

Lei Tang - Huan Liu

Community Detection and Mining in Social Media

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Lei Cui



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Community detection and mining in social media Lei Tang, Huan Liu, 2022-06-01 The past decade has witnessed the emergence of participatory Web and social media bringing people together in many creative ways Millions of users are playing tagging working and socializing online demonstrating new forms of collaboration communication and intelligence that were hardly imaginable just a short time ago Social media also helps reshape business models sway opinions and emotions and opens up numerous possibilities to study human interaction and collective behavior in an unparalleled scale This lecture from a data mining perspective introduces characteristics of social media reviews representative tasks of computing with social media and illustrates associated challenges It introduces basic concepts presents state of the art algorithms with easy to understand examples and recommends effective evaluation methods In particular we discuss graph based community detection techniques and many important extensions that handle dynamic heterogeneous networks in social media We also demonstrate how discovered patterns of communities can be used for social media mining The concepts algorithms and methods presented in this lecture can help harness the power of social media and support building socially intelligent systems This book is an accessible introduction to the study of emph community detection and mining in social media It is an essential reading for students researchers and practitioners in disciplines and applications where social media is a key source of data that piques our curiosity to understand manage innovate and excel This book is supported by additional materials including lecture slides the complete set of figures key references some toy data sets used in the book and the source code of representative algorithms The readers are encouraged to visit the book website for the latest information Table of Contents Social Media and Social Computing Nodes Ties and Influence Community Detection and Evaluation Communities in Heterogeneous Networks Social Media Mining **Social Media Mining** Reza

Zafarani, Mohammad Ali Abbasi, Huan Liu, 2014-04-28 The growth of social media over the last decade has revolutionized the way individuals interact and industries conduct business Individuals produce data at an unprecedented rate by interacting sharing and consuming content through social media Understanding and processing this new type of data to glean actionable patterns presents challenges and opportunities for interdisciplinary research novel algorithms and tool development Social Media Mining integrates social media social network analysis and data mining to provide a coherent platform to understand the basics and potentials of social media mining It introduces the unique problems arising from social media data and presents fundamental concepts emerging issues and effective algorithms for network analysis and data mining Suitable for use in advanced undergraduate and beginning graduate courses as well as professional short courses the text contains exercises of different degrees of difficulty that improve understanding and help apply concepts principles and methods for social media mining Privacy in Social Networks Elena Zheleva, Evimaria Terzi, Lise Getoor, 2022-05-31 This synthesis lecture provides a survey of work on privacy in online social networks OSNs This work encompasses concerns of users as

well as service providers and third parties Our goal is to approach such concerns from a computer science perspective and building upon existing work on privacy security statistical modeling and databases to provide an overview of the technical and algorithmic issues related to privacy in OSNs We start our survey by introducing a simple OSN data model and describe common statistical inference techniques that can be used to infer potentially sensitive information Next we describe some privacy definitions and privacy mechanisms for data publishing Finally we describe a set of recent techniques for modeling evaluating and managing individual users privacy risk within the context of OSNs

Table of Contents Introduction A Model for Online Social Networks Types of Privacy Disclosure Statistical Methods for Inferring Information in Networks Anonymity and Differential Privacy Attacks and Privacy preserving Mechanisms Models of Information Sharing Users Privacy Risk Management of Privacy Settings

Exploiting the Power of Group Differences Guozhu Dong, 2022-05-31 This book presents pattern based problem solving methods for a variety of machine learning and data analysis problems The methods are all based on techniques that exploit the power of group differences They make use of group differences represented using emerging patterns aka contrast patterns which are patterns that match significantly different numbers of instances in different data groups A large number of applications outside of the computing discipline are also included Emerging patterns EPs are useful in many ways EPs can be used as features as simple classifiers as subpopulation signatures characterizations and as triggering conditions for alerts EPs can be used in gene ranking for complex diseases since they capture multi factor interactions The length of EPs can be used to detect anomalies outliers and novelties Emerging contrast pattern based methods for clustering analysis and outlier detection do not need distance metrics avoiding pitfalls of the latter in exploratory analysis of high dimensional data EP based classifiers can achieve good accuracy even when the training datasets are tiny making them useful for exploratory compound selection in drug design EPs can serve as opportunities in opportunity focused boosting and are useful for constructing powerful conditional ensembles EP based methods often produce interpretable models and results In general EPs are useful for classification clustering outlier detection gene ranking for complex diseases prediction model analysis and improvement and so on EPs are useful for many tasks because they represent group differences which have extraordinary power Moreover EPs represent multi factor interactions whose effective handling is of vital importance and is a major challenge in many disciplines Based on the results presented in this book one can clearly say that patterns are useful especially when they are linked to issues of interest We believe that many effective ways to exploit group differences power still remain to be discovered Hopefully this book will inspire readers to discover such new ways besides showing them existing ways to solve various challenging problems

Community Structure Analysis from Social Networks Sajid Yousuf Bhat, Fouzia Jan, Muhammad Abulaish, 2025-07-23 This book addresses social and complex network analysis challenges exploring social network structures dynamic networks and hierarchical communities Emphasizing network structure heterogeneity including directionality and dynamics it covers community structure concepts

like distinctness overlap and hierarchy The book aims to present challenges and innovative solutions in community structure detection incorporating diversity into problem solving Furthermore it explores the applications of identified community structures within network analysis offering insights into social network dynamics Investigates the practical applications and uses of community structures identified from network analysis across various domains of real world networks Highlights the challenges encountered in analyzing community structures and presents state of the art approaches designed to address these challenges Spans into various domains like business intelligence marketing and epidemics examining influential node detection and crime within social networks Explores methodologies for evaluating the quality and accuracy of community detection models Examines a diverse range of challenges and offers innovative solutions in the field of detecting community structures from social networks The book is a ready reference for researchers and scholars of Computer Science and Computational Social Systems working in the area of Community Structure Analysis from Social Network Data

Exploratory Causal Analysis with Time Series Data James M. McCracken, 2022-06-01 Many scientific disciplines rely on observational data of systems for which it is difficult or impossible to implement controlled experiments Data analysis techniques are required for identifying causal information and relationships directly from such observational data This need has led to the development of many different time series causality approaches and tools including transfer entropy convergent cross mapping CCM and Granger causality statistics A practicing analyst can explore the literature to find many proposals for identifying drivers and causal connections in time series data sets Exploratory causal analysis ECA provides a framework for exploring potential causal structures in time series data sets and is characterized by a myopic goal to determine which data series from a given set of series might be seen as the primary driver In this work ECA is used on several synthetic and empirical data sets and it is found that all of the tested time series causality tools agree with each other and intuitive notions of causality for many simple systems but can provide conflicting causal inferences for more complicated systems It is proposed that such disagreements between different time series causality tools during ECA might provide deeper insight into the data than could be found otherwise Correlation Clustering Francesco Bonchi, David

García-Soriano, Francesco Gullo, 2022-05-31 Given a set of objects and a pairwise similarity measure between them the goal of correlation clustering is to partition the objects in a set of clusters to maximize the similarity of the objects within the same cluster and minimize the similarity of the objects in different clusters In most of the variants of correlation clustering the number of clusters is not a given parameter instead the optimal number of clusters is automatically determined Correlation clustering is perhaps the most natural formulation of clustering as it just needs a definition of similarity its broad generality makes it applicable to a wide range of problems in different contexts and particularly makes it naturally suitable to clustering structured objects for which feature vectors can be difficult to obtain Despite its simplicity generality and wide applicability correlation clustering has so far received much more attention from an algorithmic theory perspective than from

the data mining community The goal of this lecture is to show how correlation clustering can be a powerful addition to the toolkit of a data mining researcher and practitioner and to encourage further research in the area **Social Media**

Processing Xueqi Cheng,Weiying Ma,Huan Liu,Huawei Shen,Shizheng Feng,Xing Xie,2017-10-24 This book constitutes the thoroughly refereed proceedings of the 6th National Conference of Social Media Processing SMP 2017 held in Beijing China in September 2017 The 28 revised full papers presented were carefully reviewed and selected from 140 submissions The papers address issues such as knowledge discovery for data natural language processing text mining and sentiment analysis social network analysis and social computing From Social Data Mining and Analysis to Prediction and Community

Detection Mehmet Kaya,Özcan Erdoğan,Jon Rokne,2017-03-21 This book presents the state of the art in various aspects of analysis and mining of online social networks Within the broader context of online social networks it focuses on important and upcoming topics of social network analysis and mining such as the latest in sentiment trends research and a variety of techniques for community detection and analysis The book collects chapters that are expanded versions of the best papers presented at the IEEE ACM International Conference on Advances in Social Networks Analysis and Mining ASONAM 2015 which was held in Paris France in August 2015 All papers have been peer reviewed and checked carefully for overlap with the literature The book will appeal to students and researchers in social network analysis mining and machine learning

Social Networks Mining: Concepts, Techniques, and Applications in Library and Information Science Sohong Dhar,2025-07-01 Social Networks Mining Concepts Techniques and Applications in Library and Information Science by Sohong Dhar offers a comprehensive guide to analyzing and mining social media data Tailored for library and information professionals it explores key methods and real world applications to unlock insights from digital networks making it a vital resource for data driven research and decision making in the information age *From Security to Community Detection in Social Networking Platforms* Panagiotis Karampelas,Jalal Kawash,Tansel Özyer,2019-04-09 This book focuses on novel and state of the art scientific work in the area of detection and prediction techniques using information found generally in graphs and particularly in social networks Community detection techniques are presented in diverse contexts and for different applications while prediction methods for structured and unstructured data are applied to a variety of fields such as financial systems security forums and social networks The rest of the book focuses on graph based techniques for data analysis such as graph clustering and edge sampling The research presented in this volume was selected based on solid reviews from the IEEE ACM International Conference on Advances in Social Networks Analysis and Mining ASONAM 17 Chapters were then improved and extended substantially and the final versions were rigorously reviewed and revised to meet the series standards This book will appeal to practitioners researchers and students in the field **Community Detection in Social Networks** Zhige Xin,2018 Community detection in large scale networks has recently attracted greater interest and research focus Identifying community structure is essential for uncovering underlying functionality and interaction patterns in

complex networks In this dissertation we divide this rather substantial topic into three related aspects disjoint community detection multi view community detection and overlapping community detection In the first part we study the similarity measurements on disjoint community structure using spectral graph partitioning We tested various similarity measurements not only on synthetic data but also Facebook newsgroup pages we crawled In Facebook various interactions make it hard to analyze network structure To deal with this problem we derive a multi view community detection method to uncover the latent structure of Facebook newsgroup pages Another issue is that people can simultaneously stay in different groups like family friends or colleagues Thus mining overlapping communities can give people more sensible and meaningful results in real networks Last we focus on overlapping community structure and study the application of overlapping community detection in recommendation for Facebook posts

Mining and Analyzing Social Networks I-Hsien Ting, Hui-Ju Wu, Tien-Hwa Ho, 2010-05-29 Mining social networks has now becoming a very popular research area not only for data mining and web mining but also social network analysis Data mining is a technique that has the ability to process and analyze large amount of data and by this to discover valuable information from the data In recent year due to the growth of social communications and social networking websites data mining becomes a very important and powerful technique to process and analyze such large amount of data Thus this book will focus upon Mining and Analyzing social network Some chapters in this book are extended from the papers that presented in MSNDS2009 the First International Workshop on Mining Social Networks for Decision Support and SNMABA2009 The International Workshop on Social Networks Mining and Analysis for Business Applications In addition we also sent invitations to researchers that are famous in this research area to contribute for this book The chapters of this book are introduced as follows In chapter 1 Graph Model for Pattern Recognition in Text Qin Wu et al present a novel approach that uses a weighted directed multigraph for text pattern recognition In the proposed methodology a weighted directed multigraph model has been set up by using the distances between the keywords as the weights of arcs as well a keyword frequency distance based algorithm has also been introduced Case studies are also included in this chapter to show the performance is better than traditional means

Social Media Mining Reza Zafarani, 2014 Community Detection in Dynamic Social Networks Nathan Aston, 2014 *COMMUNITY DETECTION FOR SOCIAL NETWORK ANALYSIS* Seema Rani, 2022-02-20

Machine Learning Methods for Community Detection in Networks Using Known Community Information Meghana Venkata Palukuri, 2022 In a network the problem of community detection refers to finding groups of nodes and edges that form communities relevant to the field such as groups of people with common interests in social networks and fraudulent websites linked to each other on the web Community detection also yields downstream use cases such as the summarization of massive networks into smaller networks of communities We are most interested in mining protein complexes i e communities of interacting proteins accelerating biological experiments by providing candidates for previously unknown protein complexes Characterization of protein

complexes is important as they play essential roles in cellular functions and their disruption often leads to disease. Previous methods in community detection comprise a majority of unsupervised graph clustering strategies which work on the assumption that communities are dense subgraphs in a network which is not always true. Also many community detection algorithms are in memory and serial and do not scale to large networks. In this dissertation we use knowledge from communities including rich features from graph nodes with supervised and reinforcement learning improving on accuracies with parallel algorithms ensuring high performance and scalability. Specifically we work on 1 learning a community fitness function using supervised machine learning methods with AutoML 2 a distributed algorithm for finding candidate communities using multiple heuristics 3 learning to walk trajectories on a network leading to communities with reinforcement learning and 4 feature augmentation with graph node information such as images and additional graph node embeddings. While we optimize our algorithms on protein complexes that have characteristics such as being overlapping in nature with different topologies our methods are generalizable to other domains since they learn and use characteristics of communities to predict new communities. Further in domains with limited known information the algorithms we develop can be applied by transferring learned knowledge such as dense community fitness functions from other domains. In conclusion we build Super Complex RL complex detection and DeepSLICEM three accurate efficient scalable and generalizable community detection algorithms that effectively utilize known community information with different machine learning methods and also present 3 evaluation measures for accurate community evaluation.

Privacy Preserving Data Mining for Numerical Matrices, Social Networks, and Big Data Lian Liu, 2015 [Community Detection in Social Networks](#) Lei Cui, 2016

Community structure is one of the essential properties of social networks. That is the users can be divided into groups within which the communications are dense while between which the communications are sparse. This modular structure can disclose important cues especially in online social networks, metabolic interaction networks, WWW, wireless sensor network and viral marketing and facilitate creation, representation and transfer of knowledge and influence. For lack of standard and exact definition of community structure of social networks we take the factors of time complexity and effectiveness into account and design community detection algorithms adjusted to various application situations. In this dissertation based on existing popular community detection methods several innovative methods and ideas were proposed including Global Influence based Maximum K Community Partition, GI-MKCP, Degree based Terminal Set Enhanced Community Detection, TSECD, D-Influence based Modularity Maximization and Competitive Influence Maximization Game based community detection. Due to the NP-hardness of general community detection problems our proposed algorithms can be executed in polynomial time and approximate the optimal solution. More importantly validated and demonstrated by the experiments performed on benchmark networks the proposed algorithms are able to generate high quality community structures and outperform existing algorithms.

Social Network Mining, Analysis, and Research Trends: Techniques

and Applications Ting, I-Hsien,Hong, Tzung-Pei,Wang, Leon Shyue-Liang,2011-12-31 This book covers current research trends in the area of social networks analysis and mining sharing research from experts in the social network analysis and mining communities as well as practitioners from social science business and computer science Provided by publisher

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