

Social Networking and Community Behavior Modeling:

Qualitative and Quantitative Measures

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Section 1 **Social Networks and Communities**

This section illustrates the different meanings and definitions of offline and online communities and the concepts covered are found in social network analysis. This section aims to demonstrate the intrinsic capability of show how communication technologies enabled through electronic connections using the Internet and mobile applications in the form of (through the exchange of messages over SMS, emails, blogs, and social network sites). It also emphasizes how those technologies' expansion in both speed and number has expanded (both in number and speed) the creation of virtual online social networks and communities as opposed to the traditional local/nation civic communities and social groups that are usually created by traditional forms of communications; face-to-face, telephone, or mail communications.

Chapter 1

Social Networks and Communities: From Traditional Society to the Virtual Sphere	1
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Francesca Odella, University of Trento, Italy

The author introduces the readers to a critical view of the use of the concept of community concept in social network analysis and in particular to the study of complex interaction environments, such as Internet and mobile media. The development of the field of network analysis is described by means of case studies and scholarly examples from various fields of empirical network research (political science, communication sciences, and technology studies). In particular, the chapter explores the research process that evolved from the first ethnographic studies of social groups, and proceeds to exploration of new forms of interaction in online and computer mediated environments.

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Network Perspective on Structures Related to Communities	26
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Alvin Wolfe, University of Southern Florida, USA

The application of network perspectives to communities requires some appreciation of the variety of ways people are now writing about communities. From the 1940s well into the 1960s, the local community was the recognized social unit that sociologists and anthropologists studied. People who write about communities nowadays are using terms in a wide variety of ways. The “little communities” that anthropologist Robert Redfield (1960) wrote about fifty years ago have very little in common with the present-day “community of nations, the community of Jamaica Plain, the gay community, the IBM community, the Catholic Community, the Yale Community, the African American community, the ‘virtual’ community of cyberspace,” all mentioned by Robert Putnam (2000). In the decade since Putnam, electronic connections have expanded logarithmically in both number and speed, and the community problem is even more vexing.

Chapter 3

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Philip J. Salem, Texas State University, USA

Individuals address public issues by becoming involved with civic groups and performing civic activities such as charity and political work. Changes in communication technology have led to changes in civic engagement, and it is now possible to perform civic activities digitally. Actors develop social networks as they use various communication technologies, and the resultant networks act as passive constraints on individual activities. This chapter investigated face-to-face, telephone, email, private electronic, and public electronic communication networks. Private electronic communication networks develop through text messaging, instant messaging, and private chat, and public electronic communication networks emerge through the exchange of messages over blogs, social network sites, and Twitter.

Section 2

Modeling and Developing Social Networks and Online Communities

This section outlines some models of social networks that describe how online social networks and communities are formed, constructed, developed and analyzed. It illustrates the use of some analytical tools to provide an adequate interpretation of these newly created social networks such as with an example of the famous friendship network in Second Life. In addition, the chapter concludes with it defines some key success factors for the development for social networking websites.

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Almudena Moreno, Universidad de Valladolid, Spain

This chapter contains a theoretical reflection on the meaning of the new forms of social relations in this ICT-based culture, as well as on the need to define new analytical tools to enable an adequate interpretation of this new cultural context within the framework of globalization and digitalization. The work analyzes the cultural significance of the new concept of cyberculture and the new socio-cultural concepts regarding to ICTs.

Chapter 5

From Virtual to the Simulated World: An Agent-Based Model of Friendship Network in Second Life 85

Sadaf Alvi, University of Karachi, Pakistan

Shah Jamal Alam, University of Michigan, USA

A prototype agent-based model of the friendship network in Second Life is presented. Second Life is a 3D virtual world that allows users to engage in various social activities, meet friends, form communities, attend events of interests, and trade online with other users represented through their virtual 3D avatars. For social and behavioral scientists, this provides an opportunity to investigate the dynamics of social interaction and formation of interpersonal and group affiliation ties. Initial results from the model concerning friendship ties are reported.

Chapter 6

Analysis of Success Factors in Social Networking Website Development 103

Zanita Zahari, La Trobe University, Australia

Eric Pardede, La Trobe University, Australia

The popularity and rapid growth of social networking Websites is undeniable. Unfortunately, it is hard to guarantee the success and sustainability of these Websites. This chapter focuses on identifying the key success factors for each phase in agile iteration development for social networking Websites. Qualitative and quantitative analysis analyses were adopted using Web analytical tools to gather and measure these success factors. This chapter will benefit website designers and developers by suggesting the success factors for each agile iteration development phase.

Section 3

Information-Knowledge Discovery and Diffusion in Social Networks and Online Communities

The growth of the Internet and online communities has led to an increasing importance for understanding the social network structure of communities, the relationships between members, and how information is discovered and diffused in such virtual networks. This section overviews the gathering of network data by means of both qualitative and quantitative methodologies. It describes the state-of-the-art data mining algorithms and tools oriented to knowledge discovery, collective decision-making, information diffusion, and identifying relationships from online communities.

Chapter 7

Knowledge Discovery from Online Communities 123

Luca Cagliero, Politecnico di Torino, Italy

Alessandro Fiori, Politecnico di Torino, Italy

The chapter overviews the most notable research trends and application systems concerning data mining and knowledge discovery from user-generated content. It first introduces the most popular social media features. Secondly, it overviews the most appealing approaches to social network analysis and user behavior modeling. Finally, it categorizes and thoroughly describes the state-of-the-art data mining algorithms and tools oriented to knowledge discovery from online communities. A particular attention is focused on semantic knowledge inference and automatic understanding of the user-generated content.

Chapter 8

Information Diffusion in Social Networks..... 146

Dmitry Zinoviev, Suffolk University, USA

The chapter provides an overview of information and innovation diffusion in scale-free, small-world social networks. The material is suitable for network science specialists, as well as for interested professionals in the fields of Sociology, Psychology, and Marketing. Both static and dynamic aspects are discussed, as well as message taxonomies. The text addresses the role and the strategic position of influential spreaders of information; the pathways in the social networks that serve as conduits for communication and information flow; mathematical models describing proliferation processes; short-term and long-term dynamics of information diffusion, and secrecy of information diffusion.

Chapter 9

Social Network, Information Flow and Decision-Making Efficiency: A Comparison of Humans and Animals 164

Cédric Sueur, Free University of Brussels, Belgium & Kyoto University, Japan

In animals, including humans, group or community members not only have to take decisions satisfying the majority of individuals (i.e. decision accuracy) but also have a relatively short period to do so (i.e. decision speed). The decision efficiency will vary according to the way individuals are inter-connected, namely according to the social network. However, the traditional approach used in management and decision sciences has been revealed to be insufficient to fully explain decision-making efficiency. This chapter addresses the question of how social network may enhance collective decision-making by increasing both the accuracy and the speed of decisions.

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Extracting and Measuring Relationship Strength in Social Networks..... 178

Steven Gustafson, GE Global Research, USA

Abha Moitra, GE Global Research, USA

The growth of the Internet and online communities has led to increasing importance for understanding the social network structure of communities and the relationships between members. The mapping from online communications and behaviors to relationships should identify valid relationships so that the structural properties of the resulting social network are stable in the face of incomplete or inaccurate data. This chapter shows how slight variations in data processing steps for identifying relationships can lead to very different networks. It considers a number of design choices and the network structure variability they introduce and measures its effectiveness in performance on a prediction task.

Chapter 11

Bringing Qualitative and Quantitative Data Together:Collecting Network Data with the Help of the Software Tool VennMaker 193

Markus Gamper, University Trier, Germany

Michael Schönhuth, University Trier, Germany

Michael Kronenwett, University Trier, Germany

This chapter describes the gathering of network data by means of both qualitative and quantitative methodologies. An overview of the important visual approaches (e.g. network pictures and network maps) is given. Following, an example of a migration-network study was investigated with the aid of the software program VennMaker. Finally, the advantages and disadvantages of data collection based on digital network maps are discussed.

Section 4

Evolution of Social Networks and Online Communities

This section introduces two case studies of actual social networks with an objective to analyze their formation and evolution in time that aim at observing they form and evolve/develop over time. S. Dynamic social network analysis was applied to a learning community built around a Master's Program in an Italian University, and some international terror networks to help in detecting, or modifying the created/evolved networks.

Chapter 12

Observing the Evolution of a Learning Community Using Social Network Analysis 215

Francesca Grippa, University of Salento, Italy

Marco De Maggio, University of Salento, Italy

Angelo Corallo, University of Salento, Italy

This chapter proposes an empirical correlation between the stages of development of a learning community and a set of social network metrics. Social Network Analysis was applied to observe a learning community built around a Master's Program in an Italian University. It was found that the evolution of social network metrics - such as Density, Betweenness Centrality, Contribution Index, Core/Periphery Structure – matched the formal stages of community development, with a clear identification of forming, norming, and storming phases.

Chapter 13

Social Networks and Terrorism 232

David Knoke, University of Minnesota, USA

This chapter explains how international terror networks, consisting of individuals and organizations spanning countries and continents, form and evolve. Terrorism is violence committed by groups with political goals, targeted against civilians, and intended to create fear in a population. Social network analysis, which uses visual and matrix algebra methods to study such networks, can help counterterrorist organizations to detect, disrupt, and dismantle terrorist groups.

Section 5

Business Impact of Social Networks and Online Communities

This section focuses on the methods, frameworks, and approaches that study the relationship between social network users/customers and businesses and analyses the important role that social network sites can play in market penetration and strengthening. It identifies the mechanisms to how to extract useful information from the community structure, and how this information can be used to improve business efficiency and customer satisfaction. An overview of how the proposed frameworks and approaches can be used by others is given along with the wider context of its use.

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Social Network Sites: Modeling the New Business-Customer Relationship 248

Pedro Isaías, Universidade Aberta, Portugal

Sara Pifano, Information Society Research Lab, Portugal

Paula Miranda, Polytechnic Institute of Setubal, Portugal

This chapter focuses on the new facets of the relationship between customers and businesses and analyses the important role that Social Network Sites (SNSs) can play in its strengthening. The era of Web 2.0 has empowered consumers, by amplifying their voices and providing them with venues for information search and sharing. SNSs represent one of the most successful examples of social technology and since the business sector needs to adapt to customers' changing profile and behaviour, SNSs have proven to be important tools in terms of upholding the business-consumer relationship. Nonetheless, their primordial social and informal nature recommends thoroughness in order to maximise their potential, while avoiding their perils.

Chapter 15

Community Structure Extraction for Social Networks 266

Helen Hadush, North Carolina Central University, USA

Gaolin Zheng, North Carolina Central University, USA

Chung-Hao Chen, North Carolina Central University, USA

E-Wen Huang, National Central University, Taiwan

This chapter applied two graph partition approaches to extract community structures from social networks. The spectral approach is based on the minimization of balanced cut and its resulting solution comes from the spectral decomposition of the graph Laplacian. The modularity-based approach is based on the maximization of modularity and implemented in a hierarchical fashion. The method is able to extract useful information from the community structure, such as what is the most influential component in a given community. This information can be used to improve marketing efficiency by customized advertisement. Network visualization and navigation can also benefit from the community structural information.

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Towards a Bespoke Framework for Eliciting Consumer Satisfaction in Second Life 283

Mitul Shukla, University of Bedfordshire, UK

Marc Conrad, University of Bedfordshire, UK

Nik Bessis, University of Bedfordshire, UK and University of Derby, UK

This chapter focuses on the development of a framework for eliciting consumer satisfaction perceptions in the context of the social virtual world Second Life. An introduction to Second Life is followed by an overview of the relevant literature. The framework and the inter-related component parts that it is made up from are then described in detail. This is followed by an evaluation of the framework through semi-structured in-world interviews as well as the refinement of the framework as a consequence of our evaluation. Finally an overview of how the framework can be used by others is given along with the wider context of its use.

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Finding Similar Users in Facebook.....	304
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Pasquale De Meo, University of Messina, Italy

Emilio Ferrara, University of Messina, Italy

Giacomo Fiumara, University of Messina, Italy

A crucial aspect in the analysis of Online Social Networks is to determine whether two users of the network can be considered similar, or not. This reflects in several interesting applications, such as the possibility of finding social aggregations or targeting commercial promotions with proficiency. This chapter provides an approach to estimate the similarity among users of a network using information about their social ties and the analysis of their activities. It draws several local measures of similarity considering different indicators, and combines them obtaining a global measure of similarity, by applying metrics introduced in Social Sciences combined with techniques as the linear regression.

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