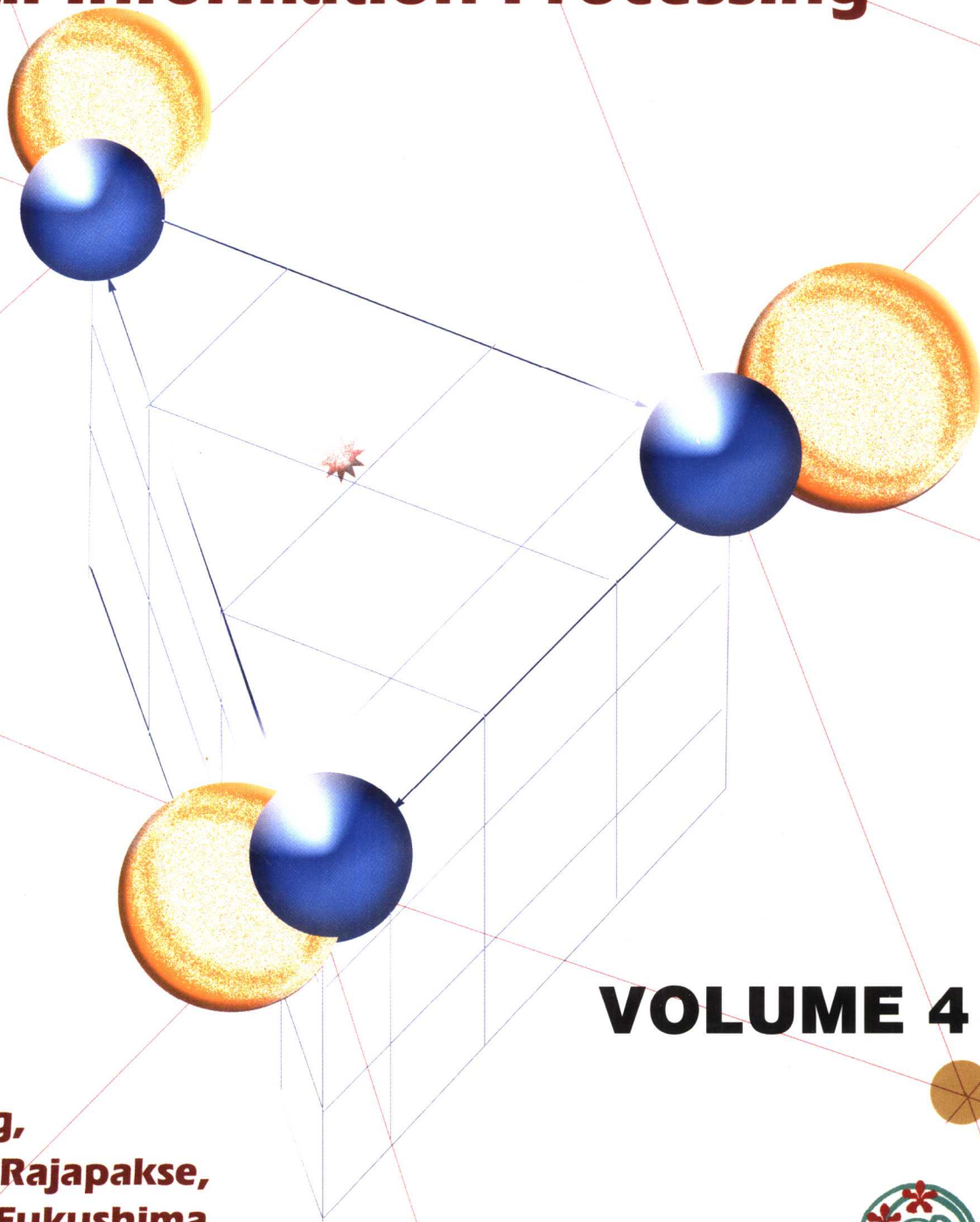


# ICONIP'02

## Proceedings of the 9th International Conference on Neural Information Processing



### VOLUME 4

Lipo Wang,  
Jagath C. Rajapakse,  
Kunihiko Fukushima,  
Soo-Young Lee,  
and Xin Yao (Editors)

November 18 - 22, 2002  
Orchid Country Club, Singapore



# ICONIP'02

Proceedings of the  
9<sup>th</sup> International Conference on Neural  
Information Processing

*Computational Intelligence for the E-Age*

Volume 4

**Lipo Wang, Jagath C. Rajapakse, Kunihiko Fukushima,  
Soo-Young Lee, and Xin Yao (Editors)**

November 18 - 22, 2002

Orchid Country Club, Singapore

## **Proceedings of the 9th International Conference on Neural Information Processing (ICONIP'02)**

Abstracting and indexing of the paper is permitted but due credit should be given to the source. Photocopy of an article is permitted for authors and researchers for their own reading and research. Written permission should be obtained from the publishers prior to any prohibited reproduction. Please contact: Conference Management Centre/CCE, Nanyang Technological University, Administration Annex Building, #04-06, 42 Nanyang Avenue, Singapore 639815; Fax: +65 6793 0997.

ISBN: 981-04-7524-1

IEEE Catalog Number: 02EX575

Additional copies of this publication are available from:

IEEE Service Center  
445 Hoes Lane  
P.O.Box 1331  
Piscataway, NJ08855-1331  
Tel: +1 732 981-0600  
Fax: +1 732 981-9667

<http://shop.ieee.org/store/customer-service@ieee.org>  
e-mail: [customer-services@ieee.org](mailto:customer-services@ieee.org)

Organized by



School of Electrical & Electronic Engineering  
Nanyang Technological University, Singapore



Sponsored by

Asia-Pacific Neural Network Assembly  
Singapore Neuroscience Association  
SEAL & FSKD Conference Steering Committees

In-Cooperation with

IEEE Neural Networks Society  
International Neural Network Society  
European Neural Network Society  
SPIE

Supported by

Lee Foundation



SINGAPORE EXHIBITION & CONVENTION BUREAU



U.S. Asian Office of Aerospace Research & Development (AOARD)



U.S. Army Research Office-Far East (ARO-FE)



Novartis Pharmaceuticals



## Welcome Message from Conference Chairs

On behalf of the Organizing Committee, we welcome you to the 9<sup>th</sup> International Conference on Neural Information Processing (ICONIP'02), the 4<sup>th</sup> Asia-Pacific Conference on Simulated Evolution And Learning (SEAL'02), and the 1<sup>st</sup> International Conference on Fuzzy Systems and Knowledge Discovery (FSKD'02). And for most of you, welcome to Singapore!

ICONIP is the annual conference of the Asia-Pacific Neural Network Assembly. SEAL is a biannual conference on evolutionary computation in the Asia-Pacific region. It is the first time that these two conferences are held jointly at the same venue and at the same time, and it is also the first time that they are held here in Singapore. We are very pleased that both ICONIP'02 and SEAL'02 are among the most successful in their respective serials. The name of the FSKD conference was suggested to us by its Honorary Conference Chair, Professor Lotfi A. Zadeh. It is gratifying to see the extremely encouraging first run of FSKD'02.

ICONIP'02 has attracted 670 submissions. The joint conference has received a total of 1100 submissions from 60 countries in all continents. We have selected 536 high quality papers for ICONIP'02 (852 for the joint conference) based on a thorough and comprehensive review of each and every paper. About 15% of these accepted papers are from special sessions, for which the special session organizers coordinated the reviews. The accepted papers are arranged into 12 parallel oral sessions, plus 1 poster session in each afternoon.

The theme of the conference is "Computational Intelligence for the E-Age". With the proliferation of soft computing applications, there are numerous challenges for both researchers and practitioners in the broad areas of neural information processing, evolutionary computation, fuzzy systems, and knowledge discovery. The joint ICONIP'02-SEAL'02-FSKD'02 aims at providing a common platform to report recent developments, as well as to promote cross-fertilization, in these exciting and yet closely-related areas. The Organizing Committee firmly believes that the joint conference will have a significant impact on the advancement of these important technologies.

The Conference starts off with tutorials and we are fortunate to have several well-known authorities to deal in depth with issues related to the conference theme. More than 100 participants have registered for the tutorial sessions.

We are blessed with the presence of six renowned keynote and plenary speakers. Each of them will address a very topical issue. We are sure you will find their addresses inspiring and insightful.

On behalf of the Organizing Committee, we thank our Guest-of-Honour, Dr Cham Tao Soon, President of Nanyang Technological University, for gracing the Opening Ceremony. We thank Professor Er Meng Hwa, Deputy President, Dean of College of Engineering, and Dean of the School of Electrical and Electronic Engineering, Nanyang Technological University, for his advice, guidance and encouragement given to the Organizing Committee. We are grateful for the technical cooperation from the IEEE Neural Networks Society, the International Neural Network Society, the European Neural Network Society, the SPIE, and the Singapore Neuroscience Association. We would like to thank the generous financial support from our sponsors: Lee Foundation, Singapore Exhibition and Convention Bureau, U.S. Asian Office of Aerospace Research & Development (AOARD), U.S. Army Research Office-Far East (ARO-FE), Novartis Pharmaceuticals, Salford Systems, and CyberSoft.

We thank the members of the Organizing Committee, the International Advisory Board, and the Program Committees for their hard work in the past 18 months, especially the Advisor, Professor Alex Kot, for his extremely valuable suggestions and input throughout.

We also wish to express our heart-felt appreciation to the keynote and plenary speakers, special session organizers, session chairs, reviewers, tutorial speakers, staff members from the NTU Conference Management Center, and student helpers. Special thanks are due to the Support Team Leader, Sophia Kuo, as well as the members of the Support Team, for their most dedicated and enthusiastic efforts.

Last, but definitely the most, thank you all, the authors and participants, for your great contributions that have made this conference possible. It is your very presence here that makes all the hard work worthwhile.

We trust that you will have a rewarding experience at the conference and a pleasant stay in Singapore. You may have noticed that some of the name tags, including ours, are printed on colored papers. This is not to make the rest of you envious, but to identify those whom you can approach for assistance during the conference, should the need arises.

Sincerely,

Lipo Wang  
*General Chair*

Jagath C. Rajapakse  
Kunihiko Fukushima  
Soo-Young Lee  
*Program Co-Chairs*

Xin Yao  
*Special Sessions Chair*

## Organizing Committee

### Honorary Conference Chair

Shun-ichi Amari, *Japan*

### Advisor

Alex C. Kot, *Singapore*

### General Chair

Lipo Wang, *Singapore*

### Program Co-Chairs

Kunihiko Fukushima, *Japan*

Soo-Young Lee, *Korea*

Jagath C. Rajapakse, *Singapore*

### Special Sessions Chair

Xin Yao, *UK*

### Finance Chair

Charoensak Charayaphan, *Singapore*

### Local Arrangement Chair

Meng Hiot Lim, *Singapore*

### Proceedings Chair

Farook Sattar, *Singapore*

### Publicity Co-Chairs

Hepu Deng, *Australia*

Chunru Wan, *Singapore*

Li Weigang, *Univ Brazil*

Zili Zhang, *Australia*

### Secretary

Olga Sourina, *Singapore*

### Sponsorship/Exhibition Chair

Tong Seng Quah, *Singapore*

### Tutorial Chair

P. N. Suganthan, *Singapore*

### Support Team Leader

Sophia Kuo, *Singapore*

### Secretariat

Shirley Soh, *Singapore*

### International Advisory Board

Sung-Yang Bang, *Postech, Korea*

Meng Hwa Er, *Nanyang Technological University, Singapore*

David Fogel, *Natural Selections, Inc., USA*

Toshio Fukuda, *Nagoya University, Japan*

A. Galushkin, *Russia*

Tom Gedeon, *Murdoch University, Australia*

Zhenya He, *Southeast University, China*

Mo Jamshidi, *University of New Mexico, USA*

Nikola Kasabov, *University of Otago, New Zealand*

Sun-Yuan Kung, *Princeton University, USA*

Tong Heng Lee, *National University of Singapore, Singapore*

Erkki Oja, *Helsinki University of Technology, Finland*

Nikhil R. Pal, *Indian Statistical Institute, India*

Enrique H. Ruspini, *SRI International, USA*

Harcharan Singh, *Nanyang Technological University, Singapore*

Ah Chung Tsoi, *University of Wollongong, Australia*

Shiro Usui, *Toyohashi University of Technology, Japan*

Lei Xu, *Chinese University of Hong Kong, China*

Benjamin W. Wah, *University of Illinois, USA*

Donald C. Wunsch II, *University of Missouri, USA*

Xindong Wu, *Colorado School of Mines, USA*

Youshou Wu, *Tsinghua University, China*

Yixin Zhong, *Beijing University of Postal Technology, China*

Jacek M. Zurada, *University of Louisville, USA*

## Program Committee

- Kazuyuki Aihara, *University of Tokyo, Japan*  
Igor Aleksander, *Imperial College of Science Technology and Medicine, UK*  
Abdesselam Bouzerdoun, *Edith Cowan University, Australia*  
Laiwan Chan, *The Chinese Univ. of Hong Kong, Hong Kong*  
Tianping Chen, *Fudan University, China*  
Sung-Bae Cho, *Yonsei University, Korea*  
Andrzej Cichocki, *Brain Science Institute, Riken, Japan*  
Michael Denham, *University of Plymouth, UK*  
Wlodzislaw Duch, *Nicolas Copernicus University, Poland*  
Karl Friston, *Institute of Neurology, UCL, UK*  
Jay Giedd, *National Institutes of Health, USA*  
Masafumi Hagiwara, *Keio University, Japan*  
Azlan Hussain, *University Malaya, Malaysia*  
Aapo Hyvarinen, *Helsinki University of Technology, Finland*  
Naohiro Ishii, *Nagoya Instituyte of Technology, Japan*  
Masumi Ishikawa, *Kyushu Institute of Technology, Japan*  
Arun Jagota, *University of California, USA*  
Takeshi Kambara, *University of Electro-Communications, Japan*  
Mohamed Kamel, *University of Waterloo, Canada*  
Samuel Kaski, *Helsinki University of Technology, Finland*  
Okyay Kaynak, *Turkey*  
Sanjay Khanna, *National University of Singapore, Singapore*  
Rhee Man Kil, *Division of Applied Mathematics, KAIST, Korea*  
Seunghwan Kim, *Pohang University of Science & Technology, Korea*  
Irwin King, *The Chinese Univ. of Hong Kong, Hong Kong*  
Frithjof Kruggel, *Max-Planck-Institute of Cognitive Neuroscience, Germany*  
Chong Ho Lee, *Inha University, Korea*  
Minho Lee, *Kyungpook National University, Korea*  
Te-Won Lee, *University of California, USA*  
Wei Ling Lee, *National University of Singapore, Singapore*  
Graham Leedham, *Nanyang Technological University, Singapore*  
Cees van Leeuwen, *Brain Science Institute, RIKEN, Japan*  
Cheng-Yuan Liou, *National Taiwan University, Taiwan*  
Frederic Maire, *Queensland University of Technology, Australia*  
Jacek Mandziuk, *Warsaw University of Technology, Poland*  
Gen Matsumoto, *Brain Science Institute, RIKEN, Japan*  
Evangelia Micheli-Tzanakou, *Rutgers University, USA*  
Takashi Omori, *Hokkaido University, Japan*  
Hiok Chai Quek, *Nanyang Technological University, Singapore*  
Asim Roy, *Arizona State University, USA*  
V. David Sanchez, *Advanced Computational Intelligent Systems, USA*  
P. Saratchandran, *Nanyang Technological University, Singapore*  
Rudy Setiono, *National University of Singapore, Singapore*  
Amanda Sharkey, *University of Sheffield, UK*  
Jang-Kyoo Shin, *Kyungpook National University, Korea*  
Kate A. Smith, *Monash University, Australia*  
Samuel Tay, *National University of Singapore, Singapore*  
John Taylor, *King's College London, UK*  
Vladimir I. Vasilyev, *Ufa State Aviation Technical University, Russia*  
Brijesh Verma, *Griffith University-Gold Coast Campus, Australia*  
Jun Wang, *The Chinese University of Hong Kong, Hong Kong*  
Patrick Wong, *The University of New South Wales, Australia*  
Hiroo Yonezu, *Toyohashi University of Technology, Japan*  
Shuji Yoshizawa, *Saitama University, Japan*  
Yanqing Zhang, *Georgia State University, USA*

## Reviewers

Abdul Wahab  
Ajith Abraham  
Alex Tay  
Alexander Boukalov  
Amitava Datta  
Andreas Ioannides  
Aniko Ekart  
Arijit Laha  
Arjuna Balasuriya  
Arnie Azcarraga  
Arun Jagata  
Ashish Ghosh  
Authur Tsai  
Bala Srinivasan  
CL Tan  
Deepu Rajan  
Edmond Prakash  
Gao Yansheng  
Gavin Dawe  
Geok See Ng  
Guozhu Dong  
Hussain Abbas  
Jagdish Patra  
Jinming Li  
Jinyan Li  
Keith Chan  
Kenji Doya  
Kinchoong Yow  
Krzysztof Siwek  
Lei Yan  
Lihui Chen  
Liming Zhang

Limsoon Wong  
Lipo Wang  
Liqing Zhang  
Marcelo Ang  
Marwan Jabri  
Masumi Ishikawa  
Maylor Leung  
Michel Pasquier  
Michelle Liou  
Muthu Palaniswami  
Narandra Chaudhari  
Ng Kong  
Noel Sharkey  
Omandi Amos  
Pando Georgiev  
Peter Whigham  
Phillip Chen  
Ponnathurai Suganthan  
PTH Wong  
Qi Tian  
Raman Yasdi  
Reda Gharieb  
Ryotaro Kamimura  
Saman Abeysekera  
Samu Ng  
Sardha Wijesoma  
Sathiya Keerthi  
Seekiong Ng  
Seong-Wan Lee  
Seungjin Choi  
Shigeo Abe  
Si Wu

Srimanta Pal  
Stuart Perry  
Sukumar Chakraborty  
Susan Liow  
Susanto Rahardja  
Takeshi Aihara  
Tatjen Cham  
Thambi Srikanthan  
Tomasz Rutkowski  
Tuan Pham  
Udantha Abeyratna  
Ujjwal Bhattacharya  
Vladimir Brusic  
Vladmir Bajic  
Wee Leow  
Wei Lu  
Wieslaw Nowinski  
WY Ong  
WY Yau  
Xin Yao  
Xuegong Zhang  
Yasue Mitsukura  
Yin Sitoh  
Yiu-ming Cheung  
Yoko Yamaguchi  
Yong Xue  
Yoshizawa Shuji  
Yuanqing Li  
Yutaka Sakaguchi  
Zheru Chi  
Zhihong Man

## Support Team

Cheong Poh Huat, *Singapore*  
Serene Fernandez-Lam Siew Gan, *Singapore*  
Hoay-Lim Suat Geok, *Singapore*  
Frances Koh-Ho Cheng Fiang, *Singapore*  
Clara Lee-Tan Lee Hiang, *Singapore*  
Leow-How Seok Lai, *Singapore*

Joseph Lim Puay Chye, *Singapore*  
Pamela Ng-Yap Poh Geok, *Singapore*  
Eric Tan Ah Chong, *Singapore*  
Dorothy Tay-Teo Boon Ping, *Singapore*  
Yeo Sung Kheng, *Singapore*  
Audrey Yong-Choo Bee Hong, *Singapore*

## Special Sessions

| Organizers                                                                                                                                                                                                         | Topics                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Andries Engelbrecht, <i>University of Pretoria, South Africa</i>                                                                                                                                                   | Trends in Global Optimization                        |
| Nikola Kasabov, <i>University of Otago, New Zealand</i>                                                                                                                                                            | Intelligent System in Bioinformatics                 |
| Cees van Leeuwen, <i>RIKEN BSI, Japan</i>                                                                                                                                                                          | Multi-stability, Perceptual Ambiguity, and the Brain |
| Chih-Jen Lin, <i>National Taiwan University, Taiwan</i> ; S. Sathya Keerthi, <i>National University of Singapore, Singapore</i>                                                                                    | Support Vector Machines and Kernel Methods           |
| Jacek Mandziuk, <i>Warsaw University of Technology, Poland</i>                                                                                                                                                     | Neural Networks for Time Series Predictions          |
| Tohru Nitta, <i>National Institute of Advanced Industrial Science and Technology, Japan</i>                                                                                                                        | Complex-valued Neural Networks                       |
| Jagath C. Rajapakse, <i>Nanyang Technological University, Singapore</i> , Frithjof Kruggel, <i>Max-Planck-Institute of Cognitive Neuroscience, Germany</i> , Karl J. Friston, <i>University College London, UK</i> | Brain Imaging                                        |
| Shiro Usui, <i>Toyohashi Univ. of Technology / RIKEN BSI, Japan</i> , Soo-Young Lee, <i>KAIST, Korea</i> , Vijayalakshmi Ravindranath, <i>NBRC, India</i>                                                          | Neuroinformatics Researches in Asian and Pan-Pacific |
| Jun Wang, <i>Chinese University of Hong Kong, China</i>                                                                                                                                                            | Neural Networks for Control Applications             |
| Xufa Wang, <i>Univeristy of Science and Technology of China, China</i>                                                                                                                                             | Artificial Immune Systems and their Applications     |

# Contents

## Volume 1

### Keynote Speech

|                                                                                                                                                   |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---|
| Precisiated Natural Language--Toward a Radical Enlargement of the Role of Natural Languages in Information Processing, Decision and Control ..... | 1 |
| <i>Lotfi A. Zadeh* (University of California, USA)</i>                                                                                            |   |

### Panel Discussion

|                                                                     |   |
|---------------------------------------------------------------------|---|
| “Oh sure, my method is connectionist too. Who said it’s not?” ..... | 4 |
| <i>Asim Roy</i>                                                     |   |

### TueAmRm1: Neuroscience I

**Chair(s): Gilbert Case (Columbia University, USA); Birgit Roerig (University of Maryland, USA)**

|                                                                                                                                                |    |
|------------------------------------------------------------------------------------------------------------------------------------------------|----|
| NeuroLab 2003: A Simulator that Produces Biologically-Based Experimental Alternatives that Aid in Designing Detailed Experiments (#2128) ..... | 5  |
| <i>Gilbert R. Case and PF Balan</i>                                                                                                            |    |
| Neural Networks Based Identification of Helicopter Dynamics Using Flight Data (#1587) .....                                                    | 10 |
| <i>S Suresh, M Vijaya Kumar, S. N. Omkar, V Mani and Prasad Sampath</i>                                                                        |    |
| Organization of Inhibitory Synaptic Circuits in Layer 4 of Ferret Visual Cortex Related to Direction Preference Maps (#1667) .....             | 15 |
| <i>Birgit Roerig, Bingzhong Chen and Josep P.Y. Kao</i>                                                                                        |    |
| A Neuronal Model of Sound Location Map Generated Based on Multiplicative Binding of ITD and IID Information (#1328) .....                      | 20 |
| <i>Kenta Maeda, Masashi Ohta, Meihong Zheng, Yoshiki Kashimori and Takeshi Kambara</i>                                                         |    |
| Condition of Supralinear Amplification in Pairing Action Potentials with EPSPs (#1966) .....                                                   | 25 |
| <i>Hidetoshi Urakubo and Masataka Watanabe</i>                                                                                                 |    |
| Role of Feedback Signals to Hindbrain in Discriminating Between Two Objects in Electrolocation (#1274) .....                                   | 30 |
| <i>Yoshiki Kashimori, Eiji Murase, Meihong Zheng and Takeshi Kambara</i>                                                                       |    |

### TueAmRm2: Neural Network Architectures I

**Chair(s): Werner Dilger (Chemnitz University of Technology, Germany); Akito Sakurai (Keio University, Japan)**

|                                                                                           |    |
|-------------------------------------------------------------------------------------------|----|
| Simple Recurrent Networks and Random Indexing (#1558) .....                               | 35 |
| <i>Akito Sakurai and Daisuke Hyodo</i>                                                    |    |
| Linear and Quadratic Local Models for ICE-Networks (#1446) .....                          | 40 |
| <i>Mark Schaefer and Werner Dilger</i>                                                    |    |
| Making a Multilayered Perceptron Network Say - "Don't Know" When It Should. (#1527) ..... | 45 |
| <i>Debrup Chakraborty and Nikhil Pal</i>                                                  |    |
| Construction of Neural Networks on Structured Domains (#1303) .....                       | 50 |

*Hsien-Leing Tsai and Shie-Jue Lee*

|                                                          |    |
|----------------------------------------------------------|----|
| The Spatial Basis of Neural Representation (#1956) ..... | 55 |
| <i>Toru Yanagawa, Fumihiko Taya and Ken Mogi</i>         |    |

### **TueAmRm3: Neural Network Architectures II**

**Chair(s): Yoshiki Mizukami (Yamaguchi University, Japan); Rodica Waivio (University of Illinois at Chicago, USA)**

|                                                                                     |    |
|-------------------------------------------------------------------------------------|----|
| On Discrete N-Layer Heteroassociative Memory Models (#1178) .....                   | 60 |
| <i>Rodica Waivio</i>                                                                |    |
| A New Framework of Neural Network for Non-Linear System Modeling (#1869) .....      | 65 |
| <i>Yoshiki Mizukami, Taiji Satoh and Kanya Tanaka</i>                               |    |
| Associative Memory by Recurrent Neural Networks with Delay Elements (#1256) .....   | 70 |
| <i>Seiji Miyoshi, Hiro-Fumi Yanai and Masato Okada</i>                              |    |
| Multiplication Units in Feed-Forward Neural Networks and Its Training (#1857) ..... | 75 |
| <i>Dazi Li, Kotaro Hirasawa, Jinglu Hu and Junichi Murata</i>                       |    |
| An Abstract Model of a Cortical Hypercolumn (#1238) .....                           | 80 |
| <i>Baran Curuklu and Anders Lansner</i>                                             |    |

### **TueAmRm4: Learning and Memory I**

**Chair(s): Minfen Shen (Shantou University, China); Michinori Ichikawa (RIKEN, Brain Science Institute, Japan)**

|                                                                                                                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Optical Imaging Method with Voltage-Sensitive Dye as a Tool to Explore Learning Rules Acting in Synaptic Strength Change Upon Burst Stimulation in Area CA1 of RAT Hippocampal Slices (#1110) ..... | 86  |
| <i>Takashi Tominaga, Yoko Tominaga and Michinori Ichikawa</i>                                                                                                                                       |     |
| The Investigation of Time-Varying Synchrony of EEG During Sentence Learning Using Wavelet Analysis (#1277) .....                                                                                    | 92  |
| <i>Minfen Shen, Lisha Sun, K. H. Ting and Francis H. Y. Chan</i>                                                                                                                                    |     |
| Visual and Pain Pathways Involved in Fear Conditioning Measured with Fear-Potentiated Startle: Behavioral and Anatomic Studies (#1642) .....                                                        | 96  |
| <i>Changjun Shi and Michael Davis</i>                                                                                                                                                               |     |
| Memory and Learning in a MESO Level Reasoning System (#1931) .....                                                                                                                                  | 101 |
| <i>Janet Aisbett and Greg Gibbon</i>                                                                                                                                                                |     |
| An Extension of Weighted Strategy Sharing in Cooperative Q-Learning for Specialized Agents. (#1976) .....                                                                                           | 106 |
| <i>Sahar Mastour Eshgh and Majid Nili Ahmadabadi</i>                                                                                                                                                |     |

### **TueAmRm5: Perception, Emotion, and Cognition I**

**Chair(s): Cees van Leeuwen (RIKEN Brain Science Institute, Japan); Yiannis Demiris (Imperial College, United Kingdom)**

|                                                                                           |     |
|-------------------------------------------------------------------------------------------|-----|
| Mirror Neurons, Imitation, and the Learning of Movement Sequences (#1552) .....           | 111 |
| <i>Yiannis Demiris</i>                                                                    |     |
| Activity Synchronization in Neural Networks Developing on Planar Substrates (#1348) ..... | 116 |
| <i>Andrey Samarin, Yasunobu Igarashi, Iryna Kulagina and Sergey Korogod</i>               |     |

|                                                                                                     |     |
|-----------------------------------------------------------------------------------------------------|-----|
| Roles of Frequency-Modulated Components of Monosyllabic Sounds in Auditory Processing (#1132) ..... | 120 |
| <i>Tsuyoshi Ono, Kouji Waki, Osamu Hoshino and Kazuharu Kuroiwa</i>                                 |     |
| Positive Emotion Learning Through Music Listening (#1693) .....                                     | 125 |
| <i>Mladen Milicevic</i>                                                                             |     |
| Knowledge Theory and Information-Knowledge-Intelligence Trinity (#2091) .....                       | 130 |
| <i>Yixin Zhong</i>                                                                                  |     |

## **TueAmRm6: Vision and Auditory Models**

**Chair(s): Zheru Chi (Hong Kong Polytechnic University, Hong Kong); Lynn Richards (University of Plymouth, United Kingdom)**

|                                                                                                   |     |
|---------------------------------------------------------------------------------------------------|-----|
| Structural Representation and BPTS Learning for Shape Classification (#1017) .....                | 134 |
| <i>Zhiyong Wang, Zheru Chi and David Dagan Feng</i>                                               |     |
| Object Representation-By-Fragments in the Visual System: A Neurocomputational Model (#1829) ..... | 139 |
| <i>Dan Joyce, Lynn Richards, Angelo Cangelosi and Kenny Coventry</i>                              |     |
| A Functional Model of a Form Pathway from V1 to V4 in Visual Cortex (#1295) .....                 | 144 |
| <i>Nobuhiro Hashimoto, Osamu Hoshino, Yoshiki Kashimori and Takeshi Kambara</i>                   |     |
| A General Model for Visual Motion Detection (#1103) .....                                         | 149 |
| <i>Nagano Takashi, Hirahara Makoto and Urushihara Wakako</i>                                      |     |
| Visual Perception of Low Quality Images (#2037) .....                                             | 153 |
| <i>Justin Boyle, Anthony Maeder and Wageeh Boles</i>                                              |     |

## **TueAmRm7: Learning Algorithms I**

**Chair(s): Kazushi Ikeda (Kyoto University, Japan); Kazuyuki Hara (Tokyo Metropolitan College of Technology, Japan)**

|                                                                                                                   |     |
|-------------------------------------------------------------------------------------------------------------------|-----|
| On-Line Learning Trough Simple Perceptron Learning with a Margin (#1357) .....                                    | 158 |
| <i>Kazuyuki Hara and Masato Okada</i>                                                                             |     |
| Convergence Theorem for Kernel Perceptron (#1057) .....                                                           | 163 |
| <i>Kazushi Ikeda</i>                                                                                              |     |
| Progressive Feature Extraction by Extended Greedy Information Acquisition (#1250) .....                           | 167 |
| <i>Ryotaro Kamimura, Haruhiko Takeuchi and Osamu Uchida</i>                                                       |     |
| An Approach to Control Aging Rate of Neural Networks Under Adaptation to Gradually Changing Context (#1299) ..... | 174 |
| <i>Thitipong Tanprasert and Thosaporn Kripruksawan</i>                                                            |     |
| Classification of Time Series Data: A Synergistic Neural Networks Approach (#1022) .....                          | 179 |
| <i>Kittichai Lavangnananda and Orasa Tengsriprasert</i>                                                           |     |
| Two Applications of the LSA Machine (#1695) .....                                                                 | 184 |
| <i>Andreas Albrecht, Georgios Lappas, Staal Vinterbo, C.K. Wong and Lucila Ohno-Machado</i>                       |     |

## **TueAmRm13: Special Session on Neuroinformatics Researches in Asian and Pan-Pacific I**

**Chair(s): Shiro Usui (Toyohasih Univ. of Technology/ RIKEN BSI, Japan); Soo-Young Lee (KAIST, South Korea)**

|                                                                                                                                |     |
|--------------------------------------------------------------------------------------------------------------------------------|-----|
| Neuroscience Data Bases (#2208) .....                                                                                          | 190 |
| <i>Stephen Koslow</i>                                                                                                          |     |
| Development of In Vivo High Resolution Individual Based Neuroanatomical Atlases Using Magnetic Resonance Imaging (#2206) ..... | 193 |
| <i>Nathan Walters, Mark Jenkinson, Michael Kean, John Watson and Gary Egan</i>                                                 |     |
| The Informatics Requirements for Human Brain Atlasing (#2201) .....                                                            | 197 |
| <i>Arthur W. Toga</i>                                                                                                          |     |
| Legal and Policy Questions for International Collaboration in Neuroscience (#2197) .....                                       | 202 |
| <i>Peter Eckersley and Gary Egan</i>                                                                                           |     |

**TuePmRm1Ss1: Special Session on Anatomical Brain Imaging**  
**Chair(s): Karl Friston (Institute of Neurology, UCL, United Kingdom); Arthur Toga (University of California, Los Angeles, USA)**

|                                                                                                   |     |
|---------------------------------------------------------------------------------------------------|-----|
| Bayesian Tissue Segmentation of Multispectral Brain Images (#2267) .....                          | 206 |
| <i>Choong Leong Tan and Jagath Rajapakse</i>                                                      |     |
| Nurbs-Based Detection of Age-Related Variability of Human Brain Surface (#2234) .....             | 211 |
| <i>Ravinda Meegama and Jagath Rajapakse</i>                                                       |     |
| Mr Brain Image Segmentation by Adaptive Mixture Distribution (#1441) .....                        | 216 |
| <i>Juin-Der Lee, Philip E. Cheng and Michelle Liou</i>                                            |     |
| Using Multidimensional Scaling to Assess Shape Differences of Human Corpus Callosum (#2219) ..... | 219 |
| <i>Hong Liu, Jonathan Blumenthal, Liv Clasen, Alice Lausier and Jay Giedd</i>                     |     |
| Entropy Maximization Algorithm for Positron Emission Tomography (#1638) .....                     | 222 |
| <i>Partha Pratim Mondal and Rajan Kanhirodan</i>                                                  |     |

**TuePmRm2Ss1: Neural Network Architectures III**  
**Chair(s): Dusan Husek (Czech Academy of Sciences, Czech Republic); Kenyo Jin'no (Nippon Institute of Technology University, Japan)**

|                                                                                                                |     |
|----------------------------------------------------------------------------------------------------------------|-----|
| Construction of Petri Nets via States of Action Objects and Subjects (#1842) .....                             | 226 |
| <i>Nasima Shakirova</i>                                                                                        |     |
| A Comparison of TABU Algorithms for Hysteresis Neural Networks (#2021) .....                                   | 231 |
| <i>Toshiya Nakaguchi, Kenya Jin'no and Mamoru Tanaka</i>                                                       |     |
| On Information Characteristics of Sparsely Encoded Binary Auto-Associative Memory (#1668) .....                | 235 |
| <i>Alexander Frolov, Dmitri Rachkovskij and Dusan Husek</i>                                                    |     |
| Four-Legged Robot's Behavior Controlled by Pulsed Para-Neural Networks (PPNN) (#1748) .....                    | 239 |
| <i>Andrzej Buller and Tarun Tuli</i>                                                                           |     |
| Multi-Branch Structure of Layered Neural Networks (#1804) .....                                                | 243 |
| <i>Takashi Yamashita, Kotaro Hirasawa, Jinglu Hu and Junichi Murata</i>                                        |     |
| A New Approach to the Analysis of Petri Nets: Parallel Processes and Predictability of Scenarios (#1840) ..... | 248 |
| <i>Nasima Shakirova</i>                                                                                        |     |

**TuePmRm3Ss1: Neural Network Architectures IV**  
**Chair(s): Edga N. Sanchez (CINVESTAV, Mexico); Eshaa Alkhalifa (University of**

## **Bahrain, Bahrain)**

|                                                                                                                    |     |
|--------------------------------------------------------------------------------------------------------------------|-----|
| Effect of Hamming Distance of Patterns on Storage Capacity of Hopfield Network (#1165) .....                       | 253 |
| <i>Suman Kumar Manandhar and Ramakoti Sadananda</i>                                                                |     |
| A Tensor-Competition Based Architecture: To Capture the Influence of Word Sense (#1081) .....                      | 257 |
| <i>Eshaa Alkhalifa</i>                                                                                             |     |
| Chaos Identification Using Variable Structure Recurrent Neural Networks (#1254) .....                              | 262 |
| <i>Ramon Felix and Edgar Sanchez</i>                                                                               |     |
| Link between Energy and Computation in a Physical Model of Hopfield Network (#2082) .....                          | 267 |
| <i>Abhishek Kumar, V. Manmohan, M. Uday Shankar, M. Viswanathan and V.S Chakravarthy</i>                           |     |
| Prognostic Systems for NPC: A Comparison of the Multi Layer Perceptron Model and the Recurrent Model (#1683) ..... | 271 |
| <i>Sameem Abdul-Kareem, Sapiyan Baba, Yong Zulina Zubairi, U Prasad and Mohd Ibrahim A Wahid</i>                   |     |
| Adaptive Recurrent Neural Control for Robot Trajectory Tracking Including Friction (#1275) .....                   | 276 |
| <i>Luis Ricalde, Edgar Sanchez and Jose Perez</i>                                                                  |     |

## **TuePmRm4Ss1: Learning and Memory II**

**Chair(s): Toshio Inui (Kyoto University, Japan); Naoyuki Sato (CREST, JST, Japan)**

|                                                                                                                                       |     |
|---------------------------------------------------------------------------------------------------------------------------------------|-----|
| A Neural Network Model of the Hippocampus with Theta Phase Precession for Object-Place Memory (#1852) .....                           | 281 |
| <i>Naoyuki Sato and Yoko Yamaguchi</i>                                                                                                |     |
| A Neural Network Model of Encoding Rules in the Prefrontal Cortex (#1358) .....                                                       | 286 |
| <i>Tetsuto Minami and Toshio Inui</i>                                                                                                 |     |
| Generalized Brain-State-In-A-Box Based Associative Memory for Correcting Words and Images (#1711) .....                               | 291 |
| <i>Ram Dayal Goyal and Gopalakrishnaswamy Nagaraja</i>                                                                                |     |
| Life-Like Learning in Technical Artefacts: Biochemical Vs. Neural Mechanisms (#1714) .....                                            | 296 |
| <i>Andreas E. Kilian and Bernd S. Mueller</i>                                                                                         |     |
| Using Taguchi Methods to Train Artificial Neural Networks in Pattern Recognition, Control and Evolutionary Applications (#1073) ..... | 301 |
| <i>Grant M Maxwell and Christopher Macleod</i>                                                                                        |     |
| Certainty and Expertness-Based Credit Assignment for Cooperative Q-Learning Agents with An AND-Type Task (#1974) .....                | 306 |
| <i>Ahad Harati and Majid Nili Ahmadabadi</i>                                                                                          |     |

## **TuePmRm5Ss1: Learning Algorithms II**

**Chair(s): Ryotaro Kamimura (Tokai University, Japan); Stefano Fannelli (University of Rome, Italy)**

|                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------|-----|
| Information Theoretic Competitive Learning in Multi-Layered Networks (#1249) .....                       | 311 |
| <i>Ryotaro Kamimura</i>                                                                                  |     |
| Computational Experiences of a Novel Global Algorithm for Optimal Learning in MLP-Networks (#1432) ..... | 317 |
| <i>Carmine Di Fiore, Stefano Fanelli and Paolo Zellini</i>                                               |     |

|                                                                                                               |     |
|---------------------------------------------------------------------------------------------------------------|-----|
| Maximizing Margins of Multilayer Neural Networks (#1049) .....                                                | 322 |
| <i>Takahiro Nishikawa and Shigeo Abe</i>                                                                      |     |
| Exponentiated Backpropagation Algorithm for Multilayer Feedforward Neural Networks (#1417) .....              | 327 |
| <i>Narayanan Srinivasan, V Ravichandran, K L Chan, J R Vidhya, S Ramakrishnan and Shankar M Krishnan</i>      |     |
| Greedy Information Acquisition in Multi-Layered Networks (#1248) .....                                        | 332 |
| <i>Ryotaro Kamimura and Haruhiko Takeuchi</i>                                                                 |     |
| Time Constrain Optimal Method to Find the Minimum Architectures for Feedforward Neural Networks (#1720) ..... | 338 |
| <i>Teck-Sun Tan and Guang-Bin Huang</i>                                                                       |     |

**TuePmRm6Ss1: Neurodynamics and Spiking Neurons I**  
**Chair(s): Salim Bouzerdoum (Edith Cowan University, Australia)**

|                                                                                                                                         |     |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----|
| Storage and Recall of Dynamical Patterns in Neural Network Models of Hippocampus (#1221) .....                                          | 343 |
| <i>Tsuyoshi Horiguchi and Hiroaki Yokoyama</i>                                                                                          |     |
| An Competitive Learning Pulsed Neural Network for Temporal Signals (#1786) .....                                                        | 348 |
| <i>Susumu Kuroyanagi and Akira Iwata</i>                                                                                                |     |
| Chaotic Wandring and Its Sensitivity to External Input in a Chaotic Neural Network (#1849) .....                                        | 353 |
| <i>Jousuke Kuroiwa, Naoki Masutani, Shigetoshi Nara and Kazuyuki Aihara</i>                                                             |     |
| A Four-Dimensional Hyperchaotic Spiking Neuron (#1862) .....                                                                            | 358 |
| <i>Yusuke Takahashi, Hidehiro Nakano and Toshimichi Saito</i>                                                                           |     |
| Grouping Synchronization in a Pulse-Coupled Network of Chaotic Spiking Oscillators (#1892) .....                                        | 363 |
| <i>Hidehiro Nakano and Toshimichi Saito</i>                                                                                             |     |
| Regulation of Spontaneous Rhythmic Activity and Preserved Stimulus Dependent Pattern by STDP in the Hippocampal CA3 Model (#1971) ..... | 367 |
| <i>Motoharu Yoshida and Hatsuo Hayashi</i>                                                                                              |     |

**TuePmRm7Ss1: Learning Algorithms III**  
**Chair(s): Tianping Chen (Fudan University, China)**

|                                                                                        |     |
|----------------------------------------------------------------------------------------|-----|
| Stability Analysis of Discrete-Time Recurrently Connected Neural Network (#1065) ..... | 372 |
| <i>Tianping Chen and Wenlian Lu</i>                                                    |     |
| Implementation of $H^\infty$ -Learning and Its Analysis (#1593) .....                  | 377 |
| <i>Kiyoshi Nishiyama</i>                                                               |     |
| Model Identification Using Virtual Compact Mapping Model (#1674) .....                 | 383 |
| <i>Gi-Nam Wang</i>                                                                     |     |
| Auto-Associative Memory by Universal Learning Networks (ULNS) (#1778) .....            | 388 |
| <i>Keiko Shibata, Kotaro Hirasawa, Jinglu Hu and Junichi Murata</i>                    |     |
| A Multiclass Classification Method by Distance Mapping Learning Network (#1860) .....  | 393 |
| <i>Kenji Suzuki and Shuji Hashimoto</i>                                                |     |
| Incremental Learning with Sleep --Learning of Noiseless Datasets -- (#1929) .....      | 398 |
| <i>Koichiro Yamauchi and Nobufusa Kobayashi</i>                                        |     |

**TuePmRm1Ss2: Special Session on Functional Brain Imaging**  
**Chair(s): Karl Friston (Institute of Neurology, UCL, United Kingdom); Jagath**

## **Rajapakse (Nanyang Technological University, Singapore)**

|                                                                                                                                                                        |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Independent Component Analysis and Beyond in Brain Imaging: EEG, MEG, FMRI, and PET (Invited) (#2246) .....                                                            | 404 |
| <i>Jagath Rajapakse, Andrezj Cichocki and V. David Sanchez A.</i>                                                                                                      |     |
| Bayesian Inference and Posterior Probability Maps (Invited) (#1831) .....                                                                                              | 413 |
| <i>Karl Friston and Will Penny</i>                                                                                                                                     |     |
| Combining Tomographic Single Subject, Single Trial Activity into Time-Dependent Grand-Summaries of Activated Areas and Functional Connectivity (Invited) (#2133) ..... | 418 |
| <i>Andreas Ioannides</i>                                                                                                                                               |     |
| Formulating Representations of Time: An Event-Related fMRI Study (#1490) .....                                                                                         | 423 |
| <i>Deborah Harrington, Lara Boyd, Andrew Mayer, Daniel Sheltraw and Roland Lee</i>                                                                                     |     |
| Theta Episodes Observed in Human Scalp EEG During Virtual Navigation - Spatial Distribution and Task Dependence (#2195) .....                                          | 428 |
| <i>Nobuaki Nishiyama, Hiroaki Mizuhara, Fumikazu Miwakeichi and Yoko Yamaguchi</i>                                                                                     |     |
| Baseline Correction of Functional Mr Time Courses with PCA (#1430) .....                                                                                               | 433 |
| <i>Chien-Chih Huang, Michelle Liou and Philip E. Cheng</i>                                                                                                             |     |

## **TuePmRm2Ss2: Neural Network Architectures V**

**Chair(s): ZhengRong Yang (Exeter University, United Kingdom); Tarek El. Tobely (Kyushu University, Japan)**

|                                                                                                                       |     |
|-----------------------------------------------------------------------------------------------------------------------|-----|
| The Competition Algorithm of the Hypercolumn Neural Network (#1400) .....                                             | 436 |
| <i>Tarek El.Tobely, Naoyuki Tsuruta and Makoto Amamiya</i>                                                            |     |
| A Novel Basis Function Neural Network (#1878) .....                                                                   | 441 |
| <i>Rebecca Thomson and Zhengrong Yang</i>                                                                             |     |
| Efficient Subspace Learning Using a Large Scale Neural Network Combnet-II (#1801) .....                               | 447 |
| <i>A. Ammar Ghaibeh, Susumu Kuroyanagi and Akira Iwata</i>                                                            |     |
| The Modular Neural Predictive Coding Architecture (#1827) .....                                                       | 452 |
| <i>Chetouani Mohamed, Gas Bruno and Zarader Jean-Luc</i>                                                              |     |
| Maximum and Minimum Likelihood Hebbian Rules for Exploratory Projections Pursuit (#1453) .....                        | 457 |
| <i>Emilio Corchado and Colin Fyfe</i>                                                                                 |     |
| The Realization of Quantum Complex-Valued Backpropagation Neural Network in Pattern Recognition Problem (#2067) ..... | 462 |
| <i>Jarernsri L. Mitranont and Ananta Srisuphab</i>                                                                    |     |

## **TuePmRm3Ss2: Learning Algorithms IV**

**Chair(s): Geok See Ng (Nanyang Technological University, Singapore); Peter Geczy (RIKEN Brain Science Institute, Japan)**

|                                                                                                                  |     |
|------------------------------------------------------------------------------------------------------------------|-----|
| Rival Penalization Controlled Competitive Learning for Data Clustering with Unknown Cluster Number (#1983) ..... | 467 |
| <i>Yiu-ming Cheung</i>                                                                                           |     |
| Survey of Two Selected Superlinear Learning Techniques (#1312) .....                                             | 472 |
| <i>Peter Geczy and Shiro Usui</i>                                                                                |     |