

Preface

A rapidly growing number of Internet users participate in social networks, belong to communities, produce, broadcast and use media content in different ways. This tremendous growth of social networks has led to a multidisciplinary research on analyzing and mining such networks according to various directions and trends as shown in the present book.

The book contains recent studies in social network analysis and represent extended versions of a selected collection of articles presented at the 2015 IEEE/ACM international Conference on Advances in Social Network Analysis and Mining (ASONAM), which took place in Paris between August 25 and 28, 2015. The topics covered by this book are: assortativity, influence propagation and maximization, social user's profile and behavioral modeling, sarcasm analysis, delurking, social engineering and vulnerability assessment, link prediction and social media forecasting.

"The Perceived Assortativity of Social Networks: Methodological Problems and Solutions" by David N. Fisher, Matthew J. Silk and Daniel W. Franks studies assortativity (also called assortative mixing) in social networks and shows that while social networks are more assortative than non-social ones, they tend to be positively assortative only when they are built using group-based methods. To overcome this bias, a number of solutions based on advances in sociological and biological fields are exploited.

"A Parametric Study to Construct Time-aware Social Profiles" by Sirinya Onat, Arnaud Quirin, André Péninou, Nadine Baptiste-Jessel, Marie-Françoise Canut, Florence Sèdes focuses on using information shared on users' egocentric networks to extract their interests. To that end, a time-aware method is applied inside an existing social profile building process and aims at weighting user's interests in the social profile according to their temporal relevance (temporal score). An empirical study on scientific publication networks (DBLP/Mendeley) is then used to compare the effectiveness and accuracy of the proposed social profile construction technique against the time agnostic technique.

“Sarcasm Analysis on Twitter Data Using Machine Learning Approaches” by Santosh Kumar Bharti, Ramkrushna Pradhan, Korra Sathya Babu and Sanjay Kumar Jena tackles the new and challenging problem of sarcasm analysis in social networks by proposing four approaches that aim at extracting text features such as lexical, hyperbole, behavioral and universal facts. Then, the accuracy of the proposed solutions for Twitter data is computed and reveals a considerable improvement over existing sarcasm identification techniques.

The goal of the chapter, “The DEvOTION algorithm for Delurking in Social Networks” by Roberto Interdonato, Chiara Pulice and Andrea Tagarelli is to delurk silent members of a social network, i.e., to encourage them to get more involved in the network. To reach such a goal, the authors define a delurking-oriented targeted influence maximization problem under the linear threshold model and propose an approximate solution based on a greedy algorithm named DEvOTION. The superiority of the defined procedure over other existing delurking approaches is then given.

“Social Engineering Threat Assessment using a Multi-layered Graph-based Model” by Omar Jaafor and Babiga Birregah deals with a security issue related to social engineering vulnerability, i.e., evaluating the set of attacks that focus on deceiving humans into performing actions or disclosing information. The study proposes a graph-based multi-layered model built from layers that depict different attack scenarios, different states in an attack and multiple contexts that could be used. It highlights the interconnections between the different elements in an attack such as actions performed, users involved and resources used, and represents actions that do not necessarily leave traces in a monitored system.

In the chapter titled “Through The Grapevine: A Comparison of News in Microblogs and Traditional Media”, the authors Byungkyu Kang, Haleigh Wright, Tobias Höllerer, Ambuj K. Singh and John O’Donovan propose two novel algorithmic approaches, namely content similarity computation and graph analysis, to automatically capture the main differences in newsworthy content between microblogs and traditional news media.

“Prediction of Elevated Activity in Online Social Media Using Aggregated and Individualized Models” by Jimpei Harada, David Darmon, Michelle Girvan and William Rand deals with information propagation to a large set of social network members by focusing on the identification of the time periods when a large portion of a target population is active, which requires modeling users’ behavior. Three methods for behavior modeling are then proposed and validated on data collected from a set of users on Twitter in 2011 and 2012.

“Unsupervised Link Prediction based on time frames in Weighted-Directed Citation Networks” by Mehmet Kaya, Mujtaba Jawed, Ertan Bütün and Reda Alhajj proposes a time-frame based unsupervised link prediction method for directed and weighted networks. To that end, weighted temporal events are first defined. Then, a novel approach based on the common neighbor metric for computing the time-frame based node score is given. The empirical study exploits an unsupervised learning strategy on a weighted-directed citation network to show that the proposed method gives accurate prediction and promising results.

“An Approach to Maximize the Influence Spread in Social Networks” by Ibrahima Gaye, Gervais Mendy, Samuel Ouya and Djaraf Seck deals with the influence maximization problem by proposing a Spanning Connected Graph algorithm (with three variants) that computes the seeds from which the information propagation is initiated. The first variant builds the children of the nodes randomly while the second one uses the neighborhood for the identification of children. The third variant is a generalization of the first two ones and takes an arbitrary graph as input while the first two variants require a connected graph as input. These procedures are effective and have a polynomial time complexity.

Eva García Martín, Niklas Lavesson, and Håkan Grahm on “Energy Efficiency Analysis of the Very Fast Decision Tree Algorithm” addresses a general issue in data mining applications and could be useful for mining social networks. It introduces energy consumption and energy efficiency as important factors to consider during data mining algorithm analysis and evaluation. The impact of varying the parameters of the Very Fast Decision Tree (VFDT) algorithm on energy consumption and accuracy is empirically studied. The conclusion is that energy consumption is affected by such parameters and can be reduced significantly while maintaining accuracy.

We would like to conclude this preface by conveying our appreciation to all contributing authors and our warm thanks to Professor Reda Alhajj for giving us the opportunity to be the Guest Editors of this book. We also would like to express our gratitude to Christopher T. Coughlin and his team members from Springer US for their help in the preparation of this volume.

QC, Canada
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December 2016

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Trends in Social Network Analysis

Information Propagation, User Behavior Modeling,
Forecasting, and Vulnerability Assessment

Missaoui, R.; Abdessalem, T.; Latapy, M. (Eds.)

2017, XIII, 255 p. 90 illus., 68 illus. in color., Hardcover

ISBN: 978-3-319-53419-0