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 Data Mining Techniques

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CARLO SIMPSON

Association Rule Hiding for Data Mining World Scientific

Data mining continues to be an emerging interdisciplinary field that offers the ability to extract information from an existing data set and translate that knowledge for end-users into an understandable way. Data Mining: Concepts, Methodologies, Tools, and Applications is a comprehensive collection of research on the latest advancements and developments of data mining and how it fits into the current technological world.

Mining Imperfect Data Springer Science & Business Media

This book is not just another theoretical text on statistics or data mining. Instead, it's designed for database administrators who want to buttress their understanding of statistics to support data mining and customer relationship management analytics and who want to use Structured Query Language (SQL). Each chapter is independent and self-contained with examples tailored to business applications. Each analysis technique is expressed in a mathematical format that lends itself to coding either as a database query or as a Visual Basic procedure using SQL. Each chapter includes: formulas (how to perform the required analysis, numerical example using data from a database, data visualization and presentation options (graphs, charts,

tables), SQL procedures for extracting the desired results, and data mining techniques.

Spreadsheets, Databases, Matrices, and Graphs CRC Press

This book presents some recent systems engineering and mathematical tools for health care along with their real-world applications by health care practitioners and engineers. Advanced approaches, tools, and algorithms used in operating room scheduling and patient flow are covered. State-of-the-art results from applications of data mining, business process modeling, and simulation in healthcare, together with optimization methods, form the core of the volume. Systems Analysis Tools for Better Health Care Delivery illustrates the increased need of partnership between engineers and health care professionals. This book will benefit researchers and practitioners in health care delivery institutions, staff members and professionals of specialized hospital units, and lecturers and graduate students in engineering, applied mathematics, business administration and health care.

Statistical Methods for Business and Industry Walter de Gruyter GmbH & Co KG

"An overview of the multidisciplinary field of data mining, this book focuses specifically on new methodologies and case studies. Included are case studies written by 44 leading scientists and talented young scholars from seven different countries. Topics covered include data mining based on rough sets, the impact of missing data, and mining free text for structure. In addition, the four basic mining operations supported by numerous mining techniques are addressed: predictive model creation supported by supervised induction techniques; link analysis supported by association discovery and sequence discovery techniques; DB segmentation supported by clustering techniques; and deviation detection supported by statistical

techniques."

Mathematical Tools for Data Mining Apress

Longlisted for the National Book Award New York Times Bestseller A former Wall Street quant sounds an alarm on the mathematical models that pervade modern life -- and threaten to rip apart our social fabric We live in the age of the algorithm. Increasingly, the decisions that affect our lives-- where we go to school, whether we get a car loan, how much we pay for health insurance--are being made not by humans, but by mathematical models. In theory, this should lead to greater fairness: Everyone is judged according to the same rules, and bias is eliminated. But as Cathy O'Neil reveals in this urgent and necessary book, the opposite is true. The models being used today are opaque, unregulated, and uncontestable, even when they're wrong. Most troubling, they reinforce discrimination: If a poor student can't get a loan because a lending model deems him too risky (by virtue of his zip code), he's then cut off from the kind of education that could pull him out of poverty, and a vicious spiral ensues. Models are propping up the lucky and punishing the downtrodden, creating a "toxic cocktail for democracy." Welcome to the dark side of Big Data. Tracing the arc of a person's life, O'Neil exposes the black box models that shape our future, both as individuals and as a society. These "weapons of math destruction" score teachers and students, sort resumes, grant (or deny) loans, evaluate workers, target voters, set parole, and monitor our health. O'Neil calls on modelers to take more responsibility for their algorithms and on policy makers to regulate their use. But in the end, it's up to us to become more savvy about the models that govern our lives. This important book empowers us to ask the tough questions, uncover the truth, and demand change. - Longlist for National Book Award (Non-Fiction) -- Goodreads, semi-finalist for the 2016 Goodreads Choice Awards (Science and Technology) -- Kirkus, Best Books of 2016 -- New York Times, 100 Notable Books of 2016 (Non-Fiction) -- The Guardian, Best Books of 2016 -- WBUR's "On Point," Best Books of 2016: Staff Picks -- Boston Globe, Best Books of 2016, Non-Fiction

Analysis, Features, Classification and Retrieval American Mathematical Soc.

Data mining aims at finding interesting, useful or profitable information in very large databases. The enormous increase in the size of available scientific and commercial databases (data avalanche) as well as the continuing and exponential growth in performance of present day computers make data mining a very active field. In many cases, the burgeoning volume of data sets has grown so large that it threatens to overwhelm rather than enlighten scientists. Therefore, traditional methods are revised and streamlined, complemented by many new methods to address challenging new problems. Mathematical Programming plays a key role in this endeavor. It helps us to formulate precise objectives (e.g., a clustering criterion or a measure of discrimination) as well as the constraints imposed on the solution (e.g., find a partition, a covering or a hierarchy in clustering). It also provides powerful mathematical tools to build highly performing exact or approximate algorithms. This book is based on lectures presented at the workshop on "Data Mining and Mathematical Programming" (October 10-13, 2006, Montreal) and will be a valuable scientific source of information to faculty, students, and researchers in optimization, data analysis and data mining, as well as people working in computer science, engineering and applied mathematics.

Math + R + Data Academic Press

Data mining, an interdisciplinary field combining methods from artificial intelligence, machine learning, statistics and database systems, has grown tremendously over the last 20 years and produced core results for applications like business intelligence, spatio-temporal data analysis, bioinformatics, and stream data processing. The fifteen contributors to this volume are successful and well-known data mining scientists and professionals. Although by no means an exhaustive list, all of them have helped the field to gain the reputation and importance it enjoys today, through the many valuable contributions they have made. Mohamed Medhat Gaber has asked them (and many others) to write down their journeys through the data mining field, trying to answer the following questions: 1. What are your motives for conducting research in the data mining field? 2. Describe the milestones of your research in this field. 3. What are your notable success stories? 4. How did you learn from your failures? 5. Have you encountered unexpected results? 6. What are the current research issues and challenges in your area? 7. Describe your research tools and techniques. 8. How would you advise a young researcher to make an impact? 9. What do you predict for the next two years in your area? 10. What are your expectations in the long term? In order to maintain the informal character of their contributions, they were given complete freedom as to how to organize their answers. This narrative presentation style provides PhD students and novices who are eager to find their way to successful research in data mining with valuable insights into career planning. In addition, everyone else interested in the history of computer science may be surprised about the stunning successes and possible failures computer science careers (still) have to offer.

Methodologies for Knowledge Discovery and Data Mining SIAM

This book constitutes the refereed proceedings of the Third Pacific-Asia Conference on Knowledge Discovery and Data Mining, PAKDD '99, held in Beijing, China, in April 1999. The 29 revised full papers presented together with 37 short papers were carefully selected from a total of 158 submissions. The book is divided into sections on emerging KDD technology; association rules; feature selection and generation; mining in semi-structured data; interestingness, surprisingness, and exceptions; rough sets, fuzzy logic, and neural networks; induction, classification, and clustering; visualization; causal models and graph-based methods; agent-based and distributed data mining; and advanced topics and new methodologies.

Journeys to Data Mining World Scientific Publishing Company Incorporated

Quantitative biomedical data analysis is a fast-growing interdisciplinary area of applied and computational mathematics, statistics, computer science, and biomedical science, leading to new fields such as bioinformatics, biomathematics, and biostatistics. In addition to traditional statistical techniques and mathematical models using differential equations, new developments with a very broad spectrum of applications, such as wavelets, spline functions, curve and surface subdivisions, sampling, and learning theory, have found their mathematical home in biomedical data analysis. This book gives a new and integrated introduction to quantitative medical data analysis from the viewpoint of biomathematicians, biostatisticians, and bioinformaticians. It offers a definitive resource to bridge the disciplines of mathematics, statistics, and biomedical sciences. Topics include mathematical models for cancer invasion and clinical sciences, data mining techniques and subset selection in data analysis, survival data analysis and survival models for cancer patients, statistical analysis and neural network techniques for genomic and proteomic data analysis, wavelet and

spline applications for mass spectrometry data preprocessing and statistical computing.

Handbook of Statistical Analysis and Data Mining Applications CRC Press

Mathematical Tools for Applied Multivariate Analysis provides information pertinent to the aspects of transformational geometry, matrix algebra, and the calculus that are most relevant for the study of multivariate analysis. This book discusses the mathematical foundations of applied multivariate analysis. Organized into six chapters, this book begins with an overview of the three problems in multiple regression, principal components analysis, and multiple discriminant analysis. This text then presents a standard treatment of the mechanics of matrix algebra, including definitions and operations on matrices, vectors, and determinants. Other chapters consider the topics of eigenstructures and linear transformations that are important to the understanding of multivariate techniques. This book discusses as well the eigenstructures and quadratic forms. The final chapter deals with the geometric aspects of linear transformations. This book is a valuable resource for students.

Mathematical Tools for Applied Multivariate Analysis World Scientific

This book constitutes the thoroughly refereed conference proceedings of the 14th International Conference on Rough Sets, Fuzzy Sets, Data Mining and Granular Computing, RSFDGrC 2013, held in Halifax, Canada in October 2013 as one of the co-located conference of the 2013 Joint Rough Set Symposium, JRS 2013. The 69 papers (including 44 regular and 25 short papers) included in the JRS proceedings (LNCS 8170 and LNCS 8171) were carefully reviewed and selected from 106 submissions. The papers in this volume cover topics such as inconsistency, incompleteness, non-determinism; fuzzy and rough hybridization; granular computing and covering-based rough sets; soft clustering; image and medical data analysis.

Mathematics for Machine Learning Springer Science & Business Media

Annotation The advent of mathematical software has been one of the most important events in mathematics. Mathematical software systems are used to construct examples, to prove theorems, and to find new mathematical phenomena. On the other hand, mathematical research often motivates developments of new algorithms and new systems. Mathematical software systems rely on the cooperation of mathematicians, designers of algorithms, and mathematical programmers. This book is aimed at software developers in mathematics and programming mathematicians, but it also provides opportunities to discuss the topics with mathematicians.

Computational Methods for Data Analysis SIAM

This graduate text covers a variety of mathematical and statistical tools for the analysis of big data coming from biology, medicine and economics. Neural networks, Markov chains, tools from statistical physics and wavelet analysis are used to develop efficient computational algorithms, which are then used for the processing of real-life data using Matlab.

Linear Algebra Tools for Data Mining Springer

Data mining aims at finding interesting, useful or profitable information in very large databases. The enormous increase in the size of available scientific and commercial databases (data avalanche) as well as the continuing and exponential growth in performance of present day computers make data mining a very active field. In many cases, the burgeoning volume of data sets has grown so large that it threatens to overwhelm rather than enlighten scientists. Therefore, traditional methods are revised and streamlined, complemented by many new methods to address challenging new problems. Mathematical Programming plays a key role in this endeavor. It helps us to formulate precise objectives (e.g., a clustering criterion or a measure of discrimination) as well as the constraints imposed on the solution (e.g., find a partition, a covering or a hierarchy in clustering). It also provides powerful mathematical tools to build highly performing exact or approximate algorithms. This book is based on lectures presented at the workshop on "Data Mining and Mathematical Programming" (October 10-13, 2006, Montreal) and will be a valuable scientific source of information to faculty, students, and researchers in optimization, data analysis and data mining, as well as people working in computer science, engineering and applied mathematics.

Weapons of Math Destruction Springer

The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

Proceedings of the First International Congress of Mathematical Software : Beijing, China, 17-19 August 2002 Elsevier

criteria linear and nonlinear programming has proven to be a very useful approach. • Knowledge management for enterprise: These papers address various issues related to the application of knowledge management in corporations using various techniques. A particular emphasis here is on coordination and cooperation. • Risk management: Better knowledge management also requires more advanced techniques for risk management, to identify, control, and minimize the impact of uncertain events, as shown in these papers, using fuzzy set theory and other approaches for better risk management. • Integration of data mining and knowledge management: As indicated earlier, the integration of these two research fields is still in the early stage. Nevertheless, as shown in the papers selected in this volume, researchers have endeavored to integrate data mining methods such as neural networks with various aspects related to knowledge management, such as decision support systems and expert systems, for better knowledge management. September 2004 Yong Shi Weixuan Xu Zhengxin Chen CASDMKM 2004 Organization Hosted by Institute of Policy and Management at the Chinese Academy of Sciences Graduate School of the Chinese Academy of Sciences International Journal of Information Technology and Decision Making Sponsored by Chinese Academy of Sciences National Natural Science Foundation of China University of Nebraska at Omaha, USA Conference Chairs Weixuan Xu, Chinese Academy of Sciences, China Yong Shi, University of Nebraska at Omaha, USA Advisory Committee

Mathematical Foundations for Data Analysis Springer Nature

This two-volume set of CCIS 307 and CCIS 308 constitutes the refereed proceedings of the Third International Conference on Information Computing and Applications, ICICA 2012, held in Chengde, China, in September 2012. The 330 revised full papers presented in both volumes were carefully reviewed and selected from 1089 submissions. The papers are organized in topical sections on internet computing and applications; multimedia networking and computing; intelligent computing and applications; computational statistics and applications; knowledge management and applications; communication technology and applications; information management system; control engineering and applications; business intelligence and applications; cloud and evolutionary computing; computational genomics and proteomics; engineering management and applications.

Cloud Computing for Geospatial Big Data Analytics CRC Press

It is a great privilege and pleasure to write a foreword for a book honoring Wolfgang Gaul on the occasion of his sixtieth birthday. Wolfgang Gaul is currently Professor of Business Administration and Management Science and the Head of the Institute of Decision Theory and Management Science, Faculty of Economics, University of Karlsruhe (TH), Germany. He is, by any measure, one of the most distinguished and eminent scholars in the world today. Wolfgang Gaul has been instrumental in numerous leading research initiatives and has achieved an unprecedented level of success in facilitating communication among researchers in diverse disciplines from around the world. A particularly remarkable and unique aspect of his work is that he has been a leading scholar in such diverse areas of research as graph theory and network models, reliability theory, stochastic optimization, operations research, probability theory, sampling theory, cluster analysis, scaling and multivariate data analysis. His activities have

been directed not only at these and other theoretical topics, but also at applications of statistical and mathematical tools to a multitude of important problems in computer science (e.g., web mining), business research (e.g., market segmentation), management science (e.g., decision support systems) and behavioral sciences (e.g., preference measurement and data mining). All of his endeavors have been accomplished at the highest level of professional excellence.

11th International Conference, RSFDGrC 2007, Toronto, Canada, May 14-16, 2007 Cambridge University Press

This compendium provides a self-contained introduction to mathematical analysis in the field of machine learning and data mining. The mathematical analysis component of the typical mathematical curriculum for computer science students omits these very important ideas and techniques which are indispensable for approaching specialized areas of machine learning centered around optimization such as support vector machines, neural networks, various types of regression, feature selection, and clustering. The book is of special interest to researchers and graduate students who will benefit from these application areas discussed in the book.

Information Computing and Applications MIT Press

This volume presents an extensive collection of contributions covering aspects of the exciting and important research field of data mining techniques in biomedicine. Coverage includes new approaches for the analysis of biomedical data; applications of data mining techniques to real-life problems in medical practice; comprehensive reviews of recent trends in the field. The book addresses incorporation of data mining in fundamental areas of biomedical research: genomics, proteomics, protein characterization, and neuroscience.

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