

LNCs 4221

Licheng Jiao
Lipo Wang
Xinbo Gao
Jing Liu
Feng Wu (Eds.)

Advances in Natural Computation

Second International Conference, ICNC 2006
Xi'an, China, September 2006
Proceedings, Part I

1 Part I



Springer

TP301.6-53

Z17

2006

V.1

Licheng Jiao Lipo Wang Xinbo Gao
Jing Liu Feng Wu (Eds.)

Advances in Natural Computation

Second International Conference, ICNC 2006
Xi'an, China, September 24-28, 2006
Proceedings, Part I



Springer



E200604087

Volume Editors

Licheng Jiao
Xidian University, Xi'an 710071, China
E-mail: lchjiao@mail.xidian.edu.cn

Lipo Wang
Nanyang Technological University, Singapore
E-mail: elpwang@ntu.edu.sg

Xinbo Gao
Xidian University, Xi'an, 710071, China
E-mail: xbgao@mail.xidian.edu.cn

Jing Liu
Xidian University, Xi'an 710071, China
E-mail: neouma@mail.xidian.edu.cn

Feng Wu
Microsoft Research Asia, 100080 Beijing, China
E-mail: fengwu@microsoft.com

Library of Congress Control Number: 20069322971

CR Subject Classification (1998): F.1, F.2, I.2, G.2, I.4, I.5, J.3, J.4

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN	0302-9743
ISBN-10	3-540-45901-4 Springer Berlin Heidelberg New York
ISBN-13	978-3-540-45901-9 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media
springer.com

© Springer-Verlag Berlin Heidelberg 2006
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 11881070 06/3142 5 4 3 2 1 0

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Moshe Y. Vardi

Rice University, Houston, TX, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

Preface

This book and its sister volumes, i.e., LNCS volumes 4221 and 4222, constitute the proceedings of the 2nd International Conference on Natural Computation (ICNC 2006), jointly held with the 3rd International Conference on Fuzzy Systems and Knowledge Discovery (FSKD 2006, LNAI volume 4223) on 24-28 September 2006 in Xi'an, Shaanxi, China. In its budding run, ICNC 2006 successfully attracted 1915 submissions from 35 countries/regions (the joint ICNC-FSKD 2006 event received 3189 submissions). After rigorous reviews, 254 high-quality papers, i.e., 168 long papers and 86 short papers, were included in the ICNC 2006 proceedings, representing an acceptance rate of 13.3%.

ICNC-FSKD 2006 featured the most up-to-date research results in computational algorithms inspired from nature, including biological, ecological, and physical systems. It is an exciting and emerging interdisciplinary area in which a wide range of techniques and methods are being studied for dealing with large, complex, and dynamic problems. The joint conferences also promoted cross-fertilization over these exciting and yet closely-related areas, which had a significant impact on the advancement of these important technologies. Specific areas included neural computation, quantum computation, evolutionary computation, DNA computation, fuzzy computation, granular computation, artificial life, etc., with innovative applications to knowledge discovery, finance, operations research, and more. In addition to the large number of submitted papers, we were blessed with the presence of six renowned keynote speakers.

On behalf of the Organizing Committee, we thank Xidian University for sponsorship, and the National Natural Science Foundation of China, the International Neural Network Society, the Asia-Pacific Neural Network Assembly, the IEEE Circuits and Systems Society, the IEEE Computational Intelligence Society, the IEEE Computational Intelligence Singapore Chapter, and the Chinese Association for Artificial Intelligence for technical co-sponsorship. We thank the members of the Organizing Committee, the Advisory Board, and the Program Committee for their hard work in the past 12 months. We wish to express our heartfelt appreciation to the keynote speakers, session chairs, reviewers, and student helpers. Our special thanks go to the publisher, Springer, for publishing the ICNC 2006 proceedings as two volumes of the Lecture Notes in Computer Science series (and the FSKD 2006 proceedings as one volume of the Lecture Notes in Artificial Intelligence series). Finally, we thank all the authors and participants for their great contributions that made this conference possible and all the hard work worthwhile.

September 2006

Lipo Wang
Licheng Jiao

Organization

ICNC 2006 was organized by Xidian University and technically co-sponsored by the National Natural Science Foundation of China, the International Neural Network Society, the Asia-Pacific Neural Network Assembly, the IEEE Circuits and Systems Society, the IEEE Computational Intelligence Society, the IEEE Computational Intelligence Singapore Chapter, and the Chinese Association for Artificial Intelligence.

Organizing Committee

Honorary Conference Chairs:	Shun-ichi Amari (RIKEN BSI, Japan) Xin Yao (University of Birmingham, UK)
General Co-chairs:	Lipo Wang (Nanyang Technological University, Singapore) Licheng Jiao (Xidian University, China)
Program Committee Chairs:	Xinbo Gao (Xidian University, China) Feng Wu (Microsoft Research Asia, China)
Local Arrangement Chairs:	Yuanyuan Zuo (Xidian University, China) Xiaowei Shi (Xidian University, China)
Proceedings Chair:	Jing Liu (Xidian University, China)
Publicity Chair:	Yuping Wang (Xidian University, China)
Sponsorship Chair:	Yongchang Jiao (Xidian University, China)
Secretaries:	Bin Lu (Xidian University, China) Tiantian Su (Xidian University, China)
Webmasters:	Yinfeng Li (Xidian University, China) Maoguo Gong (Xidian University, China)

Advisory Board

Zheng Bao	Xidian University, China
Zixing Cai	Central South University, China
Guoliang Chen	University of Science and Technology of China, China
Huowang Chen	National University of Defense Technology, China
David Corne	The University of Exeter, UK
Dipankar Dasgupta	University of Memphis, USA
Kalyanmoy Deb	Indian Institute of Technology Kanpur, India
Baoyan Duan	Xidian University, China
Kunihiko Fukushima	Tokyo University of Technology, Japan
Tom Gedeon	The Australian National University, Australia

VIII Organization

Aike Guo	Chinese Academy of Science, China
Yao Hao	Xidian University, China
Zhenya He	Southeastern University, China
Fan Jin	Southwest Jiaotong University, China
Yaochu Jin	Honda Research Institute Europe, Germany
Janusz Kacprzyk	Polish Academy of Sciences, Poland
Lishan Kang	China University of Geosciences, China
Nikola Kasabov	Auckland University of Technology, New Zealand
John A. Keane	The University of Manchester, UK
Soo-Young Lee	KAIST, Korea
Yanda Li	Tsinghua University, China
Zhiyong Liu	National Natural Science Foundation of China, China
Erkki Oja	Helsinki University of Technology, Finland
Nikhil R. Pal	Indian Statistical Institute, India
Yunhe Pan	Zhe Jiang University, China
Jose Principe	University of Florida, USA
Witold Pedrycz	University of Alberta, Canada
Marc Schoenauer	University of Paris Sud, France
Zhongzhi Shi	Chinese Academy of Science, China
Harold Szu	Office of Naval Research, USA
Shiro Usui	RIKEN BSI, Japan
Shoujue Wang	Chinese Academy of Science, China
Xindong Wu	University of Vermont, USA
Lei Xu	Chinese University of Hong Kong, HK
Bo Zhang	Tsinghua University, China
Nanning Zheng	Xi'an Jiaotong University, China
Yixin Zhong	University of Posts & Telecommunications, China
Syozo Yasui	Kyushu Institute of Technology, Japan
Jacek M. Zurada	University of Louisville, USA

Program Committee

Shigeo Abe	Kobe University, Japan
Davide Anguita	University of Trento, Italy
Abdesselam Bouzerdoun	University of Wollongong, Australia
Laiwan Chan	The Chinese University of Hong Kong, HK
Li Chen	Northwest University, China
Guanrong Chen	City University of Hong Kong, HK
Shu-Heng Chen	National Chengchi University, Taiwan
Tianping Chen	Fudan University, China
YanQiu Chen	Fudan University, China
Vladimir Cherkassky	University of Minnesota, USA

Sung-Bae Cho	Yonsei University, Korea
Sungzoon Cho	Seoul National University, Korea
Tommy W.S. Chow	City University of Hong Kong, China
Vic Ciesielski	RMIT, Australia
Keshav Dahal	University of Bradford, UK
L.N. de Castro	Catholic University of Santos, Brazil
Emilio Del-Moral-Hernandez	University of Sao Paulo, Brazil
Andries Engelbrecht	University of Pretoria, South Africa
Tomoki Fukai	Tamagawa University, Japan
Lance Fung	Murdoch University, Australia
Takeshi Furuhashi	Nagoya University, Japan
Hiroshi Furutani	University of Miyazaki, Japan
John Q. Gan	The University of Essex, UK
Wen Gao	The Chinese Academy of Science, China
Peter Geczy	AIST, Japan
Zengguang Hou	University of Saskatchewan, Canada
Jiwu Huang	Sun Yat-Sen University, China
Masumi Ishikawa	Kyushu Institute of Technology, Japan
Yongchang Jiao	Xidian University, China
Robert John	De Montfort University, UK
Mohamed Kamel	University of Waterloo, Canada
Yoshiki Kashimori	University of Electro-Communications, Japan
Samuel Kaski	Helsinki University of Technology, Finland
Andy Keane	University of Southampton, UK
Graham Kendall	The University of Nottingham, UK
Jong-Hwan Kim	KAIST, Korea
JungWon Kim	University College London, UK
Natalio Krasnogor	University of Nottingham, UK
Vincent C.S. Lee	Monash University, Australia
Stan Z. Li	Chinese Academy of Science, China
Yangmin Li	University of Macau, Macau
Xiaofeng Liao	Chongqing University, China
Derong Liu	University of Illinois at Chicago, USA
Ding Liu	Xi'an University of Technology, China
Jing Liu	Xidian University, China
Ke Liu	National Natural Science Foundation of China, China
Baoliang Lu	Shanghai Jiao Tong University, China
Frederic Maire	Queensland University of Technology, Australia
Jacek Mandziuk	Warsaw University of Technology, Poland
Satoshi Matsuda	Nihon University, Japan
Masakazu Matsugu	Canon Research Center, Japan
Bob McKay	University of New South Wales, Australia
Ali A. Minaei	University of Cincinnati, USA
Hiromi Miyajima	Kagoshima University, Japan
Hongwei Mo Harbin	Engineering University, China

Mark Neal	University of Wales, Aberystwyth, UK
Pedja Neskovic	Brown University, USA
Richard Neville	The University of Manchester, UK
Tohru Nitta	National Institute of Advanced Industrial Science and Technology, Japan
Yusuke Nojima	Osaka Prefecture University, Japan
Takashi Omori	Hokkaido University, Japan
Yew Soon Ong	Nanyang Technological University, Singapore
M. Palaniswami	The University of Melbourne, Australia
Andrew P. Paplinski	Monash University, Australia
Asim Roy	University of Arizona, USA
Bernhard Sendhoff	Honda Research Centre Europe, Germany
Leslie Smith	University of Stirling, UK
Andy Song	RMIT, Australia
Lambert Spaanenburg	Lund University, Sweden
Changyin Sun	Southeast University, China
Mingui Sun	University of Pittsburgh, USA
Johan Suykens	KULeuven, Belgium
Kay Chen Tan	National University of Singapore, Singapore
Jonathan Timmis	University of York, UK
Seow Kiam Tian	Nanyang Technological University, Singapore
Peter Tino	The University of Birmingham, UK
Kar-Ann Toh	Institute of Infocomm Research, Singapore
Yasuhiro Tsujimura	Nippon Institute of Technology, Japan
Ganesh Kumar	University of Missouri-Rolla, USA
Venayagamoorthy	
Ray Walshe	Dublin City University, Ireland
Lei Wang	Xi'an University of Technology, China
Xiaofan Wang	Shanghai Jiaotong University, China
Xufa Wang	University of Science and Technology of China, China
Yuping Wang	Xidian University, China
Sumio Watanabe	Tokyo Institute of Technology, Japan
Gang Wei	South China University of Technology, China
Stefan Wermter	University of Sunderland, UK
Kok Wai Wong	Murdoch University, Australia
Feng Wu	Microsoft Research Asia, China
Xihong Wu	Peking University, China
Zongben Xu	Xi'an Jiaotong University, China
Ron Yang	University of Exeter, UK
Li Yao	Beijing Normal University, China
Daniel Yeung	The Hong Kong Polytechnic University, HK
Ali M.S. Zalzal	Heriot-Watt University, UK
Hongbin Zha	Peking University, China
Liming Zhang	Fudan University, China
Qingfu Zhang	The University of Essex, UK

Wenxiu Zhang
Yanning Zhang
Yi Zhang

Zhaotian Zhang

Liang Zhao
Mingsheng Zhao
Qiangfu Zhao

Xi'an Jiaotong University, China
Northwestern Polytechnical University, China
University of Electronic Science and
Technology of China, China
National Natural Science Foundation of China,
China
University of Sao Paulo, Brazil
Tsinghua University, China
University of Aizu, Japan

Reviewers

A. Attila ISLIER
Abdesselam BOUZERDOUM
Adel AZAR
Ah-Kat TAN
Aifeng REN
Aifeng REN
Ailun LIU
Aimin HOU
Aizhen LIU
Ales KEPRT
Ali Bekir YILDIZ
Alparslan TURANBOY
Anan FANG
Andreas HERZOG
Andrew TEOH
Andrew P. PAPLINSKI
Andries ENGELBRECHT
Andy SONG
Anni CAI
Ariel GOMEZ
Arumugam S.
Ay-Hwa A. LIOU
Bang-Hua YANG
Baolong GUO
Bei-Ping HOU
Bekir CAKIR
Ben-Shun YI
Bharat BHASKER
Bin XU
Bin JIAO
Bin LI
Bing HAN
Binghai ZHOU

Bo FU
Bob MCKAY
Bohdan MACUKOW
Bo-Qin FENG
Brijesh VERMA
Caihong MU
Ce FAN
Changyin SUN
Changzhen HU
Chao DENG
Chaojian SHI
Chaowan YIN
Chen YONG
Cheng WANG
Chengxian XU
Cheng-Yuan CHANG
Cheol-Hong MOON
Chi XIE
Ching-Hung LEE
Chong FU
Chonghui GUO
Chong-Zhao HAN
Chor Min TAN
Chu WU
Chuang GUO
Chuanhan LIU
Chun JIN
Chun CHEN
Chung-Li TSENG
Chunshien LI
Cong-Kha PHAM
Cuiqin HOU
Cunchen GAO

Daehyeon CHO	Guang LI
Dat TRAN	Guangming SHI
Davide ANGUIA	Guangqiang LI
De XU	Guang-Qiu HUANG
Deqin YAN	Guangrui WEN
Dewu WANG	Guang-Zhao CUI
Dexi ZHANG	Guanjun WANG
Deyun CHEN	Guanlong CHEN
Diangang WANG	Guanzheng TAN
Dong LIU	Gui-Cheng WANG
Dong Hwa KIM	Guixi LIU
Dongbo ZHANG	Guojun ZHANG
Dongfeng HAN	Guowei YANG
Donghu NIE	Guoyin WANG
Dong-Min WOO	Guo-Zheng LI
Du-Yun BI	Gurvinder BAICHER
Emilio DEL-MORAL-HERNANDEZ	Gwi-Tae PARK
En-Min FENG	Hai TAO
Ergun ERASLAN	Hai-Bin DUAN
Euntai KIM	Haifeng DU
Fajun ZHANG	Haiqi ZHENG
Fang LIU	Haixian WANG
Fangshi WANG	Haixiang GUO
Fan-Hua YU	Haiyan JIN
Fei HAO	Hajime NOBUHARA
Fei GAO	Hanjun JIN
Feng SHI	Hao WANG
Feng XUE	Haoran ZHANG
Feng DING	Haoyong CHEN
Feng CHEN	He JIANG
Feng JIAO	Hengqing TONG
Feng GAO	Hiroshi FURUTANI
Fenlin LIU	Hong JIN
Fu-Ming LI	Hong ZHANG
Gabriel CIOBANU	Hong LIU
Gang WANG	Hong Jie YU
Gang CHEN	Hongan WANG
Gaofeng WANG	Hongbin DONG
Gaoping WANG	Hongbing JI
Gary YEN	Hongcai ZHANG
Gexiang ZHANG	Honghua SHI
Golayoglu Fatullayev AFET	Hongsheng SU
Graham KENDALL	Hongwei MO
Guang REN	Hongwei LI
Guang TIAN	Hongwei SI

Hongwei HUO
 Hongxin ZHANG
 Hongyu LI
 Hongzhang JIN
 Hua-An ZHAO
 Huaxiang LU
 Hua-Xiang WANG
 Huayong LIU
 Hui YIN
 Hui LI
 Hui WANG
 Huizhong YANG
 Hyun YOE
 Hyun Chan CHO
 Hyun-Cheol JEONG
 Ihn-Han BAE
 Ilhong SUH
 In-Chan CHOI
 I-Shyan HWANG
 Ivan Nunes Da SILVA
 Jae Hung YOO
 Jae Yong SEO
 Jae-Jeong HWANG
 Jae-Wan LEE
 Jea Soo KIM
 Jia LIU
 Jiafan ZHANG
 Jian YU
 Jian SHI
 Jian CHENG
 Jian XIAO
 Jianbin SONG
 Jiang CUI
 Jiangang LU
 Jianguo JIANG
 Jianhua PENG
 Jianjun WANG
 Jianling WANG
 Jian-Sheng QIAN
 Jianwei YIN
 Jianwu DANG
 Jianyuan JIA
 Jiating LUO
 Jidong SUO
 Jie LI

Jie HU
 Jie WANG
 Jie LI
 Jih-Chang HSIEH
 Jih-Fu TU
 Jih-Gau JUANG
 Jili TAO
 Jil-Lin LIU
 Jin YANG
 Jinchao LI
 Jinfeng YANG
 Jing LIU
 Jing-Min WANG
 Jingwei LIU
 Jingxin DONG
 Jin-Ho KIM
 Jinhui ZHANG
 Jinling ZHANG
 Jinping LI
 Jintang YANG
 Jin-Young KIM
 Jiqing QIU
 Jiquan SHEN
 Ji-Song KOU
 Jiu-Chao FENG
 Jiulong ZHANG
 Jiuying DENG
 Jiyang DONG
 Jiyi WANG
 Johan SUYKENS
 John Q GAN
 Jong-Min KIM
 Joong-Hwan BAEK
 Jorge CASILLAS
 Jose SEIXAS
 Jr-Syu YANG
 Ju Cheng YANG
 Ju Han KIM
 Juan LIU
 Jumin ZHAO
 Jun GAO
 Jun YANG
 Jun CAO
 Jun JING
 Jun MENG

XIV Organization

Jun-An LU	Ling WANG
Jung-Hyun YUN	Ling CHEN
Jungsik LEE	Ling1 WANG
Junguo SUN	Liqing ZHANG
Junping ZHANG	Liquan SHEN
Jun-Seok LIM	Lixin ZHENG
Jun-Wei LU	Luo ZHONG
Junyi SHEN	Lusheng ZHONG
Junying ZHANG	Luyang GUAN
Kay Chen TAN	Manjaiah D H
Kay-Soon LOW	Maoguo GONG
Ke LU	Maoguo GONG
Kefeng FAN	Maoyuan ZHANG
Kenneth REVETT	Masahiko TOYONAGA
Keun-Sang PARK	Masakazu MATSUGU
Khamron SUNAT	Masumi ISHIKAWA
Kok Wai WONG	Mehmet Zeki BILGIN
Kwan Houng LEE	Mei TIAN
Kwang-Baek KIM	Meihong SHI
Kyung-Woo KANG	Meiyi LI
Laicheng CAO	Mengxin LI
Laiwan CHAN	Michael MARGALIOT
Lambert SPAANENBURG	Min LIU
Lan GAO	Min FANG
Lance FUNG	Ming BAO
Lean YU	Ming LI
Lei LIN	Ming LI
Lei WANG	Ming CHEN
Leichun WANG	Mingbao LI
Li MEIJUAN	Mingguang WU
Li WU	Minghui LI
Li DAYONG	Mingquan ZHOU
Li SUN	Moh Lim SIM
Li ZHANG	Mudar SAREM
Liang GAO	Nagabhushan P.
Liang XIAO	Naigang CUI
Liang MING	Nak Yong KO
Lian-Wei ZHAO	Naoko TAKAYAMA
Lianxi WU	Naoyuki KUBOTA
Liefeng BO	Ning CHEN
Lili ZHOU	Otvio Noura TEIXEIRA
Liming CHEN	Pei-Chann CHANG
Li-Ming WANG	Peide LIU
Lin CONG	Peixin YE
Lincheng SHEN	Peizhi WEN

Peng TIAN
 Peter TINO
 Phill Kyu RHEE
 Ping JI
 Pu WANG
 Qi WANG
 Qi LUO
 Qiang LV
 Qiang SUN
 Qijuan CHEN
 Qing GUO
 Qing LI
 Qinghe MING
 Qingming YI
 Qingqi PEI
 Qiongshui WU
 Qiyong GONG
 Quan ZHANG
 Renbiao WU
 Renpu LI
 Renren LIU
 Richard EPSTEIN
 Richard NEVILLE
 Robo ZHANG
 Roman NERUDA
 Rong LUO
 Rongfang BIE
 Ronghua SHANG
 Ronghua SHANG
 Rubin WANG
 Rui XU
 Ruijun ZHU
 Ruiming FANG
 Ruixuan LI
 Ruochen LIU
 S.G. LEE
 Sanyang LIU
 Satoshi MATSUDA
 Seok-Lyong LEE
 Seong Whan KIM
 Serdar KUCUK
 Seungwan LEE
 Sezai TOKAT
 Shan TAN
 Shangmin LUAN

Shao-Ming FEI
 Shao-Xiong WU
 Shigeo ABE
 Shiqiang ZHENG
 Shuguang ZHAO
 Shuiping GOU
 Shui-Sen CHEN
 Shui-Sheng ZHOU
 Shunman WANG
 Shunsheng GUO
 Shutao LI
 Shuyuan YANG
 Soo-Hong PARK
 Soon Cheol PARK
 Sung-Bae CHO
 Sungshin KIM
 Sunjun LIU
 Sunkook YOO
 Tae Ho CHO
 Tae-Chon AHN
 Tai Hoon CHO
 Takao TERANO
 Takeshi FURUHASHI
 Tan LIU
 Tao SHEN
 Tao WANG
 Taoshen LI
 Thi Ngoc Yen PHAM
 Tianding CHEN
 Tiantian SU
 Tianyun CHEN
 Tie-Jun ZHOU
 Ting WU
 Tong-Zhu FANG
 Vianey Guadalupe CRUZ SANCHEZ
 Vic CIESIELSKI
 Wang LEI
 Wanli MA
 Wei ZOU
 Wei WU
 Wei LI
 Wei FANG
 Weida ZHOU
 Wei-Hua LI
 Weiqin YIN

Weiyou CAI
 Wei-Yu YU
 Wen ZHU
 Wenbing XIAO
 Wenbo XU
 Wenchuan YANG
 Wenhui LI
 Wenping MA
 Wenping MA
 Wenqing ZHAO
 Wen-Shyong TZOU
 Wentao HUANG
 Wentao HUANG
 Wenxing ZHU
 Wenxue HONG
 Wenyu LIU
 X.B. CAO
 Xian-Chuan YU
 Xianghui LIU
 Xiangrong ZHANG
 Xiangwei LAI
 Xiaobing LIU
 Xiaodong KONG
 Xiaofeng SONG
 Xiaoguang ZHANG
 Xiaoguang LIU
 Xiaohe LI
 Xiaohua YANG
 Xiaohua WANG
 Xiaohua ZHANG
 Xiaohui YUAN
 Xiaohui YANG
 Xiaojian SHAO
 Xiao-Jie ZHAO
 Xiaojun WU
 Xiaoli LI
 Xiaosi ZHAN
 Xiaosuo LU
 Xiaoyi FENG
 Xiaoying PAN
 Xiaoyuan WANG
 Xin XU
 Xin YUAN
 Xinbo GAO
 Xinchao ZHAO

Xingming SUN
 Xinsheng YAO
 Xinyu WANG
 Xiu JIN
 Xiu-Fen YU
 Xiufeng WANG
 Xiuhua GAO
 Xiuli MA
 Xiyang LIU
 Xiyue HUANG
 Xu YANG
 Xu CHEN
 Xuejun XU
 Xueliang BI
 Xuerong CHEN
 Xuezhou XU
 Xun WANG
 Xuyan TU
 Yan ZHANG
 Yan LIANG
 Yan ZHANG
 Yang YAN
 Yangmi LIM
 Yangmin LI
 Yangyang LI
 Yangyang WU
 Yanling WU
 Yanning ZHANG
 Yanning ZHANG
 Yanpeng LIU
 Yanping LV
 Yanxia ZHANG
 Yanxin ZHANG
 Yan-Xin ZHANG
 Yaoguo DANG
 Yaping DAI
 Yaw-Jen CHANG
 Yeon-Pun CHANG
 Yezheng LIU
 Yidan SU
 Yifeng NIU
 Yimin YU
 Ying GUO
 Ying GAO
 Ying TIAN

Yingfang FAN
 Yingfeng QIU
 Yinghong PENG
 Yingying LIU
 Yong ZHAO
 Yong YANG
 Yong FAN
 Yong-Chang JIAO
 Yonggui KAO
 Yonghui JIANG
 Yong-Kab KIM
 Yongqiang ZHANG
 Yongsheng DING
 Yongsheng ZHAO
 Yongzhong ZHAO
 Yoshikii KASHIMORI
 You-Feng LI
 Youguo PI
 You-Ren WANG
 Yu GUO
 Yu GAO
 Yuan KANG
 Yuehui CHEN
 Yuehui CHEN
 Yufeng LIAO
 Yuheng SHA
 Yukun BAO
 Yulong LEI
 Yumin LIU
 Yumin TIAN
 Yun-Chia LIANG
 Yunjie ZHANG
 Yuping WANG
 Yurong ZENG
 Yusuke NOJIMA

Yutao QI
 Yutian LIU
 Yuyao HE
 Yu-Yen OU
 Yuzhong CHEN
 Zafer BINGUL
 Zeng-Guang HOU
 Zhang YANG
 Zhanli LI
 Zhao ZHAO
 Zhaoyang ZHANG
 Zhe-Ming LU
 Zhen YANG
 Zhenbing ZENG
 Zhengxing CHENG
 Zhengyou XIA
 Zhi LIU
 Zhidong ZHAO
 Zhifeng HAO
 Zhigang XU
 Zhigeng FANG
 Zhihui LI
 Zhiqing MENG
 Zhixiong LIU
 Zhiyong ZHANG
 Zhiyu ZHANG
 Zhonghua LI
 Zhurong WANG
 Zi-Ang LV
 Zixing CAI
 Zong Woo GEEM
 Zongmin LI
 Zongying OU
 Zoran BOJKOVIC

Lecture Notes in Computer Science

For information about Vols. 1–4133

please contact your bookseller or Springer

- Vol. 4238: Y.-T. Kim, M. Takano (Eds.), *Management of Convergence Networks and Services*. XVIII, 604 pages. 2006.
- Vol. 4228: D.E. Lightfoot, C.A. Szyperski (Eds.), *Modular Programming Languages*. X, 415 pages. 2006.
- Vol. 4227: W. Nejdl, K. Tochtermann (Eds.), *Innovative Approaches for Learning and Knowledge Sharing*. XVII, 721 pages. 2006.
- Vol. 4224: E. Corchado, H. Yin, V. Botti, C. Fyfe (Eds.), *Intelligent Data Engineering and Automated Learning – IDEAL 2006*. XXVII, 1447 pages. 2006.
- Vol. 4222: L. Jiao, L. Wang, X. Gao, J. Liu, F. Wu (Eds.), *Advances in Natural Computation, Part II*. XLII, 998 pages. 2006.
- Vol. 4221: L. Jiao, L. Wang, X. Gao, J. Liu, F. Wu (Eds.), *Advances in Natural Computation, Part I*. XLI, 992 pages. 2006.
- Vol. 4219: D. Zamboni, C. Kruegel (Eds.), *Recent Advances in Intrusion Detection*. XII, 331 pages. 2006.
- Vol. 4217: P. Cuenca, L. Orozco-Barbosa (Eds.), *Personal Wireless Communications*. XV, 532 pages. 2006.
- Vol. 4216: M.R. Berthold, R. Glen, I. Fischer (Eds.), *Computational Life Sciences*. XIII, 269 pages. 2006. (Sublibrary LNBI).
- Vol. 4213: J. Fürnkranz, T. Scheffer, M. Spiliopoulou (Eds.), *Knowledge Discovery in Databases: PKDD 2006*. XXII, 660 pages. 2006. (Sublibrary LNAI).
- Vol. 4212: J. Fürnkranz, T. Scheffer, M. Spiliopoulou (Eds.), *Machine Learning: ECML 2006*. XXIII, 851 pages. 2006. (Sublibrary LNAI).
- Vol. 4211: P. Vogt, Y. Sugita, E. Tuci, C. Nehaniv (Eds.), *Symbol Grounding and Beyond*. VIII, 237 pages. 2006. (Sublibrary LNAI).
- Vol. 4209: F. Crestani, P. Ferragina, M. Sanderson (Eds.), *String Processing and Information Retrieval*. XIV, 367 pages. 2006.
- Vol. 4208: M. Gerndt, D. Kranzlmüller (Eds.), *High Performance Computing and Communications*. XXII, 938 pages. 2006.
- Vol. 4207: Z. Ésik (Ed.), *Computer Science Logic*. XII, 627 pages. 2006.
- Vol. 4206: P. Dourish, A. Friday (Eds.), *UbiComp 2006: Ubiquitous Computing*. XIX, 526 pages. 2006.
- Vol. 4205: G. Bourque, N. El-Mabrouk (Eds.), *Comparative Genomics*. X, 231 pages. 2006. (Sublibrary LNBI).
- Vol. 4203: F. Esposito, Z.W. Ras, D. Malerba, G. Semeraro (Eds.), *Foundations of Intelligent Systems*. XVIII, 767 pages. 2006. (Sublibrary LNAI).
- Vol. 4202: E. Asarin, P. Bouyer (Eds.), *Formal Modeling and Analysis of Timed Systems*. XI, 369 pages. 2006.
- Vol. 4201: Y. Sakakibara, S. Kobayashi, K. Sato, T. Nishino, E. Tomita (Eds.), *Grammatical Inference: Algorithms and Applications*. XII, 359 pages. 2006. (Sublibrary LNAI).
- Vol. 4199: O. Nierstrasz, J. Whittle, D. Harel, G. Reggio (Eds.), *Model Driven Engineering Languages and Systems*. XVI, 798 pages. 2006. (Sublibrary LNBI).
- Vol. 4197: M. Raubal, H.J. Miller, A.U. Frank, M.F. Goodchild (Eds.), *Geographic, Information Science*. XIII, 419 pages. 2006.
- Vol. 4196: K. Fischer, I.J. Timm, E. André, N. Zhong (Eds.), *Multiagent System Technologies*. X, 185 pages. 2006. (Sublibrary LNAI).
- Vol. 4195: D. Gaiti, G. Pujolle, E. Al-Shaer, K. Calvert, S. Dobson, G. Leduc, O. Martikainen (Eds.), *Autonomic Networking*. IX, 316 pages. 2006.
- Vol. 4194: V.G. Ganzha, E.W. Mayr, E.V. Vorozhtsov (Eds.), *Computer Algebra in Scientific Computing*. XI, 313 pages. 2006.
- Vol. 4193: T.P. Runarsson, H.-G. Beyer, E. Burke, J.J. Merelo-Guervós, L. D. Whitley, X. Yao (Eds.), *Parallel Problem Solving from Nature – PPSN IX*. XIX, 1061 pages. 2006.
- Vol. 4192: B. Mohr, J.L. Träff, J. Worringen, J. Dongarra (Eds.), *Recent Advances in Parallel Virtual Machine and Message Passing Interface*. XVI, 414 pages. 2006.
- Vol. 4191: R. Larsen, M. Nielsen, J. Sparring (Eds.), *Medical Image Computing and Computer-Assisted Intervention – MICCAI 2006, Part II*. XXXVIII, 981 pages. 2006.
- Vol. 4190: R. Larsen, M. Nielsen, J. Sparring (Eds.), *Medical Image Computing and Computer-Assisted Intervention – MICCAI 2006, Part I*. XXXVIII, 949 pages. 2006.
- Vol. 4189: D. Gollmann, J. Meier, A. Sabelfeld (Eds.), *Computer Security – ESORICS 2006*. XI, 548 pages. 2006.
- Vol. 4188: P. Sojka, I. Kopeček, K. Pala (Eds.), *Text, Speech and Dialogue*. XIV, 721 pages. 2006. (Sublibrary LNAI).
- Vol. 4187: J.J. Alferes, J. Bailey, W. May, U. Schwertel (Eds.), *Principles and Practice of Semantic Web Reasoning*. XI, 277 pages. 2006.
- Vol. 4186: C. Jesshope, C. Egan (Eds.), *Advances in Computer Systems Architecture*. XIV, 605 pages. 2006.
- Vol. 4185: R. Mizoguchi, Z. Shi, F. Giunchiglia (Eds.), *The Semantic Web – ASWC 2006*. XX, 778 pages. 2006.
- Vol. 4184: M. Bravetti, M. Núñez, G. Zavattaro (Eds.), *Web Services and Formal Methods*. X, 289 pages. 2006.