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Association Analysis

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Highlighting the Importance of Big Data Management and Analysis for Various Applications

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5th International Work-Conference, IWBBIO 2017, Granada, Spain, April 26-28, 2017, Proceedings, Part II

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CARLO KANE

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Leveraging Biomedical and Healthcare
Data: Semantics, Analytics and Knowledge

provides an overview of the approaches used in semantic systems biology, introduces novel areas of its application, and describes step-wise protocols for transforming heterogeneous data into useful knowledge that can influence healthcare and biomedical research. Given the astronomical increase in the number of published reports, papers, and datasets over the last few decades, the ability to

curate this data has become a new field of biomedical and healthcare research. This book discusses big data text-based mining to better understand the molecular architecture of diseases and to guide health care decision. It will be a valuable resource for bioinformaticians and members of several areas of the biomedical field who are interested in understanding more about how to process

and apply great amounts of data to improve their research. Includes at each section resource pages containing a list of available curated raw and processed data that can be used by researchers in the field Provides demonstrative and relevant examples that serve as a general tutorial Presents a list of algorithm names and computational tools available for basic and clinical researchers

Applying Big Data Analytics in Bioinformatics and Medicine CRC Press

This book is designed to introduce biologists, clinicians and computational researchers to fundamental data analysis principles, techniques and tools for supporting the discovery of biomarkers and the implementation of diagnostic/prognostic systems. The focus of the book is on how fundamental statistical and data mining approaches can support biomarker discovery and evaluation, emphasising applications based on different types of "omic" data. The book also discusses design factors, requirements and techniques for disease screening, diagnostic and prognostic applications. Readers are provided with the knowledge needed to assess the

requirements, computational approaches and outputs in disease biomarker research. Commentaries from guest experts are also included, containing detailed discussions of methodologies and applications based on specific types of "omic" data, as well as their integration. Covers the main range of data sources currently used for biomarker discovery Covers the main range of data sources currently used for biomarker discovery Puts emphasis on concepts, design principles and methodologies that can be extended or tailored to more specific applications Offers principles and methods for assessing the bioinformatic/biostatistic limitations, strengths and challenges in biomarker discovery studies Discusses systems biology approaches and applications Includes expert chapter commentaries to further discuss relevance of techniques, summarize biological/clinical implications and provide alternative interpretations A Machine Learning Perspective Academic Press

Development of high-throughput technologies in molecular biology during the last two decades has contributed to

the production of tremendous amounts of data. Microarray and RNA sequencing are two such widely used high-throughput technologies for simultaneously monitoring the expression patterns of thousands of genes. Data produced from such experiments are voluminous (both in dimensionality and numbers of instances) and evolving in nature. Analysis of huge amounts of data toward the identification of interesting patterns that are relevant for a given biological question requires high-performance computational infrastructure as well as efficient machine learning algorithms. Cross-communication of ideas between biologists and computer scientists remains a big challenge. Gene Expression Data Analysis: A Statistical and Machine Learning Perspective has been written with a multidisciplinary audience in mind. The book discusses gene expression data analysis from molecular biology, machine learning, and statistical perspectives. Readers will be able to acquire both theoretical and practical knowledge of methods for identifying novel patterns of high biological significance. To measure the effectiveness of such algorithms, we discuss statistical

and biological performance metrics that can be used in real life or in a simulated environment. This book discusses a large number of benchmark algorithms, tools, systems, and repositories that are commonly used in analyzing gene expression data and validating results. This book will benefit students, researchers, and practitioners in biology, medicine, and computer science by enabling them to acquire in-depth knowledge in statistical and machine-learning-based methods for analyzing gene expression data. Key Features: An introduction to the Central Dogma of molecular biology and information flow in biological systems A systematic overview of the methods for generating gene expression data Background knowledge on statistical modeling and machine learning techniques Detailed methodology of analyzing gene expression data with an example case study Clustering methods for finding co-expression patterns from microarray, bulkRNA, and scRNA data A large number of practical tools, systems, and repositories that are useful for computational biologists to create, analyze, and validate biologically relevant

gene expression patterns Suitable for multidisciplinary researchers and practitioners in computer science and the biological sciences

"Omic" Data Analysis for Personalized Medicine IGI Global

This book addresses the impacts of various types of services such as infrastructure, platforms, software, and business processes that cloud computing and Big Data have introduced into business. Featuring chapters which discuss effective and efficient approaches in dealing with the inherent complexity and increasing demands in data science, a variety of application domains are covered. Various case studies by data management and analysis experts are presented in these chapters. Covered applications include banking, social networks, bioinformatics, healthcare, transportation and criminology. Highlighting the Importance of Big Data Management and Analysis for Various Applications will provide the reader with an understanding of how data management and analysis are adapted to these applications. This book will appeal to researchers and professionals in the field.

Computational Intelligence and Big Data Analytics Academic Press

Big Data of Complex Networks presents and explains the methods from the study of big data that can be used in analysing massive structural data sets, including both very large networks and sets of graphs. As well as applying statistical analysis techniques like sampling and bootstrapping in an interdisciplinary manner to produce novel techniques for analyzing massive amounts of data, this book also explores the possibilities offered by the special aspects such as computer memory in investigating large sets of complex networks. Intended for computer scientists, statisticians and mathematicians interested in the big data and networks, Big Data of Complex Networks is also a valuable tool for researchers in the fields of visualization, data analysis, computer vision and bioinformatics. Key features: Provides a complete discussion of both the hardware and software used to organize big data Describes a wide range of useful applications for managing big data and resultant data sets Maintains a firm focus on massive data and large networks

Unveils innovative techniques to help readers handle big data Matthias Dehmer received his PhD in computer science from the Darmstadt University of Technology, Germany. Currently, he is Professor at UMIT – The Health and Life Sciences University, Austria, and the Universität der Bundeswehr München. His research interests are in graph theory, data science, complex networks, complexity, statistics and information theory. Frank Emmert-Streib received his PhD in theoretical physics from the University of Bremen, and is currently Associate professor at Tampere University of Technology, Finland. His research interests are in the field of computational biology, machine learning and network medicine. Stefan Pickl holds a PhD in mathematics from the Darmstadt University of Technology, and is currently a Professor at Bundeswehr Universität München. His research interests are in operations research, systems biology, graph theory and discrete optimization. Andreas Holzinger received his PhD in cognitive science from Graz University and his habilitation (second PhD) in computer science from Graz University of

Technology. He is head of the Holzinger Group HCI-KDD at the Medical University Graz and Visiting Professor for Machine Learning in Health Informatics Vienna University of Technology.

Probabilistic Models of Proteins and Nucleic Acids BoD – Books on Demand The Encyclopedia of Big Data Technologies provides researchers, educators, students and industry professionals with a comprehensive authority over the most relevant Big Data Technology concepts. With over 300 articles written by worldwide subject matter experts from both industry and academia, the encyclopedia covers topics such as big data storage systems, NoSQL database, cloud computing, distributed systems, data processing, data management, machine learning and social technologies, data science. Each peer-reviewed, highly structured entry provides the reader with basic terminology, subject overviews, key research results, application examples, future directions, cross references and a bibliography. The entries are expository and tutorial, making this reference a practical resource for students, academics, or professionals. In addition, the

distinguished, international editorial board of the encyclopedia consists of well-respected scholars, each developing topics based upon their expertise.

Big Data of Complex Networks Springer Although we can't usually see them, microbes are essential for every part of human life -- indeed all life on Earth. The emerging field of metagenomics offers a new way of exploring the microbial world that will transform modern microbiology and lead to practical applications in medicine, agriculture, alternative energy, environmental remediation, and many others areas. Metagenomics allows researchers to look at the genomes of all of the microbes in an environment at once, providing a "meta" view of the whole microbial community and the complex interactions within it. It's a quantum leap beyond traditional research techniques that rely on studying -- one at a time -- the few microbes that can be grown in the laboratory. At the request of the National Science Foundation, five Institutes of the National Institutes of Health, and the Department of Energy, the National Research Council organized a committee to address the current state of

metagenomics and identify obstacles current researchers are facing in order to determine how to best support the field and encourage its success. The New Science of Metagenomics recommends the establishment of a "Global Metagenomics Initiative" comprising a small number of large-scale metagenomics projects as well as many medium- and small-scale projects to advance the technology and develop the standard practices needed to advance the field. The report also addresses database needs, methodological challenges, and the importance of interdisciplinary collaboration in supporting this new field.

Highlighting the Importance of Big Data Management and Analysis for Various Applications CRC Press

Probabilistic models are becoming increasingly important in analysing the huge amount of data being produced by large-scale DNA-sequencing efforts such as the Human Genome Project. For example, hidden Markov models are used for analysing biological sequences, linguistic-grammar-based probabilistic models for identifying RNA secondary structure, and probabilistic evolutionary

models for inferring phylogenies of sequences from different organisms. This book gives a unified, up-to-date and self-contained account, with a Bayesian slant, of such methods, and more generally to probabilistic methods of sequence analysis. Written by an interdisciplinary team of authors, it aims to be accessible to molecular biologists, computer scientists, and mathematicians with no formal knowledge of the other fields, and at the same time present the state-of-the-art in this new and highly important field. Bioinformatics and Medical Applications World Scientific

Demystifies Biomedical and Biological Big Data Analyses Big Data Analysis for Bioinformatics and Biomedical Discoveries provides a practical guide to the nuts and bolts of Big Data, enabling you to quickly and effectively harness the power of Big Data to make groundbreaking biological discoveries, carry out translational medical research, and implement personalized genomic medicine. Contributing to the NIH Big Data to Knowledge (BD2K) initiative, the book enhances your computational and quantitative skills so that you can exploit the Big Data being generated in

the current omics era. The book explores many significant topics of Big Data analyses in an easily understandable format. It describes popular tools and software for Big Data analyses and explains next-generation DNA sequencing data analyses. It also discusses comprehensive Big Data analyses of several major areas, including the integration of omics data, pharmacogenomics, electronic health record data, and drug discovery. Accessible to biologists, biomedical scientists, bioinformaticians, and computer data analysts, the book keeps complex mathematical deductions and jargon to a minimum. Each chapter includes a theoretical introduction, example applications, data analysis principles, step-by-step tutorials, and authoritative references.

Big Data Analytics in Bioinformatics and Healthcare CRC Press

As technology evolves and electronic data becomes more complex, digital medical record management and analysis becomes a challenge. In order to discover patterns and make relevant predictions based on large data sets, researchers and medical

professionals must find new methods to analyze and extract relevant health information. *Big Data Analytics in Bioinformatics and Healthcare* merges the fields of biology, technology, and medicine in order to present a comprehensive study on the emerging information processing applications necessary in the field of electronic medical record management. Complete with interdisciplinary research resources, this publication is an essential reference source for researchers, practitioners, and students interested in the fields of biological computation, database management, and health information technology, with a special focus on the methodologies and tools to manage massive and complex electronic information.

Big Data Analysis for Bioinformatics and Biomedical Discoveries Springer

This book presents the latest developments in bioinformatics, highlighting the importance of bioinformatics in genomics, transcriptomics, metabolism and cheminformatics analysis, as well as in drug discovery and development. It covers tools, data mining and analysis, protein

analysis, computational vaccine, and drug design. Covering cheminformatics, computational evolutionary biology and the role of next-generation sequencing and neural network analysis, it also discusses the use of bioinformatics tools in the development of precision medicine. This book offers a valuable source of information for not only beginners in bioinformatics, but also for students, researchers, scientists, clinicians, practitioners, policymakers, and stakeholders who are interested in harnessing the potential of bioinformatics in many areas.

Unsupervised Feature Extraction Applied to Bioinformatics CRC Press

Many aspects of modern life have become personalized, yet healthcare practices have been lagging behind in this trend. It is now becoming more common to use big data analysis to improve current healthcare and medicinal systems, and offer better health services to all citizens. *Applying Big Data Analytics in Bioinformatics and Medicine* is a comprehensive reference source that overviews the current state of medical treatments and systems and offers

emerging solutions for a more personalized approach to the healthcare field. Featuring coverage on relevant topics that include smart data, proteomics, medical data storage, and drug design, this publication is an ideal resource for medical professionals, healthcare practitioners, academicians, and researchers interested in the latest trends and techniques in personalized medicine.

Bioinformatics CRC Press

This book highlights that the capacity for gathering, analysing, and utilising vast amounts of digital (user) data raises significant ethical issues. Annika Richterich provides a systematic contemporary overview of the field of critical data studies that reflects on practices of digital data collection and analysis. The book assesses in detail one big data research area: biomedical studies, focused on epidemiological surveillance. Specific case studies explore how big data have been used in academic work. The *Big Data Agenda* concludes that the use of big data in research urgently needs to be considered from the vantage point of ethics and social justice. Drawing upon discourse ethics and critical data studies,

Richterich argues that entanglements between big data research and technology/ internet corporations have emerged. In consequence, more opportunities for discussing and negotiating emerging research practices and their implications for societal values are needed.

5th International Work-Conference, IWBBIO 2017, Granada, Spain, April 26-28, 2017, Proceedings, Part II
Springer Nature

Advances in high-throughput biological methods have led to the publication of a large number of genome-wide studies in human and animal models. In this context, recent tools from bioinformatics and computational biology have been fundamental for the analysis of these genomic studies. The book *Bioinformatics and Human Genomics Research* provides updated and comprehensive information about multiple approaches of the application of bioinformatic tools to research in human genomics. It covers strategies analysis of genome-wide association studies, genome-wide expression studies and genome-wide DNA methylation, among other topics. It

provides interesting strategies for data mining in human genomics, network analysis, prediction of binding sites for miRNAs and transcription factors, among other themes. Experts from all around the world in bioinformatics and human genomics have contributed chapters in this book. Readers will find this book as quite useful for their in silico explorations, which would contribute to a better and deeper understanding of multiple biological processes and of pathophysiology of many human diseases.

Advanced Deep Learning for Engineers and Scientists Wiley-Scrivener

This book covers several of the statistical concepts and data analytic skills needed to succeed in data-driven life science research. The authors proceed from relatively basic concepts related to computed p-values to advanced topics related to analyzing highthroughput data. They include the R code that performs this analysis and connect the lines of code to the statistical and mathematical concepts explained.

Leveraging Biomedical and Healthcare Data Springer

Big Data Analytics in Chemoinformatics and Bioinformatics: With Applications to Computer-Aided Drug Design, Cancer Biology, Emerging Pathogens and Computational Toxicology provides an up-to-date presentation of big data analytics methods and their applications in diverse fields. The proper management of big data for decision-making in scientific and social issues is of paramount importance. This book gives researchers the tools they need to solve big data problems in these fields. It begins with a section on general topics that all readers will find useful and continues with specific sections covering a range of interdisciplinary applications. Here, an international team of leading experts review their respective fields and present their latest research findings, with case studies used throughout to analyze and present key information. Brings together the current knowledge on the most important aspects of big data, including analysis using deep learning and fuzzy logic, transparency and data protection, disparate data analytics, and scalability of the big data domain Covers many applications of big data analysis in diverse fields such as chemistry,

chemoinformatics, bioinformatics, computer-assisted drug/vaccine design, characterization of emerging pathogens, and environmental protection Highlights the considerable benefits offered by big data analytics to science, in biomedical fields and in industry

Gene Quantification National Academies Press

With the advent of new technologies in big data science, the study of medical problems has made significant progress. Connecting medical studies and computational methods is crucial for the advancement of the medical industry. *Big Data Analytics in HIV/AIDS Research* provides emerging research on the development and implementation of computational techniques in big data analysis for biological and medical practices. While highlighting topics such as deep learning, management software, and molecular modeling, this publication explores the various applications of data analysis in clinical decision making. This book is a vital resource for medical practitioners, nurses, scientists, researchers, and students seeking current research on the connections between data

analytics in the field of medicine.

Big Data Analytics CRC Press

An introduction to geometric and topological methods to analyze large scale biological data; includes statistics and genomic applications.

A Practical Approach Elsevier

This book addresses the impacts of various types of services such as infrastructure, platforms, software, and business processes that cloud computing and Big Data have introduced into business. Featuring chapters which discuss effective and efficient approaches in dealing with the inherent complexity and increasing demands in data science, a variety of application domains are covered. Various case studies by data management and analysis experts are presented in these chapters. Covered applications include banking, social networks, bioinformatics, healthcare, transportation and criminology. *Highlighting the Importance of Big Data Management and Analysis for Various Applications* will provide the reader with an understanding of how data management and analysis are adapted to these applications. This book will appeal to

researchers and professionals in the field.

A Statistical and Machine Learning

Perspective Springer Nature

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