

# Preface

Social media and social networks are pervasive in the daily use as well as in a number of applications. Social media and social networks are also intertwined, as the social media platforms also offer the opportunity to develop and analyze social networks. This book is an edited collection of a number of chapters that focus on topics from analysis of different nodal attributes of a social network, including node centrality, node reputation, and contributions of different nodes within the network; aspects of information and influence diffusion in a social network, including influence diffusion, rumor spreading, and control; sentiment analysis via opinion extraction and topic modeling; system level framework for decision making and cultural experience learning; and finally an application of social networks in a biometric field. The chapters are independent contributions of the authors.

“[A Node-Centric Reputation Computation Algorithm on Online Social Networks](#)” introduces an algorithm to capture how reputations of individuals spread within the network. There are two major contributions: (1) authors demonstrated that individual’s reputation is influenced by its position in the network and associated local structure; (2) the topological information of networks matters in computing individual’s reputation. In the algorithm, individual’s reputation is updated from its neighbors by considering the interaction history between this node and its neighbors.

“[Measuring Centralities for Transportation Networks Beyond Structures](#)” discusses centrality from the perspective of evaluating node’s importance within the network structure. Centrality measures are important to identify critical nodes in transportation networks, which are useful to improve the design of transportation networks. However, most centrality measures only consider the network topological information, and thus they are oblivious of transportation factors. This paper introduced a new centrality measure, which combines network topology and some external transportation factors, such as travel time delay and travel flux volume. The new centrality measure is demonstrated to be more efficient in identifying critical nodes in transportation networks.

“[Indifferent Attachment: The Role of Degree in Ranking Friends](#)” discusses the role of degree in ranking friends. The authors study whether the popularity of one’s

friends is the determining factor when ranking the order of all friends. They find that the popularity of two friends is essentially uninformative about which will be ranked as the more preferred friend. Surprisingly, there is evidence that individuals tend to prefer less popular friends to more popular ones. These observations suggest that positing individuals' tendency to attach to popular people—as in network-growth models like preferential attachment—may not suffice to explain the heavy-tailed degree distributions seen in real networks.

[“Analyzing the Social Networks of Contributors in Open Source Software Community”](#) analyzes the social networks of contributors in the open source community. The authors analyze the connectivity and tie structure in social networks where each user is one contributor of Open Source Software communities, and to investigate the network effects on developers' productivity. First, they find high degree nodes tend to connect more with low degree nodes suggesting collaboration between experts and newbie developers; second, they show positive correlations between in-degree, out-degree, betweenness, and closeness centrality and the developers' contribution and commitment in Open Source Software projects; third, in general, highly connected and strongly tied contributors are more productive than the low connected, weakly tied, and not connected contributors.

[“Precise Modeling Rumor Propagation and Control Strategy on Social Networks”](#) discusses various models for epidemic spreading of rumor and/or information. The authors also propose a novel epidemic model, namely the SPNR model. SPNR model has three states, infected states, positive infected states, and negative infected states. The introduction of positive infected states and negative infected states enable the SPNR model to better capture the rumor spreading process in real-world social systems. Additionally, a corresponding rumor control strategy is designed based on SPNR model. This novel rumor control strategy is demonstrated to be effective in fighting against rumor spreading, compared with several state-of-the-art control strategies.

[“Studying Graph Dynamics Through Intrinsic Time Based Diffusion Analysis”](#) focuses on time-based diffusion analysis. The authors aim to characterize the co-evolution of network dynamics and diffusion processes. They propose the notion of intrinsic time to record the formation of new links, and further use it to isolate the diffusion processes from the network evolution. The experimental results show significant differences in the analysis of diffusion in the extrinsic, extrinsic converted into intrinsic, and intrinsic times.

[“A Learning-Based Approach for Real-Time Emotion Classification of Tweets”](#) focuses on emotion recognition by analyzing tweets—a cross-section of social media and social networks. The authors discuss their computational framework as well as the machine learning-based approach. The reported experiments demonstrate that the authors' approach is competitive to the other lexicon-based methods. They also demonstrate that their computational framework can make emotion recognition and classification a lightweight task, enabling use on mobile devices.

[“A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments”](#) focuses on linguistic methods to assess the opinion of users in social networks. The authors study the problem of differentiating texts expressing a

positive or a negative opinion. The major observation is that positive texts are statistically shorter than negative ones. The method is to generate a lexicon that is used to indicate the level of opinions of given texts. The resulting adaptability would represent an advantage with free or approximate expression commonly found in social networks environment.

“[Visual Analysis of Topical Evolution in Unstructured Text: Design and Evaluation of TopicFlow](#)” presents an application of topic modeling to group-related documents into automatically generated topics, as well as an interactive tool, TopicFlow, to visualize the evolution of these topics. The authors discuss their analysis technique, namely binned topic models and alignment. It is an application Latent Dirichlet Application (LDA) to time-stamped documents at independent time intervals. The TopicFlow tool provides interactive visualization capabilities to select topics between time slices as they develop or diverge over a time period.

“[Explaining Scientific and Technical Emergence Forecasting](#)” provides an infrastructure for enabling the explanation of hybrid intelligence systems using probabilistic models and providing corresponding evidence. This infrastructure is designed to assist users in the interpretation of results. There are two contributions: (1) enable to support transparency into indicator-based forecasting systems; (2) provide evidence underlying presented indicators to the analyst users. The application of such an infrastructure is to automate the prediction of trends in science and technology based on the information of scientific publications and published patents.

“[Combining Social, Audiovisual and Experiment Content for Enhanced Cultural Experiences](#)” presents an experimental system that enhances the experience of visitors in cultural centers by leveraging social networks and multimedia. The system offers a modern, immersive, richer experience to the visitors, and provides valuable instant, spontaneous, and comprehensive feedback to organizers. It has been deployed and used in the Foundation of the Hellenic World cultural center.

“[Social Network Analysis for Biometric Template Protection](#)” provides an application of social network analysis for biometric template protection. Its general goal is to provide biometric system with cancelability that can defend the biometric database. The authors applied social network analysis to transfer raw biometric features related to, e.g., face or ear images, into secure ones.

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