Lecture Notes in Computer Science 8226

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Minho Lee Akira Hirose Zeng-Guang Hou
Rhee Man Kil (Eds.)

Neural Information Processing

20th International Conference, ICONIP 2013
Daegu, Korea, November 3-7, 2013
Proceedings, Part I

Springer

Volume Editors

Minho Lee
Kyungpook National University
1370 Sankyuk-Dong, Puk-Gu, Taegu 702-701, Korea
E-mail: mholee@knu.ac.kr

Akira Hirose
The University of Tokyo
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan
E-mail: ahirose@ee.t.u-tokyo.ac.jp

Zeng-Guang Hou
Chinese Academy of Sciences, Institute of Automation
Key Laboratory of Complex Systems and Intelligence Science
Beijing 100190, China
E-mail: zengguang.hou@ia.ac.cn

Rhee Man Kil
Sungkyunkwan University
2066, Seobu-ro, Jangan-gu, Suwon 440-746, Korea
E-mail: rmkil@skku.edu

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-42053-5 e-ISBN 978-3-642-42054-2
DOI 10.1007/978-3-642-42054-2
Springer Heidelberg New York Dordrecht London

Library of Congress Control Number: 2013951838

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

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

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

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

Preface

This volume is part of the three-volume proceedings of the 20th International Conference on Neural Information Processing (ICONIP 2013), which was held in Daegu, Korea, during November 3–7, 2013. ICONIP is the annual conference of the Asia Pacific Neural Network Assembly (APNNA). This series of conferences has been held annually since ICONIP 1994 in Seoul and has become one of the premier international conferences in the areas of neural networks.

Over the past few decades, the neural information processing community has witnessed tremendous efforts and developments from all aspects of neural information processing research. These include theoretical foundations, architectures and network organizations, modeling and simulation, empirical study, as well as a wide range of applications across different domains. Recent developments in science and technology, including neuroscience, computer science, cognitive science, nano-technologies, and engineering design, among others, have provided significant new understandings and technological solutions to move neural information processing research toward the development of complex, large-scale, and networked brain-like intelligent systems. This long-term goal can only be achieved with continuous efforts from the community to seriously investigate different issues of the neural information processing and related fields. To this end, ICONIP 2013 provided a powerful platform for the community to share their latest research results, to discuss critical future research directions, to stimulate innovative research ideas, as well as to facilitate multidisciplinary collaborations worldwide.

ICONIP 2013 received tremendous submissions authored by scholars coming from 30 countries and regions across six continents. Based on a rigorous peer review process, where each submission was evaluated by at least two qualified reviewers, about 270 high-quality papers were selected for publication in the prestigious series of *Lecture Notes in Computer Science*. These papers cover all major topics of theoretical research, empirical study, and applications of neural information processing research.

In addition to the contributed papers, the ICONIP 2013 technical program included a keynote speech by Shun-Ichi Amari (RIKEN Brain Science Institute, Japan), 5 plenary speeches by Yoshua Bengio (University of Montreal, Canada), Kunihiko Fukushima (Fuzzy Logic Systems Institute, Fukuoka, Japan), Soo-Young Lee (Brain Science Research Center, KAIST, Korea), Naftali Tishby (The Hebrew University, Jerusalem, Israel) and Zongben Xu (Xi'an Jiatong University, China). This conference also featured invited presentations, regular sessions with oral and poster presentations, and special sessions and tutorials on topics of current interest.

Our conference would not have been successful without the generous patronage of our sponsors. We are most grateful to our sponsors Korean Brain Research

Institute, Qualcomm Korea. We would also like to express our sincere thanks to the International Neural Network Society, European Neural Network Society, Japanese Neural Network Society, Brain Engineering Society of Korea, and The Korean Society for Cognitive Science for technical sponsorship.

We would also like to sincerely thank honorary chair Shun-ichi Amari, Soo-Young Lee, the members of the Advisory Committee, the APNNA Governing Board and past presidents for their guidance, the organizing chair Hyeyoung Park, the members of the Organizing Committee, special sessions chairs, Publication Committee and publicity chairs, for all their great efforts and time in organizing such an event. We would also like to take this opportunity to express our deepest gratitude to the members of the Program Committee and all reviewers for their professional review of the papers. Their expertise guaranteed the high quality of the technical program of the ICONIP 2013!

Furthermore, we would also like to thank Springer for publishing the proceedings in the prestigious series of *Lecture Notes in Computer Science*. We would, moreover, like to express our heartfelt appreciation to the keynote, plenary, panel, and invited speakers for their vision and discussions on the latest.

Finally, we would like to thank all the speakers, authors, and participants for their great contribution and support that made ICONIP 2013 a huge success.

This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government.

November 2013

Minho Lee
Akira Hirose
Rhee Man Kil
Zeng-Guang Hou

Organization

Honorary Chair

Shun-ichi Amari	RIKEN, Japan
Soo-Young Lee	KAIST, Korea

General Chair

Minho Lee	Kyungpook National University, Korea

Program Chair

Akira Hirose	The University of Tokyo, Japan
Zeng-Guang Hou	The Chinese Academy of Sciences, China
Rhee Man Kil	Sungkyunkwan University, Korea

Organizing Chair

Hyeyoung Park	Kyungpook National University, Korea

Workshop Chair

Daijin Kim	POSTECH, Korea
Kyunghwan Kim	NT Research, Korea
Seong-Whan Lee	Korea University, Korea

Special Session Chair

Sung-Bae Cho	Yonsei University, Korea
Seiichi Ozawa	Kobe University, Japan
Liqing Zhang	Shanghai Jiao Tong University, China

Tutorial Chair

Seungjin Choi	POSTECH, Korea

Publication Chair

Yoonsuck Choe	Texas A&M University, USA
Hyung-Min Park	Sogang University, Korea
Seong-Bae Park	Kyungpook National University, Korea

Publicity Chair

Kazushi Ikeda	NAIST, Japan
Chi-Sing Leung	University of Hong Kong, Hong Kong
Shaoning Pang	Unitec Institute of Technology, New Zealand

Registration Chair

Min-Young Kim	Kyungpook National University, Korea

Financial Chair

Sang-Woo Ban	Dongguk University, Korea

Local Arrangement Chair

Doo-Hyun Choi	Kyungpook National University, Korea
Jong-Seok Lee	Yonsei University, Korea
Rammohan Mallipeddi	Kyungpook National University, Korea

Advisory Committee

Jonathan H. Chan, Thailand
Wlodzislaw Duch, Poland
Kunihiko Fukushima, Japan
Tom Gedeon, Australia
Aike Guo, China
Akira Iwata, Japan
Nik Kasabov, New Zealand
Irwin King, Hong Kong
Noboru Onishi, Japan
Ron Son, USA
Il Hong Suh, Korea
Shiro Usui, Japan
DeLiang Wang, USA
Lipo Wang, Singapore
Jun Wang, Hong Kong
Lei Xu, Hong Kong
Takeshi Yamakawa, Japan
Byoung-Tak Zhang, Korea
Li-Ming Zhang, China

Program Committee Members

Tani Jun
Soo-Young Lee
Sung-Bae Cho
Sungmoon jeong
Kyung-Joong Kim
C.K. Loo
Nung Kion Lee
Shan He
Dae-Shik Kim
Rubin Wang
Xin Yao
S. Ma
Honghai Liu
Joarder Kamruzzaman
Mallipeddi Rammohan
Zhirong Yang
Anto Satriyo Nugroho
Nikola Kasabov

Jonghwan Lee
Yaochu Jin
DaeEun Kim
Tingwen Huang
Fangxiang Wu
Dongbing Gu
Hongli Dong
Cesare Alippi
Kyung Hwan Kim
Lae-Jeong Park
Sang-Woong Lee
Sabri Arik
Chee-Peng Lim
Haibo He
Dat Tran
Kee-Eung Kim
Seungjin Choi
Robert (Bob) McKay
Xueyi (Frank) Wang
Jennie Si
Markus Koskela
Ivo Bukovský
Ryo Saegusa
El-Sayed El-Alfy
Hyeyoung Park
Bunthit Watanapa
Vinh Nguyen
Kalyana C. Veluvolu
Mufti Mahmud
Gil-Jin Jang
Hyung-Min Park
Jeounghoon Kim
Rhee Man Kil
Sang-Woo Ban
Masa Takatsuka
Chee Seng Chan
Pau-Choo Chung
Uvais Qidwai
Dong-Joo Kim
JongJin Lim
Sungoh Kwon
Long Cheng
Akitoshi Hanazawa
Andrzej Cichocki
Sheng Li
Oclay Kursun
Michel Verleysen
Peter Erdi
Qingsong Song
Bin Li
Huaguang Zhang
Derong Liu
Eric Matson
Mehdi Roopaei
Jacek Ma'ndziuk
Yang Shi
Zhiwu Lu
Xiaofeng Liao
Zhigang Zeng
Ding-Xuan Zhou
James Tin-Yau Kwok
Hsuan-Tien Lin
Osman Elgawi
Chao Zhang
Bo Shen
Nistor Grozavu
Younès Bennani
Jinde Cao
Li-Po Wang
Justin Dauwels
Andrew Leung
Bao-Liang Lu
Changyin Sun
Hong Yan
Abdesselam Bouzerdoum
Emili Balaguer Ballester
H. Tang
Roland Goecke
Jose Alfredo Ferreira Costa
Shri Rai
Kuntal Ghosh
TaeHyun Hwang
Alexander Rast
Yangming Li
Akira Hirose
Akira Iwata
Ko Sakai
Koichiro Yamauchi

Atsushi Shimada
Eiji Uchino
Hayao Shouno
Hayaru Shouno
Heizo Tokutaka
Hideki Asoh
Hiroaki Gomi
Hiroshi Dozono
Hiroshi Kage
Hiroshi Yamakawa
Hiroyuki Nakahara
Ikuko Nishikawa
Jinglu Hu
Jun Nishii
Katsumi Tateno
Katsunari Shibata
Kazuho Watanabe
Kazushi Ikeda
Kazuyuki Samejima
Keisuke Kameyama
Kenichi Tanaka
Kenichiro Miura
Kenji Doya
Kiyohisa Natsume
Masafumi Hagiwara
Michio Niwano
Mingcong Deng
Naoyuki Sato
Noboru Ohnishi
Seiichi Ozawa
Shin Ishii
Shinichiro Kano
Shunji Satoh
Shunshoku Kanae
Takashi Morie
Takashi Omori
Takeshi Aihara
Takio Kurita
Tao Ban
Tetsuya Yagi
Tohru Nitta
Tom Shibata
Toshiaki Omori
Toshihisa Tanaka
Yen-Wei Chen
Yoko Yamaguchi
Yoshikazu Washizawa

Table of Contents – Part I

Table of Contents – Part II

Table of Contents – Part III