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Computational Intelligent Data Analysis for Sustainable Development Jun 11 2022 Going beyond performing simple analyses, researchers involved in the highly dynamic field of computational intelligent data analysis design algorithms that solve increasingly complex data problems in changing environments, including economic, environmental, and social data. Computational Intelligent Data Analysis for Sustainable Development present

Feature Engineering for Machine Learning and Data Analytics May 30 2021 Feature engineering plays a vital role in big data analytics. Machine learning and data mining algorithms cannot work without data. Little can be achieved if there are few features to represent the underlying data objects, and the quality of results of those algorithms largely depends on the quality of the available features. Feature Engineering for Machine Learning and Data Analytics provides a comprehensive introduction to feature engineering, including feature generation, feature extraction, feature transformation, feature selection, and feature analysis and evaluation. The book presents key concepts, methods, examples, and applications, as well as chapters on feature engineering for major data types such as texts, images, sequences, time series, graphs, streaming data, software engineering data, Twitter data, and social media data. It also contains generic feature generation approaches, as well as methods for generating tried-and-tested, hand-crafted, domain-specific features. The first chapter defines the concepts of features and feature engineering, offers an overview of the book, and provides pointers to topics not covered in this book. The next six chapters are devoted to feature engineering, including feature generation for specific data types. The subsequent four chapters cover generic approaches for feature engineering, namely feature selection, feature transformation based feature engineering, deep learning based feature engineering, and pattern based feature generation and engineering. The last three chapters discuss feature engineering for social bot detection, software management, and Twitter-based applications respectively. This book can be used as a reference for data analysts, big data scientists, data preprocessing workers, project managers, project developers, prediction modelers, professors, researchers, graduate students, and upper level undergraduate students. It can also be used as the primary text for courses on feature engineering, or as a supplement for courses on machine learning, data mining, and big data analytics.

Handbook of Educational Data Mining Dec 05 2021 Handbook of Educational Data Mining (EDM) provides a thorough overview of the current state of knowledge in this area. The first part of the book includes nine surveys and tutorials on the principal data mining techniques that have been applied in education. The second part presents a set of 25 case studies that give a rich overview of the problems that EDM has addressed. Researchers at the Forefront of the Field Discuss Essential Topics and the Latest Advances With contributions by well-known researchers from a variety of fields, the book reflects the multidisciplinary nature of the EDM community. It brings the educational and data mining communities together, helping education experts understand what types of questions EDM can address and helping data miners understand what types of questions are important to educational design and educational decision making. Encouraging readers to integrate EDM into their research and practice, this timely handbook offers a broad, accessible treatment of essential EDM techniques and applications. It provides an excellent first step for newcomers to the EDM community and for active researchers to keep abreast of recent developments in the field.

Intelligent Technologies for Web Applications Aug 01 2021 The Internet has become an integral part of human life, yet the web still utilizes mundane interfaces to the physical world, which makes Internet operations somewhat mechanical, tedious, and less human-oriented. Filling a large void in the literature, Intelligent Technologies for Web Applications is one of the first books to focus on providing vital fundamental and advanced guidance in the area of Web intelligence for beginners and researchers. The book covers techniques from diverse areas of research, including: Natural language processing Information extraction, retrieval, and filtering Knowledge representation and management Machine learning Databases Data, web, and text mining Human-computer interaction Semantic web technologies To develop effective and intelligent web applications and services, it is critical to discover useful knowledge through analyzing large amounts of content, hidden content structures, or usage patterns of web data resources. Intended to improve and reinforce problem-solving methods in this area, this book delves into the hybridization of artificial intelligence (AI) and web technologies to help simplify complex Web operations. It introduces readers to the state-of-the-art development of web intelligence techniques and teaches how to apply these techniques to develop the next generation of intelligent Web applications. The book lays out presented projects, case studies, and innovative ideas, which readers can explore independently as standalone research projects. This material facilitates experimentation with the book's content by including fundamental tools, research directions, practice questions, and additional reading.

Healthcare Data Analytics Jul 24 2023 At the intersection of computer science and healthcare, data analytics has emerged as a promising tool for solving problems across many healthcare-related disciplines. Supplying a comprehensive overview of recent healthcare analytics research, Healthcare Data Analytics provides a clear understanding of the analytical techniques currently available to solve healthcare problems. The book details novel techniques for acquiring, handling, retrieving, and making best use of healthcare data. It analyzes recent developments in healthcare computing and discusses emerging technologies that can help improve the health and well-being of patients. Written by prominent researchers and experts working in the healthcare domain, the book sheds light on many of the computational challenges in the field of medical informatics. Each chapter in the book is structured as a "survey-style" article discussing the prominent research issues and the advances made on that research topic. The book is divided into three major categories: Healthcare Data Sources and Basic Analytics - details the various healthcare data sources and analytical techniques used in the processing and analysis of such data Advanced Data Analytics for Healthcare - covers advanced analytical methods, including clinical prediction models, temporal pattern mining methods, and visual analytics Applications and Practical Systems for Healthcare - covers the applications of data analytics to pervasive healthcare, fraud detection, and drug discovery along with systems for medical imaging and decision support Computer scientists are usually not trained in domain-specific medical concepts, whereas medical practitioners and researchers have limited exposure to the data analytics area. The contents of this book will help to bring together these diverse communities by carefully and comprehensively discussing the most relevant contributions from each domain.

Computational Methods of Feature Selection Oct 15 2022 Due to increasing demands for dimensionality reduction, research on feature selection has deeply and widely expanded into many fields, including computational statistics, pattern recognition, machine learning, data mining, and knowledge discovery. Highlighting current research issues, Computational Methods of Feature Selection introduces the basic concepts and principles, state-of-the-art algorithms, and novel applications of this tool. The book begins by exploring unsupervised, randomized, and causal feature selection. It then reports on some recent results of empowering feature selection, including active feature selection, decision-border estimate, the use of ensembles with independent probes, and incremental feature selection. This is followed by discussions of weighting and local methods, such as the ReliefF family, k-means clustering, local feature relevance, and a new interpretation of Relief. The book subsequently covers text classification, a new feature selection score, and both constraint-guided and aggressive feature selection. The final section examines applications of feature selection in bioinformatics, including feature construction as well as redundancy-, ensemble-, and penalty-based feature selection. Through a clear, concise, and coherent presentation of topics, this volume systematically covers the key concepts, underlying principles, and inventive applications of feature selection, illustrating how this powerful tool can efficiently harness massive, high-dimensional data and turn it into valuable, reliable information.

Data Science and Machine Learning Jan 06 2022 "This textbook is a well-rounded, rigorous, and informative work presenting the mathematics behind modern machine learning techniques. It hits all the right notes: the choice of topics is up-to-date and perfect for a course on data science for mathematics students at the advanced undergraduate or early graduate level. This book fills a sorely-needed gap in the existing literature by not sacrificing depth for breadth, presenting proofs of major theorems and subsequent derivations, as well as providing a copious amount of Python code. I only wish a book like this had been around when I first began my journey!" -Nicholas Hoell, University of Toronto "This is a well-written book that provides a deeper dive into data-scientific methods than many introductory texts. The writing is clear, and the text logically builds up regularization, classification, and decision trees. Compared to its probable competitors, it carves out a unique niche. -Adam Loy, Carleton College The purpose of Data Science and Machine Learning: Mathematical and Statistical Methods is to provide an accessible, yet comprehensive textbook intended for students interested in gaining a better understanding of the mathematics and statistics that underpin the rich variety of ideas and machine learning algorithms in data science. Key Features: Focuses on mathematical understanding. Presentation is self-contained, accessible, and comprehensive. Extensive list of exercises and worked-out examples. Many concrete algorithms with Python code. Full color throughout. Further Resources can be found on the authors website: <https://github.com/DSML-book/Lectures>

Exploratory Data Analysis Using R Feb 24 2021 Exploratory Data Analysis Using R provides a classroom-tested introduction to exploratory data analysis (EDA) and introduces the range of "interesting" – good, bad, and ugly – features that can be found in data, and why it is important to find them. It also introduces the mechanics of using R to explore and explain data. The book begins with a detailed overview of data, exploratory analysis, and R, as well as graphics in R. It then explores working with external data, linear regression models, and crafting data stories. The second part of the book focuses on developing R programs, including good programming practices and examples, working with text data, and general predictive models. The book ends with a chapter on "keeping it all together" that includes managing the R installation, managing files, documenting, and an introduction to reproducible computing. The book is designed for both advanced undergraduate, entry-level graduate students, and working professionals with little to no prior exposure to data analysis, modeling, statistics, or programming. It keeps the treatment relatively non-mathematical, even though data analysis is an inherently mathematical subject. Exercises are included at the end of most chapters, and an instructor's solution manual is available. About the Author: Ronald K. Pearson holds the position of Senior Data Scientist with GeoVera, a property insurance company in Fairfield, California, and he has previously held similar positions in a variety of application areas, including software development, drug safety data analysis, and the analysis of industrial process data. He holds a PhD in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology and has published conference and journal papers on topics ranging from nonlinear dynamic model structure selection to the problems of disguised missing data in predictive modeling. Dr. Pearson has authored or co-authored books including Exploring Data in Engineering, the Sciences, and Medicine (Oxford University Press, 2011) and Nonlinear Digital Filtering with Python. He is also the developer of the DataCamp course on base R graphics and is an author of the datarobot and GoodmanKruskal R packages available from CRAN (the Comprehensive R Archive Network).

Introduction to Data Technologies Mar 20 2023 Providing key information on how to work with research data, Introduction to Data Technologies presents ideas and techniques for performing critical, behind-the-scenes tasks that take up so much time and effort yet typically receive little attention in formal education. With a focus on computational tools, the book shows readers how to improve their awareness of what tasks can be achieved and describes the correct approach to perform these tasks. Practical examples demonstrate the most important points The author first discusses how to write computer code using HTML as a concrete example. He then covers a variety of data storage topics, including different file formats, XML, and the structure and design issues of relational databases. After illustrating how to extract data from a relational database using SQL, the book presents tools and techniques for searching, sorting, tabulating, and manipulating data. It also introduces some very basic programming concepts as well as the R language for statistical computing. Each of these topics has supporting chapters that offer reference material on HTML, CSS, XML, DTD, SQL, R, and regular expressions. One-stop shop of introductory computing information Written by a member of the R Development Core Team, this resource shows readers how to apply data technologies to tasks within a research setting. Collecting material otherwise scattered across many books and the web, it explores how to publish information via the web, how to access information stored in different formats, and how to write small programs to automate simple, repetitive tasks.

Music Data Mining Dec 17 2022 The research area of music information retrieval has gradually evolved to address the challenges of effectively accessing and interacting large collections of music and associated data, such as styles, artists, lyrics, and reviews. Bringing together an interdisciplinary array of top researchers, Music Data Mining presents a variety of approaches to successfully employ data mining techniques for the purpose of music processing. The book first covers music data mining tasks and algorithms and audio feature extraction, providing a framework for subsequent chapters. With a focus on data classification, it then describes a computational approach inspired by human auditory perception and examines instrument recognition, the effects of music on moods and emotions, and the connections between power laws and music aesthetics. Given the importance of social aspects in understanding music, the text addresses the use of the Web and peer-to-peer networks for both music data mining and evaluating music mining tasks and algorithms. It also discusses indexing with tags and explains how data can be collected using online human computation games. The final chapters offer a balanced exploration of hit song science as well as a look at symbolic musicology and data mining. The multifaceted nature of music information often requires algorithms and systems using sophisticated signal processing and machine learning techniques to better extract useful information. An excellent introduction to the field, this volume presents state-of-the-art techniques in music data mining and information retrieval to create novel ways of interacting with large music collections.

Next Generation of Data Mining Aug 25 2023 Drawn from the US National Science Foundation's Symposium on Next Generation of Data Mining and Cyber-Enabled Discovery for Innovation (NGDM 07), Next Generation of Data Mining explores emerging technologies and applications in data mining as well as potential challenges faced by the field. Gathering perspectives from top experts across different disciplines, the book debates upcoming challenges and outlines computational methods. The contributors look at how ecology, astronomy, social science, medicine, finance, and more can benefit from the next generation of data mining techniques. They examine the algorithms, middleware, infrastructure, and privacy policies associated with ubiquitous, distributed, and high performance data mining. They also discuss the impact of new technologies, such as the semantic web, on data mining and provide recommendations for privacy-preserving mechanisms. The dramatic increase in the availability of massive, complex data from various sources is creating computing, storage, communication, and human-computer interaction challenges for data mining. Providing a framework to better understand these fundamental issues, this volume surveys promising approaches to data mining problems that span an array of disciplines.

Industrial Applications of Machine Learning Sep 02 2021 Industrial Applications of Machine Learning shows how machine learning can be applied to address real-world problems in the fourth industrial revolution, and provides the required knowledge and tools to empower readers to build their own solutions based on theory and practice. The book introduces the fourth industrial revolution and its current impact on organizations and society. It explores machine learning fundamentals, and includes four case studies that address a real-world problem in the manufacturing or logistics domains, and approaches machine learning solutions from an application-oriented point of view. The book should be of special interest to researchers interested in real-world industrial problems. Features Describes the opportunities, challenges, issues, and trends offered by the fourth industrial revolution Provides a user-friendly introduction to machine learning with examples of cutting-edge applications in different industrial sectors Includes four case studies addressing real-world industrial problems solved with machine learning techniques A dedicated website for the book contains the datasets of the case studies for the reader's reproduction, enabling the groundwork for future problem-solving Uses of three of the most widespread software and programming languages within the engineering and data science communities, namely R, Python, and Weka

Data Clustering May 22 2023 Research on the problem of clustering tends to be fragmented across the pattern recognition, database, data mining, and machine learning communities. Addressing this problem in a unified way, Data Clustering: Algorithms and Applications provides complete coverage of the entire area of clustering, from basic methods to more refined and complex data clustering approaches. It pays special attention to recent issues in graphs, social networks, and other domains. The book focuses on three primary aspects of data clustering: Methods, describing key techniques commonly used for clustering, such as feature selection, agglomerative clustering, partitional clustering, density-based clustering, probabilistic clustering, grid-based clustering, spectral clustering, and nonnegative matrix factorization Domains, covering methods used for different domains of data, such as categorical data, text data, multimedia data, graph data, biological data, stream data, uncertain data, time series clustering, high-dimensional clustering, and big data Variations and Insights, discussing important variations of the clustering process, such as semisupervised clustering, interactive clustering, multiview clustering, cluster ensembles, and cluster validation In this book, top researchers from around the world explore the characteristics of clustering problems in a variety of application areas. They also explain how to glean detailed insight from the clustering process—including how to verify the quality of the underlying clusters—through supervision, human intervention, or the automated generation of alternative clusters.

Flexible Imputation of Missing Data, Second Edition May 18 2020 Missing data pose challenges to real-life data analysis. Simple ad-hoc fixes, like deletion or mean imputation, only work under highly restrictive conditions, which are often not met in practice. Multiple imputation replaces each missing value by multiple plausible values. The variability between these replacements reflects our ignorance of the true (but missing) value. Each of the completed data set is then analyzed by standard methods, and the results are pooled to obtain unbiased estimates with correct confidence intervals. Multiple imputation is a general approach that also inspires novel solutions to old problems by reformulating the task at hand as a missing-data problem. This is the second edition of a popular book on multiple imputation, focused on explaining the application of methods through detailed worked examples using the MICE package as developed by the author. This new edition incorporates the recent developments in this fast-moving field. This class-tested book avoids mathematical and technical details as much as possible: formulas are accompanied by verbal statements that explain the formula in accessible terms. The book sharpens the reader's intuition on how to think about missing data, and provides all the tools needed to execute a well-grounded quantitative analysis in the presence of missing data.

R for Health Data Science Mar 28 2021 In this age of information, the manipulation, analysis, and interpretation of data have become a fundamental part of professional life; nowhere more so than in the delivery of healthcare. From the understanding of disease and the development of new treatments, to the diagnosis and management of individual patients, the use of data and technology is now an integral part of the business of healthcare. Those working in healthcare interact daily with data, often without realizing it. The conversion of this avalanche of information to useful knowledge is essential for high-quality patient care. R for Health Data Science includes everything a healthcare professional needs to go from R novice to R guru. By the end of this book, you will be taking a sophisticated approach to health data science with beautiful visualisations, elegant tables, and nuanced analyses. Features Provides an introduction to the fundamentals of R for healthcare professionals Highlights the most popular statistical approaches to health data science Written to be as accessible as possible with minimal mathematics Emphasises the importance of truly understanding the underlying data through the use of plots Includes numerous examples that can be adapted for your own data Helps you create publishable documents and collaborate across teams With this book, you are in safe hands – Prof. Harrison is a clinician and Dr. Pius is a data scientist, bringing 25 years' combined experience of using R at the coal face. This content has been taught to hundreds of individuals from a variety of backgrounds, from rank beginners to experts moving to R from other platforms.

Handbook of Regression Modeling in People Analytics Nov 23 2020 Despite the recent rapid growth in machine learning and predictive analytics, many of the statistical questions that are faced by researchers and practitioners still involve explaining why something is happening. Regression analysis is the best 'swiss army knife' we have for answering these kinds of questions. This book is a learning resource on inferential statistics and regression analysis. It teaches how to do a wide range of statistical analyses in both R and in Python, ranging from simple hypothesis testing to advanced multivariate modelling. Although it is primarily focused on examples related to the analysis of people and talent, the methods easily transfer to any discipline. The book hits a 'sweet spot' where there is just enough mathematical theory to support a strong understanding of the methods, but with a step-by-step guide and easily reproducible examples and code, so that the methods can be put into practice immediately. This makes the book accessible to a wide readership, from public and private sector analysts and practitioners to students and researchers. Key Features: • 16 accompanying datasets across a wide range of contexts (e.g. academic, corporate, sports, marketing) • Clear step-by-step instructions on executing the analyses. • Clear guidance on how to interpret results. • Primary instruction in R but added sections for Python coders. • Discussion exercises and data exercises for each of the main chapters. • Final chapter of practice material and datasets ideal for class homework or project work.

Analysis of Categorical Data with R Oct 23 2020 Learn How to Properly Analyze Categorical Data Analysis of Categorical Data with R presents a modern account of categorical data analysis using the popular R software. It covers recent techniques of model building and assessment for binary, multicategory, and count response variables and discusses fundamentals, such as odds ratio and probability estimation. The authors give detailed advice and guidelines on which procedures to use and why to use them. The Use of R as Both a Data Analysis Method and a Learning Tool Requiring no prior experience with R, the text offers an introduction to the essential features and functions of R. It incorporates numerous examples from medicine, psychology, sports, ecology, and other areas, along with extensive R code and output. The authors use data simulation in R to help readers understand the underlying assumptions of a procedure and then to evaluate the procedure's performance. They also present many graphical demonstrations of the features and properties of various analysis methods. Web Resource The data sets and R programs from each example are available at www.chrisbilder.com/categorical. The programs include code used to create every plot and piece of output. Many of these programs contain code to demonstrate additional features or to perform more detailed analyses than what is in the text. Designed to be used in tandem with the book, the website also uniquely provides videos of the authors teaching a course on the subject. These videos include live, in-class recordings, which instructors may find useful in a blended or flipped classroom setting. The videos are also suitable as a substitute for a short course.

Statistical Foundations of Data Science Feb 19 2023 Statistical Foundations of Data Science gives a thorough introduction to commonly used statistical models, contemporary statistical machine learning techniques and algorithms, along with their mathematical insights and statistical theories. It aims to serve as a graduate-level textbook and a research monograph on high-dimensional statistics, sparsity and covariance learning, machine learning, and statistical inference. It includes ample exercises that

involve both theoretical studies as well as empirical applications. The book begins with an introduction to the stylized features of big data and their impacts on statistical analysis. It then introduces multiple linear regression and expands the techniques of model building via nonparametric regression and kernel tricks. It provides a comprehensive account on sparsity explorations and model selections for multiple regression, generalized linear models, quantile regression, robust regression, hazards regression, among others. High-dimensional inference is also thoroughly addressed and so is feature screening. The book also provides a comprehensive account on high-dimensional covariance estimation, learning latent factors and hidden structures, as well as their applications to statistical estimation, inference, prediction and machine learning problems. It also introduces thoroughly statistical machine learning theory and methods for classification, clustering, and prediction. These include CART, random forests, boosting, support vector machines, clustering algorithms, sparse PCA, and deep learning.

Text Mining Nov 04 2021 The Definitive Resource on Text Mining Theory and Applications from Foremost Researchers in the Field Giving a broad perspective of the field from numerous vantage points, Text Mining: Classification, Clustering, and Applications focuses on statistical methods for text mining and analysis. It examines methods to automatically cluster and classify text documents and applies these methods in a variety of areas, including adaptive information filtering, information distillation, and text search. The book begins with chapters on the classification of documents into predefined categories. It presents state-of-the-art algorithms and their use in practice. The next chapters describe novel methods for clustering documents into groups that are not predefined. These methods seek to automatically determine topical structures that may exist in a document corpus. The book concludes by discussing various text mining applications that have significant implications for future research and industrial use. There is no doubt that text mining will continue to play a critical role in the development of future information systems and advances in research will be instrumental to their success. This book captures the technical depth and immense practical potential of text mining, guiding readers to a sound appreciation of this burgeoning field.

Data Mining with R Jul 12 2022 Data Mining with R: Learning with Case Studies, Second Edition uses practical examples to illustrate the power of R and data mining. Providing an extensive update to the best-selling first edition, this new edition is divided into two parts. The first part will feature introductory material, including a new chapter that provides an introduction to data mining, to complement the already existing introduction to R. The second part includes case studies, and the new edition strongly revises the R code of the case studies making it more up-to-date with recent packages that have emerged in R. The book does not assume any prior knowledge about R. Readers who are new to R and data mining should be able to follow the case studies, and they are designed to be self-contained so the reader can start anywhere in the document. The book is accompanied by a set of freely available R source files that can be obtained at the book's web site. These files include all the code used in the case studies, and they facilitate the "do-it-yourself" approach followed in the book. Designed for users of data analysis tools, as well as researchers and developers, the book should be useful for anyone interested in entering the "world" of R and data mining. About the Author Luís Torgo is an associate professor in the Department of Computer Science at the University of Porto in Portugal. He teaches Data Mining in R in the NYU Stern School of Business' MS in Business Analytics program. An active researcher in machine learning and data mining for more than 20 years, Dr. Torgo is also a researcher in the Laboratory of Artificial Intelligence and Data Analysis (LIAAD) of INESC Porto LA.

Introduction to Data Science Apr 09 2022 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.

Analysis of Incomplete Multivariate Data Jan 26 2021 The last two decades have seen enormous developments in statistical methods for incomplete data. The EM algorithm and its extensions, multiple imputation, and Markov Chain Monte Carlo provide a set of flexible and reliable tools from inference in large classes of missing-data problems. Yet, in practical terms, those developments have had surprisingly little impact on the way most data analysts handle missing values on a routine basis. Analysis of Incomplete Multivariate Data helps bridge the gap between theory and practice, making these missing-data tools accessible to a broad audience. It presents a unified, Bayesian approach to the analysis of incomplete multivariate data, covering datasets in which the variables are continuous, categorical, or both. The focus is applied, where necessary, to help readers thoroughly understand the statistical properties of those methods, and the behavior of the accompanying algorithms. All techniques are illustrated with real data examples, with extended discussion and practical advice. All of the algorithms described in this book have been implemented by the author for general use in the statistical languages S and S Plus. The software is available free of charge on the Internet.

Temporal Data Mining Apr 21 2023 Temporal data mining deals with the harvesting of useful information from temporal data. New initiatives in health care and business organizations have increased the importance of temporal information in data today. From basic data mining concepts to state-of-the-art advances, Temporal Data Mining covers the theory of this subject as well as its application in a variety of fields. It discusses the incorporation of temporality in databases as well as temporal data representation, similarity computation, data classification, clustering, pattern discovery, and prediction. The book also explores the use of temporal data mining in medicine and biomedical informatics, business and industrial applications, web usage mining, and spatiotemporal data mining. Along with various state-of-the-art algorithms, each chapter includes detailed references and short descriptions of relevant algorithms and techniques described in other references. In the appendices, the author explains how data mining fits the overall goal of an organization and how these data can be interpreted for the purpose of characterizing a population. She also provides programs written in the Java language that implement some of the algorithms presented in the first chapter. Check out the author's blog at <http://theophanomitsa.wordpress.com/>

Contrast Data Mining May 10 2022 A Fruitful Field for Researching Data Mining Methodology and for Solving Real-Life Problems Contrast Data Mining: Concepts, Algorithms, and Applications collects recent results from this specialized area of data mining that have previously been scattered in the literature, making them more accessible to researchers and developers in data mining and other fields. The book not only presents concepts and techniques for contrast data mining, but also explores the use of contrast mining to solve challenging problems in various scientific, medical, and business domains. Learn from Real Case Studies of Contrast Mining Applications In this volume, researchers from around the world specializing in architecture engineering, bioinformatics, computer science, medicine, and systems engineering focus on the mining and use of contrast patterns. They demonstrate many useful and powerful capabilities of a variety of contrast mining techniques and algorithms, including tree-based structures, zero-suppressed binary decision diagrams, data cube representations, and clustering algorithms. They also examine how contrast mining is used in leukemia characterization, discriminative gene transfer and microarray analysis, computational toxicology, spatial and image data classification, voting analysis, heart disease prediction, crime analysis, understanding customer behavior, genetic algorithms, and network security.

Data Science and Analytics with Python Sep 14 2022 Data Science and Analytics with Python is designed for practitioners in data science and data analytics in both academic and business environments. The aim is to present the reader with the main concepts used in data science using tools developed in Python, such as SciKit-learn, Pandas, Numpy, and others. The use of Python is of particular interest, given its recent popularity in the data science community. The book can be used by seasoned programmers and newcomers alike. The book is organized in a way that individual chapters are sufficiently independent from each other so that the reader is comfortable using the contents as a reference. The book discusses what data science and analytics are, from the point of view of the process and results obtained. Important features of Python are also covered, including a Python primer. The basic elements of machine learning, pattern recognition, and artificial intelligence that underpin the algorithms and implementations used in the rest of the book also appear in the first part of the book. Regression analysis using Python, clustering techniques, and classification algorithms are covered in the second part of the book. Hierarchical clustering, decision trees, and ensemble techniques are also explored, along with dimensionality reduction techniques and recommendation systems. The support vector machine algorithm and the Kernel trick are discussed in the last part of the book. About the Author Dr. Jesús Rogel-Salazar is a Lead Data scientist with experience in the field working for companies such as AKQA, IBM Data Science Studio, Dow Jones and others. He is a visiting researcher at the Department of Physics at Imperial College London, UK and a member of the School of Physics, Astronomy and Mathematics at the University of Hertfordshire, UK, He obtained his doctorate in physics at Imperial College London for work on quantum atom optics and ultra-cold matter. He has held a position as senior lecturer in mathematics as well as a consultant in the financial industry since 2006. He is the author of the book Essential Matlab and Octave, also published by CRC Press. His interests include mathematical modelling, data science, and optimization in a wide range of applications including optics, quantum mechanics, data journalism, and finance.

Supervised Machine Learning for Text Analysis in R Oct 03 2021 Text data is important for many domains, from healthcare to marketing to the digital humanities, but specialized approaches are necessary to create features for machine learning from language. Supervised Machine Learning for Text Analysis in R explains how to preprocess text data for modeling, train models, and evaluate model performance using tools from the tidyverse and tidymodels ecosystem. Models like these can be used to make predictions for new observations, to understand what natural language features or characteristics contribute to differences in the output, and more. If you are already familiar with the basics of predictive modeling, use the comprehensive, detailed examples in this book to extend your skills to the domain of natural language processing. This book provides practical guidance and directly applicable knowledge for data scientists and analysts who want to integrate unstructured text data into their modeling pipelines. Learn how to use text data for both regression and classification tasks, and how to apply more straightforward algorithms like regularized regression or support vector machines as well as deep learning approaches. Natural language must be dramatically transformed to be ready for computation, so we explore typical text preprocessing and feature engineering steps like tokenization and word embeddings from the ground up. These steps influence model results in ways we can measure, both in terms of model metrics and other tangible consequences such as how fair or appropriate model results are.

Data Analytics Aug 13 2022 Data Analytics: A Small Data Approach is suitable for an introductory data analytics course to help students understand some main statistical learning models. It has many small datasets to guide students to work out pencil solutions of the models and then compare with results obtained from established R packages. Also, as data science practice is a process that should be told as a story, in this book there are many course materials about exploratory data analysis, residual analysis, and flowcharts to develop and validate models and data pipelines. The main models covered in this book include linear regression, logistic regression, tree models and random forests, ensemble learning, sparse learning, principal component analysis, kernel methods including the support vector machine and kernel regression, and deep learning. Each chapter introduces two or three techniques. For each technique, the book highlights the intuition and rationale first, then shows how mathematics is used to articulate the intuition and formulate the learning problem. R is used to implement the techniques on both simulated and real-world dataset. Python code is also available at the book's website: <http://dataanalyticsbook.info>.

The Data Book Jun 23 2023 The Data Book: Collection and Management of Research Data is the first practical book written for researchers and research team members covering how to collect and manage data for research. The book covers basic types of data and fundamentals of how data grow, move and change over time. Focusing on pre-publication data collection and handling, the text illustrates use of these key concepts to match data collection and management methods to a particular study, in essence, making good decisions about data. The first section of the book defines data, introduces fundamental types of data that bear on methodology to collect and manage them, and covers data management planning and research reproducibility. The second section covers basic principles of and options for data collection and processing emphasizing error resistance and traceability. The third section focuses on managing the data collection and processing stages of research such that quality is consistent and ultimately capable of supporting conclusions drawn from data. The final section of the book covers principles of data security, sharing, and archival. This book will help graduate students and researchers systematically identify and implement appropriate data collection and handling methods.

Applied Survey Data Analysis Sep 21 2020 Highly recommended by the Journal of Official Statistics, The American Statistician, and other journals, Applied Survey Data Analysis, Second Edition provides an up-to-date overview of state-of-the-art approaches to the analysis of complex sample survey data. Building on the wealth of material on practical approaches to descriptive analysis and regression modeling from the first edition, this second edition expands the topics covered and presents more step-by-step examples of modern approaches to the analysis of survey data using the newest statistical software. Designed for readers working in a wide array of disciplines who use survey data in their work, this book continues to provide a useful framework for integrating more in-depth studies of the theory and methods of survey data analysis. An example-driven guide to the applied statistical analysis and interpretation of survey data, the second edition contains many new examples and practical exercises based on recent versions of real-world survey data sets. Although the authors continue to use Stata for most examples in the text, they also continue to offer SAS, SPSS, SUDAAN, R, WesVar, IVEware, and Mplus software code for replicating the examples on the book's updated website.

The Top Ten Algorithms in Data Mining Aug 21 2020 Identifying some of the most influential algorithms that are widely used in the data mining community, The Top Ten Algorithms in Data Mining provides a description of each algorithm, discusses its impact, and reviews current and future research. Thoroughly evaluated by independent reviewers, each chapter focuses on a particular algorithm and is written by either the original authors of the algorithm or world-class researchers who have extensively studied the respective algorithm. The book concentrates on the following important algorithms: C4.5, k-Means, SVM, Apriori, EM, PageRank, AdaBoost, kNN, Naive Bayes, and CART. Examples illustrate how each algorithm works and highlight its overall performance in a real-world application. The text covers key topics—including classification, clustering, statistical learning, association analysis, and link mining—in data mining research and development as well as in data mining, machine learning, and artificial intelligence courses. By naming the leading algorithms in this field, this book encourages the use of data mining techniques in a broader realm of real-world applications. It should inspire more data mining researchers to further explore the impact and novel research issues of these algorithms.

Geospatial Health Data Jun 18 2020 Geospatial health data are essential to inform public health and policy. These data can be used to quantify disease burden, understand geographic and temporal patterns, identify risk factors, and measure inequalities. Geospatial Health Data: Modeling and Visualization with R-INLA and Shiny describes spatial and spatio-temporal statistical methods and visualization techniques to analyze georeferenced health data in R. The book covers the following topics: Manipulate and transform point, areal, and raster data, Bayesian hierarchical models for disease mapping using areal and geostatistical data, Fit and interpret spatial and spatio-temporal models with the Integrated Nested Laplace Approximations (INLA) and the Stochastic Partial Differential Equation (SPDE) approaches, Create interactive and static visualizations such as disease maps and time plots, Reproducible R Markdown reports, interactive dashboards, and Shiny web applications that facilitate the communication of insights to collaborators and policy makers. The book features fully reproducible examples of several disease and environmental applications using real-world data such as malaria in The Gambia, cancer in Scotland and USA, and air pollution in Spain. Examples in the book focus on health applications, but the approaches covered are also applicable to other fields that use georeferenced data including epidemiology, ecology, demography or criminology. The book provides clear descriptions of the R code for data importing, manipulation, modeling and visualization, as well as the interpretation of the results. This ensures contents are fully reproducible and accessible for students, researchers and practitioners.

Relational Data Clustering Mar 08 2022 A culmination of the authors' years of extensive research on this topic, Relational Data Clustering: Models, Algorithms, and Applications addresses the fundamentals and applications of relational data clustering. It describes theoretic models and algorithms and, through examples, shows how to apply these models and algorithms to solve real-world problems. After defining the field, the book introduces different types of model formulations for relational data clustering, presents various algorithms for the corresponding models, and demonstrates applications of the models and algorithms through extensive experimental results. The authors cover six topics of relational data clustering: Clustering on bi-type heterogeneous relational data Multi-type heterogeneous relational data Homogeneous relational data clustering Clustering on the most general case of relational data Individual relational clustering framework Recent research on evolutionary clustering This book focuses on both practical algorithm derivation and theoretical framework construction for relational data clustering. It provides a complete, self-contained introduction to advances in the field.

Modern Data Science with R Apr 28 2021 From a review of the first edition: "Modern Data Science with R... is rich with examples and is guided by a strong narrative voice. What's more, it presents an organizing framework that makes a convincing argument that data science is a course distinct from applied statistics" (The American Statistician). Modern Data Science with R is a comprehensive data science textbook for undergraduates that incorporates statistical and computational thinking to solve real-world data problems. Rather than focus exclusively on case studies or programming syntax, this book illustrates how statistical programming in the state-of-the-art R/Studio computing environment can be leveraged to extract meaningful information from a variety of data in the service of addressing compelling questions. The second edition is updated to reflect the growing influence of the tidyverse set of packages. All code in the book has been revised and styled to be more readable and easier to understand. New functionality from packages like sf, purrr, tidymodels, and tidytext is now integrated into the text. All chapters have been revised, and several have been split, re-organized, or re-imagined to meet the shifting landscape of best practice.

The Effect Jul 20 2020 The Effect: An Introduction to Research Design and Causality is about research design, specifically concerning research that uses observational data to make a causal inference. It is separated into two halves, each with different approaches to that subject. The first half goes through the concepts of causality, with very little in the way of estimation. It introduces the concept of identification thoroughly and clearly and discusses it as a process of trying to isolate variation that has a causal interpretation. Subjects include heavy emphasis on data-generating processes and causal diagrams. Concepts are demonstrated with a heavy emphasis on graphical intuition and the question of what we do to data. When we "add a control variable" what does that actually do? Key Features: • Extensive code examples in R, Stata, and Python • Chapters on overlooked topics in econometrics classes: heterogeneous treatment effects, simulation and power analysis, new cutting-edge methods, and uncomfortable ignored assumptions • An easy-to-read conversational tone • Up-to-date coverage of methods with fast-moving literatures like difference-in-differences

Advanced Data Science and Analytics with Python Apr 16 2020 Advanced Data Science and Analytics with Python enables data scientists to continue developing their skills and apply them in business as well as academic settings. The subjects discussed in this book are complementary and a follow-up to the topics discussed in Data Science and Analytics with Python. The aim is to cover important advanced areas in data science using tools developed in Python such as SciKit-learn, Pandas, Numpy, Beautiful Soup, NLTK, NetworkX and others. The model development is supported by the use of frameworks such as Keras, TensorFlow and Core ML, as well as Swift for the development of iOS and MacOS applications. Features: Targets readers with a background in programming, who are interested in the tools used in data analytics and data science Uses Python throughout Presents tools, alongside solved examples, with steps that the reader can easily reproduce and adapt to their needs Focuses on the practical use of the tools rather than on lengthy explanations Provides the reader with the opportunity to use the book whenever needed rather than following a sequential path The book can be read independently from the previous volume and each of the chapters in this volume is sufficiently independent from the others, providing flexibility for the reader. Each of the topics addressed in the book tackles the data science workflow from a practical perspective, concentrating on the process and results obtained. The implementation and deployment of trained models are central to the book. Time series analysis, natural language processing, topic modelling, social network analysis, neural networks and deep learning are comprehensively covered. The book discusses the need to develop data products and addresses the subject of bringing models to their intended audiences – in this case, literally to the users' fingertips in the form of an iPhone app. About the Author Dr. Jesús Rogel-Salazar is a lead data scientist in the field, working for companies such as Tympa Health Technologies, Barclays, AKQA, IBM Data Science Studio and Dow Jones. He is a visiting researcher at the Department of Physics at Imperial College London, UK and a member of the School of Physics, Astronomy and Mathematics at the University of Hertfordshire, UK.

Data Mining Dec 25 2020 Data Mining: A Tutorial-Based Primer, Second Edition provides a comprehensive introduction to data mining with a focus on model building and testing, as well as on interpreting and validating results. The text guides students to understand how data mining can be employed to solve real problems and recognize whether a data mining solution is a feasible alternative for a specific problem. Fundamental data mining strategies, techniques, and evaluation methods are presented and implemented with the help of two well-known software tools. Several new topics have been added to the second edition including an introduction to Big Data and data analytics, ROC curves, Pareto lift charts, methods for handling large-sized, streaming and imbalanced data, support vector machines, and extended coverage of textual data mining. The second edition contains tutorials for attribute selection, dealing with imbalanced data, outlier analysis, time series analysis, mining textual data, and more. The text provides in-depth coverage of RapidMiner Studio and Weka's Explorer interface. Both software tools are used for stepping students through the tutorials depicting the knowledge discovery process. This allows the reader maximum flexibility for their hands-on data mining experience.

Spectral Feature Selection for Data Mining (Open Access) Nov 16 2022 Spectral Feature Selection for Data Mining introduces a novel feature selection technique that establishes a general platform for studying existing feature selection algorithms and developing new algorithms for emerging problems in real-world applications. This technique represents a unified framework for supervised, unsupervised, and semisupervised

Mining Software Specifications Feb 07 2022 An emerging topic in software engineering and data mining, specification mining tackles software maintenance and reliability issues that cost economies billions of dollars each year. The first unified reference on

the subject, Mining Software Specifications: Methodologies and Applications describes recent approaches for mining specifications of sof

Knowledge Discovery for Counterterrorism and Law Enforcement Jun 30 2021 Most of the research aimed at counterterrorism, fraud detection, or other forensic applications assumes that this is a specialized application domain for mainstream knowledge discovery. Unfortunately, knowledge discovery changes completely when the datasets being used have been manipulated in order to conceal some underlying activity. Knowledge Discovery for Counterterrorism and Law Enforcement operates from the premise that detection algorithms must be rethought to be effective in this domain, and presents a new approach based on cutting-edge analysis for use in adversarial settings. Reveals How Criminals Conceal Information This volume focuses on four main forms of knowledge discovery: prediction, clustering, relationship discovery, and textual analysis. For each of these application areas, the author discusses opportunities for concealment that are available to criminals and reveals some of the tactics that can aid in detecting them. He reviews what is known about the different technologies for each area and evaluates their effectiveness. The book also supplies a preview of technologies currently under development and describes how they will fit in to existing approaches to knowledge discovery. Provides Proactive Formulas for Staying One Step Ahead of Adversaries While all knowledge-discovery systems are susceptible to manipulation, designers and users of algorithmic systems who are armed with the knowledge of these subversive tactics are better able to create systems to avoid these vulnerabilities. This book delineates an effective process for integrating knowledge-discovery tools, provides a unique understanding of the limits of the technology, and contains a clear presentation of the upsides and pitfalls of data collection. It is a powerful weapon in the arsenal of anyone confronting the increasingly sophisticated tactics employed by lawbreakers and other unsavory individuals.

Knowledge Discovery from Data Streams Jan 18 2023 Since the beginning of the Internet age and the increased use of ubiquitous computing devices, the large volume and continuous flow of distributed data have imposed new constraints on the design of learning algorithms. Exploring how to extract knowledge structures from evolving and time-changing data, Knowledge Discovery from Data Streams presents a coherent overview of state-of-the-art research in learning from data streams. The book covers the fundamentals that are imperative to understanding data streams and describes important applications, such as TCP/IP traffic, GPS data, sensor networks, and customer click streams. It also addresses several challenges of data mining in the future, when stream mining will be at the core of many applications. These challenges involve designing useful and efficient data mining solutions applicable to real-world problems. In the appendix, the author includes examples of publicly available software and online data sets. This practical, up-to-date book focuses on the new requirements of the next generation of data mining. Although the concepts presented in the text are mainly about data streams, they also are valid for different areas of machine learning and data mining.

- [Next Generation Of Data Mining](#)
- [Healthcare Data Analytics](#)
- [The Data Book](#)
- [Data Clustering](#)
- [Temporal Data Mining](#)
- [Introduction To Data Technologies](#)
- [Statistical Foundations Of Data Science](#)
- [Knowledge Discovery From Data Streams](#)
- [Music Data Mining](#)
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- [The Top Ten Algorithms In Data Mining](#)
- [The Effect](#)
- [Geospatial Health Data](#)
- [Flexible Imputation Of Missing Data Second Edition](#)
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