

Charu C. Aggarwal · Jiawei Han *Editors*

Frequent Pattern Mining

 Springer

Frequent Pattern Mining Charu Aggarwal

Dr. N. Venkatesan



Frequent Pattern Mining Charu Aggarwal:

Frequent Pattern Mining Charu C. Aggarwal, Jiawei Han, 2014-08-29 This comprehensive reference consists of 18 chapters from prominent researchers in the field. Each chapter is self-contained and synthesizes one aspect of frequent pattern mining. An emphasis is placed on simplifying the content so that students and practitioners can benefit from the book. Each chapter contains a survey describing key research on the topic, a case study, and future directions. Key topics include Pattern Growth Methods, Frequent Pattern Mining in Data Streams, Mining Graph Patterns, Big Data, Frequent Pattern Mining Algorithms for Data Clustering, and more. Advanced level students in computer science, researchers, and practitioners from industry will find this book an invaluable reference.

Data Mining Charu C. Aggarwal, 2015-04-13 This textbook explores the different aspects of data mining from the fundamentals to the complex data types and their applications, capturing the wide diversity of problem domains for data mining issues. It goes beyond the traditional focus on data mining problems to introduce advanced data types such as text, time series, discrete sequences, spatial data, graph data, and social networks. Until now, no single book has addressed all these topics in a comprehensive and integrated way. The chapters of this book fall into one of three categories: Fundamental chapters, Domain chapters, and Application chapters. Fundamental chapters: Data mining has four main problems which correspond to clustering, classification, association pattern mining, and outlier analysis. These chapters comprehensively discuss a wide variety of methods for these problems. Domain chapters: These chapters discuss the specific methods used for different domains of data such as text data, time series data, sequence data, graph data, and spatial data. Application chapters: These chapters study important applications such as stream mining, Web mining, ranking, recommendations, social networks, and privacy preservation. The domain chapters also have an applied flavor. Appropriate for both introductory and advanced data mining courses. Data Mining: The Textbook balances mathematical details and intuition. It contains the necessary mathematical details for professors and researchers but is presented in a simple and intuitive style to improve accessibility for students and industrial practitioners, including those with a limited mathematical background. Numerous illustrations, examples, and exercises are included with an emphasis on semantically interpretable examples. Praise for Data Mining: The Textbook. As I read through this book, I have already decided to use it in my classes. This is a book written by an outstanding researcher who has made fundamental contributions to data mining in a way that is both accessible and up to date. The book is complete with theory and practical use cases. It is a must-have for students and professors alike. Qiang Yang, Chair of Computer Science and Engineering at Hong Kong University of Science and Technology. This is the most amazing and comprehensive text book on data mining. It covers not only the fundamental problems such as clustering, classification, outliers, and frequent patterns and different data types including text, time series, sequences, spatial data, and graphs but also various applications such as recommenders, Web, social network, and privacy. It is a great book for graduate students and researchers as well as practitioners. Philip S. Yu, UIC Distinguished Professor and Wexler Chair in Information Technology at University of Illinois at

Chicago *Data Science Concepts and Techniques with Applications* Usman Qamar, Muhammad Sumair Raza, 2023-04-02 This textbook comprehensively covers both fundamental and advanced topics related to data science. Data science is an umbrella term that encompasses data analytics, data mining, machine learning, and several other related disciplines. The chapters of this book are organized into three parts. The first part, chapters 1 to 3, is a general introduction to data science. Starting from the basic concepts, the book will highlight the types of data, its use, its importance, and issues that are normally faced in data analytics, followed by presentation of a wide range of applications and widely used techniques in data science. The second part, which has been updated and considerably extended compared to the first edition, is devoted to various techniques and tools applied in data science. Its chapters 4 to 10 detail data pre-processing, classification, clustering, text mining, deep learning, frequent pattern mining, and regression analysis. Eventually, the third part, chapters 11 and 12, present a brief introduction to Python and R, the two main data science programming languages, and shows in a completely new chapter practical data science in the WEKA Waikato Environment for Knowledge Analysis, an open source tool for performing different machine learning and data mining tasks. An appendix explaining the basic mathematical concepts of data science completes the book. This textbook is suitable for advanced undergraduate and graduate students as well as for industrial practitioners who carry out research in data science. They both will not only benefit from the comprehensive presentation of important topics but also from the many application examples and the comprehensive list of further readings which point to additional publications providing more in-depth research results or provide sources for a more detailed description of related topics. This book delivers a systematic, carefully thought-out material on Data Science. Foreword by Witold Pedrycz, U Alberta, Canada. *Data Streams* Charu C. Aggarwal, 2007-04-03 This book primarily discusses issues related to the mining aspects of data streams and is unique in its primary focus on the subject. This volume covers mining aspects of data streams comprehensively; each contributed chapter contains a survey on the topic, the key ideas in the field for that particular topic, and future research directions. The book is intended for a professional audience composed of researchers and practitioners in industry. This book is also appropriate for advanced level students in computer science. *Business and Consumer Analytics: New Ideas* Pablo Moscato, Natalie Jane de Vries, 2019-05-30 This two-volume handbook presents a collection of novel methodologies with applications and illustrative examples in the areas of data-driven computational social sciences. Throughout this handbook, the focus is kept specifically on business and consumer-oriented applications with interesting sections ranging from clustering and network analysis, meta-analytics, memetic algorithms, machine learning recommender systems, methodologies, parallel pattern mining, and data mining to specific applications in market segmentation, travel, fashion, or entertainment analytics. A must-read for anyone in data analytics, marketing, behavior modelling, and computational social science interested in the latest applications of new computer science methodologies. The chapters are contributed by leading experts in the associated fields. The chapters cover technical aspects at different levels, some of which are introductory and

could be used for teaching Some chapters aim at building a common understanding of the methodologies and recent application areas including the introduction of new theoretical results in the complexity of core problems Business and marketing professionals may use the book to familiarize themselves with some important foundations of data science The work is a good starting point to establish an open dialogue of communication between professionals and researchers from different fields Together the two volumes present a number of different new directions in Business and Customer Analytics with an emphasis in personalization of services the development of new mathematical models and new algorithms heuristics and metaheuristics applied to the challenging problems in the field Sections of the book have introductory material to more specific and advanced themes in some of the chapters allowing the volumes to be used as an advanced textbook Clustering Proximity Graphs Pattern Mining Frequent Itemset Mining Feature Engineering Network and Community Detection Network based Recommending Systems and Visualization are some of the topics in the first volume Techniques on Memetic Algorithms and their applications to Business Analytics and Data Science are surveyed in the second volume applications in Team Orienteering Competitive Facility location and Visualization of Products and Consumers are also discussed The second volume also includes an introduction to Meta Analytics and to the application areas of Fashion and Travel Analytics Overall the two volume set helps to describe some fundamentals acts as a bridge between different disciplines and presents important results in a rapidly moving field combining powerful optimization techniques allied to new mathematical models critical for personalization of services Academics and professionals working in the area of business analytics data science operations research and marketing will find this handbook valuable as a reference Students studying these fields will find this handbook useful and helpful as a secondary textbook

Hands-on Pattern Mining Uday Kiran Raje, 2025-08-11 This book introduces pattern mining by presenting various pattern mining techniques and giving hands on experience with each technique Pattern mining is a popular data mining technique with many real world applications and involves discovering all user interest based patterns that may exist in a database Several models and numerous algorithms were described in the literature to find these patterns in binary databases quantitative databases uncertain databases and streams Since the lack of a Python toolkit containing these algorithms has limited the wide adaptability of pattern mining techniques the author developed Pattern Mining PAMI Python library which currently contains 80 algorithms to discover useful patterns in transactional databases temporal databases quantitative databases and graphs The book consists of three main parts if supportLists endif Introduction The first chapter introduces big data types of learning techniques and the importance of pattern mining The second chapter introduces the PAMI library its organizational structure installation and usage if supportLists endif Pattern mining algorithms and examples The following chapters present the state of the art techniques for discovering user interest based patterns in 1 transactional databases 2 temporal databases 3 quantitative databases 4 uncertain databases 5 sequential databases and 6 graphs if supportLists endif Applications The book concludes with several

applications where the predicted knowledge using TensorFlow and PyTorch was transformed into a database to discover future trends or patterns

Frequent Pattern Mining in Health Care Database Dr. N. Venkatesan, *Machine Learning for Data Streams* Albert Bifet, Ricard Gavalda, Geoffrey Holmes, Bernhard Pfahringer, 2018-03-16 A hands on approach to tasks and techniques in data stream mining and real time analytics with examples in MOA a popular freely available open source software framework Today many information sources including sensor networks financial markets social networks and healthcare monitoring are so called data streams arriving sequentially and at high speed Analysis must take place in real time with partial data and without the capacity to store the entire data set This book presents algorithms and techniques used in data stream mining and real time analytics Taking a hands on approach the book demonstrates the techniques using MOA Massive Online Analysis a popular freely available open source software framework allowing readers to try out the techniques after reading the explanations The book first offers a brief introduction to the topic covering big data mining basic methodologies for mining data streams and a simple example of MOA More detailed discussions follow with chapters on sketching techniques change classification ensemble methods regression clustering and frequent pattern mining Most of these chapters include exercises an MOA based lab session or both Finally the book discusses the MOA software covering the MOA graphical user interface the command line use of its API and the development of new methods within MOA The book will be an essential reference for readers who want to use data stream mining as a tool researchers in innovation or data stream mining and programmers who want to create new algorithms for MOA

Event Mining Tao Li, 2015-10-15 With a focus on computing system management this book presents a variety of event mining approaches for improving the quality and efficiency of IT service and system management It covers different components in the data driven framework from system monitoring and event generation to pattern discovery and summarization The book explores recent developments in event mining such as new clustering based approaches as well as various applications of event mining including social media

Feature Engineering for Machine Learning and Data Analytics Guozhu Dong, Huan Liu, 2018-03-14 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 Healthcare Data Analytics Chandan K. Reddy,Charu C. Aggarwal,2015-06-23 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 **Proceedings of the First International Conference on Computational Intelligence and Informatics** Suresh Chandra Satapathy,V. Kamakshi Prasad,B. Padmaja Rani,Siba K. Udgata,K. Srujan Raju,2016-11-26 The book covers a variety of topics which include data mining and data warehousing high performance computing parallel and distributed computing computational intelligence soft computing big data cloud computing grid computing cognitive computing image processing computer networks wireless networks social networks wireless sensor networks information and network security web security internet of things bioinformatics and geoinformatics The book is a collection of best papers submitted in the First International Conference on Computational Intelligence and Informatics ICCII 2016 held during 28 30 May 2016 at JNTUH CEH Hyderabad India It was hosted by Department of Computer Science and Engineering JNTUH College of Engineering in association with Division V Education Research CSI India Semantic Data Mining Agnieszka Lawrynowicz,2017-04-15 Ontologies are now increasingly used to integrate and organize data and knowledge particularly in data and knowledge intensive applications in both research and industry The book is devoted to semantic data mining a data mining approach where domain ontologies are used as background knowledge and where the new challenge is to mine knowledge encoded in domain ontologies and knowledge graphs rather than only purely empirical data The introductory chapters of the book provide theoretical foundations of both data mining and ontology representation Taking a unified perspective the book then covers several methods for semantic data mining addressing tasks such as pattern mining classification and similarity based approaches It attempts to provide state of the art answers to specific challenges and peculiarities of data mining with use of ontologies in particular How to deal with incompleteness of knowledge and the so called Open World Assumption What is a truly semantic similarity measure The book contains several chapters with examples of applications of semantic data mining The examples start from a scenario with moderate use of lightweight ontologies for

knowledge graph enrichment and end with a full fledged scenario of an intelligent knowledge discovery assistant using complex domain ontologies for meta mining i.e an ontology based meta learning approach to full data mining processes The book is intended for researchers in the fields of semantic technologies knowledge engineering data science and data mining and developers of knowledge based systems and applications

Managing and Mining Uncertain Data Charu C.

Aggarwal,2010-07-08 Managing and Mining Uncertain Data a survey with chapters by a variety of well known researchers in the data mining field presents the most recent models algorithms and applications in the uncertain data mining field in a structured and concise way This book is organized to make it more accessible to applications driven practitioners for solving real problems Also given the lack of structurally organized information on this topic Managing and Mining Uncertain Data provides insights which are not easily accessible elsewhere Managing and Mining Uncertain Data is designed for a professional audience composed of researchers and practitioners in industry This book is also suitable as a reference book for advanced level students in computer science and engineering as well as the ACM IEEE SIAM INFORMS and AAAI Society groups

Science and Technology for Shaping the Future of Mizoram Dr. K. Lalchhandama,2017-05-26 This book is

the direct outcome of the Mizoram Science Congress 2016 held on 13 and 14 November 2016

Recommender Systems Charu C. Aggarwal,2016-03-28 This book comprehensively covers the topic of recommender systems which provide personalized recommendations of products or services to users based on their previous searches or purchases Recommender system methods have been adapted to diverse applications including query log mining social networking news recommendations and computational advertising This book synthesizes both fundamental and advanced topics of a research area that has now reached maturity The chapters of this book are organized into three categories Algorithms and evaluation These chapters discuss the fundamental algorithms in recommender systems including collaborative filtering methods content based methods knowledge based methods ensemble based methods and evaluation Recommendations in specific domains and contexts the context of a recommendation can be viewed as important side information that affects the recommendation goals Different types of context such as temporal data spatial data social data tagging data and trustworthiness are explored Advanced topics and applications Various robustness aspects of recommender systems such as shilling systems attack models and their defenses are discussed In addition recent topics such as learning to rank multi armed bandits group systems multi criteria systems and active learning systems are introduced together with applications Although this book primarily serves as a textbook it will also appeal to industrial practitioners and researchers due to its focus on applications and references Numerous examples and exercises have been provided and a solution manual is available for instructors

Explainable Deep Learning AI Jenny Benoit-Pineau,Romain Bourqui,Dragutin

Petkovic,Georges Quenot,2023-02-20 Explainable Deep Learning AI Methods and Challenges presents the latest works of leading researchers in the XAI area offering an overview of the XAI area along with several novel technical methods and

applications that address explainability challenges for deep learning AI systems The book overviews XAI and then covers a number of specific technical works and approaches for deep learning ranging from general XAI methods to specific XAI applications and finally with user oriented evaluation approaches It also explores the main categories of explainable AI deep learning which become the necessary condition in various applications of artificial intelligence The groups of methods such as back propagation and perturbation based methods are explained and the application to various kinds of data classification are presented Provides an overview of main approaches to Explainable Artificial Intelligence XAI in the Deep Learning realm including the most popular techniques and their use concluding with challenges and exciting future directions of XAI Explores the latest developments in general XAI methods for Deep Learning Explains how XAI for Deep Learning is applied to various domains like images medicine and natural language processing Provides an overview of how XAI systems are tested and evaluated specially with real users a critical need in XAI

e-Infrastructure and e-Services for Developing Countries Rafik Zitouni,Max Agueh,Pélagie Houngue,Hénoc Soude,2020-02-13 This book constitutes the thoroughly refereed proceedings of the 11th International Conference on e Infrastructure and e Services for Developing Countries AFRICOMM 2019 held in Porto Novo Benin in December 2019 The 19 full papers were carefully selected from 46 submissions The accepted papers provide a wide range of research topics including targeted infrastructures Internet of Things IoT wireless and mobile networks intelligent transportation systems ITS software and network security cloud and virtualization data analytics and machine learning

Data Clustering Charu C. Aggarwal,Chandan K. Reddy,2018-09-03 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

Semantic Mining of Social Networks Jie Tang,Juanzi Li,2022-06-01 Online social networks have already become a bridge connecting

our physical daily life with the web based information space This connection produces a huge volume of data not only about the information itself but also about user behavior The ubiquity of the social Web and the wealth of social data offer us unprecedented opportunities for studying the interaction patterns among users so as to understand the dynamic mechanisms underlying different networks something that was previously difficult to explore due to the lack of available data In this book we present the architecture of the research for social network mining from a microscopic point of view We focus on investigating several key issues in social networks Specifically we begin with analytics of social interactions between users The first kinds of questions we try to answer are What are the fundamental factors that form the different categories of social ties How have reciprocal relationships been developed from parasocial relationships How do connected users further form groups Another theme addressed in this book is the study of social influence Social influence occurs when one's opinions emotions or behaviors are affected by others intentionally or unintentionally Considerable research has been conducted to verify the existence of social influence in various networks However few literature studies address how to quantify the strength of influence between users from different aspects In Chapter 4 and in 138 we have studied how to model and predict user behaviors One fundamental problem is distinguishing the effects of different social factors such as social influence homophily and individual's characteristics We introduce a probabilistic model to address this problem Finally we use an academic social network ArnetMiner as an example to demonstrate how we apply the introduced technologies for mining real social networks In this system we try to mine knowledge from both the informative publication network and the social collaboration network and to understand the interaction mechanisms between the two networks The system has been in operation since 2006 and has already attracted millions of users from more than 220 countries regions

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