

# Introduction To The Theory And Application Of Data

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*Multimedia Data Mining* - Zhongfei Zhang 2008-12-02

Collecting the latest developments in the field, *Multimedia Data Mining: A Systematic Introduction to Concepts and Theory* defines multimedia data mining, its theory, and its applications. Two of the most active researchers in multimedia data mining explore how this young area has rapidly developed in recent years. The book first discusses the theoretical foundations of multimedia data mining, presenting commonly used feature representation, knowledge representation, statistical learning, and soft computing techniques. It then provides application examples that showcase the great potential of multimedia data mining technologies. In this part, the authors show how to develop a semantic repository training method and a concept discovery method in an imagery database. They demonstrate how knowledge discovery helps achieve the goal of imagery annotation. The authors also describe an effective solution to large-scale video search, along with an application of audio data classification and categorization. This novel, self-contained book examines how the merging of multimedia and data mining research can promote the understanding and advance the development of knowledge discovery in multimedia data.

*Bayesian Data Analysis, Third Edition* - Andrew Gelman 2013-11-27

Winner of the 2016 De Groot Prize from the International Society for Bayesian Analysis 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.

**Introduction To Linear Algebra** - Mark J. DeBonis 2022-02-23

*Introduction to Linear Algebra: Computation, Application, and Theory* is designed for students who have never been exposed to the topics in a linear algebra course. The text is filled with interesting and diverse application sections but is also a theoretical text which aims to train students to do succinct computation in a knowledgeable way. After completing the course with this text, the student will not only know the best and shortest way to do linear algebraic computations but will also know why such computations are both effective and successful. Features: Includes cutting

edge applications in machine learning and data analytics Suitable as a primary text for undergraduates studying linear algebra Requires very little in the way of pre-requisites

**Statistical Methods for Survival Data Analysis** - Elisa T. Lee 2013-09-23

Praise for the Third Edition “. . . an easy-to read introduction to survival analysis which covers the major concepts and techniques of the subject.” —*Statistics in Medical Research* Updated and expanded to reflect the latest developments, *Statistical Methods for Survival Data Analysis, Fourth Edition* continues to deliver a comprehensive introduction to the most commonly-used methods for analyzing survival data. Authored by a uniquely well-qualified author team, the Fourth Edition is a critically acclaimed guide to statistical methods with applications in clinical trials, epidemiology, areas of business, and the social sciences. The book features many real-world examples to illustrate applications within these various fields, although special consideration is given to the study of survival data in biomedical sciences. Emphasizing the latest research and providing the most up-to-date information regarding software applications in the field, *Statistical Methods for Survival Data Analysis, Fourth Edition* also includes: Marginal and random effect models for analyzing correlated censored or uncensored data Multiple types of two-sample and K-sample comparison analysis Updated treatment of parametric methods for regression model fitting with a new focus on accelerated failure time models Expanded coverage of the Cox proportional hazards model Exercises at the end of each chapter to deepen knowledge of the presented material *Statistical Methods for Survival Data Analysis* is an ideal text for upper-undergraduate and graduate-level courses on survival data analysis. The book is also an excellent resource for biomedical investigators, statisticians, and epidemiologists, as well as researchers in every field in which the analysis of survival data plays a role.

**An Introduction to Social Media Research** - Charmaine Du Plessis 2020-08-28

Social media has become mainstream and offers numerous research opportunities to academics, students and practitioners. *An Introduction to Social Media Research: Theory and Application* is an essential new resource on how to conduct social media research in a scientific manner. This book will equip social media researchers, students and practitioners across various fields with the necessary knowledge to conduct social media research in a scientific and systematic manner. Key Features/benefits: Follows a logical sequence in the social media research process; Includes easy to understand aspects not considered in this much depth in other books, for example, social media theories, data collection and analysis techniques, as well as sampling methods for quantitative, qualitative and mixed methods research; Covers aspects of ethics, validity and reliability related to social media research How to features: Using various tools e.g. data cleaning and collection tools; data analysis and reporting tools; using various sampling methods and approaches; using media analytics and data mining; using different software, social media tools and applications to extract data for research; Local case studies; Best practice examples; Templates and sample documents

*An Introduction to Analysis of Financial Data with R* - Ruey S. Tsay 2014-08-21

A complete set of statistical tools for beginning financial analysts from a leading authority Written by one of the leading experts on the topic, *An Introduction to Analysis of Financial Data with R*

explores basic concepts of visualization of financial data. Through a fundamental balance between theory and applications, the book supplies readers with an accessible approach to financial econometric models and their applications to real-world empirical research. The author supplies a hands-on introduction to the analysis of financial data using the freely available R software package and case studies to illustrate actual implementations of the discussed methods. The book begins with the basics of financial data, discussing their summary statistics and related visualization methods. Subsequent chapters explore basic time series analysis and simple econometric models for business, finance, and economics as well as related topics including: Linear time series analysis, with coverage of exponential smoothing for forecasting and methods for model comparison Different approaches to calculating asset volatility and various volatility models High-frequency financial data and simple models for price changes, trading intensity, and realized volatility Quantitative methods for risk management, including value at risk and conditional value at risk Econometric and statistical methods for risk assessment based on extreme value theory and quantile regression Throughout the book, the visual nature of the topic is showcased through graphical representations in R, and two detailed case studies demonstrate the relevance of statistics in finance. A related website features additional data sets and R scripts so readers can create their own simulations and test their comprehension of the presented techniques. An Introduction to Analysis of Financial Data with R is an excellent book for introductory courses on time series and business statistics at the upper-undergraduate and graduate level. The book is also an excellent resource for researchers and practitioners in the fields of business, finance, and economics who would like to enhance their understanding of financial data and today's financial markets.

#### **Advanced Data Structures** - Suman Saha 2019-06-28

Advanced data structures is a core course in Computer Science which most graduate program in Computer Science, Computer Science and Engineering, and other allied engineering disciplines, offer during the first year or first semester of the curriculum. The objective of this course is to enable students to have the much-needed foundation for advanced technical skill, leading to better problem-solving in their respective disciplines. Although the course is running in almost all the technical universities for decades, major changes in the syllabus have been observed due to the recent paradigm shift of computation which is more focused on huge data and internet-based technologies. Majority of the institute has been redefined their course content of advanced data structure to fit the current need and course material heavily relies on research papers because of nonavailability of the redefined text book advanced data structure. To the best of our knowledge well-known textbook on advanced data structure provides only partial coverage of the syllabus. The book offers comprehensive coverage of the most essential topics, including: Part I details advancements on basic data structures, viz., cuckoo hashing, skip list, tango tree and Fibonacci heaps and index files. Part II details data structures of different evolving data domains like special data structures, temporal data structures, external memory data structures, distributed and streaming data structures. Part III elucidates the applications of these data structures on different areas of computer science viz, network, www, DBMS, cryptography, graphics to name a few. The concepts and techniques behind each data structure and their applications have been explained. Every chapter includes a variety of Illustrative Problems pertaining to the data structure(s) detailed, a summary of the technical content of the chapter and a list of Review Questions, to reinforce the comprehension of the concepts. The book could be used both as an introductory or an advanced-level textbook for the advanced undergraduate, graduate and research programmes which offer advanced data structures as a core or an elective course. While the book is primarily meant to serve as a course material for use in the classroom, it could be used as a starting point for the beginner researcher of a specific domain.

#### **Data Management: a gentle introduction** - Bas van Gils 2020-03-03

The overall objective of this book is to show that data management is an exciting and valuable capability that is worth time and effort. More specifically it aims to achieve the following goals: 1.

To give a “gentle” introduction to the field of DM by explaining and illustrating its core concepts, based on a mix of theory, practical frameworks such as TOGAF, ArchiMate, and DMBOK, as well as results from real-world assignments. 2. To offer guidance on how to build an effective DM capability in an organization. This is illustrated by various use cases, linked to the previously mentioned theoretical exploration as well as the stories of practitioners in the field. The primary target groups are: busy professionals who “are actively involved with managing data”. The book is also aimed at (Bachelor’s/ Master’s) students with an interest in data management. The book is industry-agnostic and should be applicable in different industries such as government, finance, telecommunications etc. Typical roles for which this book is intended: data governance office/ council, data owners, data stewards, people involved with data governance (data governance board), enterprise architects, data architects, process managers, business analysts and IT analysts. The book is divided into three main parts: theory, practice, and closing remarks. Furthermore, the chapters are as short and to the point as possible and also make a clear distinction between the main text and the examples. If the reader is already familiar with the topic of a chapter, he/she can easily skip it and move on to the next.

*Introduction to Optical Data Processing* - University of Michigan. Engineering Summer Conferences 1966

#### **Radar Data Processing With Applications** - He You 2016-10-24

Radar Data Processing with Applications Radar Data Processing with Applications He You, Xiu Jianjuan, Guan Xin, Naval Aeronautical and Astronautical University, China A summary of thirty years’ worth of research, this book is a systematic introduction to the theory, development, and latest research results of radar data processing technology. Highlights of the book include sections on data pre-processing technology, track initiation, and data association. Readers are also introduced to maneuvering target tracking, multiple target tracking termination, and track management theory. In order to improve data analysis, the authors have also included group tracking registration algorithms and a performance evaluation of radar data processing. Presents both classical theory and development methods of radar data processing Provides state-of-the-art research results, including data processing for modern radars and tracking performance evaluation theory Includes coverage of performance evaluation, registration algorithm for radar networks, data processing of passive radar, pulse Doppler radar, and phased array radar Features applications for those engaged in information engineering, radar engineering, electronic countermeasures, infrared techniques, sonar techniques, and military command Radar Data Processing with Applications is a handy guide for engineers and industry professionals specializing in the development of radar equipment and data processing. It is also intended as a reference text for electrical engineering graduate students and researchers specializing in signal processing and radars.

#### **Handbook of Statistical Analysis and Data Mining Applications** - Robert Nisbet 2017-11-09

Handbook of Statistical Analysis and Data Mining Applications, Second Edition, is a comprehensive professional reference book that guides business analysts, scientists, engineers and researchers, both academic and industrial, through all stages of data analysis, model building and implementation. The handbook helps users discern technical and business problems, understand the strengths and weaknesses of modern data mining algorithms and employ the right statistical methods for practical application. This book is an ideal reference for users who want to address massive and complex datasets with novel statistical approaches and be able to objectively evaluate analyses and solutions. It has clear, intuitive explanations of the principles and tools for solving problems using modern analytic techniques and discusses their application to real problems in ways accessible and beneficial to practitioners across several areas—from science and engineering, to medicine, academia and commerce. Includes input by practitioners for practitioners Includes tutorials in numerous fields of study that provide step-by-step instruction on how to use supplied tools to build models Contains practical advice from successful real-world

implementations Brings together, in a single resource, all the information a beginner needs to understand the tools and issues in data mining to build successful data mining solutions Features clear, intuitive explanations of novel analytical tools and techniques, and their practical applications

Understanding Advanced Statistical Methods - Peter Westfall 2013-04-09

Providing a much-needed bridge between elementary statistics courses and advanced research methods courses, *Understanding Advanced Statistical Methods* helps students grasp the fundamental assumptions and machinery behind sophisticated statistical topics, such as logistic regression, maximum likelihood, bootstrapping, nonparametrics, and Bayesian methods. The book teaches students how to properly model, think critically, and design their own studies to avoid common errors. It leads them to think differently not only about math and statistics but also about general research and the scientific method. With a focus on statistical models as producers of data, the book enables students to more easily understand the machinery of advanced statistics. It also downplays the "population" interpretation of statistical models and presents Bayesian methods before frequentist ones. Requiring no prior calculus experience, the text employs a "just-in-time" approach that introduces mathematical topics, including calculus, where needed.

Formulas throughout the text are used to explain why calculus and probability are essential in statistical modeling. The authors also intuitively explain the theory and logic behind real data analysis, incorporating a range of application examples from the social, economic, biological, medical, physical, and engineering sciences. Enabling your students to answer the why behind statistical methods, this text teaches them how to successfully draw conclusions when the premises are flawed. It empowers them to use advanced statistical methods with confidence and develop their own statistical recipes. Ancillary materials are available on the book's website.

High-Dimensional Probability - Roman Vershynin 2018-09-27

An integrated package of powerful probabilistic tools and key applications in modern mathematical data science.

**Inverse Modeling** - Gen Nakamura 2015

The book provides a concise introduction into inverse modeling, i.e. the theory and methods of inverse problems and data assimilation. Inverse problems are widely spread today in science and technology, ranging from data analysis and modeling in science to remote sensing in industrial and natural applications as well as medical imaging and non-destructive testing. Further applications come from the data assimilation task, i.e. the use of inverse methods to control dynamical systems and provide initial states for forecasting, which is of central importance in weather and climate science and an emerging technique in neuroscience and medicine.

Applied Theory of Functional Differential Equations - V. Kolmanovskii 2012-12-06

This volume provides an introduction to the properties of functional differential equations and their applications in diverse fields such as immunology, nuclear power generation, heat transfer, signal processing, medicine and economics. In particular, it deals with problems and methods relating to systems having a memory (hereditary systems). The book contains eight chapters. Chapter 1 explains where functional differential equations come from and what sort of problems arise in applications. Chapter 2 gives a broad introduction to the basic principle involved and deals with systems having discrete and distributed delay. Chapters 3-5 are devoted to stability problems for retarded, neutral and stochastic functional differential equations. Problems of optimal control and estimation are considered in Chapters 6-8. For applied mathematicians, engineers, and physicists whose work involves mathematical modeling of hereditary systems. This volume can also be recommended as a supplementary text for graduate students who wish to become better acquainted with the properties and applications of functional differential equations.

Grey Data Analysis - Sifeng Liu 2016-09-01

This book inclusively and systematically presents the fundamental methods, models and techniques of practical application of grey data analysis, bringing together the authors' many years of theoretical exploration, real-life application, and teaching. It also reflects the majority of

recent theoretical and applied advances in the theory achieved by scholars from across the world, providing readers a vivid overall picture of this new theory and its pioneering research activities. The book includes 12 chapters, covering the introduction to grey systems, a novel framework of grey system theory, grey numbers and their operations, sequence operators and grey data mining, grey incidence analysis models, grey clustering evaluation models, series of GM models, combined grey models, techniques for grey systems forecasting, grey models for decision-making, techniques for grey control, etc. It also includes a software package that allows practitioners to conveniently and practically employ the theory and methods presented in this book. All methods and models presented here were chosen for their practical applicability and have been widely employed in various research works. I still remember 1983, when I first participated in a course on Grey System Theory. The mimeographed teaching materials had a blue cover and were presented as a book. It was like finding a treasure: This fascinating book really inspired me as a young intellectual going through a period of confusion and lack of academic direction. It shone with pearls of wisdom and offered a beacon in the mist for a man trying to find his way in academic research. This book became the guiding light in my life journey, inspiring me to forge an indissoluble bond with Grey System Theory. —Sifeng Liu

Theory of Spatial Statistics - M.N.M. van Lieshout 2019-03-19

*Theory of Spatial Statistics: A Concise Introduction* presents the most important models used in spatial statistics, including random fields and point processes, from a rigorous mathematical point of view and shows how to carry out statistical inference. It contains full proofs, real-life examples and theoretical exercises. Solutions to the latter are available in an appendix. Assuming maturity in probability and statistics, these concise lecture notes are self-contained and cover enough material for a semester course. They may also serve as a reference book for researchers. Features \* Presents the mathematical foundations of spatial statistics. \* Contains worked examples from mining, disease mapping, forestry, soil and environmental science, and criminology. \* Gives pointers to the literature to facilitate further study. \* Provides example code in R to encourage the student to experiment. \* Offers exercises and their solutions to test and deepen understanding. The book is suitable for postgraduate and advanced undergraduate students in mathematics and statistics.

Loss Data Analysis - Henryk Gzyl 2018-02-05

This volume deals with two complementary topics. On one hand the book deals with the problem of determining the the probability distribution of a positive compound random variable, a problem which appears in the banking and insurance industries, in many areas of operational research and in reliability problems in the engineering sciences. On the other hand, the methodology proposed to solve such problems, which is based on an application of the maximum entropy method to invert the Laplace transform of the distributions, can be applied to many other problems. The book contains applications to a large variety of problems, including the problem of dependence of the sample data used to estimate empirically the Laplace transform of the random variable. Contents Introduction Frequency models Individual severity models Some detailed examples Some traditional approaches to the aggregation problem Laplace transforms and fractional moment problems The standard maximum entropy method Extensions of the method of maximum entropy Superresolution in maxentropic Laplace transform inversion Sample data dependence Disentangling frequencies and decomposing losses Computations using the maxentropic density Review of statistical procedures

Digital Communications with Emphasis on Data Modems - Richard W. Middlestead 2017-04-03

This book uses a practical approach in the application of theoretical concepts to digital communications in the design of software defined radio modems. This book discusses the design, implementation and performance verification of waveforms and algorithms appropriate for digital data modulation and demodulation in modern communication systems. Using a building-block approach, the author provides an introductory to the advanced understanding of acquisition and data detection using source and executable simulation code to validate the communication

system performance with respect to theory and design specifications. The author focuses on theoretical analysis, algorithm design, firmware and software designs and subsystem and system testing. This book treats system designs with a variety of channel characteristics from very low to optical frequencies. This book offers system analysis and subsystem implementation options for acquisition and data detection appropriate to the channel conditions and system specifications, and provides test methods for demonstrating system performance. This book also: Outlines fundamental system requirements and related analysis that must be established prior to a detailed subsystem design Includes many examples that highlight various analytical solutions and case studies that characterize various system performance measures Discusses various aspects of atmospheric propagation using the spherical 4/3 effective earth radius model Examines ionospheric propagation and uses the Rayleigh fading channel to evaluate link performance using several robust waveform modulations Contains end-of-chapter problems, allowing the reader to further engage with the text Digital Communications with Emphasis on Data Modems is a great resource for communication-system and digital signal processing engineers and students looking for in-depth theory as well as practical implementations.

**Introduction to Information Theory and Data Compression, Second Edition** - D.C. Hankerson 2003-02-26

An effective blend of carefully explained theory and practical applications, this text imparts the fundamentals of both information theory and data compression. Although the two topics are related, this unique text allows either topic to be presented independently, and it was specifically designed so that the data compression section requires no prior knowledge of information theory. The treatment of information theory, while theoretical and abstract, is quite elementary, making this text less daunting than many others. After presenting the fundamental definitions and results of the theory, the authors then apply the theory to memoryless, discrete channels with zeroth-order, one-state sources. The chapters on data compression acquaint students with a myriad of lossless compression methods and then introduce two lossy compression methods. Students emerge from this study competent in a wide range of techniques. The authors' presentation is highly practical but includes some important proofs, either in the text or in the exercises, so instructors can, if they choose, place more emphasis on the mathematics. Introduction to Information Theory and Data Compression, Second Edition is ideally suited for an upper-level or graduate course for students in mathematics, engineering, and computer science. Features: Expanded discussion of the historical and theoretical basis of information theory that builds a firm, intuitive grasp of the subject Reorganization of theoretical results along with new exercises, ranging from the routine to the more difficult, that reinforce students' ability to apply the definitions and results in specific situations. Simplified treatment of the algorithm(s) of Gallager and Knuth Discussion of the information rate of a code and the trade-off between error correction and information rate Treatment of probabilistic finite state source automata, including basic results, examples, references, and exercises Octave and MATLAB image compression codes included in an appendix for use with the exercises and projects involving transform methods Supplementary materials, including software, available for download from the authors' Web site at [www.dms.auburn.edu/compression](http://www.dms.auburn.edu/compression)

*An Introduction to Statistical Learning* - Gareth James 2013-06-24

An Introduction to Statistical Learning provides an accessible overview of the field of statistical learning, an essential toolset for making sense of the vast and complex data sets that have emerged in fields ranging from biology to finance to marketing to astrophysics in the past twenty years. This book presents some of the most important modeling and prediction techniques, along with relevant applications. Topics include linear regression, classification, resampling methods, shrinkage approaches, tree-based methods, support vector machines, clustering, and more. Color graphics and real-world examples are used to illustrate the methods presented. Since the goal of this textbook is to facilitate the use of these statistical learning techniques by practitioners in science, industry, and other fields, each chapter contains a tutorial on implementing the analyses

and methods presented in R, an extremely popular open source statistical software platform. Two of the authors co-wrote The Elements of Statistical Learning (Hastie, Tibshirani and Friedman, 2nd edition 2009), a popular reference book for statistics and machine learning researchers. An Introduction to Statistical Learning covers many of the same topics, but at a level accessible to a much broader audience. This book is targeted at statisticians and non-statisticians alike who wish to use cutting-edge statistical learning techniques to analyze their data. The text assumes only a previous course in linear regression and no knowledge of matrix algebra.

*Data Vedas* - Archish Rai Kapil 2018

Data Vedas provides an introduction on the various aspects of Data Science and their quick implementation in the two most popular programming languages- Python and R. This book is organized in four parts: Basic Statistics, Data Preparation, Modeling and Model Evaluation & Validation with each having two sub-sections: Theory and Application.

*An Introduction to Queueing Theory* - U. Narayan Bhat 2008-07-02

This introductory textbook is designed for a one-semester course on queueing theory that does not require a course in stochastic processes as a prerequisite. By integrating the necessary background on stochastic processes with the analysis of models, this book provides a foundational introduction to the modeling and analysis of queueing systems for a broad interdisciplinary audience of students. Containing exercises and examples, this volume may be used as a textbook by first-year graduate and upper-level undergraduate students. The work may also be useful as a self-study reference for applications and further research.

*Introduction to Spectral Theory* - P.D. Hislop 2012-12-06

The intention of this book is to introduce students to active areas of research in mathematical physics in a rather direct way minimizing the use of abstract mathematics. The main features are geometric methods in spectral analysis, exponential decay of eigenfunctions, semi-classical analysis of bound state problems, and semi-classical analysis of resonance. A new geometric point of view along with new techniques are brought out in this book which have both been discovered within the past decade. This book is designed to be used as a textbook, unlike the competitors which are either too fundamental in their approach or are too abstract in nature to be considered as texts. The authors' text fills a gap in the marketplace.

*Principles of Data Integration* - AnHai Doan 2012-06-25

How do you approach answering queries when your data is stored in multiple databases that were designed independently by different people? This is first comprehensive book on data integration and is written by three of the most respected experts in the field. This book provides an extensive introduction to the theory and concepts underlying today's data integration techniques, with detailed, instruction for their application using concrete examples throughout to explain the concepts. Data integration is the problem of answering queries that span multiple data sources (e.g., databases, web pages). Data integration problems surface in multiple contexts, including enterprise information integration, query processing on the Web, coordination between government agencies and collaboration between scientists. In some cases, data integration is the key bottleneck to making progress in a field. The authors provide a working knowledge of data integration concepts and techniques, giving you the tools you need to develop a complete and concise package of algorithms and applications. Offers a range of data integration solutions enabling you to focus on what is most relevant to the problem at hand Enables you to build your own algorithms and implement your own data integration applications

**Introduction to the Theory and Application of Data Envelopment Analysis** - Emmanuel Thanassoulis 2013-06-29

1 DATA ENVELOPMENT ANALYSIS Data Envelopment Analysis (DEA) was initially developed as a method for assessing the comparative efficiencies of organisational units such as the branches of a bank, schools, hospital departments or restaurants. The key in each case is that they perform feature which makes the units comparable the same function in terms of the kinds of resource they use and the types of output they produce. For example all bank branches to be compared

would typically use staff and capital assets to effect income generating activities such as advancing loans, selling financial products and carrying out banking transactions on behalf of their clients. The efficiencies assessed in this context by DEA are intended to reflect the scope for resource conservation at the unit being assessed without detriment to its outputs, or alternatively, the scope for output augmentation without additional resources. The efficiencies assessed are comparative or relative because they reflect scope for resource conservation or output augmentation at one unit relative to other comparable benchmark units rather than in some absolute sense. We resort to relative rather than absolute efficiencies because in most practical contexts we lack sufficient information to derive the superior measures of absolute efficiency. DEA was initiated by Charnes Cooper and Rhodes in 1978 in their seminal paper Charnes et al. (1978). The paper operationalised and extended by means of linear programming production economics concepts of empirical efficiency put forth some twenty years earlier by Farrell (1957).

*Smoothing of Multivariate Data* - Jussi Sakari Klemelä 2009-09-04

An applied treatment of the key methods and state-of-the-art tools for visualizing and understanding statistical data *Smoothing of Multivariate Data* provides an illustrative and hands-on approach to the multivariate aspects of density estimation, emphasizing the use of visualization tools. Rather than outlining the theoretical concepts of classification and regression, this book focuses on the procedures for estimating a multivariate distribution via smoothing. The author first provides an introduction to various visualization tools that can be used to construct representations of multivariate functions, sets, data, and scales of multivariate density estimates. Next, readers are presented with an extensive review of the basic mathematical tools that are needed to asymptotically analyze the behavior of multivariate density estimators, with coverage of density classes, lower bounds, empirical processes, and manipulation of density estimates. The book concludes with an extensive toolbox of multivariate density estimators, including anisotropic kernel estimators, minimization estimators, multivariate adaptive histograms, and wavelet estimators. A completely interactive experience is encouraged, as all examples and figures can be easily replicated using the R software package, and every chapter concludes with numerous exercises that allow readers to test their understanding of the presented techniques. The R software is freely available on the book's related Web site along with "Code" sections for each chapter that provide short instructions for working in the R environment. Combining mathematical analysis with practical implementations, *Smoothing of Multivariate Data* is an excellent book for courses in multivariate analysis, data analysis, and nonparametric statistics at the upper-undergraduate and graduate levels. It also serves as a valuable reference for practitioners and researchers in the fields of statistics, computer science, economics, and engineering.

**Introduction to Information Theory and Data Compression, Second Edition** - Peter D. Johnson, Jr. 2003-02-26

An effective blend of carefully explained theory and practical applications, this text imparts the fundamentals of both information theory and data compression. Although the two topics are related, this unique text allows either topic to be presented independently, and it was specifically designed so that the data compression section requires no prior knowledge of information theory. The treatment of information theory, while theoretical and abstract, is quite elementary, making this text less daunting than many others. After presenting the fundamental definitions and results of the theory, the authors then apply the theory to memoryless, discrete channels with zeroth-order, one-state sources. The chapters on data compression acquaint students with a myriad of lossless compression methods and then introduce two lossy compression methods. Students emerge from this study competent in a wide range of techniques. The authors' presentation is highly practical but includes some important proofs, either in the text or in the exercises, so instructors can, if they choose, place more emphasis on the mathematics. *Introduction to Information Theory and Data Compression, Second Edition* is ideally suited for an upper-level or graduate course for students in mathematics, engineering, and computer science. Features: Expanded discussion of the historical and theoretical basis of information theory that builds a

firm, intuitive grasp of the subject Reorganization of theoretical results along with new exercises, ranging from the routine to the more difficult, that reinforce students' ability to apply the definitions and results in specific situations. Simplified treatment of the algorithm(s) of Gallager and Knuth Discussion of the information rate of a code and the trade-off between error correction and information rate Treatment of probabilistic finite state source automata, including basic results, examples, references, and exercises Octave and MATLAB image compression codes included in an appendix for use with the exercises and projects involving transform methods Supplementary materials, including software, available for download from the authors' Web site at [www.dms.auburn.edu/compression](http://www.dms.auburn.edu/compression)

**Performance Evaluation and Beyond** - Wade D. Cook 2006

**Data Warehousing and Mining: Concepts, Methodologies, Tools, and Applications** - Wang, John 2008-05-31

In recent years, the science of managing and analyzing large datasets has emerged as a critical area of research. In the race to answer vital questions and make knowledgeable decisions, impressive amounts of data are now being generated at a rapid pace, increasing the opportunities and challenges associated with the ability to effectively analyze this data.

*Introduction to Scientific Computing and Data Analysis* - Mark H. Holmes 2016-05-30

This textbook provides an introduction to numerical computing and its applications in science and engineering. The topics covered include those usually found in an introductory course, as well as those that arise in data analysis. This includes optimization and regression based methods using a singular value decomposition. The emphasis is on problem solving, and there are numerous exercises throughout the text concerning applications in engineering and science. The essential role of the mathematical theory underlying the methods is also considered, both for understanding how the method works, as well as how the error in the computation depends on the method being used. The MATLAB codes used to produce most of the figures and data tables in the text are available on the author's website and SpringerLink.

**Compositional Data Analysis** - Vera Pawlowsky-Glahn 2011-09-19

It is difficult to imagine that the statistical analysis of compositional data has been a major issue of concern for more than 100 years. It is even more difficult to realize that so many statisticians and users of statistics are unaware of the particular problems affecting compositional data, as well as their solutions. The issue of "spurious correlation", as the situation was phrased by Karl Pearson back in 1897, affects all data that measures parts of some whole, such as percentages, proportions, ppm and ppb. Such measurements are present in all fields of science, ranging from geology, biology, environmental sciences, forensic sciences, medicine and hydrology. This book presents the history and development of compositional data analysis along with Aitchison's log-ratio approach. *Compositional Data Analysis* describes the state of the art both in theoretical fields as well as applications in the different fields of science. Key Features: Reflects the state-of-the-art in compositional data analysis. Gives an overview of the historical development of compositional data analysis, as well as basic concepts and procedures. Looks at advances in algebra and calculus on the simplex. Presents applications in different fields of science, including, genomics, ecology, biology, geochemistry, planetology, chemistry and economics. Explores connections to correspondence analysis and the Dirichlet distribution. Presents a summary of three available software packages for compositional data analysis. Supported by an accompanying website featuring R code. Applied scientists working on compositional data analysis in any field of science, both in academia and professionals will benefit from this book, along with graduate students in any field of science working with compositional data.

*Precedence-Type Tests and Applications* - Narayanaswamy Balakrishnan 2006-05-26

Full coverage of statistical techniques for developing and implementing precedence-type tests *Precedence-Type Tests and Applications* provides a comprehensive overview of theoretical and applied approaches to a variety of problems in which precedence-type test procedures can be

used. The authors clearly demonstrate the effectiveness of these tests in life-testing situations designed for making quick and reliable decisions in the early stages of an experiment. Most of the text's examples use life-time data; however, theoretical properties are also discussed in the context of precedence testing. Monte Carlo studies are used to illustrate important results. Following the authors' careful step-by-step instructions and guidance, readers master the wide range of statistical techniques involved in the development and implementation of precedence-type tests. The book covers the foundations of precedence testing research from the early 1960s up to the most recent theory and applications, including the authors' current contributions to the field. The book features the following parts: \* Part A deals with the original precedence test and some properties of precedence and related test procedures \* Part B explores alternatives to precedence testing, including maximal precedence, weighted forms of precedence and maximal precedence, and Wilcoxon-type rank-sum precedence tests and their properties \* Part C compares the extension of precedence, maximal precedence, and Wilcoxon-type rank-sum precedence tests to situations in which the sample arising from the life-testing experiment is progressively Type-II censored \* Part D examines precedence-type tests in multi-sample situations and selection problems Tables are presented throughout the book to facilitate the application of the tests to practical problems. Helpful examples illustrate all of the precedence-type procedures, and an extensive bibliography enables readers to explore specialized topics in greater depth. This book is a recommended reference for researchers and practitioners in reliability and life-time data analysis, applied probabilists, and engineers. It also serves as a supplemental text for courses in nonparametric statistics and reliability.

**Introduction to Contextual Processing** - Gregory Vert 2016-04-19

Develops a Comprehensive, Global Model for Contextually Based Processing Systems A new perspective on global information systems operation Helping to advance a valuable paradigm shift in the next generation and processing of knowledge, Introduction to Contextual Processing: Theory and Applications provides a comprehensive model for constructing a contextually based processing system. It explores the components of this system, the interactions of the components, key mathematical foundations behind the model, and new concepts necessary for operating the system. After defining the key dimensions of a model for contextual processing, the book discusses how data is used to develop a semantic model for contexts as well as language-driven context-specific processing actions. It then applies rigorous mathematical methods to contexts, examines basic sensor data fusion theory and applies it to the contextual fusion of information, and describes the means to distribute contextual information. The authors also illustrate a new type of data repository model to manage contextual data, before concluding with the requirements of contextual security in a global environment. This seminal work presents an integrated framework for the design and operation of the next generation of IT processing. It guides the way for developing advanced IT systems and offers new models and concepts that can support advanced semantic web and cloud computing capabilities at a global scale.

**Theory-Based Data Analysis for the Social Sciences** - Carol S. Aneshensel 2013

This book presents the elaboration model for the multivariate analysis of observational quantitative data. This model entails the systematic introduction of "third variables" to the analysis of a focal relationship between one independent and one dependent variable to ascertain whether an inference of causality is justified. Two complementary strategies are used: an exclusionary strategy that rules out alternative explanations such as spuriousness and redundancy with competing theories, and an inclusive strategy that connects the focal relationship to a network of other relationships, including the hypothesized causal mechanisms linking the focal independent variable to the focal dependent variable. The primary emphasis is on the translation of theory into a logical analytic strategy and the interpretation of results. The elaboration model is applied with case studies drawn from newly published research that serve as prototypes for aligning theory and the data analytic plan used to test it; these studies are drawn from a wide range of substantive topics in the social sciences, such as emotion management in

the workplace, subjective age identification during the transition to adulthood, and the relationship between religious and paranormal beliefs. The second application of the elaboration model is in the form of original data analysis presented in two Analysis Journals that are integrated throughout the text and implement the full elaboration model. Using real data, not contrived examples, the text provides a step-by-step guide through the process of integrating theory with data analysis in order to arrive at meaningful answers to research questions.

Data Assimilation for Atmospheric, Oceanic and Hydrologic Applications - SEON KI PARK 2009-02-08

Data assimilation (DA) has been recognized as one of the core techniques for modern forecasting in various earth science disciplines including meteorology, oceanography, and hydrology. Since early 1990s DA has been an important session topic in many academic meetings organized by leading societies such as the American Meteorological Society, American Geophysical Union, European Geophysical Union, World Meteorological Organization, etc. Recently, the 2 Annual Meeting of the Asia Oceania Geosciences Society (AOGS), held in Singapore in June 2005, conducted a session on DA under the title of "Data Assimilation for Atmospheric, Oceanic and Hydrologic Applications." This first DA session in the 2 AOGS was a great success with more than 30 papers presented and many great ideas exchanged among scientists from the three different disciplines. The scientists who participated in the meeting suggested making the DA session a biennial event. Two years later, at the 4 AOGS Annual Meeting, Bangkok, Thailand, the DA session was officially named "Sasaki Symposium on Data Assimilation for Atmospheric, Oceanic and Hydrologic Applications," to honor Prof. Yoshi K. Sasaki of the University of Oklahoma for his life-long contributions to DA in geosciences.

Data Management: a gentle introduction - Bas van Gils 2020-03-03

The overall objective of this book is to show that data management is an exciting and valuable capability that is worth time and effort. More specifically it aims to achieve the following goals: 1. To give a "gentle" introduction to the field of DM by explaining and illustrating its core concepts, based on a mix of theory, practical frameworks such as TOGAF, ArchiMate, and DMBOK, as well as results from real-world assignments. 2. To offer guidance on how to build an effective DM capability in an organization. This is illustrated by various use cases, linked to the previously mentioned theoretical exploration as well as the stories of practitioners in the field. The primary target groups are: busy professionals who "are actively involved with managing data". The book is also aimed at (Bachelor's/ Master's) students with an interest in data management. The book is industry-agnostic and should be applicable in different industries such as government, finance, telecommunications etc. Typical roles for which this book is intended: data governance office/ council, data owners, data stewards, people involved with data governance (data governance board), enterprise architects, data architects, process managers, business analysts and IT analysts. The book is divided into three main parts: theory, practice, and closing remarks. Furthermore, the chapters are as short and to the point as possible and also make a clear distinction between the main text and the examples. If the reader is already familiar with the topic of a chapter, he/she can easily skip it and move on to the next.

**Statistics for High-Dimensional Data** - Peter Bühlmann 2011-06-08

Modern statistics deals with large and complex data sets, and consequently with models containing a large number of parameters. This book presents a detailed account of recently developed approaches, including the Lasso and versions of it for various models, boosting methods, undirected graphical modeling, and procedures controlling false positive selections. A special characteristic of the book is that it contains comprehensive mathematical theory on high-dimensional statistics combined with methodology, algorithms and illustrations with real data examples. This in-depth approach highlights the methods' great potential and practical applicability in a variety of settings. As such, it is a valuable resource for researchers, graduate students and experts in statistics, applied mathematics and computer science.

*Entrepreneurship and Intrapreneurship in Social, Sustainable, and Economic Development* -

Sebastian Aparicio 2021-01-25

Entrepreneurship and intrapreneurship have become a vehicle that offers solutions for social, environmental, and economic problems. Even though the level of entrepreneurial activity and its diversity have been motivated through public policies, social support has also played an important role in encouraging people to think of entrepreneurship as a desirable career choice. This book brings together analyses of those elements required for entrepreneurial and intrapreneurial intention and action, which ultimately become important leverages of development. Chapters highlight the importance of rural, urban, university, organizational, and family environments for a bunch of intentions and behaviors such as green, sport, social, corporate, innovative, traditional, and gender entrepreneurship. This entrepreneurial diversity is translated into higher development through the empowerment of women, environmental consciousness, and efficient production. Policymakers, scholars, and practitioners can find different examples and cases useful for decision-making, learning, and practice in this book.

Dealing with Complexity - Robert L. Flood 2013-03-09

Contents 11. 2. 2. Four Main Areas of Dispute 247 11. 2. 3. Summary . . . 248 11. 3. Making Sense of the Issues . . 248 11. 3. 1. Introduction . . . . 248 11. 3. 2. The Scientific Approach 248 11. 3. 3. Science and Matters of Society . 249 11. 3. 4. Summary . 251 11. 4. Tying It All Together . . . . 251 11. 4. 1. Introduction . . . . 251 11. 4. 2. A Unifying Framework 251 11. 4. 3. Critical Systems Thinking 253 11. 4. 4. Summary 254 11. 5. Conclusion 254 Questions . . . 255 REFERENCES . . . . . 257 INDEX . . . . . 267 Chapter One SYSTEMS Origin and Evolution, Terms and Concepts 1. 1. INTRODUCTION We start this book with Theme A (see Figure P. I in the Preface), which aims to develop an essential and fundamental understanding of systems science. So, what is systems science? When asked to explain what systems science is all about, many systems scientists are confronted with a rather daunting task. The discipline tends to be presented and understood in a fragmented way and very few people hold an overview understanding of the subject matter, while also having sufficient in-depth competence in many and broad-ranging subject areas where the ideas are used. Indeed, it was precisely this difficulty that identified the need for a comprehensive well-documented account such as is presented here in *Dealing with Complexity*.