov chain Monte Carlo (MCMC) methods. Using popular statistical software programs, this concise and accessible text illustrates practical approaches to estimation, model fitting, and model comparisons. It includes examples and exercises with complete data sets for nearly all the models covered.

Regression & Linear Modeling Jason W. Osborne 2016-03-24 In a conversational tone, Regression & Linear Modeling provides conceptual, user-friendly coverage of the generalized linear model (GLM). Readers will become familiar with applications of ordinary least squares (OLS) regression, binary and multinomial logistic regression, ordinal regression, Poisson regression, and loglinear models. The author returns to certain themes throughout the text, such as testing assumptions, examining data quality, and, where appropriate, nonlinear and non-additive effects modeled within different types of linear models. Available with Perusall—an eBook that makes it easier to prepare for class Perusall 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.

Computational Genomics with R Altuna Akalin 2020-12-16 Computational Genomics with R provides a starting point for beginners in genomic data analysis and also guides more advanced practitioners to sophisticated data analysis techniques in genomics. The book covers topics from R programming, to machine learning and statistics, to the latest genomic data analysis techniques. The text provides accessible information and explanations, always with the genomics context in the background. This also contains practical and well-documented examples in R so readers can analyze their data by simply reusing the code presented. As the field of computational genomics is interdisciplinary, it requires different starting points for people with different backgrounds. For example, a biologist might skip sections on basic genome biology and start with R programming, whereas a computer scientist might want to start with genome biology. After reading: You will have the basics of R and be able to dive right into specialized uses of R for computational genomics such as using Bioconductor packages. You will be familiar with statistics, supervised and unsupervised learning techniques that are important in data modeling, and exploratory analysis of high-dimensional data. You will understand genomic intervals and operations on them that are used for tasks such as aligned read counting and genomic feature annotation. You will know the basics of processing and quality checking high-throughput sequencing data. You will be able to do sequence analysis, such as calculating GC content for parts of a genome or finding transcription factor binding sites. You will know about visualization techniques used in genomics, such as heatmaps, meta-gene plots, and genomic track visualization. You will be familiar with analysis of different high-throughput sequencing data sets, such as RNA-seq, ChIP-seq, and BS-seq. You will know basic techniques for integrating and interpreting multi-omics datasets. Altuna Akalin is a group leader and head of the Bioinformatics and Omics Data Science Platform at the Berlin Institute of Medical Systems Biology, Max Delbrück Center, Berlin. He has been developing computational methods for analyzing and integrating large-scale genomics data sets since 2002. He has published an extensive body of work in this area. The framework for this book grew out of the yearly computational genomics courses he has been organizing and teaching since 2015.

Logistic Regression Inside and Out Jeffrey Strickland

Logistic Regression Models for Ordinal Response Variables Ann A. O'Connell 2006 Ordinal measures provide a simple and convenient way to distinguish among possible outcomes. The book provides practical guidance on using ordinal outcome models.

Introduction to Statistical Modelling Annette J. Dobson 2013-11-11 This book is about generalized linear models as described by Nelder and Wedderburn (1972). This approach provides a unified theoretical and computational framework for the most commonly used statistical methods: regression, analysis of variance and covariance, logistic regression, log-linear models for contingency tables and several more specialized techniques. More advanced expositions of the subject are given by McCullagh and Nelder (1983) and Andersen (1980). The emphasis is on the use of statistical models to investigate substantive questions rather than to produce mathematical descriptions of the data. Therefore parameter estimation and hypothesis testing are stressed. I have assumed that the reader is familiar with the most commonly used statistical concepts and methods and has some basic knowledge of calculus and matrix algebra. Short numerical examples are used to illustrate the main points. In writing this book I have been helped greatly by the comments and criticism of my students and colleagues, especially Anne Young. However, the choice of material, and the obscurities and errors are my responsibility and I apologize to the reader for any irritation caused by them. For typing the manuscript under difficult conditions I am grateful to Anne McKim, Jan Garnsey, Cath Claydon and Julie Latimer.

Beyond Multiple Linear Regression Paul Roback 2021-01-14 Beyond Multiple Linear Regression: Applied Generalized Linear Models and Multilevel Models in R is designed for undergraduate students who have successfully completed a multiple linear regression course, helping them develop an expanded modeling toolkit that includes non-normal responses and correlated structure. Even though there is no mathematical prerequisite, the authors still introduce fairly sophisticated topics such as likelihood theory, zero-inflated Poisson, and parametric bootstrapping in an intuitive and applied manner. The case studies and exercises feature real data and real research questions; thus, most of the data in the textbook comes from collaborative research conducted by the authors and their students, or from student projects. Every chapter features a variety of conceptual exercises, guided exercises, and open-ended exercises using real data. After working through this material, students will develop an expanded toolkit and a greater appreciation for the wider world of data and statistical modeling. A solutions manual for all exercises is available to qualified instructors at the book's website at www.routledge.com, and data sets and Rmd files for all case studies and exercises are available at the authors' GitHub repo (https://github.com/proback/BeyondMLR).

Applied Regression Analysis and Generalized Linear Models John Fox 2015-03-18 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 Perusall—an 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.

Log-Linear Modeling Alexander von Eye 2014-08-21 An easily accessible introduction to log-linear modeling for non-statisticians Highlighting advances that have lent to the topic's distinct, coherent methodology over the past decade, Log-Linear Modeling: Concepts, Interpretation, and Application provides an essential, introductory treatment of the subject, featuring many new and advanced log-linear methods, models, and applications. The book begins with basic coverage of categorical data, and goes on to describe the basics of hierarchical log-linear models as well as decomposing effects in cross-classifications and goodness-of-fit tests. Additional topics include: The generalized linear model (GLM) along with popular methods of coding such as effect coding and dummy coding Parameter interpretation and how to ensure that the parameters reflect the hypotheses being studied Symmetry, rater agreement, homogeneity of association, logistic regression, and reduced designs models Throughout the book, real-world data illustrate the application of models and understanding of the related results. In addition, each chapter utilizes R, SYSTAT®, and §¤EM software, providing readers with an understanding of these programs in the context of hierarchical log-linear modeling. Log-Linear Modeling is an excellent book for courses on categorical data analysis at the upper-undergraduate and graduate levels. It also serves as an excellent reference for applied researchers in virtually any area of study, from medicine and statistics to the social sciences, who analyze empirical data in their everyday work.

Introduction to the Statistical Analysis of Categorical Data Erling B. Andersen 2012-12-06 This book deals with the analysis of categorical data. Statistical models, especially log-linear models for contingency tables and logistic regression, are described and applied to real life data. Special emphasis is given to the use of graphical methods. The book is intended as a text for both undergraduate and graduate courses for statisticians, applied statisticians, social scientists, economists and epidemiologists. Many examples and exercises with solutions should help the reader to understand the material.

Generalized Linear Models P. McCullagh 2018-10-31 The success of the first edition of Generalized Linear Models led to the updated Second Edition, which continues to provide a definitive unified, treatment of methods for the analysis of diverse types of data. Today, it remains popular for its clarity, richness of content and direct relevance to agricultural, biological, health, engineering, and ot

Foundations of Linear and Generalized Linear Models Alan Agresti 2015-02-23 A valuable overview of the most important ideas and results in statistical modeling Written by a highly-experienced author, Foundations of Linear and Generalized Linear Models is a clear and comprehensive guide to the key concepts and results of linearstatistical models. The book presents a broad, in-depth overview of the most commonly usedstatistical models by discussing the theory underlying the models, R software applications,and examples with crafted models to elucidate key ideas and promote practical modelbuilding. The book begins by illustrating the fundamentals of linear models, such as how the model-fitting projects the data onto a model vector subspace and how orthogonal decompositions of the data yield information about the effects of explanatory variables. Subsequently, the book covers the most popular generalized linear models, which include binomial and multinomial logistic regression for categorical data, and Poisson and negative binomial loglinear models for count data. Focusing on the theoretical underpinnings of these models, Foundations ofLinear and Generalized Linear Models also features: An introduction to quasi-likelihood methods that require weaker distributional assumptions, such as generalized estimating equation methods An overview of linear mixed models and generalized linear mixed models with random effects for clustered correlated data, Bayesian modeling, and extensions to handle problematic cases such as high dimensional problems Numerous examples that use R software for all text data analyses More than 400 exercises for readers to practice and extend the theory, methods, and data analysis A supplementary website with datasets for the examples and exercises An invaluable textbook for upper-undergraduate and graduate-level students in statistics and biostatistics courses, Foundations of Linear and Generalized Linear Models is also an excellent reference for practicing statisticians and biostatisticians, as well as anyone who is interested in learning about the most important statistical models for analyzing data.

Interpretable Machine Learning Christoph Molnar 2020 This book is about making machine learning models and their decisions interpretable. After exploring the concepts of interpretability, you will learn about simple, interpretable models such as decision trees, decision rules and linear regression. Later chapters focus on general model-agnostic methods for interpreting black box models like feature importance and accumulated local effects and explaining individual predictions with Shapley values and LIME. All interpretation methods are explained in depth and discussed critically. How do they work under the hood? What are their strengths and weaknesses? How can their outputs be interpreted? This book will enable you to select and correctly apply the interpretation method that is most suitable for your machine learning project.

Data Science for Business Foster Provost 2013-07-27 Written by renowned data science experts Foster Provost and Tom Fawcett, Data Science for Business introduces the fundamental principles of data science, and walks you through the "data-analytic thinking" necessary for extracting useful knowledge and business value from the data you collect. This guide also helps you understand the many data-mining techniques in use today. Based on an MBA course Provost has taught at New York University over the past ten years, Data Science for Business provides examples of real-world business problems to illustrate these principles. You'll not only learn how to improve communication between business stakeholders and data scientists, but also how participate intelligently in your company's data science projects. You'll also discover how to think data-analytically, and fully appreciate how data science methods can support business decision-making. Understand how data science fits in your organization—and how you can use it for competitive advantage Treat data as a business asset that requires careful investment if you're to gain real value Approach business problems data-analytically, using the data-mining process to gather good data in the most appropriate way Learn general concepts for actually extracting knowledge from data Apply data science principles when interviewing data science job candidates

Generalized Linear Models Raymond H. Myers 2012-01-20 Praise for the First Edition "The obvious enthusiasm of Myers, Montgomery, and Vining and their reliance on their many examples as a major focus of their pedagogy make Generalized Linear Models a joy to read. Every statistician working in any area of applied science should buy it and experience the excitement of these new approaches to familiar activities." —Technometrics Generalized Linear Models: With Applications in Engineering and the Sciences, Second Edition continues to provide a clear introduction to the theoretical foundations and key applications of generalized linear models (GLMs). Maintaining the same nontechnical approach as its predecessor, this update has been thoroughly extended to include the latest developments, relevant computational approaches, and modern examples from the fields of engineering and physical sciences. This new edition maintains its accessible approach to the topic by reviewing the various types of problems that support the use of GLMs and providing an overview of the basic, related concepts such as multiple linear regression, nonlinear regression, least squares, and the maximum likelihood estimation procedure. Incorporating the latest developments, new features of this Second Edition include: A new chapter on random effects and designs for GLMs A thoroughly revised chapter on logistic and Poisson regression, now with additional results on goodness of fit testing, nominal and ordinal responses, and overdispersion A new emphasis on GLM design, with added sections on designs for regression models and optimal designs for nonlinear regression models Expanded discussion of weighted least squares, including examples that illustrate how to estimate the weights Illustrations of R code to perform GLM analysis The authors demonstrate the diverse applications of GLMs through numerous examples, from classical applications in the fields of biology and biopharmaceuticals to more modern examples related to engineering and quality assurance. The Second Edition has been designed to demonstrate the growing computational nature of GLMs, as SAS®, Minitab®, JMP®, and R software packages are used throughout the book to demonstrate fitting and analysis of generalized linear models, perform inference, and conduct diagnostic checking. Numerous figures and screen shots illustrating computer output are provided, and a related FTP site houses supplementary material, including computer commands and additional data sets. Generalized Linear Models, Second Edition is an excellent book for courses on regression analysis and regression modeling at the upper-undergraduate and graduate level. It also serves as a valuable reference for engineers, scientists, and statisticians who must understand and apply GLMs in their work.

Hierarchical Modeling and Inference in Ecology J. Andrew Royle 2008-10-15 A guide to data collection, modeling and inference strategies for biological survey data using Bayesian and classical statistical methods. This book describes a general and flexible framework for modeling and inference in ecological systems based on hierarchical models, with a strict focus on the use of probability models and parametric inference. Hierarchical models represent a paradigm shift in the application of statistics to ecological inference problems because they combine explicit models of ecological system structure or dynamics with models of how ecological systems are observed. The principles of hierarchical modeling are developed and applied to problems in population, metapopulation, community, and metacommunity systems. The book provides the first synthetic treatment of many recent methodological advances in ecological modeling and unifies disparate methods and procedures. The authors apply principles of hierarchical modeling to ecological problems, including * occurrence or occupancy models for estimating species distribution * abundance models based on many sampling protocols, including distance sampling * capture-recapture models with individual effects * spatial capture-recapture models based on camera trapping and related methods * population and metapopulation dynamic models * models of biodiversity, community structure and dynamics * Wide variety of examples involving many taxa (birds, amphibians, mammals, insects, plants) * Development of classical, likelihood-based procedures for inference, as well as Bayesian methods of analysis * Detailed explanations describing the implementation of hierarchical models using freely available software such as R and WinBUGS * Computing support in technical appendices in an online companion web site

Log-Linear Models Ronald Christensen 2013-12-14 This book examines log-linear models for contingency tables. Logistic re gression and logistic discrimination are treated as special cases and gener alized linear models (in the GLIM sense) are also discussed. The book is designed to fill a niche between basic introductory books such as Fienberg (1980) and Everitt (1977) and advanced books such as Bishop, Fienberg, and Holland (1975), Haberman (1974), and Santner and Duffy (1989). It is primarily directed at advanced Masters degree students in Statistics but it can be used at both higher and lower levels. The primary theme of the book is using previous knowledge of analysis of variance and regression to motivate and explicate the use of log-linear models. Of course, both the analogies and the distinctions between the different methods must be kept in mind. The book is written at several levels. A basic introductory course would take material from Chapters I, II (deemphasizing Section II. 4), III, Sec tions IV. 1 through IV. 5 (eliminating the material on graphical models), Section IV. lü, Chapter VII, and Chapter IX. The advanced modeling ma terial at the end of Sections VII. 1, VII. 2, and possibly the material in Section IX. 2 should be deleted in a basic introductory course. For Mas ters degree students in Statistics, all the material in Chapters I through V, VII, IX, and X should be accessible. For an applied Ph. D.

Regression Analysis with R Giuseppe Ciaburro 2018-01-31 Build effective regression models in R to extract valuable insights from real data Key Features Implement different regression analysis techniques to solve common problems in data science - from data exploration to dealing with missing values From Simple Linear Regression to Logistic Regression - this book covers all regression techniques and their implementation in R A complete guide to building effective regression models in R and interpreting results from them to make valuable predictions Book Description Regression analysis is a statistical process which enables prediction of relationships between variables. The predictions are based on the casual effect of one variable upon another. Regression techniques for modeling and analyzing are employed on large set of data in order to reveal hidden relationship among the variables. This book will give you a rundown explaining what regression analysis is, explaining you the process from scratch. The first few chapters give an understanding of what the different types of learning are – supervised and unsupervised, how these learnings differ from each other. We then move to covering the supervised learning in details covering the various aspects of regression analysis. The outline of chapters are arranged in a way that gives a feel of all the steps covered in a data science process – loading the training dataset, handling missing values, EDA on the dataset, transformations and feature engineering, model building, assessing the model fitting and performance, and finally making predictions on unseen datasets. Each chapter starts with explaining the theoretical concepts and once the reader gets comfortable with the theory, we move to the practical examples to support the understanding. The practical examples are illustrated using R code including the different packages in R such as R Stats, Caret and so on. Each chapter is a mix of theory and practical examples. By the end of this book you will know all the concepts and pain-points related to regression analysis, and you will be able to implement your learning in your projects. What you will learn Get started with the journey of data science using Simple linear regression Deal with interaction, collinearity and other problems using multiple linear regression Understand diagnostics and what to do if the assumptions fail with proper analysis Load your dataset, treat missing values, and plot relationships with exploratory data analysis Develop a perfect model keeping overfitting, under-fitting, and cross-validation into consideration Deal with classification problems by applying Logistic regression Explore other regression techniques – Decision trees, Bagging, and Boosting techniques Learn by getting it all in action with the help of a real world case study Who this book is for This book is intended for budding data scientists and data analysts who want to implement regression analysis techniques using R. If you are interested in statistics, data science, machine learning and wants to get an easy introduction to the topic, then this book is what you need! Basic understanding of statistics and math will help you to get the most out of the book. Some programming experience with R will also be helpful

An Introduction to Generalized Linear Models Annette J. Dobson 2002 Generalized linear models provide a unified theoretical and conceptual framework for many of the most commonly used statistical methods. In the ten years since publication of the first edition of this bestselling text, great strides have been made in the development of new methods and in software for generalized linear models and other closely related models.Thoroughly revised and updated, An Introduction to Generalized Linear Models, Second Edition continues to initiate intermediate students of statistics, and the many other disciplines that use statistics, in the practical use of these models and methods. The new edition incorporates many of the important developments of the last decade, including survival analysis, nominal and ordinal logistic regression, generalized estimating equations, and multi-level models. It also includes modern methods for checking model adequacy and examples from an even wider range of application. Statistics can appear to the uninitiated as a collection of unrelated tools. An Introduction to Generalized Linear Models, Second Edition illustrates how these apparently disparate methods are examples or special cases of a conceptually simple structure based on the exponential family of distribution, maximum likelihood estimation, and the principles of statistical modelling.

Linear Models in Statistics Alvin C. Rencher 2008-01-18 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.

Practical Guide to Logistic Regression Joseph M. Hilbe 2016-04-05 Practical Guide to Logistic Regression covers the key points of the basic logistic regression model and illustrates how to use it properly to model a binary response variable. This powerful methodology can be used to analyze data from various fields, including medical and health outcomes research, business analytics and data science, ecology, fisheries, astronomy, transportation, insurance, economics, recreation, and sports. By harnessing the capabilities of the logistic model, analysts can better understand their data, make appropriate predictions and classifications, and determine the odds of one value of a predictor compared to another. Drawing on his many years of teaching logistic regression, using logistic-based models in research, and writing about the subject, Professor Hilbe focuses on the most important features of the logistic model. Serving as a guide between the author and readers, the book explains how to construct a logistic model, interpret coefficients and odds ratios, predict probabilities and their standard errors based on the model, and evaluate the model as to its fit. Using a variety of real data examples, mostly from health outcomes, the author offers a basic step-by-step guide to developing and interpreting observation and grouped logistic models as well as penalized and exact logistic regression. He also gives a step-by-step guide to modeling Bayesian logistic regression. R statistical software is used throughout the book to display the statistical models while SAS and Stata codes for all examples are included at the end of each chapter. The example code can be adapted to readers' own analyses. All the code is available on the author's website.

Regression Modeling Strategies Frank E. Harrell 2013-03-09 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. It includes imputation methods for dealing with missing data 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 on inference to achieve "safe data mining".

Generalized Linear Models and Extensions, Second Edition James W. Hardin 2007 Deftly balancing theory and application, this book stands out in its coverage of the derivation of the GLM families and their foremost links. This edition has new sections on discrete response models, including zero-truncated, zero-inflated, censored, and hurdle count models, as well as heterogeneous negative binomial, and more.

Plane Answers to Complex Questions Ronald Christensen 2020-03-13 This textbook provides a wide-ranging introduction to the use and theory of linear models for analyzing data. The author's emphasis is on providing a unified treatment of linear models, including analysis of variance models and regression models, based on projections, orthogonality, and other vector space ideas. Every chapter comes with numerous exercises and examples that make it ideal for a graduate-level course. All of the standard topics are covered in depth: estimation including biased and Bayesian estimation, significance testing, ANOVA, multiple comparisons, regression analysis, and experimental design models. In addition, the book covers topics that are not usually treated at this level, but which are important in their own right: best linear and best linear unbiased prediction, split plot models, balanced incomplete block designs, testing for lack of fit, testing for independence, models with singular covariance matrices, diagnostics, collinearity, and variable selection. This new edition includes new sections on alternatives to least squares estimation and the variance-bias tradeoff, expanded discussion of variable selection, new material on characterizing the interaction space in an unbalanced two-way ANOVA, Freedman's critique of the sandwich estimator, and much more.

Log-Linear Models and Logistic Regression Ronald Christensen 2013-03-08 The primary focus here is on log-linear models for contingency tables, but in this second edition, greater emphasis has been placed on logistic regression. The book explores topics such as logistic discrimination and generalised linear models, and builds upon the relationships between these basic models for continuous data and the analogous log-linear and logistic regression models for discrete data. It also carefully examines the differences in model interpretations and evaluations that occur due to the discrete nature of the data. Sample commands are given for analyses in SAS, BMFP, and GLIM, while numerous data sets from fields as diverse as engineering, education, sociology, and medicine are used to illustrate procedures and provide exercises. Throughout the book, the treatment is designed for students with prior knowledge of analysis of variance and regression.

Advanced Linear Modeling Ronald Christensen 2019-12-20 This book introduces several topics related to linear model theory, including: multivariate linear models, discriminant analysis, principal components, factor analysis, time series in both the frequency and time domains, and spatial data analysis. This second edition adds new material on nonparametric regression, response surface maximization, and longitudinal models. The book provides a unified approach to these disparate subjects and serves as a self-contained companion volume to the author's Plane Answers to Complex Questions: The Theory of Linear Models. Ronald Christensen is Professor of Statistics at the University of New Mexico. He is well known for his work on the theory and application of linear models having linear structure.

Applied Logistic Regression Analysis Scott Menard 2002 The focus in this Second Edition is again on logistic regression models for individual level data, but aggregate or grouped data are also considered. The book includes detailed discussions of goodness of fit, indices of predictive efficiency, and standardized logistic regression coefficients, and examples using SAS and SPSS are included. More detailed consideration of grouped as opposed to case-wise data throughout the book Updated discussion of the properties and appropriate use of goodness of fit measures, R-square analogues, and indices of predictive efficiency Discussion of the misuse of odds ratios to represent risk ratios, and of over-dispersion and under-dispersion for grouped data Updated coverage of unordered and ordered polytomous logistic regression models.

Applying Generalized Linear Models James K. Lindsey 2008-01-15 This book describes how generalised linear modelling procedures can be used in many different fields, without becoming entangled in problems of statistical inference. The author shows the unity of many of the commonly used models and provides readers with a taste of many different areas, such as survival models, time series, and spatial analysis, and of their unity. As such, this book will appeal to applied statisticians and to scientists having a basic grounding in modern statistics. With many exercises at the end of each chapter, it will equally constitute an excellent text for teaching applied statistics students and non-statistics majors. The reader is assumed to have knowledge of basic statistical principles, whether from a Bayesian, frequentist, or direct likelihood point of view, being familiar at least with the analysis of the simpler normal linear models, regression and ANOVA.

An Introduction to Generalized Linear Models Annette J. Dobson 2018-04-17 An Introduction to Generalized Linear Models, Fourth Edition provides a cohesive framework for statistical modelling, with an emphasis on numerical and graphical methods. This new edition of a bestseller has been updated with new sections on non-linear associations, strategies for model selection, and a Postface on good statistical practice. Like its predecessor, this edition presents the theoretical background of generalized linear models (GLMs) before focusing on methods for analyzing particular kinds of data. It covers Normal, Poisson, and Binomial distributions; linear regression models; classical estimation and model fitting methods; and frequentist methods of statistical inference. After forming this foundation, the authors explore multiple linear regression, analysis of variance (ANOVA), logistic regression, log-linear models, survival analysis, multilevel modeling, Bayesian models, and Markov chain Monte Carlo (MCMC) methods. Introduces GLMs in a way that enables readers to understand the unifying structure that underpins them Discusses common concepts and principles of advanced GLMs, including nominal and ordinal regression, survival analysis, non-linear associations and longitudinal analysis Connects Bayesian analysis and MCMC methods to fit GLMs Contains numerous examples from business, medicine, engineering, and the social sciences Provides the example code for R, Stata, and WinBUGS to encourage implementation of the methods Offers the data sets and solutions to the exercises online Describes the components of good statistical practice to improve scientific validity and reproducibility of results. Using popular statistical software programs, this concise and accessible text illustrates practical approaches to estimation, model fitting, and model comparisons.

Log-Linear Models for Event Histories Jeroen K. Vermunt 1997-05-13 Event history analysisùa method for explaining why some people are more likely to experience a particular event, transition, or change than other peopleùhas been useful in the social sciences for studying the processes of social change. One of the main difficulties, however, in using this technique is that often information is (partially) missing on some of the relevant variables. Author Jeroen K. Vermunt presents a general approach to these missing data problems in event history analysis that is based on the similarities between log-linear, hazard, and event history models. The book begins with a discussion of log-linear, log-rate, and modified path models and methods for obtaining maximum likelihood estimates of the parameters of these models. Vermunt then shows how to incorporate variables with missing information in log-linear models for non-response. In addition, he covers such topics as the main types of hazard models; censoring; the use of time-varying covariates; models for competing risks; multivariate hazard models; and a general approach for dealing with missing data problems, including unobserved heterogeneity, measurement error in the dependent variable, measurement error in the covariate, partially missing information on the dependent variable, and partially observed covariate values.

Probability and Bayesian Modeling Jim Albert 2019-12-19 Probability and Bayesian Modeling is an introduction to probability and Bayesian thinking for undergraduate students with a calculus background. The first part of the book provides a broad view of probability including foundations, conditional probability, discrete and continuous distributions, and joint distributions. Statistical inference is presented completely from a Bayesian perspective. The text introduces inference and prediction for a single proportion and a single mean from Normal sampling. After fundamentals of Markov Chain Monte Carlo algorithms are introduced, Bayesian inference is described for hierarchical and regression models including logistic regression. The book presents several case studies motivated by some historical Bayesian studies and the authors' research. This text reflects modern Bayesian statistical practice. Simulation is introduced in all the probability chapters and extensively used in the Bayesian material to simulate from the posterior and predictive distributions. One chapter describes the basic tenets of Metropolis and Gibbs sampling algorithms; however several chapters introduce the fundamentals of Bayesian inference for conjugate priors to deepen understanding. Strategies for constructing prior distributions are described in situations when one has substantial prior information and for cases where one has weak prior knowledge. One chapter introduces hierarchical Bayesian modeling as a practical way of combining data from different groups. There is an extensive discussion of Bayesian regression models including the construction of informative priors, inference about functions of the parameters of interest, prediction, and model selection. The text uses JAGS (Just Another Gibbs Sampler) as a general-purpose computational method for simulating from posterior distributions for a variety of Bayesian models. An R package ProbBayes is available containing all of the book datasets and special functions for illustrating concepts from the book.