

Computational Statistics Handbook With Matlab Second Edition Chapman Hallrc Computer Science Data Analysis

Exploratory data analysis (EDA) was conceived at a time when computers were not widely used, and thus computational ability was rather limited. As computational sophistication has increased, EDA has become an even more powerful process for visualizing and summarizing data before making model assumptions to generate hypotheses, encompassing larger a The purpose of this handbook is to allow users to learn and master the mathematics software package MATLAB®, as well as to serve as a quick reference to some of the most used instructions in the package. A unique feature of this handbook is that it can be used by the novice and by experienced users alike. For experienced users, it has four chapters with examples and applications in engineering, finance, physics, and optimization. Exercises are included, along with solutions available for the interested reader on the book's web page. These exercises are a complement for the interested reader who wishes to get a deeper understanding of MATLAB. Features Covers both MATLAB and introduction to Simulink Covers the use of GUIs in MATLAB and Simulink Offers downloadable examples and programs from the handbook's website Provides an introduction to object oriented programming using MATLAB Includes applications from many areas Includes the realization of executable files for MATLAB programs and Simulink models

This volume focuses on the highly debated topic of theatrical translation, one brought on by a renewed interest in the idea of performance and translation as a cooperative effort on the part of the translator, the director, and the actors. Exploring the role and function of the translator as co-subject of the performance, it addresses current issues concerning the role of the translator for the stage, as opposed to the one for the editorial market, within a multifarious cultural context. The current debate has shown a growing tendency to downplay and challenge the notion of translational accuracy in favor of a recreational and post-dramatic attitude, underlying the role of the director and playwright instead. This book discusses the delicate balance between translating and directing from an intercultural, semiotic, aesthetic, and interlingual perspective, taking a critical stance on approaches that belittle translation for the theatre or equate it to an editorial practice focused on literality. Chapters emphasize the idea of dramatic translation as a particular and extremely challenging type of performance, while consistently exploring its various textual, intertextual, intertranslational, contextual, cultural, and intercultural facets. The notion of performance is applied to textual interpretation as performance, interlingual versus intersemiotic performance, and (inter)cultural performance in the adaptation of translated texts for the stage, providing a wide-ranging discussion from an international group of contributors, directors, and translators.

This textbook on statistical modeling and statistical inference will assist advanced undergraduate and graduate students. Statistical Modeling and Computation provides a unique introduction to modern Statistics from both classical and Bayesian perspectives. It also offers an integrated treatment of Mathematical Statistics and modern statistical computation, emphasizing statistical modeling, computational techniques, and applications. Each of the three parts will cover topics essential to university courses. Part I covers the fundamentals of probability theory. In Part II, the authors introduce a wide variety of classical models that include, among others, linear regression and ANOVA models. In Part III, the authors address the statistical analysis and computation of various advanced models, such as generalized linear, state-space and Gaussian models. Particular attention is paid to fast Monte Carlo techniques for Bayesian inference on these models. Throughout the book the authors include a large number of illustrative examples and solved problems. The book also features a section with solutions, an appendix that serves as a MATLAB primer, and a mathematical supplement.?

With the ubiquitous use of digital imaging, a new profession has emerged: imaging engineering. Designed for newcomers to imaging science and engineering, Theoretical Foundations of Digital Imaging Using MATLAB treats the theory of digital imaging as a specific branch of science. It covers the subject in its entirety, from image formation to image p

The First Book to Explain How a User of R or MATLAB Can Benefit from the Other In today's increasingly interdisciplinary world, R and MATLAB® users from different backgrounds must often work together and share code. R and MATLAB® is designed for users who already know R or MATLAB and now need to learn the other platform. The book makes the transition from one platform to the other as quick and painless as possible. Enables R and MATLAB Users to Easily Collaborate and Share Code The author covers essential tasks, such as working with matrices and vectors, writing functions and other programming concepts, graphics, numerical computing, and file input/output. He highlights important differences between the two platforms and explores common mistakes that are easy to make when transitioning from one platform to the other.

Fulfilling the need for a practical user's guide, Statistics in MATLAB: A Primer provides an accessible introduction to the latest version of MATLAB and its extensive functionality for statistics. Assuming a basic knowledge of statistics and probability as well as a fundamental understanding of linear algebra concepts, this book:Covers capabilities

Student-Friendly Coverage of Probability, Statistical Methods, Simulation, and Modeling ToolsIncorporating feedback from instructors and researchers who used the previous edition, Probability and Statistics for Computer Scientists, Second Edition helps students understand general methods of stochastic modeling, simulation, and data analysis; make o

Publisher Description

Computational inference is based on an approach to statistical methods that uses modern computational power to simulate distributional properties of estimators and test statistics. This book describes computationally intensive statistical methods in a unified presentation, emphasizing techniques, such as the PDF decomposition, that arise in a wide range of methods.

Praise for the Second Edition: "The authors present an intuitive and easy-to-read book. ... accompanied by many examples, proposed exercises, good references, and comprehensive appendices that initiate the reader unfamiliar with MATLAB." —Adolfo Alvarez Pinto, International Statistical Review "Practitioners of EDA who use MATLAB will want a copy of this book. ... The authors have done a great service by bringing together so many EDA routines, but their main accomplishment in this dynamic text is providing the understanding and tools to do EDA. —David A Huckaby, MAA Reviews Exploratory Data Analysis (EDA) is an important part of the data analysis process. The methods presented in this text are ones that should be in the toolkit of every data scientist. As computational sophistication has increased and data sets have grown in size and complexity, EDA has become an even more important process for visualizing and summarizing data before making assumptions to generate hypotheses and models. Exploratory Data Analysis with MATLAB, Third Edition presents EDA methods from a computational perspective and uses

numerous examples and applications to show how the methods are used in practice. The authors use MATLAB code, pseudo-code, and algorithm descriptions to illustrate the concepts. The MATLAB code for examples, data sets, and the EDA Toolbox are available for download on the book's website. New to the Third Edition Random projections and estimating local intrinsic dimensionality Deep learning autoencoders and stochastic neighbor embedding Minimum spanning tree and additional cluster validity indices Kernel density estimation Plots for visualizing data distributions, such as beanplots and violin plots A chapter on visualizing categorical data

The Handbook of Computational Statistics - Concepts and Methods (second edition) is a revision of the first edition published in 2004, and contains additional comments and updated information on the existing chapters, as well as three new chapters addressing recent work in the field of computational statistics. This new edition is divided into 4 parts in the same way as the first edition. It begins with "How Computational Statistics became the backbone of modern data science" (Ch.1): an overview of the field of Computational Statistics, how it emerged as a separate discipline, and how its own development mirrored that of hardware and software, including a discussion of current active research. The second part (Chs. 2 - 15) presents several topics in the supporting field of statistical computing. Emphasis is placed on the need for fast and accurate numerical algorithms, and some of the basic methodologies for transformation, database handling, high-dimensional data and graphics treatment are discussed. The third part (Chs. 16 - 33) focuses on statistical methodology. Special attention is given to smoothing, iterative procedures, simulation and visualization of multivariate data. Lastly, a set of selected applications (Chs. 34 - 38) like Bioinformatics, Medical Imaging, Finance, Econometrics and Network Intrusion Detection highlight the usefulness of computational statistics in real-world applications.

Computational Statistics Handbook with MATLABCRC Press

This book is intended for use in advanced graduate courses in statistics / machine learning, as well as for all experimental neuroscientists seeking to understand statistical methods at a deeper level, and theoretical neuroscientists with a limited background in statistics. It reviews almost all areas of applied statistics, from basic statistical estimation and test theory, linear and nonlinear approaches for regression and classification, to model selection and methods for dimensionality reduction, density estimation and unsupervised clustering. Its focus, however, is linear and nonlinear time series analysis from a dynamical systems perspective, based on which it aims to convey an understanding also of the dynamical mechanisms that could have generated observed time series. Further, it integrates computational modeling of behavioral and neural dynamics with statistical estimation and hypothesis testing. This way computational models in neuroscience are not only explanatory frameworks, but become powerful, quantitative data-analytical tools in themselves that enable researchers to look beyond the data surface and unravel underlying mechanisms. Interactive examples of most methods are provided through a package of MatLab routines, encouraging a playful approach to the subject, and providing readers with a better feel for the practical aspects of the methods covered.

"Computational neuroscience is essential for integrating and providing a basis for understanding the myriads of remarkable laboratory data on nervous system functions. Daniel Durstewitz has excellently covered the breadth of computational neuroscience from statistical interpretations of data to biophysically based modeling of the neurobiological sources of those data. His presentation is clear, pedagogically sound, and readily useable by experts and beginners alike. It is a pleasure to recommend this very well crafted discussion to experimental neuroscientists as well as mathematically well versed Physicists. The book acts as a window to the issues, to the questions, and to the tools for finding the answers to interesting inquiries about brains and how they function." Henry D. I. Abarbanel Physics and Scripps Institution of Oceanography, University of California, San Diego "This book delivers a clear and thorough introduction to sophisticated analysis approaches useful in computational neuroscience. The models described and the examples provided will help readers develop critical intuitions into what the methods reveal about data. The overall approach of the book reflects the extensive experience Prof. Durstewitz has developed as a leading practitioner of computational neuroscience." Bruno B. Averbeck

Provides statistical modeling and simulating approaches to address the needs for intrusion detection and protection. Covers topics such as network traffic data, anomaly intrusion detection, and prediction events.

A comprehensive manual on the efficient modeling and analysis of photonic devices through building numerical codes, this book provides graduate students and researchers with the theoretical background and MATLAB programs necessary for them to start their own numerical experiments. Beginning by summarizing topics in optics and electromagnetism, the book discusses optical planar waveguides, linear optical fiber, the propagation of linear pulses, laser diodes, optical amplifiers, optical receivers, finite-difference time-domain method, beam propagation method and some wavelength division devices, solitons, solar cells and metamaterials. Assuming only a basic knowledge of physics and numerical methods, the book is ideal for engineers, physicists and practising scientists. It concentrates on the operating principles of optical devices, as well as the models and numerical methods used to describe them.

Handbook of Computational Econometrics examines the state of the art of computational econometrics and provides exemplary studies dealing with computational issues arising from a wide spectrum of econometric fields including such topics as bootstrapping, the evaluation of econometric software, and algorithms for control, optimization, and estimation. Each topic is fully introduced before proceeding to a more in-depth examination of the relevant methodologies and valuable illustrations. This book: Provides self-contained treatments of issues in computational econometrics with illustrations and invaluable bibliographies. Brings together contributions from leading researchers. Develops the techniques needed to carry out computational econometrics. Features network studies, non-parametric estimation, optimization techniques, Bayesian estimation and inference, testing methods, time-series analysis, linear and nonlinear methods, VAR analysis, bootstrapping developments, signal extraction, software history and evaluation. This book will appeal to econometricians, financial statisticians, econometric researchers and students of econometrics at both graduate and advanced undergraduate levels.

Simultaneous confidence bands enable more intuitive and detailed inference of regression analysis than the standard inferential methods of parameter estimation and hypothesis testing. Simultaneous Inference in Regression provides a thorough overview of the construction methods and applications of simultaneous confidence bands for various inferentia

As with the bestselling first edition, Computational Statistics Handbook with MATLAB, Second Edition covers some of the most commonly used contemporary techniques in computational statistics. With a strong, practical focus on implementing the methods, the authors include algorithmic descriptions of the procedures as well as

This comprehensive resource provides readers with the tools necessary to perform analysis of various waveforms for use in radar

systems. It provides information about how to produce synthetic aperture (SAR) images by giving a tomographic formulation and implementation for SAR imaging. Tracking filter fundamentals, and each parameter associated with the filter and how each affects tracking performance are also presented. Various radar cross section measurement techniques are covered, along with waveform selection analysis through the study of the ambiguity function for each particular waveform from simple linear frequency modulation (LFM) waveforms to more complicated coded waveforms. The text includes the Python tool suite, which allows the reader to analyze and predict radar performance for various scenarios and applications. Also provided are MATLAB® scripts corresponding to the Python tools. The software includes a user-friendly graphical user interface (GUI) that provides visualizations of the concepts being covered. Users have full access to both the Python and MATLAB source code to modify for their application. With examples using the tool suite are given at the end of each chapter, this text gives readers a clear understanding of how important target scattering is in areas of target detection, target tracking, pulse integration, and target discrimination.

Due to the scale and complexity of data sets currently being collected in areas such as health, transportation, environmental science, engineering, information technology, business and finance, modern quantitative analysts are seeking improved and appropriate computational and statistical methods to explore, model and draw inferences from big data. This book aims to introduce suitable approaches for such endeavours, providing applications and case studies for the purpose of demonstration. Computational and Statistical Methods for Analysing Big Data with Applications starts with an overview of the era of big data. It then goes on to explain the computational and statistical methods which have been commonly applied in the big data revolution. For each of these methods, an example is provided as a guide to its application. Five case studies are presented next, focusing on computer vision with massive training data, spatial data analysis, advanced experimental design methods for big data, big data in clinical medicine, and analysing data collected from mobile devices, respectively. The book concludes with some final thoughts and suggested areas for future research in big data. Advanced computational and statistical methodologies for analysing big data are developed. Experimental design methodologies are described and implemented to make the analysis of big data more computationally tractable. Case studies are discussed to demonstrate the implementation of the developed methods. Five high-impact areas of application are studied: computer vision, geosciences, commerce, healthcare and transportation. Computing code/programs are provided where appropriate.

An elementary first course for students in mathematics and engineering. Practical in approach: examples of code are provided for students to debug, and tasks – with full solutions – are provided at the end of each chapter. Includes a glossary of useful terms, with each term supported by an example of the syntaxes commonly encountered.

This much-needed work presents, among other things, the relevant aspects of the theory of matrix algebra for applications in statistics. Written in an informal style, it addresses computational issues and places more emphasis on applications than existing texts.

This beginning graduate textbook teaches data science and machine learning methods for modeling, prediction, and control of complex systems.

Approaching computational statistics through its theoretical aspects can be daunting. Often intimidated or distracted by the theory, researchers and students can lose sight of the actual goals and applications of the subject. What they need are its key concepts, an understanding of its methods, experience with its implementation, and practice with

While there are many books on advanced control for specialists, there are few that present these topics for nonspecialists. Assuming only a basic knowledge of automatic control and signals and systems, Optimal and Robust Control: Advanced Topics with MATLAB® offers a straightforward, self-contained handbook of advanced topics and tools in automatic control. Techniques for Controlling System Performance in the Presence of Uncertainty. The book deals with advanced automatic control techniques, paying particular attention to robustness—the ability to guarantee stability in the presence of uncertainty. It explains advanced techniques for handling uncertainty and optimizing the control loop. It also details analytical strategies for obtaining reduced order models. The authors then propose using the Linear Matrix Inequalities (LMI) technique as a unifying tool to solve many types of advanced control problems. Topics covered include: LQR and H-infinity approaches. Kalman and singular value decomposition. Open-loop balancing and reduced order models. Closed-loop balancing. Passive systems and bounded-real systems. Criteria for stability control. This easy-to-read text presents the essential theoretical background and provides numerous examples and MATLAB exercises to help the reader efficiently acquire new skills. Written for electrical, electronic, computer science, space, and automation engineers interested in automatic control, this book can also be used for self-study or for a one-semester course in robust control.

Functional magnetic resonance imaging (fMRI) has become the most popular method for imaging brain function. Handbook of Functional MRI Data Analysis provides a comprehensive and practical introduction to the methods used for fMRI data analysis. Using minimal jargon, this book explains the concepts behind processing fMRI data, focusing on the techniques that are most commonly used in the field. This book provides background about the methods employed by common data analysis packages including FSL, SPM and AFNI. Some of the newest cutting-edge techniques, including pattern classification analysis, connectivity modeling and resting state network analysis, are also discussed. Readers of this book, whether newcomers to the field or experienced researchers, will obtain a deep and effective knowledge of how to employ fMRI analysis to ask scientific questions and become more sophisticated users of fMRI analysis software.

This is a short, focused introduction to MATLAB, a comprehensive software system for mathematical and technical computing. It contains concise explanations of essential MATLAB commands, as well as easily understood instructions for using MATLAB's programming features, graphical capabilities, simulation models, and rich desktop interface. Written for MATLAB 7, it can also be used with earlier (and later) versions of MATLAB. This book teaches how to graph functions, solve equations, manipulate images, and much more. It contains explicit instructions for using MATLAB's companion software, Simulink, which allows graphical models to be built for dynamical systems. MATLAB's new "publish" feature is discussed, which allows mathematical computations to be combined with text and graphics, to produce polished, integrated, interactive documents. For the beginner it explains everything needed to start using MATLAB, while experienced users making the switch to MATLAB 7 from an earlier version will also find much useful information here.

MATLAB. The tremendously popular computation, numerical analysis, signal processing, data analysis, and graphical software package—allows virtually every scientist and engineer to make better and faster progress. As MATLAB's world-wide sales approach a half-million with an estimated four million users, it becomes a near necessity that professionals a

The matrix laboratory interactive computing environment—MATLAB—has brought creativity to research in diverse disciplines, particularly in designing and programming experiments. More commonly used in mathematics and the sciences, it also lends itself to a variety of

applications across the field of psychology. For the novice looking to use it in experimental psychology research, though, becoming familiar with MATLAB can be a daunting task. MATLAB for Psychologists expertly guides readers through the component steps, skills, and operations of the software, with plentiful graphics and examples to match the reader's comfort level. Using an extended illustration, this concise volume explains the program's usefulness at any point in an experiment, without the limits imposed by other types of software. And the authors demonstrate the responsiveness of MATLAB to the individual's research needs, whether the task is programming experiments, creating sensory stimuli, running simulations, or calculating statistics for data analysis. Key features of the coverage: Thinking in a matrix way. Handling and plotting data. Guidelines for improved programming, sound, and imaging. Statistical analysis and signal detection theory indexes. The Graphical User Interface. The Psychophysics Toolbox. MATLAB for Psychologists serves a wide audience of advanced undergraduate and graduate level psychology students, professors, and researchers as well as lab technicians involved in programming psychology experiments.

A comprehensive overview of Monte Carlo simulation that explores the latest topics, techniques, and real-world applications More and more of today's numerical problems found in engineering and finance are solved through Monte Carlo methods. The heightened popularity of these methods and their continuing development makes it important for researchers to have a comprehensive understanding of the Monte Carlo approach. Handbook of Monte Carlo Methods provides the theory, algorithms, and applications that helps provide a thorough understanding of the emerging dynamics of this rapidly-growing field. The authors begin with a discussion of fundamentals such as how to generate random numbers on a computer. Subsequent chapters discuss key Monte Carlo topics and methods, including: Random variable and stochastic process generation Markov chain Monte Carlo, featuring key algorithms such as the Metropolis-Hastings method, the Gibbs sampler, and hit-and-run Discrete-event simulation Techniques for the statistical analysis of simulation data including the delta method, steady-state estimation, and kernel density estimation Variance reduction, including importance sampling, latin hypercube sampling, and conditional Monte Carlo Estimation of derivatives and sensitivity analysis Advanced topics including cross-entropy, rare events, kernel density estimation, quasi Monte Carlo, particle systems, and randomized optimization The presented theoretical concepts are illustrated with worked examples that use MATLAB®, a related Web site houses the MATLAB® code, allowing readers to work hands-on with the material and also features the author's own lecture notes on Monte Carlo methods. Detailed appendices provide background material on probability theory, stochastic processes, and mathematical statistics as well as the key optimization concepts and techniques that are relevant to Monte Carlo simulation. Handbook of Monte Carlo Methods is an excellent reference for applied statisticians and practitioners working in the fields of engineering and finance who use or would like to learn how to use Monte Carlo in their research. It is also a suitable supplement for courses on Monte Carlo methods and computational statistics at the upper-undergraduate and graduate levels.

Foundations of Statistics for Data Scientists: With R and Python is designed as a textbook for a one- or two-term introduction to mathematical statistics for students training to become data scientists. It is an in-depth presentation of the topics in statistical science with which any data scientist should be familiar, including probability distributions, descriptive and inferential statistical methods, and linear modeling. The book assumes knowledge of basic calculus, so the presentation can focus on "why it works" as well as "how to do it." Compared to traditional "mathematical statistics" textbooks, however, the book has less emphasis on probability theory and more emphasis on using software to implement statistical methods and to conduct simulations to illustrate key concepts. All statistical analyses in the book use R software, with an appendix showing the same analyses with Python. The book also introduces modern topics that do not normally appear in mathematical statistics texts but are highly relevant for data scientists, such as Bayesian inference, generalized linear models for non-normal responses (e.g., logistic regression and Poisson loglinear models), and regularized model fitting. The nearly 500 exercises are grouped into "Data Analysis and Applications" and "Methods and Concepts." Appendices introduce R and Python and contain solutions for odd-numbered exercises. The book's website has expanded R, Python, and Matlab appendices and all data sets from the examples and exercises. The high-level language of R is recognized as one of the most powerful and flexible statistical software environments, and is rapidly becoming the standard setting for quantitative analysis, statistics and graphics. R provides free access to unrivalled coverage and cutting-edge applications, enabling the user to apply numerous statistical methods ranging from simple regression to time series or multivariate analysis. Building on the success of the author's bestselling Statistics: An Introduction using R, The R Book is packed with worked examples, providing an all inclusive guide to R, ideal for novice and more accomplished users alike. The book assumes no background in statistics or computing and introduces the advantages of the R environment, detailing its applications in a wide range of disciplines. Provides the first comprehensive reference manual for the R language, including practical guidance and full coverage of the graphics facilities. Introduces all the statistical models covered by R, beginning with simple classical tests such as chi-square and t-test. Proceeds to examine more advance methods, from regression and analysis of variance, through to generalized linear models, generalized mixed models, time series, spatial statistics, multivariate statistics and much more. The R Book is aimed at undergraduates, postgraduates and professionals in science, engineering and medicine. It is also ideal for students and professionals in statistics, economics, geography and the social sciences. Now in its third edition, this classic book is widely considered the leading text on Bayesian methods, lauded for its accessible, practical approach to analyzing data and solving research problems. Bayesian Data Analysis, Third Edition continues to take an applied approach to analysis using up-to-date Bayesian methods. The authors—all leaders in the statistics community—introduce basic concepts from a data-analytic perspective before presenting advanced methods. Throughout the text, numerous worked examples drawn from real applications and research emphasize the use of Bayesian inference in practice. New to the Third Edition Four new chapters on nonparametric modeling Coverage of weakly informative priors and boundary-avoiding priors Updated discussion of cross-validation and predictive information criteria Improved convergence monitoring and effective sample size calculations for iterative simulation Presentations of Hamiltonian Monte Carlo, variational Bayes, and expectation propagation New and revised software code The book can be used in three different ways. For undergraduate students, it introduces Bayesian inference starting from first principles. For graduate students, the text presents effective current approaches to Bayesian modeling and computation in statistics and related fields. For researchers, it provides an assortment of Bayesian methods in applied statistics. Additional materials, including data sets used in the examples, solutions to selected exercises, and software instructions, are available on the book's web page.

Computational Economics: A concise introduction is a comprehensive textbook designed to help students move from the traditional and comparative static analysis of economic models, to a modern and dynamic computational study. The ability to equate an economic problem, to formulate it into a mathematical model and to solve it computationally is becoming a crucial and distinctive competence for most economists. This vital textbook is organized around static and dynamic models, covering both macro and microeconomic topics, exploring the numerical techniques required to solve those models. A key aim of the book is to enable students to develop the ability to modify the models themselves so that, using the MATLAB/Octave codes provided on the book and on the website, students can demonstrate a complete understanding of computational methods. This textbook is innovative, easy to read and highly focused, providing students of economics with the skills needed to understand the essentials of using numerical methods to solve economic problems. It also provides more technical readers with an easy way to cope with economics through modelling and simulation. Later in the book, more elaborate economic models and advanced numerical methods are introduced which will prove valuable to those in more advanced study. This book is ideal for all students of economics, mathematics, computer science and engineering taking classes on Computational or Numerical Economics.

Describes most popular computational methods used to solve problems in electromagnetics Matlab code is included throughout, so that the

