Preface

The International Conference on Intelligent Computing (ICIC) was formed to provide an annual forum dedicated to the emerging and challenging topics in artificial intelligence, machine learning, pattern recognition, image processing, bioinformatics, and computational biology. It aims to bring together researchers and practitioners from both academia and industry to share ideas, problems, and solutions related to the multifaceted aspects of intelligent computing.

ICIC 2010, held in Changsha, China, August 18-21, 2010, constituted the 6th International Conference on Intelligent Computing. It built upon the success of ICIC 2009, ICIC 2008, ICIC 2007, ICIC 2006, and ICIC 2005 that were held in Ulsan, Korea, Shanghai, Qingdao, Kunming and Hefei, China, respectively.

This year, the conference concentrated mainly on the theories and methodologies as well as the emerging applications of intelligent computing. Its aim was to unify the picture of contemporary intelligent computing techniques as an integral concept that highlights the trends in advanced computational intelligence and bridges theoretical research with applications. Therefore, the theme for this conference was “Advanced Intelligent Computing Technology and Applications”. Papers focusing on this theme were solicited, addressing theories, methodologies, and applications in science and technology.

ICIC 2010 received 926 submissions from 29 countries and regions. All papers went through a rigorous peer review procedure and each paper received at least three review reports. Based on the review reports, the Program Committee finally selected 253 high-quality papers for presentation at ICIC 2010, of which 243 papers are included in three volumes of proceedings published by Springer: one volume of Lecture Notes in Computer Science (LNCS), one volume of Lecture Notes in Artificial Intelligence (LNAI), and one volume of Communications in Computer and Information Science (CCIS). The other 10 papers will be included in Neural Computing & Applications.

This volume of Lecture Notes in Computer Science (LNCS) includes 84 papers.

The organizers of ICIC 2010, including Hunan University, Institute of Intelligent Machines of Chinese Academy of Sciences, made an enormous effort to ensure the success of ICIC 2010. We hereby would like to thank the members of the Program Committee and the referees for their collective effort in reviewing and soliciting the papers. We would like to thank Alfred Hofmann from Springer for his frank and helpful advice and guidance throughout and for his continuous support in publishing the proceedings. In particular, we would like to thank all the authors for contributing their papers. Without the high-quality submissions from the authors, the success of the conference would not have been possible. Finally, we are especially grateful to the IEEE Computational Intelligence Society, the International Neural Network Society, and the National Science Foundation of China for their sponsorship.

June 2010

De-Shuang Huang
Zhongming Zhao
Vitoantonio Bevilacqua
Juan Carlos Figueroa
ICIC 2010 Organization

General Co-chairs
De-Shuang Huang, China
Martin McGinnity, UK

Program Committee Co-chairs
Laurent Heutte, France
Zhongming Zhao, USA
Xiao-Ping Zhang, Canada

Organizing Committee Co-chairs
Renfa Li, China
Jiawei Luo, China
Kenli Li, China
Wei Jia, China

Award Committee Chair
Kang-Hyun Jo, Korea

Publication Co-chairs
Vitoantonio Bevilacqua, Italy
Carlos Alberto Reyes Garcia, Mexico

Special Session Co-chairs
Kang Li, UK
Xiang Zhang, USA
Vincent C. S. Lee, Australia

Tutorial Chair
Marco Loog, Denmark

International Liaison Chair
Prashan Premaratne, Australia

Publicity Co-chairs
Valeriya Gribova, Russia
Kyungsook Han, Korea
Lei Zhang, Hong Kong, China
Juan Carlos Figueroa, Colombia
Muhammad Khurram Khan, Saudi Arabia

Exhibition Chair
Chun-Hou Zheng, China

Organizing Committee Members
Bo Liao, China
Shulin Wang, China
Zhiyong Li, China
Xinguo Lu, China

Program Committee Members

Khalid Mahmood Aamir, Pakistan
Andrea Francesco Abate, Italy
Shafayat Abrar, UK
Peter Andras, UK
Sabri Arik, Turkey
Vasily Aristarkhov, Russian Federation
Costin Badica, Romania
Martin Brown, UK
Uday K. Chakraborty, USA
Shih-Hsin Chen, Taiwan
Tan Kay Chen, Singapore
Wen-Sheng Chen, China
Xiyuan Chen, China
Yuehui Chen, China
Ziping Chiang, Taiwan
Min-Sen Chiu, Singapore
Won-Ho Choi, Korea
Michal Choras, Poland
Tommy Chow, Hong Kong
Jose Alfredo F. Costa, Brazil
Mingcong Deng, Japan
Youping Deng, USA
Eng. Salvatore Distefano, Italy
Karim Faez, Iran
Jianbo Fan, China
Dimitar Filev, USA
Wai-Keung Fung, Canada
Liang Gao, China
Xiao-Zhi Gao, Finland
Dunwei Gong, China
Valeriya Gribova, Russia
Ping Guo, China
Sung Ho Ha, Korea
Kyungsook Han, Korea
Haibo He, USA
Nojeong Heo, Korea
Laurent Heutte, France
Wei-Chiang Hong, Taiwan
Yuexian Hou, China
Zeng-Guang Hou, China
Kun Huang, USA
Tingwen Huang, Qatar
Yufei Huang, USA
Peter Hung, Ireland
Li Jia, China
Zhenran Jiang, China
Robert I. John, UK
Dah-Jing Jwo, Taiwan
Sanggil Kang, Korea
Muhammad Khurram Khan, Saudi Arabia
Myung-Kyun Kim, Korea
Sungshin Kim, Korea
In-Soo Koo, Korea
Harshit Kumar, Korea
Yoshinori Kuno, Japan
Takashi Kurimoto, Japan
Vincent C.S. Lee, Australia
Guo-Zheng Li, China
Kang Li, UK
Peihua Li, China
Shutao Li, China
Hualou Liang, USA
Chunmei Liu, USA
Chun-Yu Liu, USA
Van-Tsai Liu, Taiwan, China
Marco Loog, Denmark
Jinwen Ma, China
Vishnu Vardhan Makkapati, India
Miguel Melgarejo, Colombia
Cheolhong Moon, Korea
Tarik Veli Mumcu, Turkey
Roman Neruda, Czech Republic
Ben Niu, China
Yusuke Nojima, Japan
Pedro Nuno Oliveira, Portugal
Sim-Heng Ong, Singapore
Ali Özen, Turkey
Shaoning Pang, New Zealand
Francesco Pappalardo, Italy
Witold Pedrycz, Canada
Caroline Petitjean, France
Prashan Premaratne, Australia
Daowen Qiu, China
Hong Qiao, China
Seeja K.R., India
Nini Rao, China
Marylyn Ritchie, USA
Angel Sappa, Spain
Ruhul Amin Sarker, Australia
Jiatao Song, China
Joao Miguel Sousa, Portugal
Stefano Squartini, Italy
Min Su, USA
Zhan-Li Sun, Singapore
Masahiro Takatsuka, Australia
Maolin Tang, Australia
Fariba Salehi, Iran
Ernesto Cuadros-Vargas, Peru
Anhua Wan, China
Jun Wan, USA
Jeen-Shing Wang, Taiwan
Ling Wang, China
Xue Wang, China
Xuesong Wang, China
Yong Wang, China
Zhi Wei, China
Ling-Yun Wu, China
Qingxiang Wu, UK
Shunren Xia, China
Yu Xue, China
Ching-Nung Yang, Taiwan
Jun-Heng Yeh, Taiwan
Myeong-Jae Yi, Korea
Zhi-Gang Zeng, China
Jun Zhang, China
Lei Zhang, Hong Kong, China
Xiang Zhang, USA
Xiaoguang Zhao, China
Xing-Ming Zhao, China
Zhongming Zhao, USA
Bo-Jin Zheng, China
Chun-Hou Zheng, China
Fengfeng Zhou, USA
Mianlai Zhou, China
Reviewers

# Table of Contents

## Neural Networks

Design of a Novel Six-Dimensional Force/Torque Sensor and Its Calibration Based on NN .......................................................... 1  
   *Qiao-Kang Liang, Quan-Jun Song, Dan Zhang, Yun-Jian Ge, Guang-Bin Zhang, Hui-Bin Cao, and Yu Ge*

Incremental-Based Extreme Learning Machine Algorithms for Time-Variant Neural Networks ................................................. 9  
   *Yibin Ye, Stefano Squartini, and Francesco Piazza*

Global Exponential Robust Stability of Hopfield Neural Networks with Reaction-Diffusion Terms ............................................. 17  
   *Xiaohui Xu and Jiye Zhang*

Direct Inverse Model Control Based on a New Improved CMAC Neural Network ................................................................. 25  
   *Yingqi Ge, Shanshan Ma, and Xiaoping Luo*

Further Research on Extended Alternating Projection Neural Network .................................................................................. 33  
   *Jingen Wang, Yanfei Wang, and Xunxue Cui*

Global Synchronization in an Array of Hybrid Coupling Neural Networks with Multiple Time-Delay Components ...................... 41  
   *Jian Feng and Dawei Gong*

Colour Image Segmentation Based on a Spiking Neural Network Model Inspired by the Visual System ..................................... 49  
   *QingXiang Wu, T.M. McGinnity, Liam Maguire, G.D. Valderrama-Gonzalez, and Patrick Dempster*

The White Noise Impact on the Optimal Performance of the Hopfield Neural Network .......................................................... 58  
   *Yaoqun Xu and Yulei Li*

The Study and Realization of Virtual Organization File System Based on DHT Technology ..................................................... 66  
   *Jiqing Liu, Jinhua Huang, and Chen Xing*

## Evolutionary Learning and Genetic Algorithms

A Novel Quantum Genetic Algorithm for PID Controller ......................... 72  
   *Jindong Wang and Rigui Zhou*
## Table of Contents

Research on Hybrid Evolutionary Algorithms with Differential Evolution and GUO Tao Algorithm Based on Orthogonal Design  ........................................ 78  
  Zhan-Fang Zhao, Kun-Qi Liu, Xia Li, You-Hua Zhang, and Shu-Lin Wang

An Improved Evolution Strategy for Constrained Circle Packing Problem  .................................................................................................................. 86  
  Yan-jun Shi, Zhuang-Cheng Liu, and Shuai Ma

Lecture Notes in Computer Science: Research on Multi-robot Avoidance Collision Planning Based on XCS  ........................................... 94  
  Jie Shao and Jing-yu Yang

### Fuzzy Theory and Models

An Integrated Method for the Construction of Compact Fuzzy Neural Models  .............................................................................................................. 102  
  Wanqing Zhao, Kang Li, George W. Irwin, and Minrui Fei

Scalarization of Type-1 Fuzzy Markov Chains  ........................................ 110  
  Dusko Kalenatic, Juan C. Figueroa-García, and Cesar Amilcar Lopez

### Fuzzy Systems and Soft Computing

Applying Fuzzy Differential Equations to the Performance Analysis of Service Composition  ....................................................................................... 118  
  Zuohua Ding and Hui Shen

Lattice Structures of Fuzzy Soft Sets  ...................................................... 126  
  Keyun Qin and Hua Zhao

A Predicate Formal System of Universal Logic with Projection Operator  .............................................................................................................. 134  
  Yingcang Ma and Mei Zhang

A Neuro-Evolutive Interval Type-2 TSK Fuzzy System for Volatile Weather Forecasting  ....................................................................................... 142  
  Dusko Kalenatic, Juan C. Figueroa-García, and Cesar Amilcar Lopez

A Soft Computing Approach for Obtaining Transition Regions in Satellite Images  ................................................................................................. 150  
  Jorge Morales, Jesus A. Gonzalez, Carlos A. Reyes-Garcia, and Leopoldo Altamirano
Particle Swarm Optimization and Niche Technology

Particle Swarm Optimization for Two-Stage Fuzzy Generalized Assignment Problem ............................................ 158
  Xuejie Bai, Yajing Zhang, and Fengtao Liu

A Novel Cyclic Discrete Optimization Framework for Particle Swarm Optimization .................................................... 166
  Qian Tao, Hui-you Chang, Yang Yi, Chun-qin Gu, and Wen-jie Li

Economic Dispatch Considering Ancillary Service Based on Revised Particle Swarm Optimization Algorithm .................... 175
  Xin Ma and Yong Liu

Particle Swarm Optimization-Based Extremum Seeking Control .......... 185
  Shi-Jie Yu, Hong Chen, and Li Kong

Image Contour Extraction Based on Ant Colony Algorithm and B-Snake ........................................................ 197
  Jinjiang Li

Supervised and Semi-supervised Learning

An Improved Hidden Markov Model for Literature Metadata Extraction ............................................................... 205
  Bin-Ge Cui and Xin Chen

Discriminative Training of Subspace Gaussian Mixture Model for Pattern Classification ............................................ 213
  Xiao-Hua Liu and Cheng-Lin Liu

Unsupervised and Reinforcement Learning

A Stage by Stage Pruning Algorithm for Detecting the Number of Clusters in a Dataset ............................................ 222
  Yanqiao Zhu and Jinwen Ma

Adaptive Independent Component Analysis by Modified Kernel Density Estimation .................................................... 230
  Yunfeng Xue, Yujia Wang, and Yujie Han

Combinatorial and Numerical Optimization

Cross System Bank Branch Evaluation Using Clustering and Data Envelopment Analysis ............................................ 238
  Zijiang Yang
He's Variational Iteration Method for Solving Convection Diffusion Equations ....................................................... 246
  Yiliang Liu and Xinzhu Zhao

GRASP for Low Autocorrelated Binary Sequences ......................... 252
  Huchen Wang and Shaowei Wang

miRNA Target Prediction Method Based on the Combination of Multiple Algorithms .................................................... 258
  Lin Zhang, Hui Liu, Dong Yue, Hui He, and Yufei Huang

Imperialistic Competitive Algorithm for Solving a Dynamic Cell Formation Problem with Production Planning ................. 266
  Fatemeh Sarayloo and Reza Tavakkoli-Moghaddam

Systems Biology and Computational Biology

Genome-Wide DNA Methylation Profiling in 40 Breast Cancer Cell Lines ........................................................................... 277
  Leng Han, Siquan Zheng, Shuying Sun, Tim H.-M. Huang, and Zhongming Zhao

GRIDUISS – A Grid Based Universal Immune System Simulator Framework .................................................................... 285
  Francesco Pappalardo, Marzio Pennisi, Ferdinando Chiacchio, Alessandro Cincotti, and Santo Motta

Performance Comparison of Tumor Classification Based on Linear and Non-linear Dimensionality Reduction Methods ........... 291
  Shu-Lin Wang, Hong-Zhu You, Ying-Ke Lei, and Xue-Ling Li

Neural Computing and Optimization

PH Optimal Control in the Clarifying Process of Sugar Cane Juice Based on DHP ................................................................. 301
  Xiaofeng Lin, Qianli Teng, Chunning Song, Shaojian Song, and Huixia Liu

Nature Inspired Computing and Optimization

Parameter-Free Deterministic Global Search with Simplified Central Force Optimization ....................................................... 309
  Richard A. Formato

Comparison of Optimality and Robustness between SA, TS and GRASP Metaheuristics in FJSP Problem ................................. 319
  Tadeusz Witkowski, Arkadiusz Antczak, and Paweł Antczak
## Hardware Emulation of Bacterial Quorum Sensing

Fredy H. Martínez and Jesús Alberto Delgado

![Page 329](#)

## Knowledge Discovery and Data Mining

### Finding Research Community in Collaboration Network with Expertise

Profiling

Hao Wu, Jun He, Yijian Pei, and Xin Long

The Ideal Data Representation for Feature Extraction of Traditional Malay Musical Instrument Sounds Classification

Norhalina Senan, Rosziati Ibrahim, Nazri Mohd Nawi, Musa Mohd Mokji, and Tutut Herawan

Mining Reputation of Person/Product from Comment and Reply on UCC/Internet Article

Joonsuk Ryu, Wonyoung Kim, Jaeho Jeong, and Ungmo Kim

Interaction Analysis for Adaptive User Interfaces

Kawa Nazemi, Christian Stab, and Dieter W. Fellner

Unsupervised Subjectivity-Lexicon Generation Based on Vector Space Model for Multi-Dimensional Opinion Analysis in Blogosphere

Hsieh-Wei Chen, Kuan-Rong Lee, Hsun-Hui Huang, and Yaw-Huang Kuo

Enhancing Negation-Aware Sentiment Classification on Product Reviews via Multi-Unigram Feature Generation

Wei Wei, Jon Atle Gulla, and Zhang Fu

Building Associated Semantic Overlay for Discovering Associated Services

Shunxiang Zhang, Xiangfeng Luo, Wensheng Zhang, Jie Yu, and Weimin Xu

## Artificial Life and Artificial Immune Systems

### Immunity-Based Model for Malicious Code Detection

Yu Zhang, Lihua Wu, Feng Xia, and Xiaowen Liu

Sparse Representation-Based Face Recognition for One Training Image per Person

Xueping Chang, Zhonglong Zheng, Xiaohui Duan, and Chenmao Xie

Semi-supervised Local Discriminant Embedding

Chuan-Bo Huang and Zhong Jin
Orthogonal Discriminant Local Tangent Space Alignment ................. 423
  Ying-Ke Lei, Hong-Jun Wang, Shan-Wen Zhang,
  Shu-Lin Wang, and Zhi-Guo Ding

Intelligent Computing in Image Processing

Separating Pigment Components of Leaf Color Image Using FastICA ... 430
  Yuan Tian, Chunjiang Zhao, Shenglian Lu, and Xinyu Guo

Fast Algorithm for Multisource Image Registration Based on Geometric
  Feature of Corners ................................................. 438
  Shaohua Jiang, Cheng Wang, Xuejun Xu, Wensheng Tang,
  Hongbo Zhu, and Xuesong Chen

Newborn Footprint Recognition Using Subspace Learning Methods ...... 447
  Wei Jia, Jie Gui, Rong-Xiang Hu, Ying-Ke Lei, and Xue-Yang Xiao

Plant Classification Using Leaf Image Based on 2D Linear Discriminant
  Analysis .......................................................... 454
  Minggang Du and Shanwen Zhang

Palmprint Recognition Combining LBP and Cellular Automata ............ 460
  Xiao Dong Dai, Bing Wang, and Pei ZhenWang

Dual Unsupervised Discriminant Projection for Face Recognition....... 467
  Lei Tang and Jie Gui

Applying Wikipedia-Based Explicit Semantic Analysis for Query-Biased
  Document Summarization ........................................ 474
  Yunqing Zhou, Zhongqi Guo, Peng Ren, and Yong Yu

Special Session on New Hand-Based Biometric Methods

A New Approach for Vein Pattern-Based Recognition ..................... 482
  Mohit Soni, Sandesh Gupta, and Phalguni Gupta

Study of Hand-Dorsa Vein Recognition ............................... 490
  Yiding Wang, Kefeng Li, Jiali Cui, Lik-Kwan Shark, and
  Martin Varley

DHV Image Registration Using Boundary Optimization .................... 499
  Jiali Cui, Yiding Wang, and Kefeng Li
Special Session on Recent Advances in Image Segmentation

A Novel Level Set Model Based on Local Information .......................... 507
   Hai Min, Xiao-Feng Wang, and Ying-Ke Lei

A Multi-Descriptor, Multi-Nearest Neighbor Approach for Image Classification .................................................... 515
   Dongjian He, Shangsong Liang, and Yong Fang

Orthogonal Locally Discriminant Projection for Palmprint Recognition ................................................ 524
   Shanwen Zhang and Wei Jia

Special Session on Theories and Applications in Advanced Intelligent Computing

OPC UA Based Information Modeling for Distributed Industrial Systems ........................................................... 531
   Vu Van Tan and Myeong-Jae Yi

Voting-Averaged Combination Method for Regressor Ensemble .......... 540
   Kun An and Jian Meng

Face Recognition Using the Feature Fusion Technique Based on LNMF and NNSC Algorithms ................................. 547
   Li Shang, Changxiong Zhou, Yunian Gu, and Yu Zhang

A PDOC Method for Topology Optimization Design .......................... 555
   Longbiao Zhao, Zhimin Chen, Haobo Qiu, and Liang Gao

Special Session on Search Based Software Engineering

A Decision Support System Based on GIS for Grain Logistics Vehicle Routing Problem .................................................. 564
   Zhanbiao Bao, Jianjun Wu, Tong Zhen, and Hongyi Ge

On Database Normalization Using User Interface Normal Form ........ 571
   Mohd Zainuri Saringat, Rosziati Ibrahim, Noraini Ibrahim, and Tutut Herawan

Special Session on Bio-inspired Computing and Applications

Improved Particle Swarm Optimizers with Application on Constrained Portfolio Selection ................................. 579
   Li Li, Bing Xue, Lijing Tan, and Ben Niu
An Improved Image Rectification Algorithm Based on Particle Swarm Optimization
Hongwei Gao, Ben Niu, Bin Li, and Yang Yu

Particle Swarm Optimizer Based on Small-World Topology and Comprehensive Learning
Yanmin Liu, Dongshen Luo, Qingzhen Zhao, and Changling Sui

Multi-Objective PSO Based on Evolutionary Programming
Zengzhen Shao, Yanmin Liu, and Shuxia Dong

Special Session on Advance in Dimensionality Reduction Methods and Its Applications

Two-Dimensional Sparse Principal Component Analysis for Palmprint Recognition
Cuntao Xiao

Discovery of Protein’s Multifunction and Diversity of Information Transmission
Bo Li, Jin Liu, Shuxiong Wang, Wensheng Zhang, and Shu-Lin Wang

Special Session on Protein and Gene Bioinformatics: Methods and Applications

Identification and Analysis of Binding Site Residues in Protein Complexes: Energy Based Approach
M. Michael Gromiha, S. Selvaraj, B. Jayaram, and Kazuhiko Fukui

Density Based Merging Search of Functional Modules in Protein-Protein Interaction (PPI) Networks
Wei Wang and Jinwen Ma

Topology Prediction of \( \alpha \)-Helical and \( \beta \)-Barrel Transmembrane Proteins Using RBF Networks
Shu-An Chen, Yu-Yen Ou, and M. Michael Gromiha

Palmprint Recognition Based on Neighborhood Rough Set
Shanwen Zhang and Jiandu Liu

Increasing Reliability of Protein Interactome by Combining Heterogeneous Data Sources with Weighted Network Topological Metrics
Zhu-Hong You, Liping Li, Hongjie Yu, Sanfeng Chen, and Shu-Lin Wang
Predicting Protein Stability Change upon Double Mutation from Partial Sequence Information Using Data Mining Approach .......... 664
   Lien-Fu Lai, Chao-Chin Wu, and Liang-Tsung Huang

Inference of Gene Expression Regulation via microRNA Transfection ... 672
   Y.-h. Taguchi and Jun Yasuda

A Residual Level Potential of Mean Force Based Approach to Predict Protein-Protein Interaction Affinity .............................. 680
   Xue-Ling Li, Mei-Ling Hou, and Shu-Lin Wang

Author Index ............................................................................. 687