Lecture Notes in Computer Science 13108

Founding Editors

Gerhard Goos
Karlsruhe Institute of Technology, Karlsruhe, Germany
Juris Hartmanis
Cornell University, Ithaca, NY, USA

Editorial Board Members

Elisa Bertino
Purdue University, West Lafayette, IN, USA
Wen Gao
Peking University, Beijing, China
Bernhard Steffen
TU Dortmund University, Dortmund, Germany
Gerhard Woeginger
RWTH Aachen, Aachen, Germany
Moti Yung
Columbia University, New York, NY, USA

More information about this subseries at https://link.springer.com/bookseries/7407

Teddy Mantoro · Minho Lee ·
Media Anugerah Ayu · Kok Wai Wong ·
Achmad Nizar Hidayanto (Eds.)

Neural Information Processing

28th International Conference, ICONIP 2021
Sanur, Bali, Indonesia, December 8–12, 2021
Proceedings, Part I

Springer

Editors
Teddy Mantoro
Sampoerna University
Jakarta, Indonesia

Media Anugerah Ayu
Sampoerna University
Jakarta, Indonesia

Achmad Nizar Hidayanto
Universitas Indonesia
Depok, Indonesia

Minho Lee
Kyungpook National University
Daegu, Korea (Republic of)

Kok Wai Wong
Murdoch University
Murdoch, WA, Australia

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-92184-2 ISBN 978-3-030-92185-9 (eBook)
https://doi.org/10.1007/978-3-030-92185-9

LNCS Sublibrary: SL1 – Theoretical Computer Science and General Issues

© Springer Nature Switzerland AG 2021
This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Welcome to the proceedings of the 28th International Conference on Neural Information Processing (ICONIP 2021) of the Asia-Pacific Neural Network Society (APNNS), held virtually from Indonesia during December 8–12, 2021.

The mission of the Asia-Pacific Neural Network Society is to promote active interactions among researchers, scientists, and industry professionals who are working in neural networks and related fields in the Asia-Pacific region. APNNS has Governing Board Members from 13 countries/regions – Australia, China, Hong Kong, India, Japan, Malaysia, New Zealand, Singapore, South Korea, Qatar, Taiwan, Thailand, and Turkey. The society's flagship annual conference is the International Conference of Neural Information Processing (ICONIP).

The ICONIP conference aims to provide a leading international forum for researchers, scientists, and industry professionals who are working in neuroscience, neural networks, deep learning, and related fields to share their new ideas, progress, and achievements. Due to the current COVID-19 pandemic, ICONIP 2021, which was planned to be held in Bali, Indonesia, was organized as a fully virtual conference.

The proceedings of ICONIP 2021 consists of a four-volume set, LNCS 13108–13111, which includes 226 papers selected from 1093 submissions, representing an acceptance rate of 20.86% and reflecting the increasingly high quality of research in neural networks and related areas in the Asia-Pacific. The conference had four main themes, i.e., "Theory and Algorithms," "Cognitive Neurosciences," "Human Centred Computing," and "Applications."

The four volumes are organized in topical sections which comprise the four main themes mentioned previously and the topics covered in three special sessions. Another topic is from a workshop on Artificial Intelligence and Cyber Security which was held in conjunction with ICONIP 2021. Thus, in total, eight different topics were accommodated at the conference. The topics were also the names of the 20-minute presentation sessions at ICONIP 2021. The eight topics in the conference were: Theory and Algorithms; Cognitive Neurosciences; Human Centred Computing; Applications; Artificial Intelligence and Cybersecurity; Advances in Deep and Shallow Machine Learning Algorithms for Biomedical Data and Imaging; Reliable, Robust, and Secure Machine Learning Algorithms; and Theory and Applications of Natural Computing Paradigms.

Our great appreciation goes to the Program Committee members and the reviewers who devoted their time and effort to our rigorous peer-review process. Their insightful reviews and timely feedback ensured the high quality of the papers accepted for

publication. Finally, thank you to all the authors of papers, presenters, and participants at the conference. Your support and engagement made it all worthwhile.

December 2021

Teddy Mantoro
Minho Lee
Media A. Ayu
Kok Wai Wong
Achmad Nizar Hidayanto

Organization

Honorary Chairs

Jonathan Chan	King Mongkut's University of Technology Thonburi, Thailand
Lance Fung	Murdoch University, Australia

General Chairs

Teddy Mantoro	Sampoerna University, Indonesia
Minho Lee	Kyungpook National University, South Korea

Program Chairs

Media A. Ayu	Sampoerna University, Indonesia
Kok Wai Wong	Murdoch University, Australia
Achmad Nizar	Universitas Indonesia, Indonesia

Local Arrangements Chairs

Linawati	Universitas Udayana, Indonesia
W. G. Ariastina	Universitas Udayana, Indonesia

Finance Chairs

Kurnianingsih	Politeknik Negeri Semarang, Indonesia
Kazushi Ikeda	Nara Institute of Science and Technology, Japan

Special Sessions Chairs

Sunu Wibirama	Universitas Gadjah Mada, Indonesia
Paul Pang	Federation University Australia, Australia
Noor Akhmad Setiawan	Universitas Gadjah Mada, Indonesia

Tutorial Chairs

Suryono	Universitas Diponegoro, Indonesia
Muhammad Agni Catur Bhakti	Sampoerna University, Indonesia

Proceedings Chairs

Adi Wibowo	Universitas Diponegoro, Indonesia
Sung Bae Cho	Yonsei University, South Korea

Publicity Chairs

Dwiza Riana	Universitas Nusa Mandiri, Indonesia
M. Tanveer	Indian Institute of Technology, Indore, India

Program Committee

Abdulrazak Alhababi	Universiti Malaysia Sarawak, Malaysia
Abhijit Adhikary	Australian National University, Australia
Achmad Nizar Hidayanto	University of Indonesia, Indonesia
Adamu Abubakar Ibrahim	International Islamic University Malaysia, Malaysia
Adi Wibowo	Diponegoro University, Indonesia
Adnan Mahmood	Macquarie University, Australia
Afiyati Amaluddin	Mercu Buana University, Indonesia
Ahmed Alharbi	RMIT University, Australia
Akeem Olowolayemo	International Islamic University Malaysia, Malaysia
Akira Hirose	University of Tokyo, Japan
Aleksandra Nowak	Jagiellonian University, Poland
Ali Haidar	University of New South Wales, Australia
Ali Mehrabi	Western Sydney University, Australia
Al-Jadir	Murdoch University, Australia
Ana Flavia Reis	Federal Technological University of Paraná, Brazil
Anaissi Ali	University of Sydney, Australia
Andrew Beng Jin Teoh	Yonsei University, South Korea
Andrew Chiou	Central Queensland University, Australia
Aneesh Chivukula	University of Technology Sydney, Australia
Aneesh Krishna	Curtin University, Australia
Anna Zhu	Wuhan University of Technology, China
Anto Satriyo Nugroho	Agency for Assessment and Application of Technology, Indonesia
Anupiya Nugaliyadde	Sri Lanka Institute of Information Technology, Sri Lanka
Anwesha Law	Indian Statistical Institute, India
Aprinaldi Mantau	Kyushu Institute of Technology, Japan
Ari Wibisono	Universitas Indonesia, Indonesia
Arief Ramadhan	Bina Nusantara University, Indonesia
Arit Thammano	King Mongkut's Institute of Technology Ladkrabang, Thailand
Arpit Garg	University of Adelaide, Australia
Aryal Sunil	Deakin University, Australia
Ashkan Farhangi	University of Central Florida, USA

Atul Negi	University of Hyderabad, India
Barawi Mohamad Hardyman	Universiti Malaysia Sarawak, Malaysia
Bayu Distiawan	Universitas Indonesia, Indonesia
Bharat Richhariya	IISc Bangalore, India
Bin Pan	Nankai University, China
Bingshu Wang	Northwestern Polytechnical University, Taicang, China
Bonaventure C. Molokwu	University of Windsor, Canada
Bo-Qun Ma	Ant Financial
Bunthit Watanapa	King Mongkut's University of Technology Thonburi, Thailand
Chang-Dong Wang	Sun Yat-sen University, China
Chattrakul Sombattheera	Mahasarakham University, Thailand
Chee Siong Teh	Universiti Malaysia Sarawak, Malaysia
Chen Wei Chén	Chongqing Jiaotong University, China
Chengwei Wu	Harbin Institute of Technology, China
Chern Hong Lim	Monash University, Australia
Chih-Chieh Hung	National Chung Hsing University, Taiwan
Chiranjibi Sitaula	Deakin University, Australia
Chi-Sing Leung	City University of Hong Kong, Hong Kong
Choo Jun Tan	Wawasan Open University, Malaysia
Christoph Bergmeir	Monash University, Australia
Christophe Guyeux	University of Franche-Comté, France
Chuan Chen	Sun Yat-sen University, China
Chuanqi Tan	BIT, China
Chu-Kiong Loo	University of Malaya, Malaysia
Chun Che Fung	Murdoch University, Australia
Colin Samplawski	University of Massachusetts Amherst, USA
Congbo Ma	University of Adelaide, Australia
Cuiyun Gao	Chinese University of Hong Kong, Hong Kong
Cutifa Safitri	Universiti Teknologi Malaysia, Malaysia
Daisuke Miyamoto	University of Tokyo, Japan
Dan Popescu	Politehnica University of Bucharest
David Bong	Universiti Malaysia Sarawak, Malaysia
David Iclanzan	Sapientia Hungarian Science University of Transylvania, Romania
Debasmit Das	IIT Roorkee, India
Dengya Zhu	Curtin University, Australia
Derwin Suhartono	Bina Nusantara University, Indonesia
Devi Fitrianah	Universitas Mercu Buana, Indonesia
Deyu Zhou	Southeast University, China
Dhimas Arief Dharmawan	Universitas Indonesia, Indonesia
Dianhui Wang	La Trobe University, Australia
Dini Handayani	Taylors University, Malaysia
Dipanjyoti Paul	Indian Institute of Technology, Patna, India
Dong Chen	Wuhan University, China

Donglin Bai	Shanghai Jiao Tong University, China
Dongrui Wu	Huazhong University of Science & Technology, China
Dugang Liu	Shenzhen University, China
Dwina Kuswardani	Institut Teknologi PLN, Indonesia
Dwiza Riana	Universitas Nusa Mandiri, Indonesia
Edmund Lai	Auckland University of Technology, New Zealand
Eiji Uchino	Yamaguchi University, Japan
Emanuele Principi	Università Politecnica delle Marche, Italy
Enmei Tu	Shanghai Jiao Tong University, China
Enna Hirata	Kobe University, Japan
Eri Sato-Shimokawara	Tokyo Metropolitan University, Japan
Fajri Koto	University of Melbourne, Australia
Fan Wu	Australian National University, Australia
Farhad Ahamed	Western Sydney University, Australia
Fei Jiang	Shanghai Jiao Tong University, China
Feidiao Yang	Microsoft, USA
Feng Wan	University of Macau, Macau
Fenty Eka Muzayyana Agustin	UIN Syarif Hidayatullah Jakarta, Indonesia
Ferda Ernawan	Universiti Malaysia Pahang, Malaysia
Ferdous Sohel	Murdoch University, Australia
Francisco J. Moreno-Barea	Universidad de Málaga, Spain
Fuad Jamour	University of California, Riverside, USA
Fuchun Sun	Tsinghua University, China
Fumiaki Saitoh	Chiba Institute of Technology, Japan
Gang Chen	Victoria University of Wellington, New Zealand
Gang Li	Deakin University, Australia
Gang Yang	Renmin University of China
Gao Junbin	Huazhong University of Science and Technology, China
George Cabral	Universidade Federal Rural de Pernambuco, Brazil
Gerald Schaefer	Loughborough University, UK
Gouhei Tanaka	University of Tokyo, Japan
Guanghui Wen	RMIT University, Australia
Guanjin Wang	Murdoch University, Australia
Guoqiang Zhong	Ocean University of China, China
Guoqing Chao	East China Normal University, China
Sangchul Hahn	Handong Global University, South Korea
Haiqin Yang	International Digital Economy Academy, China
Hakaru Tamukoh	Kyushu Institute of Technology, Japan
Hamid Karimi	Utah State University, USA
Hangyu Deng	Waseda University, Japan
Hao Liao	Shenzhen University, China
Haris Al Qodri Maarif	International Islamic University Malaysia, Malaysia
Haruhiko Nishimura	University of Hyogo, Japan
Hayaru Shouno	University of Electro-Communications, Japan

He Chen	Nankai University, China
He Huang	Soochow University, China
Hea Choon Ngo	Universiti Teknikal Malaysia Melaka, Malaysia
Heba El-Fiqi	UNSW Canberra, Australia
Heru Praptono	Bank Indonesia/Universitas Indonesia, Indonesia
Hideitsu Hino	Institute of Statistical Mathematics, Japan
Hidemasa Takao	University of Tokyo, Japan
Hiroaki Inoue	Kobe University, Japan
Hiroaki Kudo	Nagoya University, Japan
Hiromu Monai	Ochanomizu University, Japan
Hiroshi Sakamoto	Kyushu Institute of Technology, Japan
Hisashi Koga	University of Electro-Communications, Japan
Hiu-Hin Tam	City University of Hong Kong, Hong Kong
Hongbing Xia	Beijing Normal University, China
Hongtao Liu	Tianjin University, China
Hongtao Lu	Shanghai Jiao Tong University, China
Hua Zuo	University of Technology Sydney, Australia
Hualou Liang	Drexel University, USA
Huang Chaoran	University of New South Wales, Australia
Huang Shudong	Sichuan University, China
Huawen Liu	University of Texas at San Antonio, USA
Hui Xue	Southeast University, China
Hui Yan	Shanghai Jiao Tong University, China
Hyeyoung Park	Kyungpook National University, South Korea
Hyun-Chul Kim	Kyungpook National University, South Korea
Iksoo Shin	University of Science and Technology, South Korea
Indrabayu Indrabayu	Universitas Hasanuddin, Indonesia
Iqbal Gondal	RMIT University, Australia
Iuliana Georgescu	University of Bucharest, Romania
Iwan Syarif	PENS, Indonesia
J. Kokila	Indian Institute of Information Technology, Allahabad, India
J. Manuel Moreno	Universitat Politècnica de Catalunya, Spain
Jagdish C. Patra	Swinburne University of Technology, Australia
Jean-Francois Couchot	University of Franche-Comté, France
Jelita Asian	STKIP Surya, Indonesia
Jennifer C. Dela Cruz	Mapua University, Philippines
Jérémie Sublime	ISEP, France
Jiahuan Lei	Meituan, China
Jialiang Zhang	Alibaba, China
Jiaming Xu	Institute of Automation, Chinese Academy of Sciences
Jianbo Ning	University of Science and Technology Beijing, China
Jianyi Yang	Nankai University, China
Jiasen Wang	City University of Hong Kong, Hong Kong
Jiawei Fan	Australian National University, Australia
Jiawei Li	Tsinghua University, China

Jiaxin Li	Guangdong University of Technology, China
Jiaxuan Xie	Shanghai Jiao Tong University, China
Jichuan Zeng	Bytedance, China
Jie Shao	University of Science and Technology of China, China
Jie Zhang	Newcastle University, UK
Jiecong Lin	City University of Hong Kong, Hong Kong
Jin Hu	Chongqing Jiaotong University, China
Jin Kyu Kim	Facebook, USA
Jin Ren	Beijing University of Technology, China
Jin Shi	Nanjing University, China
Jinfu Yang	Beijing University of Technology, China
Jing Peng	South China Normal University, China
Jinghui Zhong	South China University of Technology, China
Jin-Tsong Jeng	National Formosa University, Taiwan
Jiri Sima	Institute of Computer Science, Czech Academy of Sciences, Czech Republic
Jo Plested	Australian National University, Australia
Joel Dabrowski	CSIRO, Australia
John Sum	National Chung Hsing University, China
Jolfaei Alireza	Federation University Australia, Australia
Jonathan Chan	King Mongkut's University of Technology Thonburi, Thailand
Jonathan Mojoo	Hiroshima University, Japan
Jose Alfredo Ferreira Costa	Federal University of Rio Grande do Norte, Brazil
Ju Lu	Shandong University, China
Jumana Abu-Khalaf	Edith Cowan University, Australia
Jun Li	Nanjing Normal University, China
Jun Shi	Guangzhou University, China
Junae Kim	DST Group, Australia
Junbin Gao	University of Sydney, Australia
Junjie Chen	Inner Mongolia Agricultural University, China
Junya Chen	Fudan University, China
Junyi Chen	City University of Hong Kong, Hong Kong
Junying Chen	South China University of Technology, China
Junyu Xuan	University of Technology, Sydney
Kah Ong Michael Goh	Multimedia University, Malaysia
Kaizhu Huang	Xi'an Jiaotong-Liverpool University, China
Kam Meng Goh	Tunku Abdul Rahman University College, Malaysia
Katsuhiro Honda	Osaka Prefecture University, Japan
Katsuyuki Hagiwara	Mie University, Japan
Kazushi Ikeda	Nara Institute of Science and Technology, Japan
Kazuteru Miyazaki	National Institution for Academic Degrees and Quality Enhancement of Higher Education, Japan
Kenji Doya	OIST, Japan
Kenji Watanabe	National Institute of Advanced Industrial Science and Technology, Japan

Kok Wai Wong	Murdoch University, Australia
Kitsuchart Pasupa	King Mongkut's Institute of Technology Ladkrabang, Thailand
Kittichai Lavangnananda	King Mongkut's University of Technology Thonburi, Thailand
Koutsakis Polychronis	Murdoch University, Australia
Kui Ding	Nanjing Normal University, China
Kun Zhang	Carnegie Mellon University, USA
Kuntpong Woraratpanya	King Mongkut's Institute of Technology Ladkrabang, Thailand
Kurnianingsih Kurnianingsih	Politeknik Negeri Semarang, Indonesia
Kusrini	Universitas AMIKOM Yogyakarta, Indonesia
Kyle Harrison	UNSW Canberra, Australia
Laga Hamid	Murdoch University, Australia
Lei Wang	Beihang University, China
Leonardo Franco	Universidad de Málaga, Spain
Li Guo	University of Macau, China
Li Yun	Nanjing University of Posts and Telecommunications, China
Libo Wang	Xiamen University of Technology, China
Lie Meng Pang	Southern University of Science and Technology, China
Liew Alan Wee-Chung	Griffith University, Australia
Lingzhi Hu	Beijing University of Technology, China
Linjing Liu	City University of Hong Kong, Hong Kong
Lisi Chen	Hong Kong Baptist University, Hong Kong
Long Cheng	Institute of Automation, Chinese Academy of Sciences, China
Lukman Hakim	Hiroshima University, Japan
M. Tanveer	Indian Institute of Technology, Indore, India
Ma Wanli	University of Canberra, Australia
Man Fai Leung	Hong Kong Metropolitan University, Hong Kong
Maram Mahmoud A. Monshi	Beijing Institute of Technology, China
Marcin Wozniak	Silesian University of Technology, Poland
Marco Anisetti	Università degli Studi di Milano, Italy
Maria Susan Anggreainy	Bina Nusantara University, Indonesia
Mark Abernethy	Murdoch University, Australia
Mark Elshaw	Coventry University, UK
Maruno Yuki	Kyoto Women's University, Japan
Masafumi Hagiwara	Keio University, Japan
Masataka Kawai	NRI SecureTechnologies, Ltd., Japan
Media Ayu	Sampoerna University, Indonesia
Mehdi Neshat	University of Adelaide, Australia
Meng Wang	Southeast University, China
Mengmeng Li	Zhengzhou University, China

Miaohua Zhang	Griffith University, Australia
Mingbo Zhao	Donghua University, China
Mingcong Deng	Tokyo University of Agriculture and Technology, Japan
Minghao Yang	Institute of Automation, Chinese Academy of Sciences, China
Minho Lee	Kyungpook National University, South Korea
Mofei Song	Southeast University, China
Mohammad Faizal Ahmad Fauzi	Multimedia University, Malaysia
Mohsen Marjani	Taylor's University, Malaysia
Mubasher Baig	National University of Computer and Emerging Sciences, Lahore, Pakistan
Muhammad Anwar Ma'Sum	Universitas Indonesia, Indonesia
Muhammad Asim Ali	Shaheed Zulfikar Ali Bhutto Institute of Science and Technology, Pakistan
Muhammad Fawad Akbar Khan	University of Engineering and Technology Peshawar, Pakistan
Muhammad Febrian Rachmadi	Universitas Indonesia, Indonesia
Muhammad Haris	Universitas Nusa Mandiri, Indonesia
Muhammad Haroon Shakeel	Lahore University of Management Sciences, Pakistan
Muhammad Hilman	Universitas Indonesia, Indonesia
Muhammad Ramzan	Saudi Electronic University, Saudi Arabia
Muideen Adegoke	City University of Hong Kong, Hong Kong
Mulin Chen	Northwestern Polytechnical University, China
Murtaza Taj	Lahore University of Management Sciences, Pakistan
Mutsumi Kimura	Ryukoku University, Japan
Naoki Masuyama	Osaka Prefecture University, Japan
Naoyuki Sato	Future University Hakodate, Japan
Nat Dilokthanakul	Vidyasirimedhi Institute of Science and Technology, Thailand
Nguyen Dang	University of Canberra, Australia
Nhi N. Y. Vo	University of Technology Sydney, Australia
Nick Nikzad	Griffith University, Australia
Ning Boda	Swinburne University of Technology, Australia
Nobuhiko Wagatsuma	Tokyo Denki University, Japan
Nobuhiko Yamaguchi	Saga University, Japan
Noor Akhmad Setiawan	Universitas Gadjah Mada, Indonesia
Norbert Jankowski	Nicolaus Copernicus University, Poland
Norikazu Takahashi	Okayama University, Japan
Noriyasu Homma	Tohoku University, Japan
Normaziah A. Aziz	International Islamic University Malaysia, Malaysia
Olarik Surinta	Mahasarakham University, Thailand

Olutomilayo Olayemi Petinrin	Kings University, Nigeria
Ooi Shih Yin	Multimedia University, Malaysia
Osamu Araki	Tokyo University of Science, Japan
Ozlem Faydasicok	Istanbul University, Turkey
Parisa Rastin	University of Lorraine, France
Paul S. Pang	Federation University Australia, Australia
Pedro Antonio Gutierrez	Universidad de Cordoba, Spain
Pengyu Sun	Microsoft
Piotr Duda	Institute of Computational Intelligence/Czestochowa University of Technology, Poland
Prabath Abeysekara	RMIT University, Australia
Pui Huang Leong	Tunku Abdul Rahman University College, Malaysia
Qian Li	Chinese Academy of Sciences, China
Qiang Xiao	Huazhong University of Science and Technology, China
Qiangfu Zhao	University of Aizu, Japan
Qianli Ma	South China University of Technology, China
Qing Xu	Tianjin University, China
Qing Zhang	Meituan, China
Qinglai Wei	Institute of Automation, Chinese Academy of Sciences, China
Qingrong Cheng	Fudan University, China
Qiufeng Wang	Xi'an Jiaotong-Liverpool University, China
Qiulei Dong	Institute of Automation, Chinese Academy of Sciences, China
Qiuye Wu	Guangdong University of Technology, China
Rafal Scherer	Częstochowa University of Technology, Poland
Rahmadya Handayanto	Universitas Islam 45 Bekasi, Indonesia
Rahmat Budiarto	Albaha University, Saudi Arabia
Raja Kumar	Taylor's University, Malaysia
Rammohan Mallipeddi	Kyungpook National University, South Korea
Rana Md Mashud	CSIRO, Australia
Rapeeporn Chamchong	Mahasarakham University, Thailand
Raphael Couturier	Université Bourgogne Franche-Comté, France
Ratchakoon Pruengkarn	Dhurakij Pundit University, Thailand
Reem Mohamed	Mansoura University, Egypt
Rhee Man Kil	Sungkyunkwan University, South Korea
Rim Haidar	University of Sydney, Australia
Rizal Fathoni Aji	Universitas Indonesia, Indonesia
Rukshima Dabare	Murdoch University, Australia
Ruting Cheng	University of Science and Technology Beijing, China
Ruxandra Liana Costea	Polytechnic University of Bucharest, Romania
Saaveethya Sivakumar	Curtin University Malaysia, Malaysia
Sabrina Fariza	Central Queensland University, Australia
Sahand Vahidnia	University of New South Wales, Australia

Saifur Rahaman	City University of Hong Kong, Hong Kong
Sajib Mistry	Curtin University, Australia
Sajib Saha	CSIRO, Australia
Sajid Anwar	Institute of Management Sciences Peshawar, Pakistan
Sakchai Muangsrinoon	Walailak University, Thailand
Salomon Michel	Université Bourgogne Franche-Comté, France
Sandeep Parameswaran	Myntra Designs Pvt. Ltd., India
Sangtae Ahn	Kyungpook National University, South Korea
Sang-Woo Ban	Dongguk University, South Korea
Sangwook Kim	Kobe University, Japan
Sanparith Marukatat	NECTEC, Thailand
Saptakatha Adak	Indian Institute of Technology, Madras, India
Seiichi Ozawa	Kobe University, Japan
Selvarajah Thuseethan	Sabaragamuwa University of Sri Lanka, Sri Lanka
Seong-Bae Park	Kyung Hee University, South Korea
Shan Zhong	Changshu Institute of Technology, China
Shankai Yan	National Institutes of Health, USA
Sheeraz Akram	University of Pittsburgh, USA
Shenglan Liu	Dalian University of Technology, China
Shenglin Zhao	Zhejiang University, China
Shing Chiang Tan	Multimedia University, Malaysia
Shixiong Zhang	Xidian University, China
Shreya Chawla	Australian National University, Australia
Shri Rai	Murdoch University, Australia
Shuchao Pang	Jilin University, China/Macquarie University, Australia
Shuichi Kurogi	Kyushu Institute of Technology, Japan
Siddharth Sachan	Australian National University, Australia
Sirui Li	Murdoch University, Australia
Sonali Agarwal	Indian Institute of Information Technology, Allahabad, India
Sonya Coleman	University of Ulster, UK
Stavros Ntalampiras	University of Milan, Italy
Su Lei	University of Science and Technology Beijing, China
Sung-Bae Cho	Yonsei University, South Korea
Sunu Wibirama	Universitas Gadjah Mada, Indonesia
Susumu Kuroyanagi	Nagoya Institute of Technology, Japan
Sutharshan Rajasegarar	Deakin University, Australia
Takako Hashimoto	Chiba University of Commerce, Japan
Takashi Omori	Tamagawa University, Japan
Tao Ban	National Institute of Information and Communications Technology, Japan
Tao Li	Peking University, China
Tao Xiang	Chongqing University, China
Teddy Mantoro	Sampoerna University, Indonesia
Tedjo Darmanto	STMIK AMIK Bandung, Indonesia
Teijiro Isokawa	University of Hyogo, Japan

Thanh Tam Nguyen	Leibniz University Hannover, Germany
Thanh Tung Khuat	University of Technology Sydney, Australia
Thaweesak Khongtuk	Rajamangala University of Technology Suvarnabhumi, Thailand
Tianlin Zhang	University of Chinese Academy of Sciences, China
Timothy McIntosh	Massey University, New Zealand
Toan Nguyen Thanh	Ho Chi Minh City University of Technology, Vietnam
Todsanai Chumwatana	Murdoch University, Australia
Tom Gedeon	Australian National University, Australia
Tomas Maul	University of Nottingham, Malaysia
Tomohiro Shibata	Kyushu Institute of Technology, Japan
Tomoyuki Kaneko	University of Tokyo, Japan
Toshiaki Omori	Kobe University, Japan
Toshiyuki Yamane	IBM, Japan
Uday Kiran	University of Tokyo, Japan
Udom Silparcha	King Mongkut's University of Technology Thonburi, Thailand
Umar Aditiawarman	Universitas Nusa Putra, Indonesia
Upeka Somaratne	Murdoch University, Australia
Usman Naseem	University of Sydney, Australia
Ven Jyn Kok	National University of Malaysia, Malaysia
Wachira Yangyuen	Rajamangala University of Technology Srivijaya, Thailand
Wai-Keung Fung	Robert Gordon University, UK
Wang Yaqing	Baidu Research, Hong Kong
Wang Yu-Kai	University of Technology Sydney, Australia
Wei Jin	Michigan State University, USA
Wei Yanling	TU Berlin, Germany
Weibin Wu	City University of Hong Kong, Hong Kong
Weifeng Liu	China University of Petroleum, China
Weijie Xiang	University of Science and Technology Beijing, China
Wei-Long Zheng	Massachusetts General Hospital, Harvard Medical School, USA
Weiqun Wang	Institute of Automation, Chinese Academy of Sciences, China
Wen Luo	Nanjing Normal University, China
Wen Yu	Cinvestav, Mexico
Weng Kin Lai	Tunku Abdul Rahman University College, Malaysia
Wenqiang Liu	Southwest Jiaotong University, China
Wentao Wang	Michigan State University, USA
Wenwei Gu	Chinese University of Hong Kong, Hong Kong
Wenxin Yu	Southwest University of Science and Technology, China
Widodo Budiharto	Bina Nusantara University, Indonesia
Wisnu Ananta Kusuma	Institut Pertanian Bogor, Indonesia
Worapat Paireekreng	Dhurakij Pundit University, Thailand

Xiang Chen	George Mason University, USA
Xiao Jian Tan	Tunku Abdul Rahman University College, Malaysia
Xiao Liang	Nankai University, China
Xiaocong Chen	University of New South Wales, Australia
Xiaodong Yue	Shanghai University, China
Xiaoqing Lyu	Peking University, China
Xiaoyang Liu	Huazhong University of Science and Technology, China
Xiaoyang Tan	Nanjing University of Aeronautics and Astronautics, China
Xiao-Yu Tang	Zhejiang University, China
Xin Liu	Huaqiao University, China
Xin Wang	Southwest University, China
Xin Xu	Beijing University of Technology, China
Xingjian Chen	City University of Hong Kong, Hong Kong
Xinyi Le	Shanghai Jiao Tong University, China
Xinyu Shi	University of Science and Technology Beijing, China
Xiwen Bao	Chongqing Jiaotong University, China
Xu Bin	Northwestern Polytechnical University, China
Xu Chen	Shanghai Jiao Tong University, China
Xuan-Son Vu	Umeå University, Sweden
Xuanying Zhu	Australian National University, Australia
Yanling Zhang	University of Science and Technology Beijing, China
Yang Li	East China Normal University, China
Yantao Li	Chongqing University, China
Yanyan Hu	University of Science and Technology Beijing, China
Yao Lu	Beijing Institute of Technology, China
Yasuharu Koike	Tokyo Institute of Technology, Japan
Ya-Wen Teng	Academia Sinica, Taiwan
Yaxin Li	Michigan State University, USA
Yifan Xu	Huazhong University of Science and Technology, China
Yihsin Ho	Takushoku University, Japan
Yilun Jin	Hong Kong University of Science and Technology, Hong Kong
Yiming Li	Tsinghua University, China
Ying Xiao	University of Birmingham, UK
Yingjiang Zhou	Nanjing University of Posts and Telecommunications, China
Yong Peng	Hangzhou Dianzi University, China
Yonghao Ma	University of Science and Technology Beijing, China
Yoshikazu Washizawa	University of Electro-Communications, Japan
Yoshimitsu Kuroki	Kurume National College of Technology, Japan
Young Ju Rho	Korea Polytechnic University, South Korea
Youngjoo Seo	Ecole Polytechnique Fédérale de Lausanne, Switzerland

Yu Sang	PetroChina, China
Yu Xiaohan	Griffith University, Australia
Yu Zhou	Chongqing University, China
Yuan Ye	Xi'an Jiaotong University, China
Yuangang Pan	University of Technology Sydney, Australia
Yuchun Fang	Shanghai University, China
Yuhua Song	University of Science and Technology Beijing
Yunjun Gao	Zhejiang University, China
Zeyuan Wang	University of Sydney, Australia
Zhen Wang	University of Sydney, Australia
Zhengyang Feng	Shanghai Jiao Tong University, China
Zhenhua Wang	Zhejiang University of Technology, China
Zhenqian Wu	University of Electronic Science and Technology of China, China
Zhenyu Cui	University of Chinese Academy of Sciences, China
Zhenyue Qin	Australian National University, Australia
Zheyang Shen	Aalto University, Finland
Zhihong Cui	Shandong University, China
Zhijie Fang	Chinese Academy of Sciences, China
Zhipeng Li	Tsinghua University, China
Zhiri Tang	City University of Hong Kong, Hong Kong
Zhuangbin Chen	Chinese University of Hong Kong, Hong Kong
Zongying Liu	University of Malaya, Malaysia

Contents – Part I

Theory and Algorithms

Metric Learning Based Vision Transformer for Product Matching 3
Lei Huang, Wei Shao, Fuzhou Wang, Weidun Xie, and Ka-Chun Wong

Stochastic Recurrent Neural Network for Multistep Time Series Forecasting 14
Zexuan Yin and Paolo Barucca

Speaker Verification with Disentangled Self-attention 27
Junjie Guo, Zhiyuan Ma, Haodong Zhao, Gongshen Liu, and Xiaoyong Li

Multi Modal Normalization 40
Neeraj Kumar, Ankur Narang, Brejesh lall, and Srishti Goel

A Focally Discriminative Loss for Unsupervised Domain Adaptation. 54
Dongting Sun, Mengzhu Wang, Xurui Ma, Tianming Zhang, Nan Yin, Wei Yu, and Zhigang Luo

Automatic Drum Transcription with Label Augmentation Using Convolutional Neural Networks 65
Tianyu Xu, Pei Dai, Baoyin He, Mei Zhang, and Jinhui Zhu

Adaptive Curriculum Learning for Semi-supervised Segmentation of 3D CT-Scans 77
Obed Tettey Nartey, Guowu Yang, Dorothy Araba Yakoba Agyapong, JinZhao Wu, Asare K. Sarpong, and Lady Nadia Frempong

Genetic Algorithm and Distinctiveness Pruning in the Shallow Networks for VehicleX 91
Linwei Zhang and Yeu-Shin Fu

Stack Multiple Shallow Autoencoders into a Strong One: A New Reconstruction-Based Method to Detect Anomaly 103
Hanqi Wang, Xing Hu, Liang Song, Guanhua Zhang, Yang Liu, Jing Liu, and Linhua Jiang

Learning Discriminative Representation with Attention and Diversity for Large-Scale Face Recognition 116
Zhong Zheng, Manli Zhang, and Guixia Kang

Multi-task Perceptual Occlusion Face Detection with Semantic Attention Network 129
Lian Shen, Jia-Xiang Lin, and Chang-Ying Wang

RAIDU-Net: Image Inpainting via Residual Attention Fusion and Gated Information Distillation 141
Penghao He, Ying Yu, Chaoyue Xu, and Hao Yang

Sentence Rewriting with Few-Shot Learning for Document-Level Event Coreference Resolution 152
Xinyu Chen, Sheng Xu, Peifeng Li, and Qiaoming Zhu

A Novel Metric Learning Framework for Semi-supervised Domain Adaptation 165
Rakesh Kumar Sanodiya, Chinmay Sharma, Sai Satwik, Aravind Challa, Sathwik Rao, and Leehter Yao

Generating Adversarial Examples by Distributed Upsampling 177
Shunkai Zhou, Yueling Zhang, Guitao Cao, and Jiangtao Wang

CPSAM: Channel and Position Squeeze Attention Module 190
Yuchen Gong, Zhihao Gu, Zhenghao Zhang, and Lizhuang Ma

A Multi-Channel Graph Attention Network for Chinese NER 203
Yichun Zhao, Kui Meng, and Gongshen Liu

GSNESR: A Global Social Network Embedding Approach for Social Recommendation 215
Bing-biao Xiao and Jian-wei Liu

Classification Models for Medical Data with Interpretative Rules 227
Xinyue Xu, Xiang Ding, Zhenyue Qin, and Yang Liu

Contrastive Goal Grouping for Policy Generalization in Goal-Conditioned Reinforcement Learning 240
Qiming Zou and Einoshin Suzuki

Global Fusion Capsule Network with Pairwise-Relation Attention Graph Routing 254
Xinyi Li, Song Wu, and Guoqiang Xiao

MA-GAN: A Method Based on Generative Adversarial Network for Calligraphy Morphing 266
Jiaxin Zhao, Yang Zhang, Xiaohu Ma, Dongdong Yang, Yao Shen, and Hualiang Jiang

One-Stage Open Set Object Detection with Prototype Learning 279
Yongyu Xiong, Peipei Yang, and Cheng-Lin Liu

Aesthetic-Aware Recommender System for Online Fashion Products 292
Bei Zhou, Basem Suleiman, and Waheeb Yaqub

DAFD: Domain Adaptation Framework for Fake News Detection 305
Yinqiu Huang, Min Gao, Jia Wang, and Kai Shu

Document Image Classification Method Based on Graph Convolutional Network 317
Yangyang Xiong, Zhongjian Dai, Yan Liu, and Xiaotian Ding

Continual Learning of 3D Point Cloud Generators 330
Michał Sadowski, Karol J. Piczak, Przemysław Spurek, and Tomasz Trzciński

Attention-Based 3D ResNet for Detection of Alzheimer's Disease Process . . . 342
Mingjin Liu, Jialiang Tang, Wenxin Yu, and Ning Jiang

Generation of a Large-Scale Line Image Dataset with Ground Truth Texts from Page-Level Autograph Documents 354
Ayumu Nagai

DAP-BERT: Differentiable Architecture Pruning of BERT 367
Chung-Yiu Yau, Haoli Bai, Irwin King, and Michael R. Lyu

Trash Detection on Water Channels 379
Mohbat Tharani, Abdul Wahab Amin, Fezan Rasool, Mohammad Maaz, Murtaza Taj, and Abubakar Muhammad

Tri-Transformer Hawkes Process: Three Heads are Better Than One 390
Zhi-yan Song, Jian-wei Liu, Lu-ning Zhang, and Ya-nan Han

PhenoDeep: A Deep Learning-Based Approach for Detecting Reproductive Organs from Digitized Herbarium Specimen Images 402
Abdelaziz Triki, Bassem Bouaziz, Jitendra Gaikwad, and Walid Mahdi

Document-Level Event Factuality Identification Using Negation and Speculation Scope 414
Heng Zhang, Zhong Qian, Xiaoxu Zhu, and Peifeng Li

Dynamic Network Embedding by Time-Relaxed Temporal Random Walk . . . 426
Yifan Song, Darong Lai, Zhihong Chong, and Zeyuan Pan

Dual-Band Maritime Ship Classification Based on Multi-layer Convolutional Features and Bayesian Decision 438
Zhaoqing Wu, Yancheng Cai, Xiaohua Qiu, Min Li, Yujie He, Yu Song, and Weidong Du

Context-Based Anomaly Detection via Spatial Attributed Graphs in Human Monitoring 450
Kang Zhang, Muhammad Fikko Fadjrimiratno, and Einoshin Suzuki

Domain-Adaptation Person Re-Identification via Style Translation and Clustering 464
Peiyi Wei, Canlong Zhang, Zhixin Li, Yanping Tang, and Zhiwen Wang

Multimodal Named Entity Recognition via Co-attention-Based Method with Dynamic Visual Concept Expansion. 476
Xiaoyu Zhao and Buzhou Tang

Ego Networks. 488
Andrei Marin, Traian Rebedea, and Ionel Hosu

Cross-Modal Based Person Re-identification via Channel Exchange and Adversarial Learning 500
Xiaohui Xu, Song Wu, Shan Liu, and Guoqiang Xiao

SPBERT: an Efficient Pre-training BERT on SPARQL Queries for Question Answering over Knowledge Graphs 512
Hieu Tran, Long Phan, James Anibal, Binh T. Nguyen, and Truong-Son Nguyen

Deep Neuroevolution: Training Neural Networks Using a Matrix-Free Evolution Strategy. 524
Dariusz Jagodziński, Łukasz Neumann, and Paweł Zawistowski

Weighted P-Rank: a Weighted Article Ranking Algorithm Based on a Heterogeneous Scholarly Network 537
Jian Zhou, Shenglan Liu, Lin Feng, Jie Yang, and Ning Cai

Clustering Friendly Dictionary Learning. 549
Anurag Goel and Angshul Majumdar

Understanding Test-Time Augmentation. 558
Masanari Kimura

SphereCF: Sphere Embedding for Collaborative Filtering 570
Haozhuang Liu, Mingchao Li, Yang Wang, Wang Chen, and Hai-Tao Zheng

Concordant Contrastive Learning for Semi-supervised Node Classification on Graph 584
Daqing Wu, Xiao Luo, Xiangyang Guo, Chong Chen, Minghua Deng, and Jinwen Ma

Improving Shallow Neural Networks via Local and Global Normalization . . . 596
Ning Jiang, Jialiang Tang, Xiaoyan Yang, Wenxin Yu, and Peng Zhang

Underwater Acoustic Target Recognition with Fusion Feature. 609
Pengyuan Qi, Jianguo Sun, Yunfei Long, Liguo Zhang, and Tianye

Evaluating Data Characterization Measures for Clustering Problems in Meta-learning 621
Luiz Henrique dos S. Fernandes, Marcilio C. P. de Souto, and Ana C. Lorena

ShallowNet: An Efficient Lightweight Text Detection Network Based on Instance Count-Aware Supervision Information 633
Xingfei Hu, Deyang Wu, Haiyan Li, Fei Jiang, and Hongtao Lu

Image Periodization for Convolutional Neural Networks 645
Kailai Zhang, Zheng Cao, and Ji Wu

BCN-GCN: A Novel Brain Connectivity Network Classification Method via Graph Convolution Neural Network for Alzheimer's Disease 657
Peiyi Gu, Xiaowen Xu, Ye Luo, Peijun Wang, and Jianwei Lu

Triplet Mapping for Continuously Knowledge Distillation 669
Xiaoyan Yang, Jialiang Tang, Ning Jiang, Wenxin Yu, and Peng Zhang

A Prediction-Augmented AutoEncoder for Multivariate Time Series Anomaly Detection 681
Sawenbo Gong, Zhihao Wu, Yunxiao Liu, Youfang Lin, and Jing Wang

Author Index 693