

Annals of Information Systems

Volume 12

Series Editors

Ramesh Sharda
Oklahoma State University
Stillwater, OK, USA

Stefan Voß
University of Hamburg
Hamburg, Germany

For further volumes:
<http://www.springer.com/series/7573>

Nasrullah Memon · Jennifer Jie Xu ·
David L. Hicks · Hsinchun Chen
Editors

Data Mining for Social Network Data



Editors

Nasrullah Memon
University of Southern Denmark
Maersk Mc-Kinney Moller Institute
Campusvej 55
5230 Odense M
Denmark
memon@mmti.sdu.dk

Jennifer Jie Xu
Department of Computer Information
Systems
Bentley University
Forest St. 175
02452 Waltham Massachusetts
USA
jxu@bentley.edu

David L. Hicks
Department of Computer Science
and Engineering
Aalborg University Esbjerg
Niels Bohrs Vej 8
6700 Esbjerg
Denmark
hicks@cs.aau.e.dk

Hsinchun Chen
University of Arizona
Eller College of Management
E. Helen St. 1130
85721 Tucson Arizona
430Z McClelland Hall
USA
hchen@eller.arizona.edu

ISSN 1934-3221 e-ISSN 1934-3213
ISBN 978-1-4419-6286-7 e-ISBN 978-1-4419-6287-4
DOI 10.1007/978-1-4419-6287-4
Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2010928244

© Springer Science+Business Media, LLC 2010

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC, 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Contents

1 Social Network Data Mining: Research Questions, Techniques, and Applications	1
Nasrullah Memon, Jennifer Jie Xu, David L. Hicks, and Hsinchun Chen	
2 Automatic Expansion of a Social Network Using Sentiment Analysis	9
Hristo Tanev, Bruno Pouliquen, Vanni Zavarella, and Ralf Steinberger	
3 Automatic Mapping of Social Networks of Actors from Text Corpora: Time Series Analysis	31
James A. Danowski and Noah Cepela	
4 A Social Network-Based Recommender System (SNRS)	47
Jianming He and Wesley W. Chu	
5 Network Analysis of US Air Transportation Network	75
Guangying Hua, Yingjie Sun, and Dominique Haughton	
6 Identifying High-Status Nodes in Knowledge Networks	91
Siddharth Kaza and Hsinchun Chen	
7 Modularity for Bipartite Networks	109
Tsuyoshi Murata	
8 ONDOCS: Ordering Nodes to Detect Overlapping Community Structure	125
Jiyang Chen, Osmar R. Zaïane, Jörg Sander, and Randy Goebel	
9 Framework for Fast Identification of Community Structures in Large-Scale Social Networks	149
Yutaka I. Leon-Suematsu and Kikuo Yuta	
10 Geographically Organized Small Communities and the Hardness of Clustering Social Networks	177
Miklós Kurucz and András A. Benczúr	

11 Integrating Genetic Algorithms and Fuzzy Logic for Web Structure Optimization	201
Iltae Lee, Negar Koochakzadeh, Keivan Kianmehr, Reda Alhajj, and Jon Rokne	

Contributors

Reda Alhajj Department of Computer Science, University of Calgary, Calgary, AB, Canada; Department of Computer Science, Global University, Beirut, Lebanon, alhajj@ucalgary.ca

András A. Benczúr Data Mining and Web search Research Group, Informatics Laboratory, Computer and Automation Research Institute, Hungarian Academy of Sciences, Budapest, Hungary, benczur@ilab.sztaki.hu

Noah Cepela Department of Communication, University of Illinois, MC 132, 1007 W. Harrison St., Chicago, IL 60607, USA, ncepela72@gmail.com

Hsinchun Chen Eller College of Management, University of Arizona, 430Z McClelland Hall, E. Helen St. 1130, Tucson, AZ 85721, USA, hchen@eller.arizona.edu

Jiyang Chen Department of Computing Science, University of Alberta, Edmonton, AB, Canada T6G 2E8, jiyang@cs.ualberta.ca

Wesley W. Chu Computer Science Department, University of California, Los Angeles, CA 90095, USA, wwc@cs.ucla.edu

James A. Danowski Department of Communication, University of Illinois, MC 132, 1007 W. Harrison St., Chicago, IL 60607, USA, jimd@uic.edu

Randy Goebel Department of Computing Science, University of Alberta, Edmonton, AB, Canada T6G 2E8, goebel@cs.ualberta.ca

Dominique Haughton Department of Mathematical Sciences, Bentley University, 175 Forest Street, Waltham, MA 02452, USA, dhaughton@bentley.edu

Jianming He Computer Science Department, University of California, Los Angeles, CA 90095, USA, jmhek@cs.ucla.edu

David L. Hicks Department of Computer Science & Engineering, Aalborg University Esbjerg, Niels Bohrs Vej 8, 6700 Esbjerg, Denmark, hicks@cs.aau.e.dk

Guangying Hua Department of Mathematical Sciences, Bentley University, 175 Forest Street, Waltham, MA 02452, USA, ghua@bentley.edu

Siddharth Kaza Department of Computer and Information Sciences, Towson University, Towson, MD, USA, skaza@towson.edu

Keivan Kianmehr Department of Computer Science, University of Calgary, Calgary, AB, Canada, mkkian@ucalgary.ca

Negar Koochakzadeh Department of Computer Science, University of Calgary, Calgary, AB, Canada, nkoochak@ucalgary.ca

Miklós Kurucz Data Mining and Web search Research Group, Informatics Laboratory, Computer and Automation Research Institute, Hungarian Academy of Sciences, Budapest, Hungary, mkurucz@ilab.sztaki.hu

Iltae Lee Department of Computer Science, University of Calgary, Calgary, AB, Canada, itlee@ucalgary.ca

Yutaka I. Leon-Suematsu National Institute of Information and Communications Technology (NICT), 3-5 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0289, Japan, yutaka.leon@acm.org

Nasrullah Memon Maersk Mc-Kinney Moller Institute, University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark, memon@mmti.sdu.dk

Tsuyoshi Murata Department of Computer Science, Graduate School of Information Science and Engineering, Tokyo Institute of Technology, W8-59 2-12-1 Ookayama, Meguro, Tokyo 152-8552, Japan, murata@cs.titech.ac.jp

Bruno Pouliquen World Intellectual Property Organization, 34, chemin des Colombettes, CH-1211, Geneva 20, Switzerland, poulique@gmail.com

Jon Rokne Department of Computer Science, University of Calgary, Calgary, AB, Canada, rokne@ucalgary.ca

Jörg Sander Department of Computing Science, University of Alberta, Edmonton, AB, Canada T6G 2E8, joerg@cs.ualberta.ca

Ralf Steinberger IPSC, T.P. 267, Joint Research Centre – European Commission, Via E. Fermi 2749, 21027 Ispra, Italy, ralf.steinberger@jrc.ec.europa.eu

Yingjie Sun Department of Biomedical engineering, Boston University, 44 Cummington Street, Boston, MA 02215, USA, yjsun@bu.edu

Hristo Tanev IPSC, T.P. 267, Joint Research Centre – European Commission, Via E. Fermi 2749, 21027 Ispra, Italy, htanev@gmail.com

Jennifer Jie Xu Department of Computer Information Systems, Bentley University, Forest St. 175, 02452 Waltham, MA, USA, jxu@bentley.edu

Kikuo Yuta Crev Inc., Keihanna-Plaza Laboratories, 1-7 Hikaridai, Seika-cho, Kyoto 619-0237, Japan, y@crev.jp

Osmar R. Zaïane Department of Computing Science, University of Alberta,
Edmonton, AB, Canada T6G 2E8, zaiane@cs.ualberta.ca

Vanni Zavarella IPSC, T.P. 267, Joint Research Centre – European Commission,
Via E. Fermi 2749, 21027 Ispra, Italy, zavavan@yahoo.it