Jun Wang
Xiaofeng Liao
Zhang Yi (Eds.)

Advances in Neural Networks – ISNN 2005

LNCS 3496

Second International Symposium on Neural Networks
Chongqing, China, May/June 2005
Proceedings, Part I

1 Part I

Springer

Jun Wang Xiaofeng Liao Zhang Yi (Eds.)

Advances in Neural Networks – ISNN 2005

Second International Symposium on Neural Networks
Chongqing, China, May 30 - June 1, 2005
Proceedings, Part I

Springer

Volume Editors

Jun Wang
The Chinese University of Hong Kong
Department of Automation and Computer-Aided Engineering
Shatin, New Territories, Hong Kong
E-mail: jwang@acae.cuhk.edu.hk

Xiaofeng Liao
Chongqing University, School of Computer Science and Engineering
Chongqing, 400044, China
E-mail: xfliao@cqu.edu.cn

Zhang Yi
University of Electronic Science and Technology of China
School of Computer Science and Engineering
Chengdu, Sichuan, China
E-mail: zhangyi@uestc.edu.cn

Library of Congress Control Number: 2005926239

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

ISSN 0302-9743
ISBN-10 3-540-25912-0 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-25912-1 Springer Berlin Heidelberg New York

Typesetting: Camera-ready by author, data conversion by Olgun Computergrafik
Printed on acid-free paper SPIN: 11427391 06/3142 5 4 3 2 1 0

Lecture Notes in Computer Science 3496

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

Editorial Board

Preface

This book and its sister volumes constitute the proceedings of the 2nd International Symposium on Neural Networks (ISNN 2005). ISNN 2005 was held in the beautiful mountain city Chongqing by the upper Yangtze River in southwestern China during May 30–June 1, 2005, as a sequel of ISNN 2004 successfully held in Dalian, China. ISNN emerged as a leading conference on neural computation in the region with increasing global recognition and impact. ISNN 2005 received 1425 submissions from authors on five continents (Asia, Europe, North America, South America, and Oceania), 33 countries and regions (Mainland China, Hong Kong, Macao, Taiwan, South Korea, Japan, Singapore, Thailand, India, Nepal, Iran, Qatar, United Arab Emirates, Turkey, Lithuania, Hungary, Poland, Austria, Switzerland, Germany, France, Sweden, Norway, Spain, Portugal, UK, USA, Canada, Venezuela, Brazil, Chile, Australia, and New Zealand). Based on rigorous reviews, 483 high-quality papers were selected by the Program Committee for presentation at ISNN 2005 and publication in the proceedings, with an acceptance rate of less than 34%. In addition to the numerous contributed papers, 10 distinguished scholars were invited to give plenary speeches and tutorials at ISNN 2005.

The papers are organized into many topical sections under 20 coherent categories (theoretical analysis, model design, learning methods, optimization methods, kernel methods, component analysis, pattern analysis, signal processing, image processing, financial analysis, system modeling, control systems, robotic systems, telecommunication networks, incidence detection, fault diagnosis, power systems, biomedical applications, and industrial applications, and other applications) spanning all major facets of neural network research and applications. ISNN 2005 provided an international forum for the participants to disseminate new research findings and discuss the state of the art. It also created a pleasant opportunity for the participants to interact and exchange information on emerging areas and future challenges of neural network research.

Many people made significant efforts to ensure the success of this event. The ISNN 2005 organizers are grateful to Chongqing University, Southwest Normal University, Chongqing University of Posts and Telecommunications, Southwest Agricultural University, and Chongqing Education College for their sponsorship; grateful to the National Natural Science Foundation of China for the financial support; and to the Asia Pacific Neural Network Assembly, the European Neural Network Society, the IEEE Computational Intelligence Society, and the IEEE Circuits and Systems Society for their technical co-sponsorship. The organizers would like to thank the members of the Advisory Committee for their spiritual support, the members of the Program Committee for reviewing the papers, and the members of the Publication Committee for checking the papers. The organizers would particularly like to thank the publisher, Springer, for their cooperation in publishing the proceedings as three volumes of the Lecture Notes

in Computer Science series. Last but not least, the organizers would like to thank all the authors for contributing their papers to ISNN 2005. Their enthusiastic contributions and participation were essential parts of the symposium with which the organizers were proud to be involved.

May 2005

Jun Wang
Xiaofeng Liao
Zhang Yi

ISNN 2005 Organization

ISNN 2005 was organized and sponsored by Chongqing University, Southwest Normal University, Chongqing University of Posts and Telecommunications, Southwest Agricultural University, and Chongqing Education College in cooperation with the Chinese University of Hong Kong. It was technically cosponsored by the Asia Pacific Neural Network Assembly, the European Neural Network Society, the IEEE Circuits and Systems Society, and the IEEE Computational Intelligence Society. It was financially supported by the National Natural Science Foundation of China and K.C. Wong Education Foundation of Hong Kong.

General Chair

Jun Wang, Hong Kong, China

Advisory Committee Co-chairs

Shun-ichi Amari, Tokyo, Japan

Jacek M. Zurada, Louisville, USA

Advisory Committee Members

Zheng Bao, X'ian, China
Ruwei Dai, Beijing, China
Walter J. Freeman, Berkeley, USA
Kunihiko Fukushima, Tokyo, Japan
Zhenya He, Nanjing, China
Frank L. Lewis, Fort Worth, USA
Erkki Oja, Helsinki, Finland
Shoujue Wang, Beijing, China
Bo Zhang, Beijing, China

Guoliang Chen, Hefei, China
Chunbo Feng, Nanjing, China
Toshio Fukuda, Nagoya, Japan
Aike Guo, Shanghai, China
Okyay Kaynak, Istanbul, Turkey
Yanda Li, Beijing, China
Tzyh-Jong Tarn, St. Louis, USA
Youshou Wu, Beijing, China
Nanning Zheng, Xi'an, China

Steering Committee Chairs

Xiaohong Li, Chongqing, China

Yixin Zhong, Beijing, China

Steering Committee Members

Wlodzislaw Duch, Torun, Poland
Max Q.H. Meng, Hong Kong, China
Yuhui Qiu, Chongqing, China
DeLiang Wang, Columbus, USA
Zongben Xu, Xi'an, China
Fuliang Yin, Dalian, China

Yinguo Li, Chonqing, China
Marios M. Polycarpou, Cincinnati, USA
Zhengqi Sun, Beijing, China
Zhongfu Wu, Chongqing, China
Gary G. Yen, Stillwater, USA
Juebang Yu, Chengdu, China

Program Committee Co-chairs

Xiaofeng Liao, Chongqing, China
Zhang Yi, Chengdu, China

Program Committee Members

Shigeo Abe, Kobe, Japan
Amit Bhaya, Rio de Janeiro, Brazil
Jinde Cao, Nanjing, China
Ke Chen, Manchester, UK
Tianping Chen, Shanghai, China
Yiu Ming Cheung, Hong Kong, China
Hyungsuk Cho, Dae Jeon, Korea
Shuang Cong, Hefei, China
Meng Joo Er, Singapore
Jun Gao, Hefei, China
Ping Guo, Beijing, China
Baogang Hu, Beijing, China
Jinglu Hu, Fukuoka, Japan
Licheng Jiao, Xi'an, China
Hon Keung Kwan, Windsor, Canada
Cees van Leeuwen, Tokyo, Japan
Yangmin Li, Macau, China
Yanchun Liang, Changchun, China
Chin-Teng Lin, Hsingchu, Taiwan
Qing Liu, Wuhan, China
Hongtao Lu, Shanghai, China
Zhiwei Luo, Nagoya, Japan
Satoshi Matsuda, Narashino, Japan
Stanislaw Osowski, Warsaw, Poland
Rudy Setiono, Singapore
Daming Shi, Singapore
Jianbo Su, Shanghai, China
Fuchun Sun, Beijing, China
Johan Suykens, Leuven, Belgium
Ying Tan, Hefei, China
Lipo Wang, Singapore
Wei Wu, Dalian, China
Hong Yan, Hong Kong, China
Wen Yu, Mexico City, Mexico
Huaguang Zhang, Shenyang, China
Liqing Zhang, Shanghai, China
Sabri Arik, Istanbul, Turkey
Abdesselam Bouzerdoum, Wollongong, Australia
Laiwan Chan, Hong Kong, China
Luonan Chen, Osaka, Japan
Yen-Wei Chen, Kyoto, Japan
Zheru Chi, Hong Kong, China
Andrzej Cichocki, Tokyo, Japan
Chuanyin Dang, Hong Kong, China
Mauro Forti, Siena, Italy
Chengan Guo, Dalian, China
Zengguang Hou, Beijing, China
Dewen Hu, Changsha, China
Danchi Jiang, Hobart, Australia
Nikola Kasabov, Auckland, New Zealand
Irwin King, Hong Kong, China
Xiaoli Li, Birmingham, UK
Yuanqing Li, Singapore
Lizhi Liao, Hong Kong, China
Ju Liu, Jinan, China
Baoliang Lu, Shanghai, China
Fa-Long Luo, San Jose, USA
Qing Ma, Kyoto, Japan
Tetsuo Nishi, Fukuoka, Japan
Paul S. Pang, Auckland, New Zealand
Yi Shen, Wuhan, China
Peter Sincak, Kosice, Slovakia
Changyin Sun, Nanjing, China
Ron Sun, Troy, USA
Ah Hwee Tan, Singapore
Dan Wang, Singapore
Wanliang Wang, Hangzhou, China
Michel Verleysen, Louvain, Belgium
Mao Ye, Chengdu, China
Zhigang Zeng, Hefei, China
Liming Zhang, Shanghai, China
Chunguang Zhou, Changchun, China

Special Sessions Chair

Derong Liu, Chicago, USA

Organizing Chairs

Guoyin Wang, Chongqing, China

Simon X. Yang, Guelph, Canada

Finance Chairs

Guangyuan Liu, Chongqing, China
Yu Wu, Chongqing, China

Qingyu Xiong, Chongqing, China

Publication Co-chairs

Yi Chai, Chongqing, China
Jianwei Zhang, Hamburg, Germany

Hujun Yin, Manchester, UK

Publicity Co-chairs

Min Han, Dalian, China

Fengchun Tian, Chongqing, China

Registration Chairs

Yi Chai, Chongqing, China

Shaojiang Deng, Chongqing, China

Local Arrangements Chairs

Wei Zhang, Chongqing, China

Jianqiao Yu, Chongqing, China

Secretariat and Webmaster

Tao Xiang, Chongqing, China

Lecture Notes in Computer Science

For information about Vols. 1–3375

please contact your bookseller or Springer

Vol. 3525: A.E. Abdallah, C.B. Jones, J.W. Sanders (Eds.), Communicating Sequential Processes. XIV, 321 pages. 2005.

Vol. 3510: T. Braun, G. Carle, Y. Koucheryavy, V. Tsaoussidis (Eds.), Wired/Wireless Internet Communications. XIV, 366 pages. 2005.

Vol. 3503: S.E. Nikoletseas (Ed.), Experimental and Efficient Algorithms. XIV, 605 pages. 2005.

Vol. 3501: B. Kégl, G. Lapalme (Eds.), Advances in Artificial Intelligence. XV, 458 pages. 2005. (Subseries LNAI).

Vol. 3500: S. Miyano, J. Mesirov, S. Kasif, S. Istrail, P. Pevzner, M. Waterman (Eds.), Research in Computational Molecular Biology. XVII, 632 pages. 2005. (Subseries LNBI).

Vol. 3498: J. Wang, X. Liao, Z. Yi (Eds.), Advances in Neural Networks – ISNN 2005, Part III. XLIX, 1077 pages. 2005.

Vol. 3497: J. Wang, X. Liao, Z. Yi (Eds.), Advances in Neural Networks – ISNN 2005, Part II. XLIX, 947 pages. 2005.

Vol. 3496: J. Wang, X. Liao, Z. Yi (Eds.), Advances in Neural Networks – ISNN 2005, Part I. XLIX, 1055 pages. 2005.

Vol. 3492: P. Blache, E. Stabler, J. Busquets, R. Moot (Eds.), Logical Aspects of Computational Linguistics. X, 363 pages. 2005. (Subseries LNAI).

Vol. 3489: G.T. Heineman, J.A. Stafford, H.W. Schmidt, K. Wallnau, C. Szyperski, I. Crnkovic (Eds.), Component-Based Software Engineering. XI, 358 pages. 2005.

Vol. 3488: M.-S. Hacid, N.V. Murray, Z.W. Raś, S. Tsumoto (Eds.), Foundations of Intelligent Systems. XIII, 700 pages. 2005. (Subseries LNAI).

Vol. 3467: J. Giesl (Ed.), Term Rewriting and Applications. XIII, 517 pages. 2005.

Vol. 3465: M. Bernardo, A. Bogliolo (Eds.), Formal Methods for Mobile Computing. VII, 271 pages. 2005.

Vol. 3463: M. Dal Cin, M. Kaâniche, A. Pataricza (Eds.), Dependable Computing - EDCC 2005. XVI, 472 pages. 2005.

Vol. 3462: R. Boutaba, K. Almeroth, R. Puigjaner, S. Shen, J.P. Black (Eds.), NETWORKING 2005. Networking Technologies, Services, and Protocols; Performance of Computer and Communication Networks; Mobile and Wireless Communication Systems. XXX, 1483 pages. 2005.

Vol. 3461: P. Urzyczyn (Ed.), Typed Lambda Calculi and Applications. XI, 433 pages. 2005.

Vol. 3459: R. Kimmel, N.A. Sochen, J. Weickert (Eds.), Scale Space and PDE Methods in Computer Vision. XI, 634 pages. 2005.

Vol. 3456: H. Rust, Operational Semantics for Timed Systems. XII, 223 pages. 2005.

Vol. 3455: H. Treharne, S. King, M. Henson, S. Schneider (Eds.), ZB 2005: Formal Specification and Development in Z and B. XV, 493 pages. 2005.

Vol. 3454: J.-M. Jacquet, G.P. Picco (Eds.), Coordination Models and Languages. X, 299 pages. 2005.

Vol. 3453: L. Zhou, B.C. Ooi, X. Meng (Eds.), Database Systems for Advanced Applications. XXVII, 929 pages. 2005.

Vol. 3452: F. Baader, A. Voronkov (Eds.), Logic for Programming, Artificial Intelligence, and Reasoning. XI, 562 pages. 2005. (Subseries LNAI).

Vol. 3450: D. Hutter, M. Ullmann (Eds.), Security in Pervasive Computing. XI, 239 pages. 2005.

Vol. 3449: F. Rothlauf, J. Branke, S. Cagnoni, D.W. Corne, R. Drechsler, Y. Jin, P. Machado, E. Marchiori, J. Romero, G.D. Smith, G. Squillero (Eds.), Applications of Evolutionary Computing. XX, 631 pages. 2005.

Vol. 3448: G.R. Raidl, J. Gottlieb (Eds.), Evolutionary Computation in Combinatorial Optimization. XI, 271 pages. 2005.

Vol. 3447: M. Keijzer, A. Tettamanzi, P. Collet, J.v. Hemert, M. Tomassini (Eds.), Genetic Programming. XIII, 382 pages. 2005.

Vol. 3444: M. Sagiv (Ed.), Programming Languages and Systems. XIII, 439 pages. 2005.

Vol. 3443: R. Bodik (Ed.), Compiler Construction. XI, 305 pages. 2005.

Vol. 3442: M. Cerioli (Ed.), Fundamental Approaches to Software Engineering. XIII, 373 pages. 2005.

Vol. 3441: V. Sassone (Ed.), Foundations of Software Science and Computational Structures. XVIII, 521 pages. 2005.

Vol. 3440: N. Halbwachs, L.D. Zuck (Eds.), Tools and Algorithms for the Construction and Analysis of Systems. XVII, 588 pages. 2005.

Vol. 3439: R.H. Deng, F. Bao, H. Pang, J. Zhou (Eds.), Information Security Practice and Experience. XII, 424 pages. 2005.

Vol. 3437: T. Gschwind, C. Mascolo (Eds.), Software Engineering and Middleware. X, 245 pages. 2005.

Vol. 3436: B. Bouyssounouse, J. Sifakis (Eds.), Embedded Systems Design. XV, 492 pages. 2005.

Vol. 3434: L. Brun, M. Vento (Eds.), Graph-Based Representations in Pattern Recognition. XII, 384 pages. 2005.

Vol. 3433: S. Bhalla (Ed.), Databases in Networked Information Systems. VII, 319 pages. 2005.

Vol. 3432: M. Beigl, P. Lukowicz (Eds.), Systems Aspects in Organic and Pervasive Computing - ARCS 2005. X, 265 pages. 2005.

Vol. 3431: C. Dovrolis (Ed.), Passive and Active Network Measurement. XII, 374 pages. 2005.

Vol. 3429: E. Andres, G. Damiand, P. Lienhardt (Eds.), Discrete Geometry for Computer Imagery. X, 428 pages. 2005.

Vol. 3427: G. Kotsis, O. Spaniol (Eds.), Wireless Systems and Mobility in Next Generation Internet. VIII, 249 pages. 2005.

Vol. 3423: J.L. Fiadeiro, P.D. Mosses, F. Orejas (Eds.), Recent Trends in Algebraic Development Techniques. VIII, 271 pages. 2005.

Vol. 3422: R.T. Mittermeir (Ed.), From Computer Literacy to Informatics Fundamentals. X, 203 pages. 2005.

Vol. 3421: P. Lorenz, P. Dini (Eds.), Networking - ICN 2005, Part II. XXXV, 1153 pages. 2005.

Vol. 3420: P. Lorenz, P. Dini (Eds.), Networking - ICN 2005, Part I. XXXV, 933 pages. 2005.

Vol. 3419: B. Faltings, A. Petcu, F. Fages, F. Rossi (Eds.), Constraint Satisfaction and Constraint Logic Programming. X, 217 pages. 2005. (Subseries LNAI).

Vol. 3418: U. Brandes, T. Erlebach (Eds.), Network Analysis. XII, 471 pages. 2005.

Vol. 3416: M. Böhlen, J. Gamper, W. Polasek, M.A. Wimmer (Eds.), E-Government: Towards Electronic Democracy. XIII, 311 pages. 2005. (Subseries LNAI).

Vol. 3415: P. Davidsson, B. Logan, K. Takadama (Eds.), Multi-Agent and Multi-Agent-Based Simulation. X, 265 pages. 2005. (Subseries LNAI).

Vol. 3414: M. Morari, L. Thiele (Eds.), Hybrid Systems: Computation and Control. XII, 684 pages. 2005.

Vol. 3412: X. Franch, D. Port (Eds.), COTS-Based Software Systems. XVI, 312 pages. 2005.

Vol. 3411: S.H. Myaeng, M. Zhou, K.-F. Wong, H.-J. Zhang (Eds.), Information Retrieval Technology. XIII, 337 pages. 2005.

Vol. 3410: C.A. Coello Coello, A. Hernández Aguirre, E. Zitzler (Eds.), Evolutionary Multi-Criterion Optimization. XVI, 912 pages. 2005.

Vol. 3409: N. Guelfi, G. Reggio, A. Romanovsky (Eds.), Scientific Engineering of Distributed Java Applications. X, 127 pages. 2005.

Vol. 3408: D.E. Losada, J.M. Fernández-Luna (Eds.), Advances in Information Retrieval. XVII, 572 pages. 2005.

Vol. 3407: Z. Liu, K. Araki (Eds.), Theoretical Aspects of Computing - ICTAC 2004. XIV, 562 pages. 2005.

Vol. 3406: A. Gelbukh (Ed.), Computational Linguistics and Intelligent Text Processing. XVII, 829 pages. 2005.

Vol. 3404: V. Diekert, B. Durand (Eds.), STACS 2005. XVI, 706 pages. 2005.

Vol. 3403: B. Ganter, R. Godin (Eds.), Formal Concept Analysis. XI, 419 pages. 2005. (Subseries LNAI).

Vol. 3402: M. Daydé, J.J. Dongarra, V. Hernández, J.M.L.M. Palma (Eds.), High Performance Computing for Computational Science - VECPAR 2004. XI, 732 pages. 2005.

Vol. 3401: Z. Li, L.G. Vulkov, J. Waśniewski (Eds.), Numerical Analysis and Its Applications. XIII, 630 pages. 2005.

Vol. 3399: Y. Zhang, K. Tanaka, J.X. Yu, S. Wang, M. Li (Eds.), Web Technologies Research and Development - APWeb 2005. XXII, 1082 pages. 2005.

Vol. 3398: D.-K. Baik (Ed.), Systems Modeling and Simulation: Theory and Applications. XIV, 733 pages. 2005. (Subseries LNAI).

Vol. 3397: T.G. Kim (Ed.), Artificial Intelligence and Simulation. XV, 711 pages. 2005. (Subseries LNAI).

Vol. 3396: R.M. van Eijk, M.-P. Huget, F. Dignum (Eds.), Agent Communication. X, 261 pages. 2005. (Subseries LNAI).

Vol. 3395: J. Grabowski, B. Nielsen (Eds.), Formal Approaches to Software Testing. X, 225 pages. 2005.

Vol. 3394: D. Kudenko, D. Kazakov, E. Alonso (Eds.), Adaptive Agents and Multi-Agent Systems II. VIII, 313 pages. 2005. (Subseries LNAI).

Vol. 3393: H.-J. Kreowski, U. Montanari, F. Orejas, G. Rozenberg, G. Taentzer (Eds.), Formal Methods in Software and Systems Modeling. XXVII, 413 pages. 2005.

Vol. 3392: D. Seipel, M. Hanus, U. Geske, O. Bartenstein (Eds.), Applications of Declarative Programming and Knowledge Management. X, 309 pages. 2005. (Subseries LNAI).

Vol. 3391: C. Kim (Ed.), Information Networking. XVII, 936 pages. 2005.

Vol. 3390: R. Choren, A. Garcia, C. Lucena, A. Romanovsky (Eds.), Software Engineering for Multi-Agent Systems III. XII, 291 pages. 2005.

Vol. 3389: P. Van Roy (Ed.), Multiparadigm Programming in Mozart/Oz. XV, 329 pages. 2005.

Vol. 3388: J. Lagergren (Ed.), Comparative Genomics. VII, 133 pages. 2005. (Subseries LNBI).

Vol. 3387: J. Cardoso, A. Sheth (Eds.), Semantic Web Services and Web Process Composition. VIII, 147 pages. 2005.

Vol. 3386: S. Vaudenay (Ed.), Public Key Cryptography - PKC 2005. IX, 436 pages. 2005.

Vol. 3385: R. Cousot (Ed.), Verification, Model Checking, and Abstract Interpretation. XII, 483 pages. 2005.

Vol. 3383: J. Pach (Ed.), Graph Drawing. XII, 536 pages. 2005.

Vol. 3382: J. Odell, P. Giorgini, J.P. Müller (Eds.), Agent-Oriented Software Engineering V. X, 239 pages. 2005.

Vol. 3381: P. Vojtáš, M. Bieliková, B. Charron-Bost, O. Sýkora (Eds.), SOFSEM 2005: Theory and Practice of Computer Science. XV, 448 pages. 2005.

Vol. 3380: C. Priami (Ed.), Transactions on Computational Systems Biology I. IX, 111 pages. 2005. (Subseries LNBI).

Vol. 3379: M. Hemmje, C. Niederee, T. Risse (Eds.), From Integrated Publication and Information Systems to Information and Knowledge Environments. XXIV, 321 pages. 2005.

Vol. 3378: J. Kilian (Ed.), Theory of Cryptography. XII, 621 pages. 2005.

Vol. 3377: B. Goethals, A. Siebes (Eds.), Knowledge Discovery in Inductive Databases. VII, 190 pages. 2005.

Vol. 3376: A. Menezes (Ed.), Topics in Cryptology – CT-RSA 2005. X, 385 pages. 2005.

Vol. 3375: M.A. Marsan, G. Bianchi, M. Listanti, M. Meo (Eds.), Quality of Service in Multiservice IP Networks. XIII, 656 pages. 2005.

Table of Contents, Part I

1 Theoretical Analysis

Population Coding, Bayesian Inference and Information Geometry 1
Shun-ichi Amari

One-Bit-Matching ICA Theorem, Convex-Concave Programming, and Combinatorial Optimization 5
Lei Xu

Dynamic Models for Intention (Goal-Directedness) Are Required by Truly Intelligent Robots 21
Walter J. Freeman

Differences and Commonalities Between Connectionism and Symbolicism 34
Shoujue Wang and Yangyang Liu

Pointwise Approximation for Neural Networks 39
Feilong Cao, Zongben Xu, and Youmei Li

On the Universal Approximation Theorem of Fuzzy Neural Networks with Random Membership Function Parameters 45
Lipo Wang, Bing Liu, and Chunru Wan

A Review: Relationship Between Response Properties of Visual Neurons and Advances in Nonlinear Approximation Theory 51
Shan Tan, Xiuli Ma, Xiangrong Zhang, and Licheng Jiao

Image Representation in Visual Cortex and High Nonlinear Approximation 57
Shan Tan, Xiangrong Zhang, Shuang Wang, and Licheng Jiao

Generalization and Property Analysis of GENET 63
Youmei Li, Zongben Xu, and Feilong Cao

On Stochastic Neutral Neural Networks 69
Yumin Zhang, Lei Guo, Lingyao Wu, and Chunbo Feng

Eigenanalysis of CMAC Neural Network 75
Chunshu Zhang

A New Definition of Sensitivity for RBFNN and Its Applications to Feature Reduction 81
Xizhao Wang and Chunguo Li

Complexity of Error Hypersurfaces in Multilayer Perceptrons with General Multi-input and Multi-output Architecture 87
Xun Liang

Nonlinear Dynamical Analysis on Coupled Modified Fitzhugh-Nagumo Neuron Model 95
Deepak Mishra, Abhishek Yadav, Sudipta Ray, and Prem K. Kalra

Stability of Nonautonomous Recurrent Neural Networks with Time-Varying Delays 102
Haijun Jiang, Jinde Cao, and Zhidong Teng

Global Exponential Stability of Non-autonomous Neural Networks with Variable Delay 108
Minghui Jiang, Yi Shen, and Meiqin Liu

A Generalized LMI-Based Approach to the Global Exponential Stability of Recurrent Neural Networks with Delay 114
Yi Shen, Minghui Jiang, and Xiaoxin Liao

A Further Result for Exponential Stability of Neural Networks with Time-Varying Delays 120
Jun Zhang, Xiaofeng Liao, Chuandong Li, and Anwen Lu

Improved Results for Exponential Stability of Neural Networks with Time-Varying Delays 126
Deyin Wu, Qingyu Xiong, Chuandong Li, Zhong Zhang, and Haoyang Tang

Global Exponential Stability of Recurrent Neural Networks with Infinite Time-Varying Delays and Reaction-Diffusion Terms 132
Qiankun Song, Zhenjiang Zhao, and Xuedong Chen

Exponential Stability Analysis of Neural Networks with Multiple Time Delays ... 142
Huaguang Zhang, Zhanshan Wang, and Derong Liu

Exponential Stability of Cohen-Grossberg Neural Networks with Delays 149
Wei Zhang and Jianqiao Yu

Global Exponential Stability of Cohen-Grossberg Neural Networks with Time-Varying Delays and Continuously Distributed Delays 156
Yi Shen, Minghui Jiang, and Xiaoxin Liao

Exponential Stability of Stochastic Cohen-Grossberg Neural Networks with Time-Varying Delays 162
Xiaolin Li and Jinde Cao

Exponential Stability of Fuzzy Cellular Neural Networks with Unbounded Delay 168
Tingwen Huang and Linhua Zhang

Global Exponential Stability of Reaction-Diffusion Hopfield Neural Networks with Distributed Delays 174
Zhihong Tang, Yiping Luo, and Feiqi Deng

Global Exponential Stability of Delayed Impulsive Hopfield Type Neural Networks 181
Bingji Xu, Qun Wang, Yi Shen, and Xiaoxin Liao

Global Exponential Stability of Hopfield Neural Networks with Impulsive Effects 187
Zhichun Yang, Jinan Pei, Daoyi Xu, Yumei Huang, and Li Xiang

Global Exponential Stability of Discrete Time Hopfield Neural Networks with Delays 193
Qiang Zhang, Wenbing Liu, and Xiaopeng Wei

Stability Analysis of Uncertain Neural Networks with Linear and Nonlinear Time Delays 199
Hanlin He, Zhongsheng Wang, and Xiaoxin Liao

Robust Stability for Delayed Neural Networks with Nonlinear Perturbation 203
Li Xie, Tianming Liu, Jilin Liu, Weikang Gu, and Stephen Wong

Robust Stability Analysis of a Class of Hopfield Neural Networks with Multiple Delays 209
Huaguang Zhang, Ce Ji, and Derong Liu

Robust Stability of Interval Delayed Neural Networks 215
Wenlian Lu and Tianping Chen

Impulsive Robust Control of Interval Hopfield Neural Networks 222
Yinping Zhang and Jitao Sun

Global Attractivity of Cohen-Grossberg Model with Delays 229
Tao Xiang, Xiaofeng Liao, and Jian Huang

High-Order Hopfield Neural Networks 235
Yi Shen, Xiaojun Zong, and Minghui Jiang

Stability Analysis of Second Order Hopfield Neural Networks with Time Delays 241
Jinan Pei, Daoyi Xu, Zhichun Yang, and Wei Zhu

Convergence Analysis of Genetic Regulatory Networks Based on Nonlinear Measures 247
Hongtao Lu, Zhizhou Zhang, and Lin He

Stability Conditions for Discrete Neural Networks in Partial Simultaneous Updating Mode 253
Runnian Ma, Shengrui Zhang, and Sheping Lei

Dynamic Behavior Analysis of Discrete Neural Networks with Delay 259
Runnian Ma, Sheping Lei, and Shengrui Zhang

Existence and Stability of Periodic Solution
in a Class of Impulsive Neural Networks 265
Xiaofan Yang, David J. Evans, and Yuanyan Tang

Globally Attractive Periodic Solutions of Continuous-Time Neural Networks
and Their Discrete-Time Counterparts 271
Changyin Sun, Liangzhen Xia, and Chunbo Feng

Globally Stable Periodic State of Delayed Cohen-Grossberg Neural Networks ... 276
Chaojin Fu, Hanlin He, and Xiaoxin Liao

Globally Attractive Periodic State of Discrete-Time Cellular Neural Networks
with Time-Varying Delays 282
Zhigang Zeng, Boshan Chen, and Zengfu Wang

An Analysis for Periodic Solutions of High-Order BAM Neural Networks
with Delays 288
Jianlong Qiu and Jinde Cao

Periodic Oscillation and Exponential Stability
of a Class of Competitive Neural Networks 294
Boshan Chen

Synchronous Behaviors of Two Coupled Neurons 302
Ying Wu, Jianxue Xu, and Wuyin Jin

Adaptive Synchronization of Delayed Neural Networks
Based on Parameters Identification 308
Jin Zhou, Tianping Chen, and Lan Xiang

Strength and Direction of Phase Synchronization of Neural Networks 314
Yan Li, Xiaoli Li, Gaoxiang Ouyang, and Xinping Guan

Hopf Bifurcation in a Single Inertial Neuron Model:
A Frequency Domain Approach 320
Shaorong Li, Shaowen Li, Xipeng Sun, and Jie Li

Hopf Bifurcation in a Single Inertial Neuron Model with a Discrete Delay 327
Shaowen Li and Shaorong Li

Stability and Bifurcation of a Neuron Model with Delay-Dependent Parameters .. 334
Xu Xu and Yanchun Liang

Stability and Chaos of a Neural Network with Uncertain Time Delays 340
Shangbo Zhou, Hua Li, and Zhongfu Wu

Chaotic Synchronization of Delayed Neural Networks 346
Fenghua Tu, Xiaofeng Liao, and Chuandong Li

Chaos Synchronization for Bi-directional Coupled Two-Neuron Systems with Discrete Delays 351
Xiaohong Zhang and Shangbo Zhou

Complex Dynamics in a Simple Hopfield-Type Neural Network 357
Qingdu Li and Xiaosong Yang

Adaptive Chaotic Controlling Method of a Chaotic Neural Network Model 363
Lidan Wang, Shukai Duan, and Guangyuan Liu

2 Model Design

Modeling Cortex Network: A Spatio-temporal Population Approach 369
Wentao Huang, Licheng Jiao, Maoguo Gong, and Chuang Guo

A Special Kind of Neural Networks: Continuous Piecewise Linear Functions 375
Xusheng Sun and Shuning Wang

A Novel Dynamic Structural Neural Network with Neuron-Regeneration and Neuron-Degeneration Mechanisms 380
Yingtung Hsiao, Chenglong Chuang, Joeair Jiang, Chiang Wang, and Chengchih Chien

A New Adaptive Ridgelet Neural Network 385
Shuyuan Yang, Min Wang, and Licheng Jiao

Designing Neural Networks Using Hybrid Particle Swarm Optimization 391
Bo Liu, Ling Wang, Yihui Jin, and Dexian Huang

A New Strategy for Designing Bidirectional Associative Memories 398
Gengsheng Zheng, Sidney Nascimento Givigi, and Weiyu Zheng

Genetically Optimized Hybrid Fuzzy Neural Networks Based on TSK Fuzzy Rules and Polynomial Neurons 404
Sungkwun Oh, Byoungjun Park, and Hyunki Kim

Genetically Optimized Self-organizing Fuzzy Polynomial Neural Networks Based on Information Granulation 410
Hosung Park, Daehee Park, and Sungkwun Oh

Identification of ANFIS-Based Fuzzy Systems with the Aid of Genetic Optimization and Information Granulation 416
Sungkwun Oh, Keonjun Park, and Hyungsoo Hwang

Design of Rule-Based Neurofuzzy Networks by Means of Genetic Fuzzy Set-Based Granulation 422
Byoungjun Park and Sungkwun Oh

Design of Genetic Fuzzy Set-Based Polynomial Neural Networks with the Aid of Information Granulation 428
Sungkwun Oh, Seokbeom Roh, and Yongkab Kim

A Novel Self-organizing Neural Fuzzy Network for Automatic Generation of Fuzzy Inference Systems 434
Meng Joo Er and Rishikesh Parthasarathi

Constructive Fuzzy Neural Networks and Its Application 440
Lunwen Wang, Ying Tan, and Ling Zhang

A Novel CNN Template Design Method Based on GIM 446
Jianye Zhao, Hongling Meng, and Daoheng Yu

A Novel Generalized Congruence Neural Networks 455
Yong Chen, Guoyin Wang, Fan Jin, and Tianyun Yan

A SOM Based Model Combination Strategy 461
Cristofer Englund and Antanas Verikas

Typical Sample Selection and Redundancy Reduction for Min-Max Modular Network with GZC Function 467
Jing Li, Baoliang Lu, and Michinori Ichikawa

Parallel Feedforward Process Neural Network with Time-Varying Input and Output Functions 473
Shisheng Zhong, Gang Ding, and Daizhong Su

A Novel Solid Neuron-Network Chip Based on Both Biological and Artificial Neural Network Theories 479
Zihong Liu, Zhihua Wang, Guolin Li, and Zhiping Yu

Associative Memory Using Nonlinear Line Attractor Network for Multi-valued Pattern Association 485
Ming-Jung Seow and Vijayan K. Asari

Associative Chaotic Neural Network via Exponential Decay Spatio-temporal Effect 491
Shukai Duan and Lidan Wang

On a Chaotic Neural Network with Decaying Chaotic Noise 497
Tianyi Ma, Ling Wang, Yingtao Jiang, and Xiaozong Yang

Extension Neural Network-Type 3 503
Manghui Wang

Pulsed Para-neural Networks (PPNN) Based on MEXORs and Counters 509
Junquan Li and Yixin Yin