

# Computational Social Networks



Ajith Abraham  
Editor

# Computational Social Networks

Mining and Visualization

 Springer

*Editor*  
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# Preface

Computational Social Network is a new emerging field that has overlapping regions from Mathematics, Psychology, Computer Sciences, Sociology, and Management. Emails, blogs, instant messages, social network services, wikis, social bookmarking, and other instances of what is often called social software illustrate ideas from social computing.

Social network analysis is the study of relationships among social entities. Very often, all the necessary information is distributed over a number of Web sites and servers, which brings several research challenges from a data mining perspective. Real-world social networks are very dynamic and constantly evolving. Sometimes, it is much harder for us to comprehend how users in a network are connected and how influential some connections are. Visualization helps us with a better understanding of how networks function. This volume is a collection of chapters authored by world-class experts illustrating the concept of social networks from a computational point of view, with a focus on knowledge discovery (mining) and visualization of complex networks, and open avenues for further research. The authors present some of the latest advances of computational social networks and illustrate how organizations can gain competitive advantages by a better understanding of real-world complex social networks. Experience reports, survey articles, and intelligence techniques and theories with specific networks technology problems are depicted. We hope that this book will be useful for researchers, scholars, postgraduate students, and developers who are interested in social networks research and related issues. In particular, the book will be a valuable companion and comprehensive reference for both postgraduate and senior undergraduate students who are taking a course in Computational Social Networks. The book contains fourteen Chapters, which are divided into two Parts and all chapters are self-contained to provide greatest reading flexibility.

Part I comprises of nine chapters (including an introductory chapter) and deals with the modeling aspects and various computational tools used for better understanding and knowledge discovery in complex networks.

In Chap. 1, Ghali et al. introduce the concept of mining and visualization in social networks. This chapter bridges the gap by combining social network analysis

methods and information visualization technology to help a user visually identify the occurrence of a possible relationship among the members in a social network.

Panda et al. in Chap. 2 introduce clustering analysis to analyze social networks. The authors' approach is intended to address the users of social network, which will not only help an organization to understand their external and internal associations but is also highly necessary for the enhancement of collaboration, innovation, and dissemination of knowledge.

In Chap. 3, Bojic et al. provide a useful insight into the differences between the human social networks based on human-to-human (H2H) interactions and the machine social networks based on machine-to-machine interactions (M2M). The authors illustrate how to analyze social networks by connecting ethological approaches to social behavior in animals and M2M interactions.

Mirkovic et al. in Chap. 4 propose approaches to understand georeferenced community-contributed multimedia data that enable users to answer many questions regarding human behavior, since they are able to discover new trends in who (user), what (content), when (time), and where (place).

In Chap. 5, Liu et al. focus on the problem of correlation mining in news retrieval. The authors present a framework of multimodal multicorrelation news retrieval, which integrates news event correlation, news entity correlation, and event-entity correlation simultaneously by exploring both text and image information. The proposed framework enables a more vivid and informative news browsing by providing two views of result presentation, namely a query-oriented multicorrelation map and a ranking list of news items with necessary descriptions including news image, title, central entities, and relevant events.

Liao et al. in Chap. 6 investigate how micromessaging technologies such as Twitter messages can be harnessed to obtain valuable information. The authors provide some of the potential applications of the micromessaging services and then discuss some insight into different challenges faced by data mining applications. Finally, microblogging services are illustrated by three different case studies.

In Chap. 7, Liu and Yang propose a time-sensitive network by using timestamp to enhance edge representation, and then provide a methodology based on the framework of business intelligence platform to support dynamic network modeling, analysis, and data mining. A proposed framework is illustrated using a nice case study.

Ben Abdesslem et al. in Chap. 8 provide a detailed review about social network data collection and user behavior. The authors highlight the shortcomings in the past research works, and introduce a novel methodology based on the experience sampling method.

In Chap. 9, Guidi et al. focus on Twitter social network features and well known, user's behavior. The authors used the contents that previously Senator and then President Barack Obama has shared in Twitter during a course of three years, and applied text-analysis. The study reveals that the discovered data clusters could be interpreted as a mirror of his political strategy.

Part II deals with usage of social network tools and frameworks for visualization and consists of five chapters.

Reinhardt et al. in Chap. 10 propagate that Artifact-Actor-Networks (AANs) serve well for modeling, storing, and mining the social interactions around digital learning resources originating from various learning services. The authors illustrate the concept by the analysis of six networks.

In Chap. 11, Hung et al. present hypergraph-based clustering method, which utilizes 3D user usage and traversal pattern information to capture user access patterns. The authors introduce a storage solution called object-oriented hypergraph-based clustering approach, which employs hidden hinting among objects in virtual environments.

Catanese et al. in Chap. 12 analyze Facebook by acquiring the necessary information directly from the front-end of the Web site, in order to reconstruct a subgraph representing anonymous interconnections among a significant subset of users. The authors describe a privacy-compliant crawler for Facebook data extraction and two different graph-mining techniques: breadth-first search and rejection sampling to analyze the structural properties of samples consisting of millions of nodes.

Yu and Ramaswamy in Chap. 13 analyze the relationship between human-computer interaction and social networking. A framework is outlined for representing and measuring online social networks, especially those formed through Web 2.0 applications and is illustrated using a case study performed on Wikipedia.

In the last chapter, Sulaiman et al. analyze Web cache server data using social network analysis (SNA) and make a number of statistic measurements to reveal the hidden information in a real-world E-learning environment. The log dataset is displayed as a connected graph and is clustered based on the similarity of characteristics, and the analysis reveal interesting results.

I am very much grateful to the authors of this volume and to the reviewers for their tremendous service by critically reviewing the chapters. Most of the authors of chapters included in this book also served as referees for chapters written by other authors. Thanks go to all those who provided constructive and comprehensive reviews. I would like to thank Wayne Wheeler and Simon Rees of Springer Verlag, London, for the editorial assistance and excellent cooperative collaboration to produce this important scientific work. Finally, I hope that the reader will share our excitement to present this volume on social networks and will find it useful.

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