Contents

Welcome Address

On behalf of the Conference Committees, we would like to welcome you to the 2010 International Conference on Life System Modeling and Simulation and the 2010 International Conference on Intelligent Computing for Sustainable Energy and Environment which will be held in Wuxi, China from September 17-20, 2010. The 2010 International Conference on Life System Modeling and Simulation (LSMS'10) and the 2010 International Conference on Intelligent Computing for Sustainable Energy and Environment (ICSEE'10) were formed to bring together researchers and practitioners in the fields of life system modeling/simulation and intelligent computing applied to worldwide sustainable energy and environmental applications.

A life system is a broad concept, covering both micro and macro components ranging from cells, tissues and organs across to organisms and ecological niches. To comprehend and predict the complex behavior of even a simple life system can be extremely difficult using conventional approaches. To meet this challenge, a variety of new theories and methodologies have emerged in recent years on life system modeling and simulation. Along with improved understanding of the behavior of biological systems, novel intelligent computing paradigms and techniques have emerged to handle complicated real-world problems and applications. In particular, intelligent computing approaches have been valuable in the design and development of systems and facilities for achieving sustainable energy and a sustainable environment, the two most challenging issues currently facing humanity. The two LSMS'10 and ICSEE'10 conferences served as an important platform for synergizing these two research streams.

The LSMS'10 and ICSEE'10 conferences built upon the success of two previous LSMS conferences held in Shanghai in 2004 and 2007 and were based on the UK Engineering and Science Research Council (EPSRC) funded Sustainable Energy and Built Environment Science Bridge project. The conferences were jointly organized by Shanghai University, Queen's University Belfast, Jiangnan University and the System Modeling and Simulation Technical Committee of CASS, together with the Embedded Instrument and System Technical Committee of China Instrument and Control Society. The conference program covered keynote addresses, special sessions, themed workshops and poster presentations, in addition to a series of social functions to enable networking and foster future research collaboration.

LSMS'10 and ICSEE'10 received over 880 paper submissions from 22 countries. These papers went through a rigorous peer review procedure, including both pre-review and formal refereeing. Based on the review reports, the Program Committee finally selected 260 papers for presentation at the conference, from amongst which 194 were subsequently selected and recommended for publication by Springer in two volumes of Lecture Notes in Computer Science (LNCS) and one volume of Lecture Notes in Bioinformatics (LNBI), and 66 were subsequently selected and recommended for publication by Springer in two volumes of Communications in Computer and Information Science (CCIS).

The organizers of LSMS'10 and ICSEE'10 would like to acknowledge the enormous contributions from the following: the Advisory and Steering Committees for their guidance and advice, the Program Committee and the numerous referees worldwide for their significant efforts in both reviewing and soliciting the papers, and the Publication Committee for their editorial work. We would also like to thank Prof Alfred Hofmann, Vice President Publishing - Computer Science, Springer-Verlag, for his continual support and guidance to ensure the high quality publication of the conference proceedings. Particular thanks are of course due to all the authors, as without their excellent submissions and presentations, the two conferences would not have occurred.

Finally, we would like to express our gratitude to the following organizations: Chinese Association for System Simulation (CASS), IEEE SMCS Systems Biology Technical Committee, National Natural Science Foundation of China, Research Councils UK, IEEE CC Ireland chapter, IEEE SMC Ireland chapter, Shanghai Association for System Simulation, Shanghai Instrument and Control Society and Shanghai Association of Automation.

The support of the Intelligent Systems and Control research cluster at Queen's University Belfast, Tsinghua University, Peking University, Zhejiang University, Shanghai Jiaotong University, Fudan University, Delft University of Technology, University of Electronic Science Technology of China, Donghua University are all also acknowledged.

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Plenary Lectures

Plenary Lecture 1

Saturday, September 18, (9:00-9:45)

Lecture Theatre

John V McCanny

CBE FRS FREng IEEE Fellow FIAE MRIA FIET FInstP FIEI

Coupling Reseach and Innovation-new Models for Successful Economic Impact

Chair: Trevor Newsom

Abstract: Competitiveness in a global economy is highly dependent on our ability to create new knowledge that in turn drives new innovations and new market opportunities. A key aspect of this is a nation's ability to captilalise on and create new products and services from its research base and the role that business focused Research Centres, can play a key role in enabling effective Knowledge Transfer, between the academia and industry. This plenary presentation will give an overview of how these challenges are being addressed at Queen's University's Institute of Electronics Communications and Information Technology - ECIT.   ECIT, which opened in 2004 as a result of a $70M investment, is the research flagship for the Northern Ireland Science Park and brings together specialists in complementary fields of Electronics and Computer Science. It has a unique environment that couples internationally leading research with very strong industrial engagement locally, nationally and internationally. Its major themes are (a) Digital and Wireless Communications Technology and (b) Secure Information Technology, following a recent $50M investment funded by the UK's national Engineering and Physical Sciences Research Council (EPSRC) and by the UK's national Technology Strategy Board (TSB). This talk will present an overview of ECIT's activities including new "Open Innovation" models that juxtapose speculative academic research with engineering staff that have many years industrial experience. An overview will also be given of ECIT's wider role in helping to create new high technology industry on the Northern Ireland Science Park and its transfer to technology to national and international industry. This includes and environment that provides access to national and international entrepreneurs, business angels, Venture Capitalists s and Intellectual Property Lawyers as well as to leading researchers nationally and internationally.

Professor John McCanny is an international authority on special purpose silicon architectures for Signal and Video Processing. He is a Fellow of the Royal Society (of London), the UK Royal Academy of Engineering, the Irish Academy of Engineering, the IEEE and Engineers Ireland. He is also a Member of the Royal Irish Academy. He is recipient of numerous honours/awards including a UK Royal Academy of Engineering Silver Medal (1996), an IEEE Millennium Medal, the Royal Dublin Society/Irish Times Boyle medal (2004) and the IET's Faraday medal (2006). He has co-founded two successful high technology companies, Amphion Semiconductor Ltd. (later acquired by Conexant, then NXP) and Audio Processing Technology Ltd. In 2002 he was awarded a CBE (Commander of the Order of the British Empire) for his "Contributions to Engineering and Higher Education". He has published 5 research books, 350 peer reviewed research papers and holds over 20 patents. He is currently Director of the Institute of Electronics, Communications and Information Technology (ECIT) at Queen's University Belfast and also Head of the School of Electronics, Electrical Engineering and Computer Science. He has served on numerous Royal Society committees and chaired of Sectional Committee 4 (Engineering) during 2005 and 2006. He is currently is a Member of the Council of the Royal Academy of Engineering and also serves on its International Committee. He has been a board member for Ireland's Tyndall National ICT research centre since its was established in 2004, is currently a member of EPSRC's ICT Strategic Advisory Team and on the advisory board of the German Excellence Centre on "Ultra High-Speed Mobile Information and Communication" (UMIC) based at the University of Aachen. He was heavily involved in developing the vision that led to the creation of the Northern Ireland Science Park and the creation of its ECIT research flagship. He also led the initiative that created the £30M Centre for Secure Information Technology (CSIT) which is based at ECIT. He holds a Bachelors degree in Physics from the University of Manchester, a PhD in Physics from the University of Ulster and was awarded a DSc (higher doctorate) in 1998 in Electrical and Electronics Engineering from Queen's University Belfast.

Plenary Lecture 2

Saturday, September 18, (10:00-10:45)

Lecture Theatre

Cheng Wu

Tsinghua University, China

Advanced control and intelligent technology in energy saving and polution reduction

Chair: George W. Irwin

Abstract: The presentation will give a view about the importance of energy saving and pollution reduction in Chinese industrialization. A comprehensive solution for a kind of full process (including several coupled production equipment) control and optimum problem under multi-objective such as energy saving, pollution reduction etc. will be addressed in the talk. We also will introduce the modeling methods and optimization algorithms with some applications in very complex industry systems.

Academic Posts

Professor, Department of Automation, Tsinghua University

Member, Chinese Academy of Engineering

Director, China National Engineering Research Center for Contemporary Integrated Manufacturing Systems

Member, Advisory Board of IEEE Transactions on Automation Science and Engineering

Member, Editorial Board of International Journal of Robotics and Computer Integrated Manufacturing

Member, Editorial Board of International Journal of Industrial and Management Optimization

Research Interests

System Integration

Modeling, Planning, Scheduling and Optimization of Complex Industrial Systems

Professional Experiences

1967- Teaching Assistant, lecturer, associate professor, professor, Tsinghua University??Beijing

Education

1962, Bachelor, Department of Electrical Engineering, Tsinghua University

1966, Master, Department of Electrical Engineering, Tsinghua University

Awards & Honors

1991, 1996, 2001, First Prize of 863 National Scheme

1999, Second Prize of Science & Technology Progress Award, Ministry of Education

1997, Award of National Outstanding Teacher

1994, Science & Technology Progress Prize, Ho Leung Ho Lee Foundation

1994, University LEAD Award for CIM excellence by the SME (Society of Manufacturing Engineering) of USA for his achievements on CIMS research and applications

Plenary Lecture 3

Saturday, September 18, (10:45-11:30)

Lecture Theatre

Tong Heng Lee

The National University of Singapore , Singapore

Inventing and Developing an Automated Haematopoietic Stem Cells Harvesting Machine; and other Recent Advances in Intelligent Precision Modeling, Simulation & Control for Life Sciences Developments

Chair: George W. Irwin

Abstract: The human placenta and umbilical cord blood (UCB) provide a rich source of highly-proliferative haematopoietic stem cells (HSCs) for many clinical uses with advantages over traditional sources like the bone marrow and periphery blood. However, the current constraint with this source of HSCs is the inadequate number of HSCs cells which can be harvested in a single collection using current approaches which render a large number of collections unusable on their own, even for paediatric patients. The large reservoir of useful HSCs within the placenta has to be discarded upon the delivery of the placenta out of the maternal body. A novel design, involving mechanical, electronics and control components, seeks to create an artificial uterus force to harvest the HSCs. This paper will present the development of this automated device to enable more effective harvesting of HSCs from placentas, upon the discharge of placentas after deliveries. Comprehensive results, in terms of mononucleated cells (MNCs) count and CD34+ cells count, will be furnished to verify the effectiveness of the developed system, over the other current approaches. (Note: This invention was a winner of the IEEE ICMA 2009 Best Paper in Automation Award. It is patented in U.S.A., Europe, Japan and Singapore. A company, Dynamed Hi-Tech Medical Instruments, has licensed it and will market it in 2010.)

Additionally, the paper will also present recent advances in Intelligent Precision Modeling, Simulation & Control for Life Sciences developments; including recent research and development work in developing portable precision Tissue Micro-Arrayers for Tissue Repositories.

Prof. Tong Heng Lee received the B.A. degree with First Class Honours in the Engineering Tripos from Cambridge University, England, in 1980; and the Ph.D. degree from Yale University in 1987. He is a Professor in the Department of Electrical and Computer Engineering at the National University of Singapore (NUS); and also a Professor in the NUS Graduate School, NUS NGS. He was a Past Vice-President (Research) of NUS.

Dr. Lee's research interests are in the areas of adaptive systems, knowledge-based control, intelligent mechatronics and computational intelligence. He currently holds Associate Editor appointments in the IEEE Transactions in Systems, Man and Cybernetics; IEEE Transactions in Industrial Electronics; Control Engineering Practice (an IFAC journal); and the International Journal of Systems Science (Taylor and Francis, London). In addition, he is the Deputy Editor-in-Chief of IFAC Mechatronics journal.

Dr. Lee was a recipient of the Cambridge University Charles Baker Prize in Engineering; the 2004 ASCC (Melbourne) Best Industrial Control Application Paper Prize; the 2009 IEEE ICMA Best Paper in Automation Prize; and the 2009 ASCC Best Application Paper Prize. He has also co-authored five research monographs (books), and holds four patents (two of which are in the technology area of adaptive systems, and the other two are in the area of intelligent mechatronics). He has published more than 300 international journal papers.

Dr. Lee was an Invited Panelist at the World Automation Congress, WAC2000 Maui U.S.A.; an Invited Keynote Speaker for IEEE International Symposium on Intelligent Control, IEEE ISIC 2003 Houston U.S.A.; an Invited Keynote Speaker for LSMS 2007, Shanghai China; an Invited Expert Panelist for IEEE AIM2009; and an Invited Plenary Speaker for IASTED RTA 2009.

Plenary Lecture 4

Sunday, September 19, (8:00-8:45)

Lecture Theatre

George W. Irwin

Electrical Engineering and Computer Science, Queen's University Belfast, UK

Recent Research on Intelligent Diagnosis of Automotive Faults

Chair: Yugeng Xi

Abstract: Present day China is characterised by unprecedented industrialisation, with over half a billion people now living in urban areas.   Recognising the urgency of tackling the staggering rise in pollutant emissions, the Chinese government is responding vigorously through massive investment in public transportation and other initiatives. However, the continuously growing middle class will inevitably continue to buy cars, adding further to the now commonplace city traffic jams and smog which characterised Western Europe and North America in the mid- 20th century.

   This talk will introduce the regulatory legislation and government targets in Europe and North America around tailpipe emissions. Specifically, the impact on the detection and diagnosis of faults in the engine will be explained. The major part of the presentation will describe some recent research, funded by the UK Engineering and Physical Sciences Research Council, on intelligent engine fault detection using nonlinear multivariable statistical process control. Practical results for a 1.8 litre Nissan gasoline engine will be included.   These illustrate nicely the potential significance of a data-based neural network alternative to the physical modelling currently used by industry.

Professor George W. Irwin leads the Intelligent Systems and Control Research group and is Director of the University Virtual Engineering Centre at Queen University Belfast. He has been elected Fellow of the Royal Academy of Engineering and Member of the Royal Irish Academy and is a Chartered Engineer, an IEEE Fellow, a Fellow of the IEE and a Fellow of the Institute of Measurement and Control. Prof Irwin's research covers identification, monitoring, and control, including neural networks, fuzzy neural systems and multivariate statistics and has published over 350 research papers and 12 edited books. He is currently working on wireless networked control systems, fault diagnosis of internal combustion engines and novel techniques for fast temperature measurement and was Technical Director of Anex6 Ltd, a spin out company from his group specializing in process monitoring. He has been awarded a number of prizes including four IEE Premiums, a Best Paper award from the Czech Academy of Sciences and the 2002 Honeywell International Medal from the Institute of Measurement and Control. International recognitions include Honorary Professor at Harbin Institute of Technology and Shandong University, and Visiting Professor at Shanghai University. George Irwin is a former Editor-in-Chief of the IFAC Journal Control Engineering Practice and past chair of the UK Automatic Control Council. He currently chairs the IFAC Publications Committee and serves on the editorial boards of several journals.

Plenary Lecture 5

Sunday, September 19, (8:45-9:30)

Lecture Theatre

Professor Tom Heskes

Radboud University Nijmegen, Netherland

Bayesian machine learning for brains, genes, and hearing aids

Chair: Yugeng Xi

Abstract: Machine learning is about learning models from data. In so-called Bayesian machine learning we build probabilistic models and use probability calculus, in particular Bayes' rule, to infer the unknown model parameters given the observed data. In my presentation I will show where this leads to by highlighting some of the applications that we work on: brain-computer interfacing (how to control devices by reading out brain activity), functional genomics (how to use functional and structural data to unravel the life cycle of the malaria parasite), and personalization of hearing aids (how to design listening experiments that reveal the preferences of individual users).

Dr Tom Heskes is a Professor in Artificial Intelligence, and he leads the Machine Learning Group, at the Institute for Computing and Information Sciences, Radboud University Nijmegen, the Netherlands. He is further affiliated Principal Investigator at the Donders Centre for Neuroscience.

Prof Heskes' research is on artificial intelligence, in particular (Bayesian) machine learning. He works on Bayesian inference (approximate inference, hierarchical modeling, dynamic Bayesian networks, preference elicitation); machine learning (multi-task learning, bias-variance decompositions); and neural networks (on-line learning, self-organizing maps, time-series prediction). In a nutshell, he and the members of his group use probability calculus and statistics to design and understand "intelligent" systems that can learn from data. He is also involved in several projects that concern applications in, among others, brain-computer interfaces, adaptive personalization of hearing aids, and bioinformatics. Prof Heskes has published over 100 research papers and books in the above area.

Prof Heskes is the Editor-in-Chief of Neurocomputing. He has served in various prestigious committees of over 40 international conferences since 2004 onwards.

Plenary Lecture 6

Sunday, September 19, (9:45-10:30)

Lecture Theatre

Er-Wei Bai

The University of Iowa, USA

Adaptive Bolus Chasing Computed Tomography Angiography

Chair: Sean McLoone

Abstract: This talk focuses on how control, identification and signal processing techniques are used to solve an bio-medical engineering problem. The problem considered is to improve imaging quality and to reduce contrast dose and radiation exposure of a modern CT scanner. To combat mismatch of the bolus peak density and the imaging aperture in a modern CT, an optimal adaptive bolus chasing controller is proposed and experimentally tested. The controller estimates and predicts the unknown two dimensional bolus density on line and then determines the optimal control actions. Tracking errors are mathematically quantified in terms of estimation errors. The test results not only support the analytical analysis and exhibit its superior performance over the current constant velocity controller, but also demonstrate the clinical feasibility

Professor Er-Wei Bai received his PhD degree from the University of California at Berkeley and is Professor of Electrical and Computer Engineering at University of Iowa. Professor Bai is a Fellow of IEEE, and a leading expert on system identification and parameter estimation. Prof Bai has written over 140 journal papers as well as a number of conference papers and book chapters on identification, adaptive systems, signal processing and their applications to medicine and engineering. He has served as an associate editor or editorial board member for a number of journals including IEEE Trans on Automatic Control and Automatica and as a panel member for US National Science Foundation (NSF) and the US National Institute of Health. Prof Bai currently serves on the IFAC technical committee on Modelling, Identification and Signal processing, and IEEE CSS technical committee on System Identification and Adaptive Control. He is a recipient of the President's Award for Teaching Excellence and the (State of Iowa Board of) Regents Award for Faculty Excellence.

Plenary Lecture 7

Sunday, September 19, (10:30-11:15)

Lecture Theatre

Shuzhi Sam Ge

University of Electronic Science and Technology of China,China

Nonlinear Control and Its Applications

Chair: Sean McLoone

Abstract: Many complex systems are usually difficult to model and governed by general (non-affine) nonlinear systems. The well developed control schemes for affine nonlinear systems find of little use. By elegantly utilizing the Mean value and implicit function theorems, the existence of ideal stabilizing control laws are first established for non-affine nonlinear systems. Then, by combining the adaptive control and neural network parametrizition techniques, stable adaptive neural network control is presented rigorously, which demonstrate that intelligent control can do what traditional adaptive control could not, and intelligent control provides the fundamentals for further development of advanced adaptive control for complex industrial systems. Because of the inherent differences of operators, adaptive controls are presented for nonlinear systems in both continuous time and discrete-time.

Finally, a new control design is presented for a class of nonlinear systems in strict feedback form with output constraint, though our newly introduced - Barrier Lyapunov Function - which grows to infinity when its arguments approaches certain limiting values. The key principle is that, by ensuring boundedness of the Barrier Lyapunov Function in the closed loop, we also ensure that the barriers are not transgressed. Asymptotic tracking is achieved without violation of constraint, and all closed loop signals remain bounded, under a mild condition on the initial output.

Professor Shuzhi Sam Ge, IEEE Fellow, IET Fellow, is the founding director of Institute of Intelligent Systems and Information Technology, University of Electronic Science and Technology of China, and the founding Director of Social Robotics Lab of Interactive Digital Media Institute, and Professor of the Department of Electrical and Computer Engineering, the National University of Singapore.

He is the founding Editor-in-Chief, International Journal of Social Robotics, Springer. He has served/been serving as an Associate Editor for a number of flagship journals including IEEE Transactions on Automatic Control, IEEE Transactions on Control Systems Technology, IEEE Transactions on Neural Networks, and Automatica. He also serves as a book Editor of the Taylor & Francis Automation and Control Engineering Series. At IEEE Control Systems Society, he served/serves as Vice President for Technical Activities, 2009-2010, Member of Board of Governors of IEEE Control Systems Society, 2007-2009, and Chair of Technical Committee on Intelligent Control, 2005-2008. He served as the inaugural General Chair of IEEE Multi-conference on Systems and Control, Singapore 2007, and the General Chair of the IEEE International Symposium on Intelligent Control, Taipei, 2004. He was the founding General Chair of IEEE Conference on Robotics, Automation and Mechatronics, & IEEE Conference on Cybernetics and Intelligent Systems, Singapore, 2004.

He was the recipient of inaugural Thousand Talent Scheme (TTS) Professor, China, 2008; Changjiang Guest Professor, Ministry of Education, China, 2008; Outstanding Overseas Young Research Award, National Science Foundation, China, 2004; Inaugural Temasek Young Investigator Award, Defence Science and Technology Agency (DSTA), Singapore, 2002; National Technology Award of the National Science & Technology Board, Singapore,1999. He provides technical consultancy to industrial and government agencies. His current research interests include social robotics, multimedia fusion, adaptive control, intelligent systems and artificial intelligence.

Plenary Lecture 8

Sunday, September 19, (11:15-12:00)

Lecture Theatre

Gordon J. Harris

Director, 3D Imaging Service, and Radiology Computer Aided Diagnostics Laboratory (RAD CADx LAB),
Massachusetts General Hospital
Associate Professor of Radiology, Harvard Medical School

The 3D Imaging Service at Massachusetts General Hospital: 11 Years Experience

Chair: Sean McLoone

Abstract: In 1999, we set out to create a radiology three-dimensional (3D) imaging service at Massachusetts General Hospital (MGH). Our goal was two-fold: first, to integrate 3D image post-processing capabilities, computer-aided diagnosis (CAD), and quantitative analysis into the routine clinical workflow; and second, to create an infrastructure generally more conducive to the transfer of new image-processing technologies from the research realm into clinical use. Initially, we found that although our institution possessed several 3D imaging workstations, they were used only occasionally for research purposes and, when a clinical request for 3D post-processing was made, the staff lacked the expertise and experience to fulfill those requests

Dr. Harris is Director of the 3D Imaging Service, and the Radiology Computer Aided Diagnostics Laboratory (RAD CADx LAB) at the Massachusetts General Hospital, and the Tumor Imaging Metrics Core of the Dana-Farber/Harvard Cancer Center, and Associate Professor of Radiology at Harvard Medical School. Dr. Harris received his Ph.D. from Johns Hopkins Medical Institutions in Radiation Health Sciences and a B.S. in Electrical Engineering from Lafayette College. After graduate school, Dr. Harris spent one post-doctoral year and two years as junior faculty at Johns Hopkins School of Medicine. After four subsequent years as Director of the Neuroimaging Research Laboratory at New England Medical Center, Dr. Harris joined the faculty at MGH in 1997 and began a new 3D Imaging Service for clinically-oriented imaging. His primary research interests include structural and functional brain imaging research in psychiatric and neurologic illnesses including stroke and alcoholism, as well as quantitative tracking of tumors for clinical care and clinical trials. Dr. Harris has published and lectured extensively on medical imaging.

Important Information

Conference

Conference duration: September 17-20, 2010

Venue: Wuxi Picturesque Hotel

Agenda:

September 17, 2010	Registration
September 18-19, 2010	Plenary Lecture
September 18-20, 2010	Academic lectures and discussion
September 20, 2010	Sightseeing

Registration

Registration Time: **September 17, 2010: 8:00 am-22:00 pm**

September 18, 2010: 8:00 am-10:00 am

Registration Desk: **Wuxi Picturesque Hotel**

Contacting the Organizing Committee

Contacting Persons: Shiwei Ma, Li Jia, Xin Li,

Phone: (021)56334241

Fax: (021)56334241

E-mail: secretary@lsms-icsee-2010.org

Address: School of Mechatronical Eng. & Automation, Shanghai University, Shanghai, 200072, P.R.China

Web of LSMS&ICSEE2010

http://www.lsms-icsee-2010.org

Transportation and Hotel Location
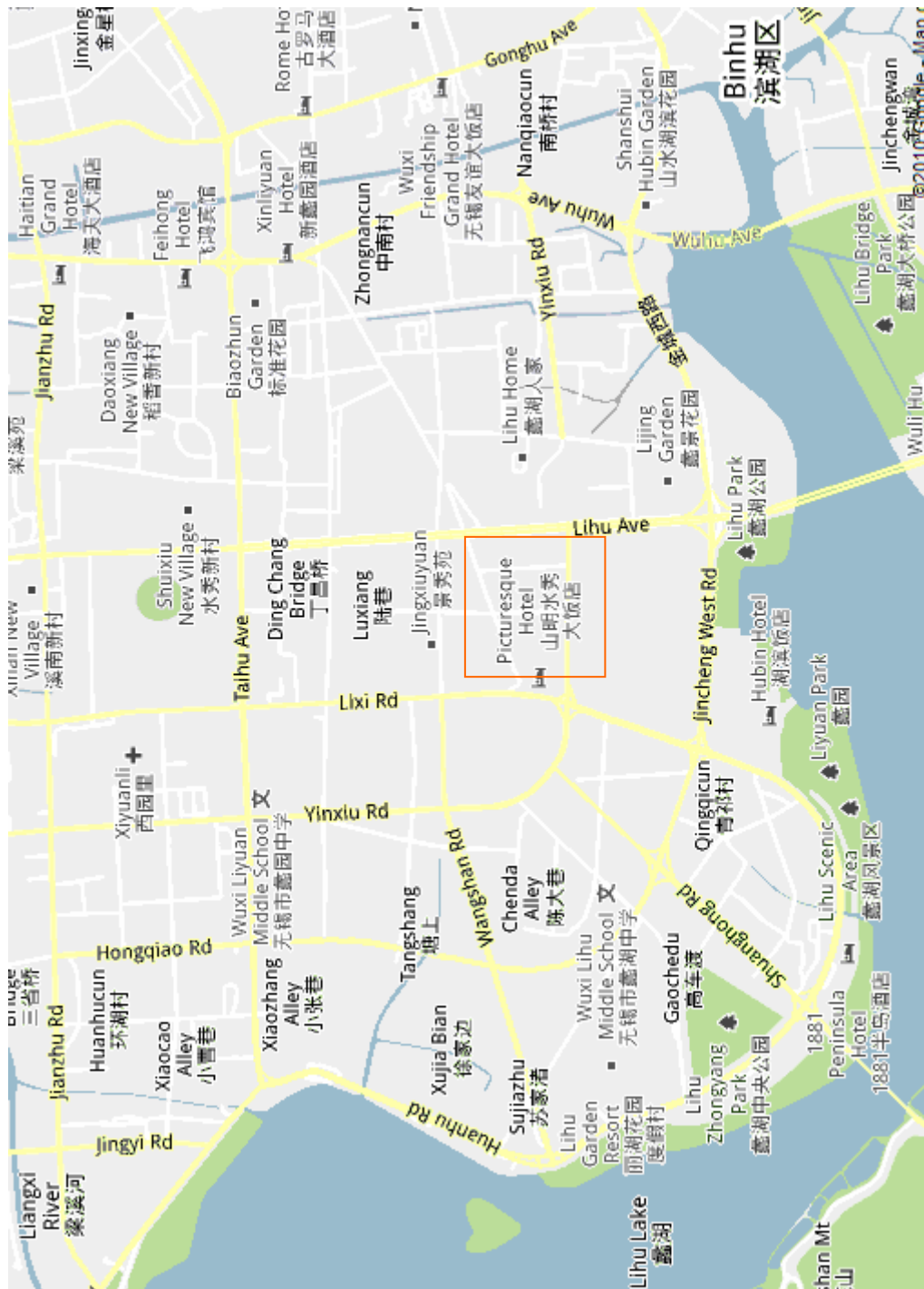
Information for Transportation

● **Wuxi Airport---Railway Station--- Wuxi Picturesque Hotel**

Take airport-bus to railway station and then transfer bus line K20 or K82 to Picturesque station.

● **PuDong International Airport/HongQiao Airport---Wuxi Railway Station—Wuxi Picturesque Hotel**

Take airport bus to Railway Station and then transfer bus line K20 or K82 to Picturesque Hotel.

Address: No. 999, Lixi Road, Wuxi City

Tel.:   0510-88681888 / 0510-85111555

Instruction for Oral

Oral Presentation:

■ Oral Presentation Time: 15minutes;

■ Each speaker is required to meet his/her session chairs in the corresponding session rooms 10 minutes before the session starts and copies the PPT file to the computer;

■ Each session room is equipped with a projector and a PC (with Microsoft Windows and Microsoft PowerPoint). Please make sure that your files are compatible and readable with our operation system by using commonly used fonts and symbols;

Program at a Glance

2010 International Conference on Life System Modeling and Simulation &
2010 International Conference on Intelligent Computing for Sustainable Energy and Environment

Registration	September 18 (Saturday)		September 19 (Sunday)		September 20 (Monday)	
September 17 **8:00 am-22:00 pm**	08:00-08:40 08:40-09:00 09:00-9:45 9:45-10:00 10:00-10:45 10:45-11:30	Opening Ceremony Taking Photo Plenary Lecture 1 Tea Break Plenary Lecture 2 Plenary Lecture 3	8:00-8:45 8:45-9:30 9:30-9:45 9:45-10:30 10:30-11:15 11:15-12:00	Plenary Lecture 4 Plenary Lecture 5 Tea Break Plenary Lecture 6 Plenary Lecture 7 Plenary Lecture 8	08:30-10:10 10:10-10:30 10:30-12:10	Oral Sessions Tea Break Oral Sessions
	12:00-13:30 Lunch		12:10-13:30 Lunch		12:10-13:30 Lunch	
	13:30-15:30 15:30-15:50 15:50-18:10	Oral Sessions Tea Break Oral Sessions	13:30-15:30 15:30-15:50 15:50-18:10	Oral Sessions Tea Break Oral Sessions	13:10-13:30 13:30-18:30	Closing Ceremony Sightseeing
	19:00 Banquet		18:30 Dinner		18:30 Dinner	
			20:00 The Evaluation Committee of the LSMS&ICSEE2010 Best Paper/Presentation Award			

Timetable for LSMS&ICSEE2010 Technical Program（oral session）

September 18, Saturday

Time	Meeting Room A	Meeting Room B	Meeting Room C	Meeting Room D	Meeting Room E	Lecture Theatre
13:30-15:30	**SaA1**	**SaB1**	**SaC1**	**SaD1**	**SaE1**	**SB1 - Science Bridge Workshop**
15:30-15:50 Break						
Time	Meeting Room A	Meeting Room B	Meeting Room C	Meeting Room D	Meeting Room E	Lecture Theatre
15:50-18:10	**SaA2**	**SaB2**	**SaC2**	**SaD2**	**SaE2**	**SB2 - Science Bridge Workshop**

September 19, Sunday

Time	Meeting Room A	Meeting Room B	Meeting Room C	Meeting Room D	Meeting Room E
13:30-15:30	**SuA3**	**SuB3**	**SuC3**	**SuD3**	**SuE3**
15:30-15:50 Break					
Time	Meeting Room A	Meeting Room B	Meeting Room C	Meeting Room D	Meeting Room E
15:50-18:10	**SuA4**	**SuB4**	**SuC4**	**SuD4**	**SuE4**

September 20, Monday

Time	Meeting Room A	Meeting Room B	Meeting Room C	Meeting Room D	Meeting Room E
08:30-10:10	**MoA5**	**MoB5**	**MoC5**	**MoD5**	**MoE5**
10:10-10:30 Break					
Time	Meeting Room A	Meeting Room B	Meeting Room C	Meeting Room D	Meeting Room E
10:30-12:10	**MoA6**	**MoB6**	**MoC6**	**MoD6**	**MoE6**

Rules for the Best Paper Award and Best Presentation Award

The candidates of the LSMS&ICSEE2010 Best paper Award and Best Presentation Award are all authors of the papers that have been accepted and given oral presentation at LSMS &ICSEE2010 and the contents have not been published elsewhere before.

The Evaluation Committee of the LSMS&ICSEE2010 Best Paper Award and Best Presentation Award are organized by the LSMS&ICSEE via inviting outstanding scholars. The evaluating criteria consist of academic level and quality of presentation.

The LSMS&ICSEE2010 holds the authority to explain the rules of this Award.

Technical Program

September 18, 2010 Saturday

Lecture Theatre

SB1-Science Bridge Workshop   13:30-15:10
Lecture Theatre
Invited session:
Intelligent modeling, monitoring, and control of complex nonlinear systems
Chair(s):   Trevor Newsom

SB1-1
Stabilization of a Class of Networked Control Systems with Random packet loss
Minrui Fei1, Weihua Deng1, Kang Li2 and Yang Song1
1 School of Mechatronical Engineering and Automation, Shanghai University, Shanghai, China
2 School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, United Kingdom

SB1-2
Stability Analysis of Multi-Channel MIMO Networked Control Systems
Dajun Du1, Minrui Fei1, and Kang Li2
1 School of Mechatronical Engineering and Automation, Shanghai University, Shanghai, , China
2 School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, United Kingdom

SB1-3
A Collision Detection System for an Assistive Robotic Manipulator
Weidong Chen1,2, Yixiang Sun1,2, Yuntian Huang1,2
1.Department of Automation, Shanghai Jiao Tong University, Shanghai, China
2.State Key Laboratory of Robotics and System (HIT), Harbin, China

SB1-4
A Novel Localization System Based on Infrared Vision for Outdoor Mobile Robot
Jingchuan Wang1,1, Weidong Chen1,2
1.Department of Automation, Shanghai Jiao Tong University, Shanghai 200240, China
2.State Key Laboratory of Robotics and System (HIT), Harbin 150001, China

SB1-5
An efficient algorithm for grid-based robotic path planning based on priority sorting of direction vectors
Aolei Yang, Qun Niu, Wanqing Zhao, Kang Li, and George W. Irwin
Intelligent Systems and Control, School of Electronics, Electrical Engineering and Computer Science, Queen's University of Belfast, UK

SB1-6
An Automatic Collision Avoidance Strategy for Unmanned Surface Vehicles
Wasif Naeem1 and George W Irwin1
1.   School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, UK

SB1-7
Adaptive Visual Servoing with Imperfect Camera and Robot Parameters
Hesheng Wang1,2, Maokui Jiang1,2, Weidong Chen1,2 Yun-hui Liu3
1.Department of Automation, Shanghai Jiao Tong University, Shanghai, China
2.State Key Laboratory of Robotics and System (HIT), Harbin, China
3.Department of Mechanical and Automation, Chinese University of Hong Kong, Hong Kong,China

SB2-Science Bridge Workshop   15:30-18:10
Lecture Theatre
Invited session:
Intelligent modeling, monitoring, and control of complex nonlinear systems
Chair(s):   George Irwin

SB2-1
A Frequency Domain Approach to PID Controllers Design in Boiler-turbine Units
Hui Pan1, Minrui Fei 1, Ling Wang 1, Kang Li2
1. Shanghai Key Laboratory of Power Station Automation Technology, Shanghai University,   China
2. School of Electronics, Electrical Engineering and Computer Science, Queen's University Belfast, United Kingdom

SB2-2
Speed Control for a Permanent Magnet Synchronous Motor with an Adaptive Self-tuning Uncertainties Observer
Da Lu1, Kang Li1, and Guangzhou Zhao2
1.School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, Belfast, BT9 5AH, UK
2.College of Electrical Engineering,Zhejiang University, Hangzhou, China

SB2-3
Modelling the Effects of Operating Conditions on Motor Power Consumption in Single Screw Extrusion
Chamil Abeykoon1,?, Marion McAfee2, Kang Li3, Peter J. Martin1, Jing Deng3, and Adrian L. Kelly4
1.School of Mechanical and Aerospace Engineering, Queen's University Belfast,UK
2.Department of Mechanical and Electronic Engineering, Institute of Technology
Sligo, Sligo, Ireland
3.School of Electronics, Electrical Engineering and Computer Science, Queen's University Belfast, UK
4.IRC in Polymer Science and Technology, School of Engineering, Design and Technology, University of Bradford, UK.

SB2-4

Fast Forward RBF Network Construction Based on Particle Swarm Optimization

Jing Deng1, Kang Li1, George W. Irwin1, and Minrui Fei2

1 School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, UK

2 Shanghai Key Laboratory of Power Station Automation Technology,School of Mechatronical Engineering and Automation,Shanghai University, Shanghai, China

SB2-5

MMSVC: An Efficient Unsupervised Learning Approach for Large-scale Datasets

Hong Gu1, Guangzhou Zhao1 and Jianliang Zhang1

1.College of Electric Engineering, Zhejiang University, Hangzhou, China

SB2-6

Identification of Chiller Model in HVAC System Using Fuzzy Inference Rules with Zadeh's Implication Operator

Yukui Zhang1, Shiji Song1, Cheng Wu1, Kang Li2

1 Department of Automation, Tsinghua University, Beijing

2 School of Electronics, Electrical Engineering and Computer Science, Queen's University, UK

SB2-7

Fuzzy Chance Constrained Support Vector Machine

Hao Zhang1 , Kang Li2, Cheng Wu1

1 Department of Automation, Tsinghua University, Beijing, China

2Queen's University Belfast, UK

RoomA

SaA1   13:30-15:10
RoomA
Topic:
Intelligent modeling, monitoring, and control of complex nonlinear systems

Chair(s):   Lin-du Zhao, Li Jia

SaA1-1

An Improved Pyramid Matching Kernel

Jun Zhang1, Guangzhou Zhao1 and Hong Gu1

1 College of Electric Engineering, Zhejiang University, Hangzhou, China

SaA1-2

Improved Nonlinear PCA Based on RBF Networks and Principal Curves

Xueqin Liu1, Kang Li1, Marion McAfee2, and Jing Deng1

1 School of Electronics, Electrical Engineering and Computer Science, Queen's University

2 Department of Mechanical and Electronic Engineering, Institute of Technology Sligo, Sligo,Ireland.

SaA1-3

Application of Partical Swarm Optimization Algorithm in Field Holo-balancing

Guangrui Wen1, 2, Xining Zhang1, Ming Zhao1

1 Research Institute of Diagnostics & Cybernetics, Xi'an Jiaotong UniversityChina

2 Xi'an Shaangu Power Co., Ltd, Xi'an, Shaanxi, China

SaA1-4

Analyzing Deformation of Supply Chain Resilient System Based on Cell Resilience Model

Yong-hong Li Lin-du Zhao1

Institute of Systems Engineering, Southeast University, P.R. China

SaA1-5

Multi-objective Particle Swarm Optimization Control Technology and Its Application in Batch Processes

Li JIA1，Dashuai CHENG 1，Luming Cao 1, Zongjun Cai 1, Min-Sen CHIU 2

1 Shanghai Key Laboratory of Power Station Automation Technology, Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University, China

2 Faculty of Engineering, National University of Singapore, Singapore

SaA1-6

Online monitoring of catalyst activity for synthesis of bisphenol A

Cheng Liangcheng1 , Li Yaqin1, Yang Huizhong1, Nam Sun Wang2

1 Institute of Measurement and Process Control, Jiangnan University,Wuxi, Jiangsu, P.R. China

2 Department of Chemical & Biomolecular, University of Maryland, US

SaA2   15:30-18:10
RoomA
Topic:
Intelligent modeling, monitoring, and control of complex nonlinear systems

Chair(s):   Min-Sen Chiu, Jingping Jiang

SaA2-1

Synthesis of PI–type Congestion Controller for AQM Router in TCP/AQM Network

Junsong Wang and Ruixi Yuan

Tsinghua University, Hai-dian District,Beinjing, China

SaA2-2

A state identification method of Networked Control Systems

Xiao-ming YU 1, Jing-ping JIANG1

1 College of Electrical Engineering, Zhejiang University, Hangzhou, China

SaA2-3

Stabilization Criterion Based on New Lyapunov Functional Candidate for Networked Control Systems

Qigong CHEN1, Lisheng WEI1, 2, Ming JIANG1 and Minrui FEI2

1 School of Electrical Engineering, Anhui Polytechnic University, Wuhu City, Anhui Province, P.R.China

2 Shanghai Key Laboratory of Power Station Automation Technology

School of Mechatronics and Automation, Shanghai UniversityShanghai City, P.R.China

SaA2-4

Development of Constant Current Source for SMA Wires Driver Based on OPA549

Yong Shao, Enyu Jiang, Quanzhen Huang, Xiangqiang Zeng

Department of Automation, School of Mechatronics

Engineering & Automation, Shanghai University; Shanghai

Key Laboratory of Power Station Automation Technology, Shanghai, P. R. China

SaA2-5

High Impedance Fault Location in Transmission Line using Nonlinear Frequency Analysis

Min-you Chen1 , Jin-qian Zhai1, Zi-qiang Lang2*, Ju-cheng Liao3, Zhao-yong Fan3

1 State Key Laboratory of Power Transmission Equipment & System Security and New Technology, Chongqing University, Chongqing, China

2 Department of Automatic Control and Systems Engineering, University of Sheffield, Mappin Street, UK

3 Chongqing Electric Power Company

SaA2-6

Batch-to-Batch Iterative Optimal Control of Batch Processes Based on Dynamic Quadratic Criterion

JIA Li1，SHI Jiping 1，Cheng Dashuai 1，Cao Luming 1，CHIU Min-Sen2

1 Shanghai Key Laboratory of Power Station Automation Technology, Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University,China;

2 Faculty of Engineering, National University of Singapore, Singapore

SaA2-7

Management Information System (MIS) for Planning and Implementation Assessment (PIA) in Lake Dianchi

Longhao YE1, Yajuan YU1*, Huaicheng GUO2, Shuxia YU3

(1.Beijing Key Laboratory of Environmental Science and Engineering, School of Chemical Engineering & Environment, Beijing Institute of Technology, Beijing, China;

2.College of Environmental Sciences and Engineering, Peking University, Beijing, China;

3.College of Resource and Environment, Huazhong Agricultural University, Wuhan,

China

SaA2-8

Integration Infrastructure in Wireless/Wired Heterogeneous Industrial Network System

Haikuan Wang 1 Weiyan Hou 2,1+ Zhaohui Qin 2 Yang Song1

1, School of Mechatronics and Automation, University Shanghai,China

2, School of Information Engineering, University Zhengzhou,China

ROOM B

Chair(s):   An Zhang, Jianguo Wang

SaB1-1

A Novel Ant Colony Optimization Algorithm in Application of Pheromone Diffusion

Peng Zhu1, Ming-sheng Zhao2, Tian-chi He3

1 Department of Information Management, Nanjing University, Nanjing, China

2 Nanjing Forest Police College, Nanjing, China

3 Nanjing University of Financial and Economics, Nanjing, China

SaB1-2

Research on Situation Assessment of UCAV Based on Dynamic Bayesian Networks in Complex Environment

Lu Cao, An Zhang, Qiang Wang

Department of Electronic and Information, Northwestern Ploytechnical University, China

SaB1-3

Quantum Genetic Algorithm for Hybrid Flow Shop Scheduling Problems to Minimize Total Completion Time

Qun Niu, Fang zhou, Taijin Zhou

Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronic Engineering and Automation, Shanghai University, Shanghai, China

SaB1-4

Re-Diversified Particle Swarm Optimization

Jie Qi, Shunan Pang

College of Information Science and Techenology, Donghua University, Shanghai, China

SaB1-5

Optimal tracking performance for unstable processes with NMP zeroes

Jianguo Wang1,1,2, Shiwei Ma1,2, Xiaowei Gou1,2, Ling Wang1,2, Li Jia1,2

1.Shanghai Key Lab of Power Station Automation Technology,Shanghai, China

2.School of Mechatronical Engineering and Automation, Shanghai University,China

SaB1-6

Effect of the twirling frequency on firing patterns evoked by acupuncture

Yu-Liang Liu1,2*，Jiang Wang1, Wen-Jie Si1, Bin Deng1, Xi-Le Wei

1. School of Electrical Engineering and Automation, Tianjin University, Tianjin,China

2. School of Automation and Electrical Engineering, Tianjin University of Technology and Education, Tianjin,China

Chair(s): Jingqi Fu, Zhiqiang Geng

SaB2-1

Typhoon Cloud Image Enhancement by Differential Evolution Algorithm and Arc-Tangent Transformation

Bo Yang1, Changjiang Zhang*1, 2

1.College of Mathematics, Physics and Information Engineering, Zhejiang Normal University, China

2.State Key Laboratory of Remote Sensing Science,

Jointly Sponsored by the Institute of Re moe Sensing Applications of Chinese Academy of Sciences and Beijing Normal University,China

SaB2-2

Data fusion-based extraction method of energy consumption index for the ethylene industry

Zhiqiang Geng , Yongming Han, Yuanyuan Zhang, Xiaoyun Shi

1School of Information Science and Technology，Beijing University of Chemical Technology,China

SaB2-3

Research on improved QPSO algorithm based on cooperative evolution with two populations∗

Longhan Cao 1, 2, Shentao Wang 1, Xiaoli Liu 1, Rui Dai 1, Mingliang Wu 1

1.Key Laboratory of Control Engineering, Chongqing Institute of Communication,Chongqing, China

2.Key Laboratory of Manufacture and Test Techniques for Automobile Parts(Chongqing University of Technology), Ministry of Education, Chongqing, China

SaB2-4

Optimum Distribution of Resources based on Particle Swarm Optimization and Complex Network Theory1

Li-lan Liu, Zhi-song Shu, Xue-hua Sun, Tao Yu

Shanghai Enhanced Laboratory of Manufacturing Automation And Robotics, Shanghai University, Shanghai, China

SaB2-5

The Model of Rainfall Forecasting by Support Vector Regression Based on Particle Swarm Optimization Algorithms

Shian Zhao1 and Lingzhi Wang2

1.Department of Mathematics and Computer Science, Baise University,Guangxi,China

2.Department of Mathematics and Computer Science, Liuz

SaB2-6

Constraint Multi-objective Automated Synthesis for CMOS Operational Amplifier

Jili Tao, Xiaoming Chen, Yong Zhu

Ningbo Institute of Technology, Zhejiang University, Ningbo Zhejiang, China

SaB2-7

Research on APIT and Monte Carlo Method of Localization Algorithm for Wireless Sensor Networks

Wang Jia1, Fu Jingqi2

College of Mechanical and Electrical Engineering and Automation, Shanghai University,China

SaB2 -8

Quantum Immune Algorithm and Its Application in Collision Detection

Jue Wu 1,2, LingXi Peng 3,4,*, LiXue Chen 1, Lei Yang 2

1.College of Computer Science and Technology, SouthWest Petroleum University, Chengdu, Sichuan, China;

2.College of Computer science and technology, SouthWest University of Science and Technology, MianYang, SiChuan, China;

3.College of Computer science and education software, Guangzhou University, Guangzhou, Guangdong, China

4.Network and Data Security Key Laboratory of Sichuan

Province，China

ROOM C

Chair(s): Ling Xia , Weiming Zhai

SaC1-1

The Time-frequency Analysis of Abnormal ECG Signals

Lantian Song1 , Fengqin Yu1

1Jiangnan University, School of Communication and Control Engineering, Wuxi, China

SaC1-2

CUDA Based High Performance Adaptive 3DVoxel Growing for Lung CT Segmentation

Weiming Zhai, Fan Yang, Yixu Song, Yannan Zhao, and Hong Wang

1.State Key Laboratory of Intelligent Technology and Systems Computer Science and Arti‾cial Intelligence Research Devision Tsinghua National Laboratory for Information Science and Technology Department of Computer Science and Technology Tsinghua University, Beijing, China

SaC1-3

Wavelet Packet-based Feature Extraction for Brain-Computer Interfaces

Yang Banghua1, 2，Liu Li1，Zan Peng1，Lu Wenyu1

1.Shanghai Key Laboratory of Power Station Automation Technology; Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University,Shanghai, China

2.State Key Laboratory of Robotics and System (HIT), Harbin, China

SaC1-4

Research of Acupuncturing Based on Hilbert-Huang Transform

Xiaoxia LI1, Xiumei GUO2 ,Guizhi XU1, Xiukui Shang3

1.Province-Ministry Joint Key Laboratory of Electromagnetic Field and Electrical Apparatus Reliability, Hebei University of Technology, Tianjin, China

2.Hebei Normal University of Science and Technology,Qinhuangdao,China

3.Department of Acupuncture, Tianjin University of Traditional Chinese Medicine, Tianjin, China

SaC1-5

Total Variation Regularization in Electrocardiographic Mapping

Guofa Shou1, Ling Xia1 and Mingfeng Jiang2

1.Department of Biomedical Engineering, Zhejiang University, Hangzhou, P.R. China

2.The College of Electronics and Informatics, Zhejiang Sci-Tech University, Hangzhou, P.R. China

SaC1-6

Analytical solution for the forward problem of magnetic induction tomography with multi-layer

sphere model
Zheng Xu, Qian Li, Wei He
State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of the Electrical Engineering, Chongqing University, Chongqing, People's Republic of China

SaC2   **15:30-18:10**
RoomC
Topic:
Biomedical signal processing, speech, imaging and visualization-2
Chair(s):   Gang Li, Jinwu Qian

SaC2-1
Dynamic Spectrum and BP Neural Network for Noninvasive Hemoglobin Measurement
Huiquan Wang, Gang Li, Zhe Zhao, Ling Lin
State Key Laboratory of Precision Measurement Technology and Instruments, Tianjin University, Tianjin, China
SaC2-2
Study on Real-time control of exoskeleton knee using electromyographic signal
Jiaxin Jiang, Zhen Zhang, Zhen Wang, Jinwu Qian
School of Mechatronics Engineering and Automation, Shanghai University, Shanghai, P.R.China
SaC2-3
Characterization of cerebral infarction in multiple channel EEG recordings based on quantifications of timefrequency representation
Li Zhang, Chuanhong He, Wei He
State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of Electrical Engineering, Chongqing University, Chongqing, China
SaC2-4
Research on a Novel Medical Image Non-rigid Registration Method Based on Improved SIFT Algorithm
Anna Wang1, Dan Lv1, Zhe Wang1, Shiyao Li1
1.College of Information Science and Engineering, Northeastern University, Shenyang, China
SaC2-5
Automatic and Reliable Extraction of Dendrite Backbone from Optical Microscopy images
Liang Xiao 1, 2, Xiaosong Yuan2, Zack Galbreath2, Badrinath Roysam2
1.School of Computer Science and Technology, Nanjing University of Science and Technology，Nanjing, P.R.China.
2.Department of Electrical, Computer, & Systems Engineering, Rensselaer Polytechnic Institute, Troy, NY ,USA
SaC2-6
Magnetic induction tomography: simulation study on the forward problem
Wei He, Xiaodong Song, Zheng Xu, Haijun Luo
State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of the Electrical Engineering, Chongqing University, Chongqing,

People's Republic of China
SaC2-7
Diagnosis of Liver Diseases from P31 MRS Data Based on Feature Selection Using Genetic Algorithm
Jinyong Cheng1 Yihui Liu1, Jun Sang1 , Qiang Liu2, Shaoqing Wang2
1.School of Computer Science and Information Technology, Shandong Institute of Light Industry, Jinan, Shandong, China,
2.Department of Magnetic Resonance Imaging, Shandong Medical Imaging Research Institute Jinan, Shandong, China

ROOM D

SaD1   **13:30-15:10**
RoomD
Topic:
Intelligent modeling, monitoring, and control of complex nonlinear systems-1
Chair(s): Xiaojin Zhu, Cheol-Hong Moon

SaD1-1
Research on Steam Generator Water Level Control System Based on Nuclear Power Plant Simulator
Jianghua Guo1
1.School of Power and Mechanical Engineering, Wuhan University Wuhan, Hubei, China
SaD1-2
Stabilization for Networked Control Systems with Packet Dropout Based on Average Dwell Time Method
Xie Jinxia1, Song Yang1,2, Xiaomin Tu1, Fei Minrui1,2
1.School of Mechatronics Engineering and Automation, Shanghai University, Shanghai,China
2.Shanghai Key Laboratory of Power Station Automation Technology, Shanghai, China
SaD1-3
Modeling of Real-time Double Loops System in Predicting Sintering's BTP
Cheng Wushan1
1. Shanghai University of Engineering Science
SaD1-4
An Orthogonal Curvature Fiber Bragg Grating Sensor Array for Shape Reconstruction
Jincong Yi, Xiaojin Zhu, Linyong Shen,Bing Sun,Lina Jiang
1.School of Mechatronics Engineering and Automation, Shanghai University, China
2.College of Computer and Information Science, Fujian Agriculture and Forestry University,China
SaD1-5
Implementation of the PCB Pattern Matching System to detect Defects
Cheol-Hong Moon1, Hyun-Chul Jang1, and Jin-Kook Jun1
1.Gwangju University, OKins Electronics Co., Korea
SaD1-6
A New Technique of Camera Calibration Based on X-target
Ruilin Bai1, Jingjing Zhao 1, Du Li 1, Wei Meng1

1.Research Institute of Intelligent Control, Jiangnan University, China

SaD1-7

Application Research of the Wavelet Analysis in Ship Pipeline Leakage Detecting

Zhongbo Peng1, Xin Xie, Xuefeng Han, Xiaobiao Fan

1.College of Maritime, Chongqing Jiaotong Univercity, Chongqing China

SaD1-8

Analysis and Implementation of FULMS Algorithm Based Active Vibration Control System

Zhiyuan Gao1, Xiaojin Zhu1, Quanzhen Huang1, Enyu Jiang1, Miao Zhao1

1.School of Mechatronics Engineering and Automation, Shanghai University Shanghai, China Chongqing China

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SaD2   15:30-18:10
RoomD
Topic:
1.Intelligent modeling, monitoring, and control of complex nonlinear systems-2
2.Modeling and simulation of societies and collective behaviour
3.Advanced theory and methodology in fuzzy systems and soft computing

Chair(s):   Xiangpei Hu, Tongtao Li

SaD2-1

Performance analysis of industrial wireless networks based on IEEE 802.15.4a

Tongtao Li1 , Minrui Fei1,*, Huosheng Hu2

1. Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics Engineering and Automation, Shanghai University, Shanghai, China

2. School of Computer Science & Electronic Engineering University of Essex,   United Kingdom

SaD2-2

A Hybrid Ant Colony Optimization and Its Application to Vehicle Routing Problem with Time Windows

Xiangpei Hu1, Qiulei Ding1, Yunzeng Wang2

1.Institute of Systems Engineering, Dalian University of Technology, China

2 A. Gary Anderson Graduate School of Management, University of California, USA

SaD2-3

Modeling and Simulation of a Yacht Propulsion System

Yihuai HU1, Xiaoming WANG1, Huawu ZHANG1

1. Department of marine engineering，Shanghai Maritime University,Shanghai, China

SaD2-4

Two-Phase Clock Auction Design

Lanbo Miao1, 2, Jiafu Tang1

1.Dept of Systems Engineering, College of Information Science & Engineering, Northeastern University, Shenyang, China

2.China United Network communications Corpration Liaoning Branch, Shenyang, China

SaD2-5

Research on Simulation of Multi-agents Competition Model with Negotiation

Liqiao Wu1, Chunyan Yu1, Hongshu Wang1,

1.College of Mathematic and Computer Science, Fuzhou University Fuzhou, Fujian, China

SaD2-6

Synchronization of Ghostburster neurons under external electrical stimulation: an adaptive approach

Wei Wei 1, Dong Hai Li 2, Jing Wang 3, Min Zhu 4

1. School of Computer and Information Engineering, Beijing Technology and Business University, Beijing, P. R. China

2. State Key Lab of Power Systems, Department of Thermal Engineering, Tsinghua University, Beijing, China

3. Institute of Engineering Research, University of Science and Technology Beijing, Beijing, China

4.Department of Thermal Engineering, Tsinghua University, Beijing, China

ROOM E

SaE1   13:30-15:10
RoomE
Topic:
1.   Innovative education in systems modeling and simulation-1
2.   Intelligent methods in developing vehicles, engines and equipments

Chair(s):   Wenshan Wang, Li Xie

SaE1-1

Interactive Identification Method forBox-Jenkins Models

Li Xie, Huizhong Yang, and Feng Ding

Control Science and Engineering Research Center, Jiangnan University, China

SaE1-2

Research on Nano-Repositioning of Atomic Force Microscopy based on Nano-manipulation

Sunxin1 Jinxiaoping1

1. School of Mechatronics Engineering and Automation, Shanghai University, China

SaE1-3

Research on Expression Method of a Unified Constraint Multi-domain Model for Complex Products

Chen Guojin1, Su Shaohui1, Gong Youping1, Zhu Miaofen1

Hangzhou Dianzi University, Hangzhou, China

SaE1-4

Auto-Creation and Navigation of the Multi-area Topological Map for 3D Large-scale Environment

Wenshan Wang, Qixin Cao, Chengcheng Deng and Zhong Liu

Research institute of Robotics, Shanghai JiaoTong Universcity, No. 800, Rd. Dongchuan Shanghai, China,

The State key Laboratory of Mechanical System and Vibration, Shanghai Jiao Tong University

SaE1-5

Research on Fire-Engine Pressure Balance Control System Based Upon Neural Networks

Xu Xiao-guang1，Shen Hong-da1
1. Department of Electrical Engineering, Anhui Polytechnic University, China

SaE1-6

The Summary of Reconstruction method for Energy conservation and emission reduction of furnace

Wangxiaoxiao1 , Sunxin2
1. School of Mechatronics Engineering and Automation, Shanghai University, Shanghai, China
2. Shanghai University, Shanghai, China

SaE1-7

Osmotic Energy Conversion Techniques from Seawater

Yihuai HU 1, Juan JI 2
1. Shanghai Maritime University, Shanghai, China
2. Qingdao Harbor Vocational and Technical College, Qingdao, P. R. China

SaE2   15:30-18:10
RoomE
Topic:
1.   **Fuzzy, neural, and fuzzy-neuro hybrids**
2.   **Computational methods and intelligence in modeling genetic and biochemical networks and regulation**

Chair(s): Yongsheng Ding, Xin Wang

SaE2-1

Vibration Monitoring of Auxiliaries in Power Plants Based on AR (P) Model Using Wireless Sensor Networks

Tongying Li1 , Minrui Fei1,
1. School of Mechatronical Engineering & Automation, Shanghai University, Shanghai China

SaE2-2

Performance Prediction for a Centrifugal Pump with splitter blades Based on BP Artificial Neural Network

Zhang Jinfeng1, Yuan Shouqi1, Shen Yanning1, Zhang Weijie1
1. Research Center of Fluid Machinery Engineering and Technology Jiangsu University, Zhenjiang,China

SaE2-3

Short-Term Traffic Flow Prediction Based on Interval Type-2 Fuzzy Neural Networks

Liang Zhao 1
1.College of Electrical Engineering, Henan University of Technology, Zhengzhou 450007, China

SaE2-4

Neural Network and Sliding Mode Control Combining Based Reconfigurable Control

Gongcai Xin1, Zhengzai Qian1, Weilun Chen1, Qiankun1, Lili1
1.Department of Aerial Instrument and Electric Engineering,   The First Aeronautical Institute of Air Force, China

SaE2-5

Study on Membrane Protein Interaction Networks byConstructing Gene Regulatory Network Model

Yong-Sheng Ding1,2*, Yi-Zhen Shen1, Li-Jun Cheng1, Jing-Jing Xu1
1.College of Information Sciences and Technology
2.Engineering Research Center of Digitized Textile & Fashion Technology, Ministry of Education Donghua University, Shanghai,China

SaE2-6

Impedance Measurement Method Based on DFT

Xin Wang1
1. Institute of Measurement and Process Control, Jiangnan University, China

SaE2-7

A 3D-shape Reconstruction Method Based On Coded Structured Light and Projected Ray Intersecting Location

Hui Chen1, Shiwei Ma*1, Bo Sun1, Zhonghua Hao1, Liusun Fu1
1.School of Mechatronic Engineering & Automation, Shanghai University, Shanghai Key Laboratory of Power Station Automation Technology, China

SaE2-8

An Algorithm of Sphere-structure Support Vector Machine Multi-classification Recognition on the Basis of Weighted Relative Distances

Shiwei Yun1,Yunxing Shu1, Bo Ge1
1.Luoyang Institute of Science and Technology Henan, Luoyang, China

September 19, 2010 Sunday

RoomA

SuA3   **13:30-15:30**
RoomA
Topic:
1. **Intelligent modeling, monitoring, and control of complex nonlinear systems**
2. **Autonomy-oriented computing and intelligent agents**

Chair(s):   Guangzhou Zhao, Ma Shiwei

SuA3-1

Multi-Innovation Generalized Extended Stochastic Gradient Algorithm for Multi-Input Multi-Output Nonlinear Box-Jenkins Systems Based on The Auxiliary Model

Jing Chen1 and Xiuping Wang2
1 Control Science and Engineering Research Center, Jiangnan University,
Wuxi, PR China
2 Wuxi Professional College of Science and Technology, Wuxi, PR China

SuA3-2

Research of Parallel-Type Double Inverted Pendulum Model Based on Lagrange Equation and LQR Controller

Jian Fan1,2, Xihong Wang1, Minrui Fei1
1 Shanghai Key Laboratory of Power Station Automation Technology,
Shanghai University, Shanghai, P.R. China
2 School of Information Science and Technology, JiuJiang University,Jiangxi Province, P.R. China

SuA3-3

A consensus protocol for multi-agent systems with double integrator model

Fang Wang, Lixin Gao, Yanping Luo
Institute of Operations Research and Control Sciences, Wenzhou University, Zhejiang, China

SuA3-4

A Production-Collaboration Model for Manufacturing Grid

Li-lan Liu, Xue-hua Sun, Zhi-song Shu, Shuai Tian, Tao Yu
Shanghai Enhanced Laboratory of Manufacturing Automation And Robotics, Shanghai University, Shanghai,China

SuA3-5

Parallel Computation for Stereovision Obstacle Detection of Autonomous Vehicles Using GPU

Zhi-yu XU1, Jie ZHANG1
1 School of Electronics and Information Engineering, Tongji University, Shanghai, China

SuA3-6

Framework Designing of BOA for the Development of Enterprise Management Information System

Ma Shiwei1*, Kong Zhaowen1, Jiang Xuelin1, Liang Chaozu1,
1 School of Mechatronic Engineering & Automation, Shanghai Key Laboratory of Power Station Automation Technology, Shanghai University, China

SuA3-7

Training Support Vector Data Descriptors Using Converging Linear Particle Swarm Optimization

Hongbo Wang, Guangzhou Zhao, Nan Li
College of Electrical Engineering, University of Zhejiang, Hangzhou, Zhejiang Province, China
2 Department of Automatic Control and Systems Engineering, University of Sheffield, UK
3 Chongqing Electric Power Company

SuA3-8

Research on Modeling and Simulation of an Adaptive Combat Agent Infrastructure for Network Centric Warfare

Yaozhong Zhang, An Zhang, Qingjun Xia, Fengjuan Guo
Department of Electronic and Information, Northwestern Ploytechnical University,Xi'an, China

SuA3-9

Genetic Algorithm-based Support Vector Classification method for Multi-spectral Remote Sensing Image

Yi-nan Guo, Da-wei Xiao, Mei Yang
1 School of Information and Electrical Engineering, China University of Mining and Technology, Xuzhou, Jiangsu P. R. China

SuA3-10

Grids-based Data Parallel Computing for Learning Optimization in a Networked Learning Control Systems

Lijun Xu*, Minrui Fei1,†, T C Yang2 , Wei Yu3
1 Shanghai Key Laboratory of Power Station Automation Technology,
Shanghai University, Shanghai, China
2 University of Sussex, UK
3 CSK Systems(Shanghai) Co., LTD, Shanghai, China

SuA4   **15:50-18:10**
RoomA
Topic:
1. **Autonomy-oriented computing and intelligent agents**
2. **Advanced theory and methodology in fuzzy systems and soft computing**

Chair(s):   Dajun Du, Xianxia Zhang

SuA4-1

A New Distributed Intrusion Detection Method Based on Immune Mobile Agent

Yongzhong Li1, Chunwei Jing1, Jing Xu2
1 School of Computer Science and Engineering, Jiangsu University of Science and Technology Zhenjiang ,China
2 College of Information Engineering,Yancheng Institute of technology,Yancheng, China

SuA4-2

Single-Machine Scheduling Problems with Two Agents Competing for Makespan

Guosheng Ding1;2 and Shijie Sun1
1 Department of Mathematics, Shanghai University, Shanghai, China
2 School of Science, Nantong University, Nantong, China

SuA4-3

Multi-Agent Asynchronous Negotiation based on Time-Delay

LiangGui Tang1, Bo An2
1 College of Computer Science and Information Engineering, Chongqing Technology and
Business University, Chongqing, P.R. China,
2 Dept. of Computer Science, University of Massachusetts, Amherst, USA, MA 01003

SuA4-4

An incremental manifold learning algorithm based on the small world model

Lukui Shi1, Qingxin Yang2, Enhai Liu1, Jianwei Li1, Yongfeng Dong1
1 School of Computer Science and Engineering, Hebei University of Technology, Tianjin, China
2 School of Electrical Engineering and Automation, Tianjin Polytechnic University, Tianjin, China

SuA4-5

An Automatic Thresholding for Crack Segmentation Based on Convex Residual

Chunhua Guo, Tongqing Wang
The Key Laboratory of Optoelectronic Technology & Systems of the Ministry of Education,
Chong Qing University, Chong Qing, China

SuA4-6

A Combined Iteration Method for Probabilistic Load Flow Calculation Applied to Grid-connected Induction Wind Power System

Xue Li, Jianxia Pei, and Dajun Du
Department of Automation, Shanghai University, Shanghai, China

SuA4-7

Associated-conflict Analysis using Covering Based on

Granular Computing

Shuang Liu, Jiyi Wang, Huang Lin
Institute of Artificial Intelligence and Parallel Computing, Zhejiang Normal University,
Jinhua, Zhejiang, P.R.China

SuA4-8

Inspection of Surface Defects in Copper Strip based on Machine Vision

Xue-Wu Zhang, Li-Zhong Xu, Yan-Qiong Ding, Xin-Nan Fan,
Li-Ping Gu, Hao Sun
Computer and Information College, Hohai University, Nanjing, China

SuA4-9

BIBO Stability of Spatial-temporal Fuzzy Control System

Xianxia Zhang1, Meng Sun1, and Guitao Cao2
1 Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics and Automation, Shanghai University，Shanghai, China
2 Software Engineering Institute, East China Normal University, Shanghai, China

ROOM B

SuB3   **13:30-15:10**
RoomB
Topic:
Advanced neural network and fuzzy system theory and algorithms
Chair(s): Shujuan Wang，Fang JIA

SuB3-1

An Artificial Bee Colony with Random Key for Resource-Constrained Project Scheduling

Yan-jun Shi1, Fu-Zhen Qu1, Wang Chen2, Bo Li2
School of Mechanical Engineering,
1.Dalian University of Technology, Dalian, P.R. China
2.China North Vehicle Research Institute Beijing, P.R. China

SuB3-2

Combined Electromagnetism-Like Mechanism Optimization Algorithm and ROLS with D-Optimality Learning for RBF Networks

Fang JIA1, Jun WU2
Department of Control Science and Engineering, Zhejiang University, Hangzhou, Zhe Jiang, China

SuB3-3

Stochastic Stability and Bifurcation Analysis on Hop¯eld Neural Networks with Noise

Xuewen Qin, Zaitang Huang ?, and Weiming Tan
School of Mathematics and Physics, Wuzhou University, Wuzhou , P. R. China

SuB3-4

EMD-TEO Based Speech Emotion Recognition

Xiang Li1, Xin Li1,2,3,*, Xiaoming Zheng1,Dexing Zhang1
1 .School of Mechatronical Engineering & Automation, Shanghai University, Shanghai
2 .State Key Laboratory of Robotics and System, HIT
3 .Shanghai Key Laboratory of Power Station Automation Technology

SuB3-5

A Novel Fast Algorithm Technique for Evaluating Reliability indices of Radial Distribution Systems

Mohammoud.M.Hadow1.1 , Ahmed.N.Abd Alla1,
and Sazali P. Abdul Karim 1 ,
1.University Malaysia pahang, Faculty of Electrical and Electronics Engineering, Malaysia

SuB3-6

An improved adaptive slidng mode observer for sensorless control of PMSM

1Ran Li, 1Guangzhou Zhao
1.College of Electrical Engineering ,Zhejiang University, Hangzhou , China

SuB3-7

Clustering-based Geometric Support Vector Machines

Jindong Chen1, Feng Pan1

1.Jiangnan University, School of Communication and Control Engineering, Wuxi, China

SuB3-8

A Fuzzy-PID Depth Control Method with Overshoot Suppression for Underwater Vehicle

Zhijie Tang, Luojun and Qingbo He

School of Mechatronics Engineering and Automation, Shanghai University,Shanghai, China.

SuB3-9

Local Class Boundaries for Support Vector Machine

Guihua Wen and Caihui Zhou and Jia Wei and Lijun Jiang

South China University of Technology,Guangzhou, China

SuB3-10

Research on Detection and Material Identification of Particles in the Aerospace Power

Shujuan Wang1, Rui Chen1, Long Zhang1 and Shicheng Wang2

1.School of Electrical Engineering and Automation, Harbin Institute of Technology,Harbin, P. R. China

2 Army Aviation Institute of PLA, , Beijing, P. R. China

SuB4   **15:50-18:10**
RoomB
Topic:
1.Advanced neural network and fuzzy system theory and algorithms
2. Modeling and simulation of societies and collective behaviour
3. Biomedical signal processing, imaging, and visualization

Chair(s): Jiafu Tang, Min-you CHEN

SuB4-1

The Design of Predictive Fuzzy-PID Controller in Temperature Control System of Electrical Heating Furnace

Ying-hong DUAN

College of Electronic Information and Automation, Tianjin University of Science &Technology,Tianjin, China

SuB4-2

Stability analysis of an impulsive Cohen-Grossbergtype BAM neural networks with time-varying delays and diffusion terms

Qiming Liu1 , Rui Xu, Yanke Du

Institute of Applied Mathematics, Shijiazhuang Mechanical Engineering College, Shijiahzuang, China

SuB4-3

Characterizing Multiplex Social Dynamics with Autonomy Oriented Computing

Lailei Huang and Jiming Liu

Department of Computer Science, Hong Kong Baptist University,China

SuB4-4

A computational method for groundwater flow through industrial waste by use of digital color image

Takako Yoshii1 and Hideyuki Koshigoe2

1. Graduate School of Engineering, Chiba University, Japan

2.Faculty of Engineering, Department of Urban Environment Systems,Chiba University, Japan

SuB4-5

A Genetic Algorithm for Solving Patient- Priority- Based Elective Surgery Scheduling Problem

Yu Wang1, Jiafu Tang1, Gang Qu2

1.Dept of Systems Engineering, College of Information Science & Engineering, Key Lab of Integrated Automation of Process Industry, Northeastern University, Shenyang, , China

2.Hospital Affiliated with Dalian University, Dalian, , China

SuB4-6

A Neighborhood Correlated Empirical Weighted Algorithm for Fictitious Play

Hongshu Wang 1, Chunyan Yu1*, Liqiao Wu1,

1.College of Mathematics & Computer Science, FuZhou University, Fuzhou, Fujian, China

SuB4-7

Application of BP Neural Network in Exhaust Emission Estimatation of CAPS

Linqing Wang1 , Jiafu Tang1

1.College of System Engineering, Northeastern University, Shenyang, China

SuB4-8

Dynamic Behavior in A Delayed Bioeconomic Model with Stochastic Fluctuations

Yue Zhang1, Qingling Zhang1, and Tiezhi Zhang2

1. Institute of Systems Science, Northeastern University, , Shenyang,Liaoning, China

2.Institute of Design, Northeastern University, , Shenyang,Liaoning, China

SuB4-9

A Feature Points Matching Method Based on Window Unique Property of Pseudo-random Coded Image

Hui Chen, Shiwei Ma*, Hao Zhang, Zhonghua Hao, Junfeng Qian

School of Mechatronic Engineering & Automation, Shanghai University,Shanghai Key Laboratory of Power Station Automation Technology,Shanghai, China

SuB4-10

A Reconstruction Method for Electrical Impedance Tomography Using Particle Swarm Optimization

Min-you CHEN, Gang HU, Wei HE, Yan-li YANG, Jin-qian ZHAI

State Key Laboratory of Power Transmission Equipment & System Security and New Technology, Chongqing University, Chongqing, China

ROOM C

SuC3   **13:30-15:30**
RoomC
Topic:
1. Biomedical signal processing, speech, imaging and visualization-3
2. Biological and biomedical data integration,

mining and visualization-1

Chair(s): Qian Li, Jun Meng

SuC3-1

A New Microphone Array Speech Enhancement Method Based on AR Model

Liyan Zhang1, Fuliang Yin2, Lijun Zhang3

1.School of Electronic Engineering,Dalian JiaoTong University,Dalian ,China

2.School of Electronic and Infomation Engineering,Dalian University of Technology,Dalian ,China

3.Grace International Group,Division R&D,Montreal, Canada

SuC3-2

A Forecast of RBF Neural Networks on Electrical Signals in Senecio cruentus

Jinli Ding , Lanzhou Wang

1.College of Metrological Technology and Engineering, China Jiliang University, Hangzhou, Zhejiang, China

2.College of Life Sciences,China Jiliang University, Hangzhou, Zhejiang, China

SuC3-3

Classification of Malignant Lymphomas by Classifier Ensemble with Multiple Texture Features

Bailing Zhang and Wenjin Lu

Department of Computer Science and Software Engineering Xi'an Jiaotong-Liverpool University Suzhou, Jiangsu Province, China

SuC3-4

Denoising of Event-Related Potential Signal Based on Wavelet Method

Zhen Wu 1, Junsong Wang 2, Deli Shen3 and Xuejun Bai3

1.Tianjin University of Technology and Education, He-xi District, Tianjin, China

2.Tsinghua University, Hai-dian District, Beinjing, China

3.Tianjin Nomal University, He-xi District, Tianjin, China

SuC3-5

Predict Molecular Interaction Network of Norway Rats Using Data Integration

Qian Li and Qiguo Rong

College of Engineering, Peking University, Beijing, P.R. China

SuC3-6

The Study of Rats' Active Avoidance Behavior by the Cluster Analysis

Otar Tavdishvili2, Nino Archvadze1, Sulkhan Tsagareli1, Anna Stamateli1, Marika Gvajaia1

1.Iv. Javakhishvili Tbilisi State University, Faculty of Exact and Natural Sciences, University, Georgia

2.Institute of Cybernetics, S.Euli str. 5, 0186, Tbilisi, Georgia

SuC3-7

MS Based Nonlinear Methods for Gastric Cancer Early Detection

Jun Meng1, Xiangyin Liu1, Fuming Qiu2, Jian Huang2

1.School of Electrical Engineering, Zhejiang University, Hangzhou, China

2.Cancer Institute, The Second Hospital Affiliated to Medical College of Zhejiang University, Hangzhou,China

SuC3-8

The SEM Statistical Mixture Model of Segmentation Algorithm of Brain Vessel Image

Wang Xing-ce1, Xu Feng1, Zhou Ming-quan1, Wu Zhong-ke1, Liu Xin-yu2

1.College of Information Science and Technology, Beijing Normal University, Beijing, China

2.Institute of computing technology ,Chinese Academy of Science Beijing, China

SuC3-9

Classification and diagnosis of syndromes in Chinese medicine in the context of coronary heart disease model based on data mining methods

Yong Wang, Huihui Zhao, Jianxin Chen, Chun Li, Wenjing Chuo, Shuzhen Guo, Junda Yu, Wei Wang

1. Beijing University of Chinese Medicine

2. Bei San Huan Dong Lu, Chao Yan District Beijing, P. R. China

SuC3-10

An image reconstruction method for Magnetic Induction Tomography：Improved Genetic Algorithm

Wei He, Haijun Luo *, Zheng Xu, Qian Li

State Key Laboratory of Power Transmission Equipment & System Security and New Technology, The Electrical Engineering College ,Chongqing University, Chongqing People's Republic of China

SuC4	15:50-18:10

RoomC

Topic:

1. **Biological and biomedical data integration, mining and visualization-2**
2. **Computational intelligence in bioinformatics and biometrics-1**

Chair(s): Wanquan Liu, Gang Li

SuC4-1

The Segmentation of the Body of Tongue Based on the Improved Level Set in TCM

Wenshu Li, Jianfu Yao, Linlin Yuan, Qinian Zhou

College of Information and Electronics, Zhejiang Sci-Tech University, Hangzhou, China

SuC4-2

Transcutaneous Coupling Implantable Stimulator

Xiong Hui1,2, Li Gang2, Lin Ling2, Zhang Wangming3, Xu Ruxiang4

1.School of Electrical Engineering and Automation, Tianjin Polytechnic University, Tianjin, China

2.State Key Laboratory of of Precision Measurement Technology and Instruments, Tianjin University, Tianjin,China

3.Neurosurgery Research Institute of Guangdong, Department of Neurosurgery, Zhujiang Hospotal,Southern Medical University,Guangzhou, China

4.Department of Neurosurgery, The Military General Hospital of Beijing PLA, Beijing, China

SuC4-3

Simulation analysis on stimulation modes of threedimension electrical impedance tomography

Wei He, Kang Ju, Zheng Xu, Bing Li, Chuanhong He

State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of Electrical Engineering, Chongqing University, Chongqing ,P.R.China

SuC4-4

Researches on Spatio-temporal Expressions of Intestinal Pressure Activity Acquired by the Capsule Robot

Rongguo Yan 1, Xudong Guo 1, Guozheng Yan 2
1.School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology, Shanghai, China;
2.Department of Information Measurement Technology and Instruments, Shanghai Jiaotong University, Shanghai, China

SuC4-5

Analysis of Chlorophyll Concentration during the Phytoplankton Spring Bloom in the Yellow Sea Based on the MODIS Data

Xiaoshen Zheng 1,2, Hao Wei 2,1
1.Physical Oceanography Laboratory,Ocean University of China, Qingdao, China.
2.Tianjin key laboratory of marine resource and chemistry, Tianjin University of Science and Technology, Tianjin, China

SuC4-6

A Novel Association Rule Mining Based on Immune Computational intelligence

Xuesong Xu ,Sichun Wang
Institute of Management Engineering, Information College of Hunan University of Commerce Changsha,China.

SuC4-7

Face Recognition via Two Dimensional Locality Preserving Projection in Frequency Domain

Chong Lu1,3, Xiaodong Liu1, and Wanquan Liu2
1.School of Electronic and Information Engineering DLUT, Dalian, China
2.Curtin University of Technology, Perth WA, 6102, Australia
3.YiLi Normal College, Yining, China

SuC4-8

Prediction of Protein-Protein Interactions Using Subcellular and Functional Localizations

Yanliang Cai, Jiangsheng Yu?, and Hanpin Wang
Keylaboratory of High Con¯dence Software Technologies, Ministry of Education School of Electronic Engineering and Computer Science, Peking University, China

SuC4-9

Nucleosomes are well positioned at both ends of exons

Liu Hongde, Sun Xiao
State Key Laboratory of Bioelectronics, Southeast University, Nanjing, China

SuC4-10

An Evaluation of DNA Barcoding Using Genetic Programming-Based Process

Masood Zamani and David K.Y. Chiu
School of Computer Science, University of Guelph, Guelph, Ontario, Canada

ROOM D

SuD3   13:30-15:30
RoomD
Topic:
1. Advanced theory and methodology in fuzzy systems and soft computing
2. Biomedical signal processing, imaging, and visualization
3. Computational intelligence in utilization of clean and renewable energy resources

Chair(s): Sean McLoone， Banghua Yang

SuD3-1

An interactive method to solve the priorities of attributes while the preferences of evaluated units are under considering

Guohua Wang1, Jingxian Chen1, Qiang Guo2, Liang Liang3
1. School of Business, Nantong University, Nantong, China
2. Tourism College, Hainan University, Haikou, China
3. School of Management, University of Science and Technology of China, China

SuD3-2

Solving delay differential equations with homotopy analysis method

Qi Wang1, 3, Fenglian Fu2
1. Faculty of Applied Mathematics, Guangdong University of Technology, Guangzhou, China
2.School of Environmental Science and Engineering, Guangdong University of Technology, Guangzhou, China
3 Shenzhen Graduate School, Harbin Institute of Technology, Shenzhen, China

SuD3-3

EEG Classification Based on Artificial Neural Network in Brain Computer Interface

Ting Wu1, Banghua Yang2, Hong Sun3
1.School of Mechanical Engineering, Shanghai Dianji University, 200240, Shanghai, China
2.School of Mechatronics Engineering & Automation, Shanghai University, 200072,
Shanghai, China
3. School of Mechanical and Electrical Engineering, Anhui University of Architecture, Hefei, China

SuD3-4

Open electrical impedance tomography: computer simulation and system realization

Wei He1, Bing Li1, Chuanhong He1, Haijun Luo1, Zheng Xu1
1.State Key Laboratory of Power Transmission Equipment & System Security and New Technology,Chongqing University, China

SuD3-5

Digital Watermarking Algorithm Based onImage Fusion

Fan Zhang1,2, Dongfang Shang2, and Xinhong Zhang3

1.Institute of Image Processing and Pattern Recognition, Henan University, China

2.College of Computer and Information Engineering, Henan University, China

3.Computing Center, Henan University,China

SuD3-6

The Dynamics of Quorum Sensing Mediated by Small RNAs in Vibrio Harveyi

Jianwei Shen1,2 Hongxian Zhou1

1.Institute of Applied Mathematics,Xuchang University, China

2.Institute of System Biology, Shanaghai University, Shanghai, China

SuD3-7

An algorithm for Reconstruction of Surface from Parallel Contours and its Section Contour Extraction in any Cutting Plane

Chun GONG1, Can TANG1, Yanhua CHENG1, Sheng CHENG1, Jianwei ZHANG1

1. Kunshan Industrial Technology Research Institute, Jiangsu, China

SuD3-8

Simulation Modeling of Network Intrusion Detection Based on Artificial Immune System

YU Jing1 WANG Feng1

1. PLA Artillery Academy, China

SuD3-9

Organic Acid Prediction in Biogas Plants Using UV/vis Spectroscopic Online-Measurements

Christian Wolf1, Daniel Gaida2, André Stuhlsatz3, Seán McLoone1 and Michael Bongards2

1. National University of Ireland Maynooth, Department of Electronic Engineering, Ireland

2 .Cologne University of Applied Sciences, Institute of Automation and Industrial IT, Germany

3. Düsseldorf University of Applied Sciences, Institute for Information Technology, Department of Mechanical and Process Engineering, Germany

SuD3-10

15:10-15:30

Power Quality Disturbances Events Recognition based on S-transform and Probabilistic Neural Network Nantian Huang1, 2, Xiaosheng Liu1, Dianguo Xu1 and Jiajin Qi3

1. Department of Electrical Engineering,Harbin Institute of Technology,China,

2. College of Information and Control Engineering, Jilin Institute of Chemical Technology, China

3. Hangzhou Electric Power Bureau, State Grid Corporation of China, China

---

SuD4   **15:50-18:10**
RoomD
Topic:
1. **Computational intelligence in utilization of clean and renewable energy resources**
2. **Innovative education for sustainable energy and environment**
3. **Intelligent methods in power and energy infrastructure development**

---

4.   Advanced evolutionary computing theory and algorithms-1

Chair(s): Xingsheng Gu ， Ling Wang

SuD4-1

A coordinated heat and electricity dispatching model for Microgrid operation via PSO

Li Zhong Xu1, Guang Ya Yang2, Zhao Xu3 Jacob Østergaard2, Quan Yuan Jiang1, Yi Jia Cao1

1.Department of Electrical Engineering, Zhejiang University, China

2.Centre for Electric Technology, Department of Electrical Engineering, Technical University of Denmark, Denmark

3.Department of Electrical Engineering, Hong Kong Polytechnic University, , HONG KONG, China

SuD4-2

MPPT Strategy of PV System Based on Adaptive Fuzzy PID Algorithm

Jing Hui1, Xiaoling Sun1

School of IOT engineering, Jiangnan University, China

SuD4-3

Optimized Approach to Architecture Thermal Comfort in Hot Summer and Warm Winter Zone

Xianfeng Huang1,1 and Yimin Lu2

1. Education Ministry Key Laboratory of Disaster Prevention and Structural Safety & College of Civil Engineering and Architecture, Guangxi University, China

2. College of Electrical Engineering, Guangxi University, China

SuD4-4

2The Application of Computational Fluid Dynamics (CFD) in HVAC Education

Jiafang Song1 and Xinyu Li1

1.Department of Building Environment and Equipment Engineering, Tianjin Polytechnic University, China

SuD4-5

Power-aware Replacement Algorithm to Deliver Dynamic Mobile Contents

Zhou Su1, and Zhihua Zhang2

1. Faculty of Science and Engineering,Waseda University, JAPAN

2. Department of Human Life Studies Sanyo Women' College, Japan

SuD4-6

Study on High-Frequency Digitally Controlled Boost Converter

Yanxia GAO1, Yanping XU1,   Shuibao GUO1, 2, Xuefang LIN-SHI2,   Bruno ALLARD2

1.School of Mechatronical Engineering and Automation, Shanghai University, China

2.Lab. AMPERE (CNRS UMR 5005)-INSA-Lyon, Villeurbanne Cedex ,France

SuD4-7

Co-Evolutionary Cultural Based Particle Swarm Optimization Algorithm

Yang Sun1, Lingbo Zhang1, Xingsheng Gu1,

1. Research Institute of Automation, East China University of Science and Technology, China

SuD4-8

Non-cooperative Game Model Based Bandwidth

Scheduling and the Optimization of Quantum-Inspired Weight Adaptive PSO in a Networked Learning Control System

Lijun Xu*, Minrui Fei1, T C Yang2

1. Shanghai Key Laboratory of Power Station Automation Technology, Shanghai University, China

2 University of Sussex, UK

SuD4-9

A Modified Binary Differential Evolution Algorithm

Ling Wang, Xiping Fu, Muhammad Ilyas Menhas and Minrui Fei,

Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics and Automation, Shanghai University,Shanghai, China

SuD4-10

A Combined System for Power Quality Improvement in grid-parallel Microgrid

Gao Xiaozhi 1,1, Li Linchuan 1, Chen Wenyan2

1.Key Laboratory of Power System Simulation and Control of Ministry of Education, Tianjin University, China.

ROOM E

SuE3	13:30-15:30
RoomE	
Topic:	
1. **Intelligent modeling, monitoring, and control of complex nonlinear systems**	
2. **Intelligent medical apparatus and clinical applications**	

Chair(s): Takashi Kuremoto, Peng Zan

SuE3-1

Application and Numerical Simulation on Water Mist Cooling for Urban Environment Regulation

Junfeng Wang 1, Xincheng Tu 2, Zhentao Wang1, Jiwei Huang1

1．Corresponding author: School of Energy and Power Engineering, Jiangsu University, Zhenjiang, Jiangsu, China,

2．School of Mechanical and Aerospace Engineering, Gyeongsang

SuE3-2

Optimal Guaranteed Cost Control for Linear Uncertain System with Pole and H∞ Index Constraint

Xianglan Han1, Gang Zhang2

1．School of Information Science and Engineering, Ningbo Institute of Technology, Zhejiang University, China;

2．The Faculty of Maritime, Ningbo University, Ningbo China

SuE3-3

Statistical Modelling of Glutamate Fermentation Process Based on GAMs

Chunbo Liu1 , Xuan Ju1, Feng Pan1

1．Institute of Automation, Jiangnan University, China

SuE3-4

The application of support vector regression in the dual-axis tilt sensor modeling

Wei Su1, Jingqi Fu1

1. Shanghai Key Laboratory of Power Station Automation Technology, School of Mechanical Engineering and Automation, Shanghai University, Shanghai, China

SuE3-5

Implementing Eco-friendly Reservoir Operation by Using Genetic Algorithm with Dynamic Mutation Operator

Duan chen1,2, Guobing Huang1, Qiuwen Chen2, Feng Jin1

1.Changjiang River Scientific Research Institute, Wuhan, China

2.Research Center for Eco-environmental Science, Chinese Academy of Sciences, Beijing, China

SuE3-6

Research on the Biocompatibility of the Human Rectum and a Novel Artificial Anal Sphincter

Peng Zan1, Jinyi Zhang1, Yong Shao1, and Banghua Yang1

1.Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University; Shanghai Key Laboratory of Power Station Automation Technology, Shanghai, China

SuE3-7

A medical tracking system for contrast media

Chuan Dai1, Zhelong Wang1 and Hongyu Zhao1

1.Faculty of Electronic Information and Electrical Engineering, Dalian University of Technology, CHINA,

SuE3-8

Rapid Planning Method for Robot Assited Minimally Invasive Surgery

Yanhua Cheng1, Chun Gong1, Can Tang1, Jianwei Zhang1, ShengCheng1

1Kunshan Industrial Technology Research Institute, Jiangsu, China

SuE3-9

Autonomic Behaviors of Swarm Robots Driven by Emotion and Curiosity

Takashi Kuremoto1 , Masanao Obayashi1, Kunikazu Kobayashi1, Liang-Bing Feng1

1.Graduate School of Science and Engineering, Yamaguchi University , Japan

SuE3-10

Modelling and Simulating Dynamic Evolvement of Collective Learning Behaviors by Voronoi Diagram

Xiang-min Gao1 and Ming-yong Pang1

1.Department of Educational Technology, Nanjing Normal UniversityJiangsu, P. R. China

SuE4	15:50-18:10
RoomE	
Topic:	
1. **Modeling and simulation of societies and collective behavior**	
2. **Brain stimulation, neural dynamics and neural Interfacing**	

Chair(s): Guozheng Yan, Renhan Huang

SuE4-1

Study of the Airway Resistance of a Micro Robot System for Direct Tracheal Inspection

Lianzhi Yu1, Guozheng Yan2, Yuesheng Lu1, Xiaofei Zhu1

1.College of Optoelectric Information and Computer Engineering, University of Shanghai for Science and Technology, Shanghai, China

2.School of Electronic, Information and Electrical Engineering, Shanghai Jiaotong University, Shanghai ,China

SuE4-2

Numerical simulation o the nutrient and phytoplankton dynamics in the Bohai Sea

Hao Liu1 , Wenshan Xu1, Baoshu Yin1

1. College of Marine Science, Shanghai Ocean University, Shanghai, China

2.Institute of Oceanology, CAS, Qingdao, China

SuE4-3

Personalized Reconstruction of 3D Face Based on Different Race

Diming Ai2, Xiaojuan Ban1, Li Song2, Wenxiu Chen1

1.School of Information Engineering,University of Science and Technology Beijing,Beijing,China

2.Beijing Institute of Special Vehicles,Beijing

SuE4-4

Lake Eutrophication Evaluation and Diagnosis Based on Bayesian Method and SD Model

Kai Huang1, Xulu Chen1, Huaicheng Guo2

1. College of Environmental Science and Engineering, Beijing Forestry University, Beijing, China

2. College of Environmental Science and Engineering, Peking University, Beijing, China

SuE4-5

Respiration Simulation of Human Upper Airway for Analysis of Obstructive Sleep Apnea Syndrome

Renhan Huang1 and Qiguo Rong1

1.College of Engineering, Peking University, Beijing, P.R. China

SuE4-6

Optimization for Nonlinear Time Series and Forecast for Sleep

Chenxi Shao1,2,3,4, Xiaoxu He1, Songtao Tong1,Huiling Dou1, Ming Yang2, and Zicai Wang2

1.Depatment of Computer Science and Technology, University of Science and Technology of China, China

2.Control & Simulation Center, Harbin Institute of Technology, China

3.MOE-Microsoft Key Laboratory of Multimedia Computing and Communication, University of Science and Technology of China, China

4.Anhui Province Key Laboratory of Software in Computing and Communication, China

SuE4-7

Classifying EEG using Incremental Support Vector Machine in BCIs

Xiaoming Zheng 1,Banghua Yang1, 2, Xiang Li 1，Peng Zan 1，zheng Dong1

1. Shanghai Key Laboratory of Power Station Automation Technology; Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University, China

2.State Key Laboratory of Robotics and System (HIT), HarbinChina

SuE4-8

Acute Isolation of Neurons Suitable for Patch-Clamping Study from Frontal Cortex of Mice

Yuan-yuan Li1,2, Li-jun Cheng1, Gang Li1, Ling Lin1, Dan-dan Li1

1. College of Precision Instruments and Opto-Electronics Engineering,Tianjin University, Tianjin, China

2.School of Computer Science & Software Engineering, Tianjin Polytechnic University, Tianjin, China

SuE4-9

Palmprint Identification Using PCA Algorithm and Hierarchical Neural Network

Ling Lin1

1.Dept.of Computer Science,YiLi Normal College, Yining,China

SuE4-10

Satellite-retrieved Surface Chlorophyll Concentration Variation Based on Statistical Methods in the Bohai Sea

Li Qian1, Wen-ling Liu1, Xiao-shen Zheng1

1.Tianjin Key Laboratory of Marine Resources and Chemistry , Tianjin University of Science and Technology, China,

September 20, 2010 Monday

ROOM A

MoA5   **8:30-10:10**
RoomA
Topic:
1. **Computational intelligence in utilization of clean and renewable energy resources**
2. **Intelligent modeling, control and supervision for energy saving and pollution reduction**

Chair(s):   Hong Hee Lee, Shihua Li

MoA5-1
Strategic Evaluation of Research and Development into Embedded Energy Storage in Wind Power Generation
T C Yang1, Lixiong Li2,
1 School of Engineering and Design, University of Sussex, Brighton, BN1 9QT, UK
2 School of Mechanical Engineering and Automation, Shanghai University,Shanghai Key Laboratory of Power Station Automation Technology,Shanghai, P.R. China

MoA5-2
A Mixed-integer Linear Optimization Model for Local Energy System Planning Based on Simplex and Branchand-
bound Algorithms
Hongbo Ren1, Weisheng Zhou2, Weijun Gao3, Qiong Wu3
1 Ritsumeikan Global Innovation Research Organization, Ritsumeikan University,Japan
2 College of Policy Sciences, Ritsumeikan University, Japan
3 Faculty of Environmental Engineering, The University of Kitakyushu,Japan

MoA5-3
IEC 61400-25 Protocol based Monitoring and Control Protocol for Tidal Current Power Plant
Jung Woo Kim, Hong Hee Lee
School of Electrical Engineering,University of Ulsan, South Korea

MoA5-4
Adaptive Maximum Power Point Tracking Algorithm for Variable Speed Wind Power Systems
Moo-Kyoung Hong, Hong-Hee Lee
School of Electrical Engineering,University of Ulsan, Nam-Gu, South of Korea

MoA5-5
Modeling and Simulation of Two-leaf Semi-rotary VAWT
Qian Zhang, Haifeng Chen, and Binbin Wang
School of Electronic and Information Engineering
Zhongyuan Institute of Technology
Zhongyuan Middle Road 41, Zhengzhou, China

MoA5-6
Sliding Mode Controller for Switching Mode Power

Supply
Yue NIU1, Yanxia GAO1,*, Shuibao GUO1, 2, Xuefang LIN-SHI2,
Bruno ALLARD2
1School of Mechatronical Engineering and Automation, Shanghai University
Shanghai, China
2 Lab. AMPERE (CNRS UMR 5005)-INSA-Lyon, Villeurbanne Cedex – France

MoA5-7
An Improved control strategy for ball mill grinding circuits
Xisong Chen1, Jun Yang1, Shihua Li1 and Qi Li1
1School of Automation, Southeast University, Nanjing, Jiangsu Province, China

MoA6   **10:30-12:10**
RoomA
Topic:
1. **Intelligent methods in developing vehicles, engines and equipments**
2. **Computational methods and intelligence in modeling genetic and biochemical networks and regulation**

Chair(s):   Lin-du Zhao, Abbas Z. Kouzani

MoA6-1
Expression of Design Problem by Design Space Model to Support Collaborative Design in Basic Plan of Architectural Design
Yoshiaki Tegoshi 1, Zhihua Zhang 2 and Zhou Su 3
1 Faculty of Environmental Studies, Hiroshima Institute of Technology,
2-1-1 Miyake, Saeki-ku,Hiroshima   Japan
2 Department of Human Life Science, Sanyo Women' College,
Sagatahonmati 1-1, Hatsukaichi, Hiroshima, Japan
3 Faculty of Science and Engineering, Waseda University,
Ohkubo3-4-1, Shinjyuku, Tokyo, Japan

MoA6-2
Drive Cycle Analysis of the Performance of Hybrid Electric Vehicles
Behnam Ganji, Abbas Z. Kouzani and H.M Trinh
School of Engineering, Deakin University , Australia

MoA6-3
Supply Chain Network Equilibrium with Profit Sharing Contract Responding to Emergencies
A-ting Yang, Lin-du Zhao1
Institute of Systems Engineering, Southeast University, Nanjing, Jiangsu ,China

MoA6-4
Modeling of the Human Bronchial Tree and Simulation of Internal Airflow: A Review
Yijuan Di1, Minrui Fei1,*, Xin Sun1 and T C Yang 2
1 Shanghai Key Laboratory of Power Station Automation Technology,

Shanghai University, Shanghai, China
2 University of Sussex, UK

MoA6-5

Robust Semi-supervised Learning for Biometrics

Nanhai Yang, Mingming Huang, Ran He, Xiukun Wang
Department of Computer Science and Technology,
Dalian University of Technology,Dalian, China

MoA6-6

Research on Virtual Assembly of Supercritical Boiler

Pi-guang Wei1, Wen-hua Zhu1, Hao Zhou1
1CIMS and Robot Center, Shanghai University, Shanghai,
China

MoA6-7

Validation of veracity on Simulating the Indoor Temperature in PCM Light Weight Building by EnergyPlus

Chun-long Zhuang1,2, Bai-zhan Li2,An-zhong Deng 1,
Sheng-bo Li1, Zhi-li Chen1,Hong-yu Zhang1, Guo-zhi Fan
1. Department of Barracks' Management and
Environmental Engineering,PLA Logistic Engineering
University, Chongqing, China;
2. College of Urban Construction and Environmental
Engineering, Chongqing University, Chongqing, China）

MoA6-8

Positive Periodic Solutions of Nonautonomous Lotka-Volterra Dispersal System with Delays

Ting Zhang, Minghui Jiang and Bin Huang
Institute of Nonlinear and Complex System, China Three
Gorges University,YiChang, Hubei, China.

ROOM B

| MoB5   8:30-10:10 |
| RoomB |
| Topic: |
| 1. **Intelligent computing and control in distributed power generation systems** |
| 2. **Intelligent methods in power and energy infrastructure development** |

Chair(s): Tim Littler, Jiming Liu

MoB5-1

VLSI Implementation of sub-pixel Interpolator for AVS Encoder

Chen Guanghua1, Wang Anqi1, Hu Dengji1, Ma Shiwei1,
Zeng Weimin2
1 School of Mechatronics Engineering and Automation,
Shanghai Key Laboratory of Power Station Automation
Technology, Shanghai University, Shanghai, P. R. China
2 Key Laboratory of Advanced Display and System
Applications, Ministry of Education &Microelectronic
Research and Development Center, Shanghai University,
Shanghai, P.R. China

MoB5-2

Optimization of Refinery Hydrogen Network

Yunqiang Jiao1, Hongye Su1

State Key Laboratory of Industrial Control Technology,
Institute of Cyber-Systems and Control,Yuquan Campus,
Zhejiang University, Hangzhou, P. R. China

MoB5-3

Overview: A Simulation Based Metaheuristic Optimization Approach to Optimal Power Dispatch Related to a Smart Electric Grid

Stephan Hutterer1, Franz Auinger1, Michael A®enzeller2,
and Gerald Steinmaurer3
1 .Upper Austria University of Applied Sciences
2 .Josef Ressel Center Heureka!
3 .Austrian Solar Innovation Center

MoB5-4

A Wavelet-Prony Method for Modeling of Fixed-Speed Wind Farm Low-Frequency Power Pulsations

Daniel McSwiggan and Tim Littler
Electrical Power and Energy Research Cluster, Queen's
University Belfast,Northern Ireland

MoB5-5

Research on Short-term Gas Load Forecasting Based on Support Vector Machine Model

Chao ZHANG1,2 , *Yi LIU1,2 , Hui ZHANG1,2 , Hong
HUANG1,2 , Wei ZHU3
1,2 Center for Public Safety Research, Department of
Engineering Phyiscs,Tsinghua University, , Beijing, CHINA
3 Beijing Research Center of Urban System Engineering,
Beijing, CHINA

MoB5-6

Network Reconfiguration at the Distribution System with Distributed Generators

Gao Xiaozhi1,1, Li Linchuan1, Xue Hailong2
Key Laboratory of Power System Simulation and Control of
Ministry of Education,Tianjin University, Tianjin, China.

MoB5-7

An Autonomy-Oriented Computing Mechanism for Modeling the Formation of Energy Distribution Networks: Crude Oil Distribution in U.S. and Canada

Benyun Shi, and Jiming Liu
Department of Computer Science, Hong Kong Baptist
University

| MoB6   10:30-12:10 |
| RoomB |
| Topic: |
| **Intelligent modeling, monitoring, and control of complex nonlinear systems** |

Chair(s): Shiji Song, Fei Liu

MoB6-1

Direct Torque Control for Permanent Magnet Synchronous Motors Based on Novel Control Strategy

Sizhou Sun, Xingzhong Guo, Huacai Lu and Ying Meng
Anhui Provincial Key Laboratory of Electric and Control,
Anhui Polytechnic University

MoB6-2

A Monitoring Method Based On Modified Dynamic Factor Analysis and Its Application

Xueyan Yin1, Fei Liu 1
1 Institute of Automation, Jiangnan University, wuxi, China

MoB6-3

A Novel Approach to System Stabilization over Constrained Channels

Weihua Deng1, Minrui Fei1;and Huosheng Hu2
1 School of Mechatronical Engineering and Automation, Shanghai University, Shanghai, China
2 School of Computer Science and Electronic Engineering, University of Essex, United Kingdom

MoB6-4

Iterative Learning Control based on Integrated Dynamic Quadratic Criterion for Batch Processes

JIA Li1，SHI Jiping 1，Cheng Dashuai 1，Cao Luming 1，CHIU Min-Sen2
1.Shanghai Key Laboratory of Power Station Automation Technology, Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University,
Shanghai 200072, China;
2. Faculty of Engineering, National University of Singapore, Singapore

MoB6-5

A Novel Method for Modeling and Analysis of Meander-Line-Coil Surface Wave EMATs

Shujuan Wang1, Lei Kang1, Zhichao Li1, Guofu Zhai1 and Long Zhang1
1 School of Electrical Engineering and Automation, Harbin Institute of Technology, Harbin, P. R. China

MoB6-6

The Design of Neuron-PID Controller for a Class of Networked Control System under Data Rate Constraints

Lixiong Li, Rui Ming and Minrui Fei,
School of Mechanical Engineering and Automation, Shanghai University,Shanghai Key Laboratory of Power Station Automation Technology,Shanghai, P.R. China

MoB6-7

Stochastic Optimization of Two-stage Multi-item Inventory System with Hybrid Genetic Algorithm

Yuli Zhang1, Shiji Song1, Cheng Wu1, Wenjun Yin2
1. Department of Automation, Tsinghua University, Beijing ,China
2. IBM China Research Lab, Beijing,China

ROOM C

<table>
<tr><td>**MoC5**</td><td>**8:30-10:10**</td></tr>
<tr><td colspan="2">**RoomC**</td></tr>
<tr><td colspan="2">**Topic:**</td></tr>
<tr><td colspan="2">**Computational intelligence in bioinformatics and biometrics-2**</td></tr>
</table>

Chair(s):   Wenhua Zhu, Yibo Zhang

MoC5-1

Artificial intelligence based optimization of fermentation medium for β -glucosidase production from newly isolated strain Tolypocladium cylindrosporum

Yibo Zhang1, Lirong Teng1, Yutong Quan1, Hongru Tian1, Yuan Dong1, Qingfan Meng1, Jiahui Lu1, Feng Lin1, Xueqing Zhen2
1.College of life science, Jilin University, Changchun, China
2.The Frist hospital of Jilin University, Changchun, China

MoC5-2

The Human Computer Interaction Technology Based on Virtual Scene

Huimeng Tan1, Wenhua Zhu1, Tianpeng Wang1
1.CIMS & Robotics Center, Shanghai University, No.149 Yanchang Road, Shanghai, China

MoC5-3

ICA-Based Automatic Classiˉcation of Magnetic Resonance Images From ADNI Data

Wenlu Yang1;2, Xinyun Chen1, Hong Xie1, and Xudong Huang2
1.Department of Electronic Engineering, Shanghai Maritime University, Shanghai, China.
2.Department of Radiology, Brigham and Women's Hospital, and Harvard Medical School,Boston, MA, USA.

MoC5-4

Label Propagation Algorithm based on Non-negative Sparse Representation

Nanhai Yang ,Yuanyuan Sang, Ran He , Xiukun Wang
Department of Computer Science and Technology, Dalian University of Technology, Dalian, China

MoC5-5

Multiple Sequence Alignment by Improved Hidden Markov Model Training and Quantum-behaved Particle Swarm Optimization

Li Cheng-yuan1, Long Hai-xia2, Ding Yan-rui1, Sun Jun1, Xu Wen-bo1
1.School of IOT Engineeing, Jiangnan University , Lihu Road 1800, WuXi, JiangSu, China
2.School of Education, Jiangnan University , Lihu Road 1800, WuXi, JiangSu, China

MoC5-6

Breast Cancer Diagnosis Using WNN Based on GA

Xiaomei Yi, Peng Wu, Jian Li, Lijuan Liu
Department of Information Engineering of ZheJiang Agricultural & Forestry University, Hangzhou, China

MoC5-7

Lattice-based Artificial Endocrine System

Qingzheng Xu1,2, Lei Wang1, Na Wang2
1.School of Computer Science and Engineering, Xi'an University of Technology, Xi'an,China
2.Xi'an Communication Institute, Xi'an, China

MoC5-8

Direct Sparse Nearest Feature Classifier for Face Recognition

Ran He, Nan-Hai Yang, Xiu-Kun Wang, Guo-Zhen Tan
School of Computer Science, Dalian University of Technolgoy, Dalian, China

<table>
<tr><td>**MoC6**</td><td>**10:30-12:10**</td></tr>
<tr><td colspan="2">**RoomC**</td></tr>
<tr><td colspan="2">**Topic:**</td></tr>
<tr><td colspan="2">**1. Computational methods and intelligence in modeling molecular, cellular and multi-cellular**</td></tr>
</table>

behavior and dynamics

2. **Intelligent modeling, monitoring, and control of complex nonlinear systems**

Chair(s):   Jingtao Lei, Xiaoming Wu

MoC6-1

A Mathematical Model of Myelodysplastic Syndromes: the Effect of Stem Cell Niches

Xiuwei ZHU , Ling XIA , Luyao LU

Key Lab of Biomedical Engineering of Ministry of Education, Department of Biomedical Engineering, Zhejiang University, Hangzhou, China

MoC6-2

Ion Channel Modeling and Simulation using Hybrid Functional Petri Net

Yin Tang1,*, Fei Wang1

1. Shanghai Key Lab of Intelligent Information Processing, Fudan University, Shanghai, China.

MoC6-3

Computer Simulation on the Compaction of Chromatin Fiber Induced by Salt

Chun-Cheng Zuo, Yong-Wu Zhao, Yong-Xia Zuo, Feng Ji, Hao Zheng

Jilin University, College of Mechanical Science and Engineering, China

MoC6-4

Electrical remolding and mechanical changes in heart failure: a model study

Yunliang Zang, Ling Xia

Department of Biomedical Engineering, Zhejiang University, Hangzhou, China

MoC6-5

Modeling Conformation of Protein Loops by Bayesian Network

Peng Yang1 Qiang LÄu1;2;+ Lingyun Yang1 and Jinzhen Wu1

1. School of Computer Science and Technology, Soochow University

2. Jiangsu Provincial Key Lab for Information Processing Technologies Suzhou, China

MoC6-6

Towards constraint optimal control of greenhouse climate

Feng Chen1, Yongning Tang2

1Department of Automation, University of Science and technology of China, Hefei, China

2School of Information Technology, Illinois State University, Chicago, USA

MoC6-7

A kernel spatial complexity-based nonlinear unmixing method of hyperspectral imagery

Xiaoming Wu1, Xiaorun Li1, Liaoying Zhao2

1.College of Electrical Engineering, Zhejiang University, Hangzhou   China;

2.Institute of Computer Application Technology, Hangzhou Dianzi University, Hangzhou, China

MoC6-8

Study on Machine Vision Fuzzy Recognition based on Matching Degree of Multi-Characteristics

Jingtao Lei1, Tianmiao Wang2, Zhenbang Gong1

1. School of Mechanical Engineering & Automation, Shanghai University, Shanghai,China

2. School of Mechanical Engineering & Automation, Beihang University, Beijing,China

ROOM D

| MoD5   8:30-10:10 |
| RoomD |
| Topic: |
| 1.Advanced evolutionary computing theory and algorithms-2 |

Chair(s): Xingsheng Gu, Ruochen Liu

MoD5-1

CFBB PID Controller tuning with Probability based Binary Particle Swarm Optimization Algorithm

Menhas Muhammad Ilyas1,2, Ling Wang2, Hui Pan2, Minrui Fei2

1. Ali Ahmed Shah University College of Engineering and Technology Mirpur Azad Kashmir, University of Azad Jammu and Kashmir, Pakistan.

2. Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics and Automation Shanghai University, China

MoD5-2

A Novel Cultural Algorithm and Its Application to the Constrained Optimization in Ammonia Synthesis

Wei Xu1, Lingbo Zhang 1, Xingsheng Gu 1

1.Research Institute of Automation, East China University of Science and Technology, China

MoD5-3

Pareto ant colony Algorithm for building life cycle energy consumption optimization

Yan Yuan 1, Jingling Yuan 2, Hongfu Du 2, and Li Li1

1. School of Urban Design,Wuhan University, Wuhan, China

2. Computer Science and Technology school, Wuhan University of Technology , China

MoD5-4

Particle Swarm Optimization based Clustering: A Comparison of Different Cluster Validity Indices

Ruochen Liu1, Xiaojuan Sun1, Licheng Jiao1

1.Key Laboratory of Intelligent Perception and Image Understanding of Ministry of Education of China, Institute of Intelligent Information Processing, Xidian University, China

MoD5-5

A General Framework for High-Dimensional Data Reduction Using Unsupervised Bayesian Model

Longcun Jin1, Wanggen Wan1, Yongliang Wu1, Bin Cui1, Xiaoqing Yu1

1. School of Communication and Information Engineering, Shanghai University, China

MoD5-6

An Estimation of Distribution Algorithm based on Clayton Copula and Empirical Margins

L.F. Wang, Y.C. Wang, J.C. Zeng, and Y. Hong

1. CollCoge of Electrical and Information Engineering, Lanzhou University of Technology, China

2.Complex System and Computational Intelligence Laboratory, Taiyuan University of Science and Technology, China

MoD5-7

Clonal Selection Classification Algorithm for High-Dimensional Data

Ruochen Liu1, Ping Zhang1, Licheng Jiao1

1.Key Laboratory of Intelligent Perception and Image Understanding of Ministry of Education of China, Institute of Intelligent Information Processing, Xidian University, China

---

MoD6   **10:30-12:10**
RoomD
Topic:
1. **Advanced neural network theory and algorithms**
2. **Innovative education in systems modeling and simulation-1**

Chair(s):   Ming Huei Chu, David Tormey

MoD6-1

The Model following Neural Control Applied to Energy-saving BLDC Air Conditioner System

Ming Huei Chu 1, Yi Wei Chen 1 and Zhi Wei Chen 1

Department of Mechatronic Technology, Tungnan University, Taiwan,China

MoD6-2

Develop of specific sewage pretreatment and network monitoring system

Rongbao Chen1, Liyou Qian2, Yuanxiang Zhou3, Xuanyu Li4

1. School of Electrical Engineering and Automation，Hefei University of Technology, China

2. Environmental Protection Office of Huangshan Beauty Spots, Huangshan, China

3. School of Resources and Environment, Hefei University of Technology, Hefei, China

4.Chizhou University, Chizhou China

MoD6-3

Application of Radial Basis Function Neural Network in Modeling Wastewater sludge recycle system

Luolong1 , Zhouliyou1

Guangzhou Institute of Railway Technology , China

MoD6-4

Improved Stability Criteria for Delayed Neural Networks

Min Zheng1,2, Minrui Fei1,2, Taicheng Yang3, and Yang Li1,2

1.College of Mechatronic Engineering and Automation,Shanghai University

2.Shanghai Key Laboratory of Power Station Automation Technology, China

3.Department of Engineering and Design, University of Sussex, UK

MoD6-5

Aplication of the Single Neuron PID Controller on the Simulated Chassis Dynamometer

1.Weichun Zhang1, Bingbing Ma1, Peng Yu1 , Baohao Pei1

Shandong University of Technology Zibo, Shandong Province, China

MoD6-6

Research on the Neural Network Information Fusion Technology for Distinguishing Chemical Agents

Minghu Zhang1,1, Dehu Wang1, Lv Shijun1, Jian Song2, Yi Huang1

1.Dept. of Shipboard Weaponry, Dalian Naval Academy, China

2.Arms Tactics Research Center, Naval Arms Command Academy, China

MoD6-7

Simulating Energy Requirements for an MDF Production Plant

Cristina Maria Luminea1, Dr. David Tormey1

1.Centre For Design Innovation, Institute of Technology Sligo, Ballinode, Sligo, Ireland

MoD6-8

Three-Dimensional Mesh Generation For Human Heart Model

Dongdong Deng1, Junjie Zhang1, Ling Xia1

1.Department of Biomedical Engineering, Zhejiang University, China

ROOM E

MoE5   **8:30-10:10**
RoomE
Topic:
1. Intelligent construction and energy saving techniques for sustainable and green built environment
2. Intelligent water treatment and waste management technologies

Chair(s): Shihu Shu, Ben Niu

MoE5 -1

A study on the Cooling Effects of Greenery on the Surrounding Areas by Computer Simulation for Green Built Environment

Jiafang Song1 and Xinyu Li1

1.Department of Building Environment and Facility Engineering, Tianjin Polytechnic University, Tianjin, China

MoE5-2

Spatial-temporal Variation of Chlorophyll-a Concentration in the Bohai Sea

Wen-ling Liu1, Li Qian1, Xiao-shen Zheng1

Tianjin Key Laboratory of Marine Resources and Chemistry , Tianjin University of Science and Technology, China

MoE5-3

Modified Bacterial Foraging Optimizer for Liquidity Risk Portfolio Optimization

Ben Niu1, 2, Han Xiao2, Lijing Tan3, Li Li2, Junjun Rao2

1. Hefei Intelligent Computing Lab, Hefei Institute of Intelligent Machines, Chinese Academy of Science, China

2. College of Management, Shenzhen University, China

3. Measurement Specialties Inc.China

MoE5-4

Comparison of Two Models for Calculating Water Environment Capacity of Songhua River

Shihu. Shu1, Huan Ma2

1.School of Environmental Science and Engineering, Tongji University, Shanghai, China;

2.Anglian Water Services Ltd , Anglian House, Ambury Road, Cambridgeshire, UK

MoE5-5

Growth Characteristics and Fermentation Kinetics of Flocculants-producing Bacterium F2

Jie Xing1, Jixian Yang1, Fang Ma1 , Wei Wang1, Kexin Liu1

1.State Key Lab of Urban Water Resource and Environment, School of Municipal and Environmental Engineering, Harbin Institute of Technology, China

MoE5-6

Research on Enrichment for Anammox Bacteria Inoculated via Enhanced Endogenous Denitrification

Yi Yuan 1,2 , Yong Huang 2, Huiping Deng1, Yong Li2, Yang Pan2

1.School of Environmental Science and Engineering，Tongji University, Shanghai ,China

2.Department of Environmental Science and Engineering，Suzhou university of Science and technology, Suzhou, China

MoE5-7

Evaluation of Geological Disaster with Extenics Based on Entropy Method

Xinmin Wang1, Zhansheng Tao 1 , Xiwen Qin 2

1.Institute of applied mathematics, Changchun University of Technology, Changchun,China

2.Collgee of Basic Sciences, Changchun University of Technology, Changchun, China

MoE5-8

Crack Image Enhancement of Track Beam Surface Based on Nonsubsampled Contourlet Transform

Chunhua Guo, Tongqing Wang

The Key Laboratory of Optoelectronic Technology & Systems of the Ministry of Education,

Chong Qing University, Chong Qing,

MoE6	10:30-12:10
RoomE	
Topic:	
Synthetical Topic	

Chair(s): Minghu Ha, Jianghong Dou

MoE6-1

The Class-2 Linguistic Dynamic Trajectories of the Interval Type-2 Fuzzy Sets

Liang Zhao

College of Electrical Engineering, Henan University of Technology,Zhengzhou, China

MoE6-2

The Key Theorem of Learning Theory Based on Sugeno Measure and Fuzzy Random Samples

Minghu Ha 1, Chao Wang 2, Witold Pedrycz3

1 College of Mathematics & Computer Sciences, Hebei University, Baoding, , P. R. China.

2 College of Physics Science & Technology, Hebei University,Baoding, , P. R. China.

3 Department of Electrical & Computer Engineering, University of Alberta, Canada. and Systems Research Institute, Polish Academy of Sciences,Warsaw, Poland.

MoE6-3

Recognition of Fire Detection Based on Neural Network

Yang Banghua， Dong Zheng，Zhang Yonghuai，Zheng Xiaoming

Shanghai Key Laboratory of Power Station Automation Technology; Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University,Shanghai,China

MoE6-4

Relation of Infarct Location and Size to Extent of Infarct Expansion After Acute Myocardial Infarction: A Quantitative Study Based on a Canine Model

Jianhong Dou1,2, Ling Xia2, Yunliang Zang2, Yu Zhang2, Guofa Shou2

1.Department of Anesthesiaology, Guangzhou General Hospital of Guangzhou Military Command Guangzhou, China

2.Department of Biomedical Engineering, Zhejiang University Hangzhou, China

MoE6-5

A Distance Sorting Based Multi-Objective Particle Swarm Optimizer and Its Applications

Zhongkai Li1, Zhencai Zhu1, Shanzeng Liu1, Zhongbin Wang1

1.School of Mechatronics Engineering, China University of Mining and Technology, China

MoE6-6

A discrete harmony search algorithm

Ling Wang1, Yin Xu1, Yunfei Mao1, Minrui Fei1

1.Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics and Automation, Shanghai University, China

MoE6-7

Image Fusion Using Self-constraint Pulse-coupled Neural Network

Zhuqing Jiao1, Weili Xiong1 and Baoguo Xu1

1.School of IoT Engineering, Jiangnan University , China

MoE6-8

Segmentation for SAR Image Based on a New Spectral Clustering Algorithm

Li-Li Liu 1,2, Xian-Bin Wen 1,2 and Xing-Xing Gao 1,2

1.Key Laboratory of Computer Vision and System of Ministry of Education, Tianjin University of Technology, 300191, Tianjin, China

2. Tianjin Key Laboratory of Intelligence Computing and Novel Software Technology, China

BOOK OF ABSTRACT

September 18, 2010 Saturday

Lecture Theatre

SB1-Science Bridge Workshop   13:30-15:10
Lecture Theatre
Invited session:
Intelligent modeling, monitoring, and control of complex nonlinear systems

Chair(s): Trevor Newsom

SB1-1

Stabilization of a Class of Networked Control Systems with Random packet loss

Minrui Fei1, Weihua Deng1, Kang Li2 and Yang Song1
1 School of Mechatronical Engineering and Automation, Shanghai University, Shanghai, China
2 School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, United Kingdom

This paper addresses the problem of stabilizing of a class of Networked Control Systems (NCSs) based on both the communication and network properties. Random packet loss together with Signal-to-Noise Ratio (SNR) constrained channels are studied and stabilization conditions are given in discrete time domain. A numerical example is presented and shown that unstable poles and packet dropouts signi¯-cantly a®ect the SNR requirement for stabilizing the NCSs.

SB1-2

Stability Analysis of Multi-Channel MIMO Networked Control Systems

Dajun Du1, Minrui Fei1, and Kang Li2
1 School of Mechatronical Engineering and Automation, Shanghai University, Shanghai, , China
2 School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, United Kingdom

This paper studies the stability of multi-input multi-output networked control systems (MIMO NCSs) with multiple channels. A gen-eral model for multi-channel MIMO NCSs with many independent sen-sors and actuators is ¯rst proposed. Based on Lyapunov stability theorycombined with linear matrix inequalities (LMIs) techniques, a su±cientcondition is then derived for multi-channel MIMO NCSs to be asymp-totical stable. Finally, simulation results con¯rm the e®ectiveness of the proposed method.

SB1-3

A Collision Detection System for an Assistive Robotic Manipulator

Weidong Chen1,2, Yixiang Sun1,2, Yuntian Huang1,2
1.Department of Automation, Shanghai Jiao Tong University, Shanghai, China
2.State Key Laboratory of Robotics and System (HIT), Harbin, China

To make human-manipulator interaction safe, a method and its realization of safety design of assistive robotic manipulator based on collision detection is presented in this paper. The collision is detected by the difference of the reference torque calculated according to the dynamic model and the factual torque measured by torque sensors. In the design of the joint torque sensor, the finite element analysis is applied to determine the optimal position for pasting strain gauge, and then a signal processing circuit with high capacity of resisting disturbances is developed. According to the low speed characteristic of the assistive robotic manipulator, a simplified dynamic model is established, which balances the efficiency and accuracy of the calculation of the reference torque. Experimental results are given to prove the validity of the proposed design.

SB1-4

A Novel Localization System Based on Infrared Vision for Outdoor Mobile Robot

Jingchuan Wang1,1, Weidong Chen1,2
1.Department of Automation, Shanghai Jiao Tong University, Shanghai 200240, China
2.State Key Laboratory of Robotics and System (HIT), Harbin 150001, China

An outdoor localization system for mobile robot based on infrared vision is presented. To deal with the changes of light conditions, an omni-directional near infrared (NIR) vision system is developed. The extended Kalman filter (EKF) is used in localization, and to improve the accuracy and robustness of the system. Finally, the experiments demonstrate the system performance in an electrical substation.

SB1-5

An efficient algorithm for grid-based robotic path planning based on priority sorting of direction vectors

Aolei Yang, Qun Niu, Wanqing Zhao, Kang Li, and George W. Irwin
Intelligent Systems and Control, School of Electronics, Electrical Engineering and Computer Science, Queen's University of Belfast, UK

Abstract: This paper presents an efficient grid-based robotic path planning algorithm. This method is motivated by the engineering requirement in practical embedded systems where the hardware resource is always limited. The main target of this algorithm is to reduce the searching time and to achieve the minimum number of movements. In order to assess the performance, the classical A* algorithm is also developed as a reference point to verify the effectiveness and determine the performance of the proposed algorithm. The comparison results confirm that the proposed approach considerably shortens the searching time by nearly half and produces smoother paths with less jagged segments than A* algorithm.

SB1-6

An Automatic Collision Avoidance Strategy for Unmanned Surface Vehicles

Wasif Naeem1 and George W Irwin1
1.School of Electronics, Electrical Engineering and

Computer Science,Queen's University Belfast, UK

Unmanned marine vehicles are useful tools for various hydrographical tasks especially when operating for extended periods and in hazardous environments. The autonomy of these vehicles depends on the design of robust navigation, guidance and control systems. This paper concerns the preliminary design of an automatic guidance system for unmanned surface vehicles based on standardised rules defined by the International Maritime Organisation. A guidance system determines "reasonable" and safe actions in order to complete a task at hand. Thus, autonomous guidance can be regarded as the mechanism that brings self-reliance to the whole system. The strategy here is based on waypoint guidance by line-of-sight coupled with a manual biasing scheme. Simulation results demonstrate the functioning of the proposed approach for multiple stationary as well as dynamic obstacles.

SB1-7

Adaptive Visual Servoing with Imperfect Camera and Robot Parameters

Hesheng Wang1,2, Maokui Jiang1,2, Weidong Chen,1,2 Yun-hui Liu3

1.Department of Automation, Shanghai Jiao Tong University, Shanghai, China

2.State Key Laboratory of Robotics and System (HIT), Harbin, China

3.Department of Mechanical and Automation, Chinese University of Hong Kong, Hong Kong,China

This paper presents a new adaptive controller for dynamic image-based visual servoing of a robot manipulator when the camera intrinsic and extrinsic parameters and robot physical are not calibrated. To cope with nonlinear dependence of the image Jacobian on the unknown parameters, this controller employs depth-independent image Jacobian which does not depend on the scale factors determined by the depths of feature points. By removing the scale factors, the camera and robot parameters appear linearly in the close-loop dynamics so that a new algorithm is developed to estimate these parameters on-line. Lyapunov theory is employed to prove asymptotic convergence of the image errors based on the robot dynamics. Simulations have been conducted to demonstrate the performance of the proposed controller.

SB2-Science Bridge Workshop   15:30-18:10
Lecture Theatre
Invited session:
Intelligent modeling, monitoring, and control of complex nonlinear systems
Chair(s):   George Irwin

SB2-1

A Frequency Domain Approach to PID Controllers Design in Boiler-turbine Units

Hui Pan1, Minrui Fei 1, Ling Wang 1, Kang Li2

1. Shanghai Key Laboratory of Power Station Automation Technology, Shanghai University,   China

2. School of Electronics, Electrical Engineering and Computer Science, Queen's University Belfast, United Kingdom

This paper proposes a frequency domain approach—direct Nyquist array (DNA) method, to the design of PID controllers for multivariable boiler-turbine units based on gain and phase margins. The main objective is to propose an integrated method for the design and auto-tuning of simple yet robust PID controllers that can be more easily implemented for the boiler-turbine units in modern power plants. For this, the model of the original multi-input multi-output (MIMO) system is first transformed into a diagonal or diagonal dominance matrix after the system is appropriately compensated. Then, various PID controller design methods for single-input single-output (SISO) systems can be easily extended to decoupled or quasi-decoupled MIMO systems. In particular, the proposed method allows the user to specify the robustness and other key performances of the system through the gain and phase margin specifications. Simulation results illustrate the efficacy of the proposed method, showing that the designed controller for a boiler-turbine unit has a reduced number of elements by a half and produces much better dynamic performances than the one designed by Tan's method.

SB2-2

Speed Control for a Permanent Magnet Synchronous Motor with an Adaptive Self-tuning Uncertainties Observer

Da Lu1, Kang Li1, and Guangzhou Zhao2

1.School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, Belfast, BT9 5AH, UK

2.College of Electrical Engineering,Zhejiang University, Hangzhou, China

This paper presents a robust speed control method for a permanent magnet synchronous motor (PMSM) drive. The controller designed from conventional _eld-oriented vector control method with constant parameters will result in an unsatisfactory performance of a PMSM due to dynamic uncertainties such as changes in load and inertia. In this paper an adaptive self-tuning (ST) observer that estimates dynamic uncertainties on-line has been developed, where output is fed forward as compensation to the PMSM torque. The stability of the ob- server is studied using the discrete-time Lyapunov theory. A performance comparison of the proposed controller with the constant parameter based conventional _eld-oriented vector controller is presented though a simulation study, which illustrates the robustness of the proposed controller for PMSMs.

SB2-3

Modelling the Effects of Operating Conditions on Motor Power Consumption in Single Screw Extrusion

Chamil Abeykoon1,?, Marion McAfee2, Kang Li3, Peter J. Martin1, Jing   Deng3, and Adrian L. Kelly4

1.School of Mechanical and Aerospace Engineering, Queen's University Belfast,UK

2.Department of Mechanical and Electronic Engineering, Institute of Technology
Sligo, Sligo, Ireland

3.School of Electronics, Electrical Engineering and Computer Science, Queen's University Belfast, UK

4.IRC in Polymer Science and Technology, School of

Engineering, Design and Technology, University of Bradford, UK

Extrusion is one of the most important production methods in the plastics industry and is involved in the production of a large number of plastics commodities. Being an energy intensive production method, process energy efficiency is of major concern and selection of the most energy efficient processing conditions is a key aim to reduce operating costs. Extruders consume energy through motor operation (i.e. drive to screw), the barrel heaters and also for cooling fans, cooling water pumps, gear pumps, screen pack changing devices etc. Typically the drive motor consumes more than one third of the total machine energy consumption. This study investigates the motor power consumption based on motor electrical variables (only for direct current (DC) motors) and new models are developed to predict the motor power consumption from easily measurable process settings for a particular machine geometry. Developed models are in good agreement with training and unseen data by representing the actual conditions with more than 95% accuracy. These models will help to determine the effects of individual process settings on the drive motor energy consumption and optimal motor energy efficient settings for single screw extruders.

SB2-4

Fast Forward RBF Network Construction Based on Particle Swarm Optimization

Jing Deng1, Kang Li1, George W. Irwin1, and Minrui Fei2

1 School of Electronics, Electrical Engineering and Computer Science,Queen's University Belfast, UK

2 Shanghai Key Laboratory of Power Station Automation Technology,School of Mechatronical Engineering and Automation,Shanghai University, Shanghai, China

The conventional forward RBF network construction methods, such as Orthogonal Least Squares (OLS) and the Fast Recursive Algorithm (FRA), can produce a sparse network with satisfactory generalization capability. However, the RBF width, as a nonlinear parameter in the network, is not easy to determine. In the aforementioned methods, the width is always pre-determined, either by trail-and-error, or generated randomly. This will inevitably reduce the network performance, and more RBF centres may then be needed to meet a desired modelling specification. This paper investigates a new forward construction algorithm for RBF networks. It utilizes the Particle Swarm Optimization (PSO) method to search for the optimal RBF centres and their associated widths. The efficiency of this network construction procedure is retained within the forward construction scheme. Numerical analysis shows that the FRA with PSO included only needs about two thirds of the computation involved in a PSO assisted OLS algorithm. The effectiveness of the proposed technique is confirmed by a numerical simulation example.

SB2-5

MMSVC: An Efficient Unsupervised Learning Approach for Large-scale Datasets

Hong Gu1, Guangzhou Zhao1 and Jianliang Zhang1

1.College of Electric Engineering, Zhejiang University, Hangzhou, China

This paper presents a multi-scale, hierarchical framework to extend the scalability of support vector clustering (SVC). Based on the multi-sphere support vector clustering, the clustering algorithm called multi-scale multi-sphere support vector clustering (MMSVC) in this framework works in a coarse-to-fine and top-down manner. Given one parent cluster, the next learning scale is generated by a secant-like numerical algorithm. A local quantity called spherical support vector density (sSVD) is proposed as a cluster validity measure which describes the compactness of the cluster. It is used as a terminate term in our framework. When dealing with large-scale dataset, our method benefits from the online learning, easy parameters tuning and the learning efficiency. 1.5 million tiny images were used to evaluate the method. Experimental results demonstrate that the method greatly improves the scalability and learning efficiency of support vector clustering.

SB2-6

Identification of Chiller Model in HVAC System Using Fuzzy Inference Rules with Zadeh's Implication Operator

Yukui Zhang1, Shiji Song1, Cheng Wu1, Kang Li2

1 Department of Automation, Tsinghua University, Beijing

2 School of Electronics, Electrical Engineering and Computer Science, Queen's University, UK

In the heating, ventilating, and air-conditioning (HVAC) system, chiller is the central part and one of the primary energy consumers. For the purpose of saving energy, the identification of the chiller model is of great significance. In this paper, based on fuzzy inference rules with Zadeh's implication operator, the model of chiller in HVAC is identified. The mean square error (MSE) is employed to evaluate the approximating capability of the fuzzy inference system. The objective of the problem is to minimize MSE. Since the Zadeh's implication operator is adopted in the fuzzy inference, the output of the system becomes a continuous but non-smooth function. In addition, the objective function contains many parameters that need to be optimized, consequently, traditional optimization algorithms based on gradient descent method fail to work. Therefore, an improved genetic algorithm (GA) is applied to minimize the MSE. Actual operational data of a chiller in HVAC are gathered to train the fuzzy inference system. Numerical experiment results validate the accuracy and efficiency of proposed fuzzy model and the improved GA algorithm.

SB2-7

Fuzzy Chance Constrained Support Vector Machine

Hao Zhang1 , Kang Li2, Cheng Wu1

1 Department of Automation, Tsinghua University, Beijing, China

2Queen's University Belfast, UK

This paper aims to improve the performance of the widely used fuzzy support vector machine (FSVM) model. By introducing a fuzzy possibility measure, we first modify the original inequality constraints of FSVM optimization model as chance constraints. We fuzzify the distance between training data and the separating hyperplane, and use a

possibility measure to compare two fuzzy numbers in forming the constraints for the FSVM model. By maximizing the confidence level we ensure that the number of misclassifications is minimized and the separation margin is maximized to guarantee the generalization. Then, the fuzzy simulation based genetic algorithm is used to solve the new optimization model. The effectiveness of the proposed model and algorithm is validated on an application to the classification of uncertainty in the hydrothermal sulfide data in the TAG region of ocean survey. The experimental results show that the new fuzzy chance constrained SVM model outperforms the original SVM model.

ROOM A

SaA1   **13:30-15:10**
RoomA
Invited session:
Intelligent modeling, monitoring, and control of complex nonlinear systems
Chair(s):   Lin-du Zhao, Li Jia

SaA1-1

An Improved Pyramid Matching Kernel

Jun Zhang1, Guangzhou Zhao1 and Hong Gu1
1 College of Electric Engineering, Zhejiang University, Hangzhou, China

The pyramid matching kernel (PMK) draws lots of researchers' attentions for its linear computational complexity while still having state-of-theart performance. However, as the feature dimension increases, the original PMK suffers from distortion factors that increase linearly with the feature dimension. This paper proposes a new method called dimension partition PMK (DP-PMK) which only increases little couples of the original PMK's computation time. But DP-PMK still catches up with other proposed strategies. The main idea of the method is to consistently divide the feature space into two subspaces while generating several levels. In each subspace of the level, the original pyramid matching is used. Then a weighted sum of every subspace at each level is made as the final measurement of similarity. Experiments on dataset Caltech-101 show its impressive performance: compared with other related algorithms which need hundreds of times of original computational time, DP-PMK needs only about 4-6 times of original computational time to obtain the same accuracy.

SaA1-2

Improved Nonlinear PCA Based on RBF Networks and Principal Curves

Xueqin Liu1, Kang Li1, Marion McAfee2, and Jing Deng1
1 School of Electronics, Electrical Engineering and Computer Science, Queen's University
2 Department of Mechanical and Electronic Engineering, Institute of Technology Sligo, Sligo,Ireland、

Nonlinear PCA based on neural networks (NN) have been widely used in different applications in the past decade.

There is a difficulty with the determination of the optimal topology for the networks that are used. Principal curves were introduced to nonlinear PCA to separate the original complex five-layer NN into two three-layer RBF networks and eased the above problem. Using the advantage of Fast Recursive Algorithm, where the number of neurons, the location of centers, and the weights between the hidden layer and the output layer can be identified simultaneously for the RBF networks, the topology problem for the nonlinear PCA based on NN can thus be solved. The simulation result shows that the method is excellent for solving nonlinear principal component problems.

SaA1-3

Application of Partical Swarm Optimization Algorithm in Field Holo-balancing

Guangrui Wen1, 2, Xining Zhang1, Ming Zhao1
1 Research Institute of Diagnostics & Cybernetics, Xi'an Jiaotong UniversityChina
2 Xi'an Shaangu Power Co., Ltd, Xi'an, Shaanxi, China

Based on the Holo-balancing theory of shaft system, a new multiobjective optimization balancing method including load mass, uniformity and maximum of the residual vibration is proposed by building a multi-objective uzzy evaluation function and application of particle swarm optimization algorithm. The advantage of the proposed method is studied by comparing with the traditional genetic algorithms optimization. And the shortcoming of influence coefficient methods failing to restrict the load mass and guaranteeing the uniformity of the residual vibration is conquered. Finally, the validity and effectiveness of the proposed method is verified through a field power generator set balancing case.

SaA1-4

Analyzing Deformation of Supply Chain Resilient System Based on Cell Resilience Model

Yong-hong Li Lin-du Zhao1
Institute of Systems Engineering, Southeast University, P.R. China

Resilience is a basic attribute of a supply chain system, and affects the core competence of the system. In the paper, based on the supply chain resilience analysis method, it built a mathematical model of supply chain resilient system with two members, and researched the changing rules of supply chain system deformation with time under the impact of sustained accumulation risks. It provided a novelty way for supply chain research. At last, a numerical simulation on the theoretic analysis was carried out by Matlab. The results showed the system deformation driven by supply chain resilience would increase gradually with some certain relationship.

SaA1-5

Multi-objective Particle Swarm Optimization Control Technology and Its Application in Batch Processes

Li JIA1，Dashuai CHENG 1，Luming Cao 1, Zongjun Cai 1, Min-Sen CHIU 2
1 Shanghai Key Laboratory of Power Station Automation

Technology, Department ofAutomation, College of Mechatronics Engineering and Automation, Shanghai University, China

2 Faculty of Engineering, National University of Singapore, Singapore

In this paper, considering the multi-objective problems in batch processes, an improved multi-objective particle swarm optimization based on pareto-optimal solutions is proposed. In this method, a novel diversity preservation strategy that combines the information on distance and angle into similarity judgment is employed to select global best and thus guarantees the convergence and the diversity characteristics of the pareto front. As a result, enough pareto solutions are distributed evenly in the pareto front. Lastly, the algorithm is applied to a classical batch process. The results show that the quality at the end of each batch can approximate the desire value sufficiently and the input trajectory converges; thus verify the efficiency and practicability of the algorithm.

SaA1-6

Online monitoring of catalyst activity for synthesis of bisphenol A

Cheng Liangcheng1 , Li Yaqin1, Yang Huizhong1, Nam Sun Wang2

1 Institute of Measurement and Process Control, Jiangnan University,Wuxi, Jiangsu, P.R. China

2 Department of Chemical & Biomolecular, University of Maryland, US

In the synthesis of bisphenol A, it is necessary to monitor the catalytic activity of ion exchanger catalyst online. A new online method to monitor the catalyst activity is proposed. Factors affecting catalyst activity are taken into consideration to compute its value using support vector machine and mathematical regression. Simulation and real operation results confirm the effectiveness of this method.

SaA2	15:30-18:10
RoomA	
Topic:	
Intelligent modeling, monitoring, and control of complex nonlinear systems	

Chair(s):   Min-Sen Chiu, Jingping Jiang

SaA2-1

Synthesis of PI–type Congestion Controller for AQM Router in TCP/AQM Network

Junsong Wang and Ruixi Yuan

Tsinghua University, Hai-dian District,Beinjing, China

Abstract. This paper considers the problem of stabilizing network using a proportional-integral (PI) based congestion controller in active queue management (AQM) router, a necessary and sufficient condition on the network is determined for the existence of stabilizing PI controllers, which will present some general guidelines for the design of a stable PI AQM controller. The complete stabilizing set in the plain of proportional-integral gains can then be drawn and identified immediately based on the presented method, rather than computed mathematically. Finally, the results are illustrated by using MATLAB simulations, which

demonstrates that it is able to choose an appropriate PI control parameter based on the stability conditions derived in this paper, to achieve satisfactory network performance.

SaA2-2

A state identification method of Networked Control Systems

JXiao-ming YU 1, Jing-ping JIANG1

1 College of Electrical Engineering, Zhejiang University, Hangzhou, China

Various control strategies achieve results in different aspects of both research and practice on Network Control Systems (NCSs). Aiming at NCSs with short delay which is less than one sampling period, from the system state identification point of view, the concept of network delay noises (NDNs) is presented, Kalman filter based on NCSs is deduced, the major factors impacting on the error variance of Kalman filter based on NCSs are explained, convergence formula of error variance of a priori estimate and convergence value of error variance of a posteriori estimate are given. At last, the simulation proves that the Kalman filter based on NCSs is feasible.

SaA2-3

Stabilization Criterion Based on New Lyapunov Functional Candidate for Networked Control Systems

Qigong CHEN1, Lisheng WEI1, 2, Ming JIANG1 and Minrui FEI2

1 School of Electrical Engineering, Anhui Polytechnic University, Wuhu City, Anhui Province, P.R.China

2 Shanghai Key Laboratory of Power Station Automation Technology

School of Mechatronics and Automation, Shanghai UniversityShanghai City, P.R.China

The issue of stability criterion based on new Lyapunov functional candidate for networked control systems (NCSs) is researched, where its network transmission is connected with network-induced delay both sensor-to-controller and controller-to-actuator. The complete mathematical model of NCSs is given. The sufficient condition for asymptotical stability is derived, and the criteria of delay-dependent asymptotical stability for systems are analyzed by using new Lyapunov functional candidate and free-weighting matrices techniques. The merit of the proposed design methods lies in their less conservativeness.

SaA2-4

Development of Constant Current Source for SMA Wires Driver Based on OPA549

Yong Shao, Enyu Jiang, Quanzhen Huang, Xiangqiang Zeng

Department of Automation, School of Mechatronics Engineering & Automation, Shanghai University; Shanghai

Key Laboratory of Power Station Automation Technology, Shanghai, P. R. China

A wide output range multi-channel constant current source is designed for the research of active structural vibration control using shape memory alloy wires. The

corresponding design circuit can discharge large constant current for low voltage load and realize the precise discharging control. With digital control, the multi-channel constant current could switch each channel according to the control method with intelligent management employed. By testing, the range of current is 0～8A, within 1% control precision, while the range of operating temperature can reach -40℃~+125℃. Experiment results show that, with over-current and over-temperature protection, the designed constant current source could drive the SMA wires for smart structures, and the effects is good. The designed current source is also fit for other research that multi-channel large current supply is needed.

SaA2-5

High Impedance Fault Location in Transmission Line using Nonlinear Frequency Analysis

Min-you Chen1 , Jin-qian Zhai1, Zi-qiang Lang2*, Ju-cheng Liao3, Zhao-yong Fan3
1 State Key Laboratory of Power Transmission Equipment & System Security and New Technology, Chongqing University, Chongqing, China
2 Department of Automatic Control and Systems Engineering, University of Sheffield, Mappin Street, UK
3 Chongqing Electric Power Company

The detection and location of high impedance faults on power system has been one of the most difficult problems in power transmission and distribution systems. According to a very highly nonlinear behavior of high impedance faults, a methodology is presented to locate high impedance faults in power system. The proposed technique is based on the fact that high impedance faults in power line can make the whole system behave nonlinearly. Consequently, the location of high impedance fault can be determined by detecting the position of nonlinear component in power line systems. The effectiveness of the method has been verified through simulation studies.

SaA2-6

Batch-to-Batch Iterative Optimal Control of Batch Processes Based on Dynamic Quadratic Criterion

JIA Li1，SHI Jiping 1，Cheng Dashuai 1，Cao Luming 1，CHIU Min-Sen2
1 Shanghai Key Laboratory of Power Station Automation Technology, Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University,China;
2 Faculty of Engineering, National University of Singapore, Singapore

A novel dynamic parameters-based quadratic criterion-iterative learning control is proposed in this paper. Firstly, quadratic criterion-iterative learning control with dynamic parameters is used to improve the performance of iterative learning control. As a result, the proposed method can avoid the problem of initialization of the optimization controller parameters, which are usually resorted to trial and error procedure in the existing iterative algorithms used for the optimization of batch process. Next, we make the first attempt to give rigorous description and

proof to verify that a perfect tracking performance can be obtained. Lastly, examples are used to illustrate the performance and applicability of the proposed method.

SaA2-7

Management Information System (MIS) for Planning and Implementation Assessment (PIA) in Lake Dianchi

Longhao YE1, Yajuan YU1*, Huaicheng GUO2, Shuxia YU3
(1.Beijing Key Laboratory of Environmental Science and Engineering, School of Chemical Engineering & Environment, Beijing Institute of Technology, Beijing, China;
2.College of Environmental Sciences and Engineering, Peking University, Beijing, China;
3.College of Resource and Environment, Huazhong Agricultural University, Wuhan,China

A kind of Management Information System for Planning and Implementation Assessment (PIA-MIS) is studied. The system is applied to the Lake Dianchi Watershed. MapInfo is selected as the system platform, Access is chosen as its database. MapBasic and Visual Basic are used as secondary development tools. PIA-MIS contains five parts: user management module; research module; statistical analysis module; database management module; display and output control module. The system can not only standardize the management of data monitoring and implementation status of the water pollution prevention program of Lake Dianchi, but also simulate and forecast the pollution condition of the whole lake. The system is meaningful to the assessment, anticipation, control and supervision of water quality. It provides a dependable basis for the future decision.

SaA2-8

Integration Infrastructure in Wireless/Wired Heterogeneous Industrial Network System

Haikuan Wang 1 Weiyan Hou 2,1+ Zhaohui Qin 2 Yang Song1
1, School of Mechatronics and Automation, University Shanghai,China
2, School of Information Engineering, University Zhengzhou,China

As various wired Field-bus systems are still pervasive in present industrial and factory environments, it is very unlikely that wireless communications will be able to replace current wired Field-bus systems in many industrial environments completely. The integration of wireless and wired segment (networks) was studied in this paper. Three integration patterns on application layer, physical layer, data-link layer were discussed respectively. Then, an industrial network-oriented universal conversion infrastructure of heterogeneous network is proposed. In light of features of industrial Field-bus data communication and special requirements for real-time properties for the automation in factory environment, a mid-layer model (DCM) is presented which uses united data reflection zone instead of conventional frame forwarding. Through the building and flexible configuration of DCM modules for different wired or wireless segments, seamless access of

terminal nodes of a variety of wireless and cable networks cab be realized, and data cooperation could be attained.

ROOM B

SaB1	13:30-15:10
RoomB	
Topic:	
Advanced evolutionary computing theory and algorithms-1	

Chair(s): An Zhang, Jianguo Wang

SaB1-1

A Novel Ant Colony Optimization Algorithm in Application of Pheromone Diffusion

Peng Zhu1, Ming-sheng Zhao2, Tian-chi He3
1 Department of Information Management, Nanjing University, Nanjing, China
2 Nanjing Forest Police College, Nanjing, China
3 Nanjing University of Financial and Economics, Nanjing, China

Ant Colony Optimization (ACO) Algorithm is a novel stochastic search technology, which simulates the social behavior of ant colony. This paper firstly analyzes the shortcomings of basic ACO, then presents an enhanced ACO algorithm which is more faithful to real ants' behavior in application of pheromone diffusion. By setting up the pheromone diffusion model, the algorithm improves the collaboration among the nearby ants. The simulation results show that the proposed algorithm can not only get much more optimal solutions but also greatly enhance convergence speed.

SaB1-2

Research on Situation Assessment of UCAV Based on Dynamic Bayesian Networks in Complex Environment

Lu Cao, An Zhang, Qiang Wang
Department of Electronic and Information, Northwestern Ploytechnical University, China

UCAV is an inevitable trend of the future intelligent and uninhabited flight platform. Situation assessment (SA) is an effective method to solve the problem of the autonomous decision-making in UCAV investigation. The concepts, contents and process of SA are put forward and the methods about the implementation of SA are analyzed. Then the concept and inference of dynamic Bayesian networks (DBN) are introduced, and SA configuration of UCAV autonomous decision system is given. Finally, the SA is applied to the UCAV autonomous decision system, especially SA based on DBN is used and the model is propounded. The simulation result indicates that the inference results are consistent with the theoretical analysis. The subjectivity of the assessment is reduced and the accuracy is greatly improved.

SaB1-3

Quantum Genetic Algorithm for Hybrid Flow Shop Scheduling Problems to Minimize Total Completion Time

Qun Niu, Fang zhou, Taijin Zhou
Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronic Engineering and Automation, Shanghai University, Shanghai, China

This paper investigates the application of the quantum genetic algorithm (QGA) for Hybrid flow shop problems (HFSP) with the objective to minimize the total completion time. Since HFSP has shown to be NP-hard in a strong sense when the objective is to minimize the makespan in case of two stages, an efficient QGA is proposed to solve the problem. A real number representation is used to convert the Q-bit representation to job permutation for evaluating the solutions and quantum rotation gate is employed to update the population. Two different types of crossover and mutation operators are investigated to enhance the performance of QGA. The experimental results indicate that QGA is capable of producing better solutions in comparison with conventional genetic algorithm (GA) and quantum algorithm (QA).

SaB1-4

Re-Diversified Particle Swarm Optimization

Jie Qi, Shunan Pang College of Information Science and Techenology, Donghua University, Shanghai, China

The tendency to converge prematurely is a main limitation which affects the performacne of evolutionary computation algorithm, including particle swarm optimization (PSO). To overcome the limitation, we propose an extended PSO algorithm, called re-diversified particle swarm optimization (RDPSO). When population diversity is small, i.e., particles's velocity approches zero and the algorithm stagnates, a restart approach called diversification mechanism begins to work, which disperses particles and lets them leave bad positions. Based on the diversity calculated by the particles' current positions, the algorithm decides when to start the diversification mechanism and when to return the usual PSO. We testify the performance of the proposed algorithm on a 10 benchmark functions and provide comparisons with 4 classical PSO variants. The numerical experiment results show that the RDPSO has superior performace in global optimization, especially for those complex multimodal functions whose solution is difficult to be found by the other tested algorithm.

SaB1-5

Optimal tracking performance for unstable processes with NMP zeroes

Jianguo Wang1,1,2, Shiwei Ma1,2, Xiaowei Gou1,2, Ling Wang1,2, Li Jia1,2
1.Shanghai Key Lab of Power Station Automation Technology,Shanghai, China
2.School of Mechatronical Engineering and Automation, Shanghai University,China

This paper has investigated optimal tracking performance for unstable processes with non-minimum phase (NMP) under control energy constraint. Firstly, based on prime factorization of unstable process, a performance index containing tracking error and plant input energy is defined, which is represented by sensitivity function and control sensitivity function. Then, utilizing spectral factorization

to minimize the performance criterion we derive an optimal controller design method for unstable processes and furthermore study the optimal tracking performance under control energy constraint. The validity of the obtained result can be illustrated by the simulation research.

SaB1-6

Effect of the twirling frequency on firing patterns evoked by acupuncture

Yu-Liang Liu1,2*，Jiang Wang1, Wen-Jie Si1, Bin Deng1, Xi-Le Wei
1. School of Electrical Engineering and Automation, Tianjin University, Tianjin,China
2. School of Automation and Electrical Engineering, Tianjin University of Technology and Education, Tianjin,China

Acupuncture is an important component of Traditional Chinese Medicine (TCM) with a long history. Although there are a number of different acupuncture manipulations, the relationship between the evoked electrical signals and manipulations is rarely investigated. So an experiment is performed that acupuncture at Zusanli acupoint by four acupuncture manipulations with different frequency to obtain the spike trains at spinal dorsal horn, and then study the correlation between manipulations via neural system outputs. Because the neural information transmission underlies the temporal spike timing, the concepts of interspike intervals (ISI) and firing rate (FR) are introduced. First, distinguish and correlation between different twirling frequencies is obtained through ISI sequences of the evoked electrical signals. Then the variation trend of the firing rate with the twirling frequency is discussed.

SaB2	15:30-18:10
RoomB	
Topic:	
Advanced evolutionary computing theory and algorithms-2	

Chair(s): Jingqi Fu, Zhiqiang Geng

SaB2-1

Typhoon Cloud Image Enhancement by Differential Evolution Algorithm and Arc-Tangent Transformation

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2.State Key Laboratory of Remote Sensing Science, Jointly Sponsored by the Institute of Re moe Sensing Applications of Chinese Academy of Sciences and Beijing Normal University,China

This paper proposed an image enhancement method based on the differential evolution algorithm (DEA) and arc tangent transformation for typhoon cloud images. Because of the effect of sensors or other factors, the contrast of the satellite cloud images received directly by satellite was not acceptable. In view of the features of typhoon cloud images, especially the feature of gray level distribution of typhoon eye's surrounding area, this algorithm can choose the most suitable parameter for arc tangent transformation to enhance the overall contrast of eyed-typhoon cloud image. To examine the validity of the proposed method, we used the partial differential equation (PDE) based on geodesic activity contour（GAC）to extract the typhoon eye. The experimental results indicated that the proposed method could improve the overall contrast of typhoon cloud images directly, and make the typhoon eye differ distinctively from the surrounding area.

SaB2-2

Data fusion-based extraction method of energy consumption index for the ethylene industry

Zhiqiang Geng , Yongming Han, Yuanyuan Zhang, Xiaoyun Shi
1School of Information Science and Technology，Beijing University of Chemical Technology,China

The assessment target of energy consumption for ethylene equipment is based on Special Energy consumption (SEC) index currently without considering the differences among the raw materials, process technology and equipment scales. Because the standards of the traditional energy consumption statistical methods are not uniform, it affects the comparability of energy consumption. Aiming at the lack of energy consumption evaluation methods for existing ethylene industrial equipments, the data fusion method is researched to obtain the energy consumption indexes of the ethylene industrial devices. The data variance fusion method of multivariate series is proposed based on cluster analysis and variance analysis, and then consumption indexes about water, steam, electricity, fuel and virtual benchmark of SEC are extracted respectively in ethylene industrial process. It can objectively evaluate the energy consumption status of the ethylene equipments, analyze the actions and opportunities of energy saving, and then suggest the direction of the energy saving and the consumption reduction of ethylene equipments.

SaB2-3

Research on improved QPSO algorithm based on cooperative evolution with two populations∗

Longhan Cao 1, 2, Shentao Wang 1, Xiaoli Liu 1, Rui Dai 1, Mingliang Wu 1
1.Key Laboratory of Control Engineering, Chongqing Institute of Communication,Chongqing, China
2.Key Laboratory of Manufacture and Test Techniques for Automobile Parts(Chongqing University of Technology), Ministry of Education, Chongqing, China

This paper presents a Cooperative Evolutionary Quantum-behaved Particle Swarm Optimization (CEQPSO) algorithm with two populations to tackle the shortcomings of the original QPSO algorithm on premature convergence and easily trapping into local extremum. In the proposed CEQPSO algorithm, the QPSO algorithm is used to update individual and global extremum in each population; the operations of absorbing and cooperation are used to exchange and share information between the two populations. The absorbing strategy makes the worse population attracted by the other

population with a certain probability, and the cooperation strategy makes the two populations mutually exchange their respective best information. Moreover, when the two populations are trapped into the same optimum value, Cauchy mutation operator is adopted in one population. Four benchmark functions are used to test the performance of the CEQPSO algorithm at a fixed iteration, and the simulation results showed that the proposed algorithm in this paper had a better optimization performance and faster convergence rate than PSO and QPSO algorithms.

SaB2-4

Optimum Distribution of Resources based on Particle Swarm Optimization and Complex Network Theory1

Li-lan Liu, Zhi-song Shu, Xue-hua Sun, Tao Yu

Shanghai Enhanced Laboratory of Manufacturing Automation And Robotics, Shanghai University, Shanghai, China

The multi-project allocation with constrained resources problems is quite common in manufacturing industry. While relationship and data in enterprise has become complex and bulky along with the leaping development, this makes it far beyond the human experience to optimize the management. Particle Swarm Optimization (PSO) algorithm is then introduced to optimize resources allocation to products. Due to the deficiency of PSO dealing with large scale network, Complex Network theory, good at statistics but not optimization, is firstly introduced to simulate and help analyze the Collaborative Manufacturing Resource network (CMRN) as a complementation Finally, an optimization is successfully applied to the network with the results
presented. Further, these methods could be used for similar researches which
integrate PSO with complex network theory.

SaB2-5

The Model of Rainfall Forecasting by Support Vector Regression Based on Particle Swarm Optimization Algorithms

Shian Zhao1 and Lingzhi Wang2

1.Department of Mathematics and Computer Science, Baise University,Guangxi,China

2.Department of Mathematics and Computer Science, Liuz Accurate forecasting of rainfall has been one of the most important issues in hydrological research. In this paper, a novel neural network technique, support vector regression (SVR), to monthly rainfall forecasting. The aim of this study is to examine the feasibility of SVR in monthly rainfall forecasting by comparing it with back–propagation neural networks (BPNN) and the autoregressive integrated moving average (ARIMA) model. This study proposes a novel approach, known as particle swarm optimization (PSO) algorithms, which searches for SVR's optimal parameters, and then adopts the optimal parameters to construct the SVR models. The monthly rainfall in Guangxi of China during 1985–2001 were employed as the data set. The experimental results demonstrate that SVR outperforms the BPNN and ARIMA models based on the normalized mean square error (NMSE) and mean absolute percentage error (MAPE).

SaB2-6

Constraint Multi-objective Automated Synthesis for CMOS Operational Amplifier

Jili Tao, Xiaoming Chen, Yong Zhu

Ningbo Institute of Technology, Zhejiang University, Ningbo Zhejiang, China

The synthesis of CMOS operational amplifier (Op-Amp) can be translated into a constrained multi-objective optimization problem, in which a large number of specifications have to be taken into account, i.e., gain, unity gain-bandwidth (GBW),slew-rate (SR), common-mode rejection ratio (CMRR) and bias conditions. A constraint handling strategy without penalty parameters for multi-objective optimization algorithm is proposed. A standard operational amplifier is then designed, the results show the proposed methodology is very effective and can obtain better specifications than other methods.

SaB2-7

Research on APIT and Monte Carlo Method of Localization Algorithm for Wireless Sensor Networks

Wang Jia1, Fu Jingqi2

College of Mechanical and Electrical Engineering and Automation, Shanghai University,China

Traditional approximate point-in-triangulation test (APIT) localization algorithm requiring low equipped hardware, having relatively high location accuracy, is easy to implement, and widely used in wireless sensor network positioning system. However, the location accuracy of unknown node in triangle overlap region should be further improved, especially in the sparse beacons' environment, the location accuracy is seriously affected. In this paper, MC-APIT algorithm is proposed, which implements random sampling using the Monte Carlo method in the overlap region, and filters samples through the target node's RSSI (Received Signal Strength) sequence values, in order that Mathematical expectation of the sample values could converge to that of the target node'. Simulation results show that: the algorithm can reduce the sampling area and the location energy consumption, to a certain extent restrained the propagation error. Compared with APIT algorithm, the location accuracy has been markedly improved.

SaB2 -8

Quantum Immune Algorithm and Its Application in Collision Detection

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2.College of Computer science and technology, SouthWest University of Science and Technology, MianYang, SiChuan, China;

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4.Network and Data Security Key Laboratory of Sichuan

Province，China

Collision detection is very important to improve the truth and immersion in the virtual environment. Firstly the paper analyzes the problems that exist in traditional algorithms. There is no algorithm suitable to every situation, and the more complex the situations are, the more rapidly the efficiency declines. Secondly the paper analyses the problem of collision detection in theory, and then converts the problem of the collision detection to the non-linear programming problem with restricted conditions. In this paper, the definition of the distance between two objects and for which the quantum coding is given. Through the steps, such as quantum clone, quantum variation, the problem of collision detection is solved. Finally, the simulation test shows that the quantum-inspired immune algorithm has much more effective impact on solving the extreme-value problem compared to the traditional genetic algorithm. It is feasible to use the algorithm in collision detection.

ROOM C

SaC1	**13:30-15:10**
RoomC	
Topic:	
Biomedical signal processing, speech, imaging and visualization-1	

Chair(s):   Ling Xia , Weiming Zhai

SaC1-1

The Time-frequency Analysis of Abnormal ECG Signals

Lantian Song1 , Fengqin Yu1

1Jiangnan University, School of Communication and Control Engineering, Wuxi, China

ECG(electrocardiogram) signal is an important basis to diagnose heart diseases, but its a weak low-frequency non-stationary signal, and possessing noise setting strong characters, neither time-domain nor frequency-domain based methods are suitable for analyzing this signal. In this article we adopt time-frequency analysis approaches which could reflect signal both in time and frequency domains. Totally, we adopts two time-frequency approaches: Pseudo-Wigner–Ville Distribution (PWVD) and Wigner High-Order Spectra(WHOS) ,we successfully extract characters from two kinds abnormal ECG signals ,which improves our methods are effective.

SaC1-2

CUDA Based High Performance Adaptive 3DVoxel Growing for Lung CT Segmentation

Weiming Zhai, Fan Yang, Yixu Song, Yannan Zhao, and Hong Wang

1.State Key Laboratory of Intelligent Technology and Systems Computer Science and Arti¯cial Intelligence Research Devision Tsinghua National Laboratory for Information Science and Technology Department of Computer Science and Technology Tsinghua University, Beijing, China

A novel CUDA based high performance parallel voxel growing algorithm to segment 3D CT pulmonary volumes with GPU Acceleration is introduced in this paper. The optimal parameters for segmentation is dynamically iterative adjusted based on the statistical information about previous segmented regions. To avoid the disadvantage of leaking during segmentation with the conventional voxel-growing based methods, it adopts a process to mutually utilize segment results between both of lateral lung leaves, which in turn bene¯ts the discriminative segmentation on left and right lung leaves. Experiments show that the algorithms obtain accurate results with a speed about 10-20 times faster than the traditional methods on CPU, which imply that this algorithm is potentially valid for future clinical diagnosis applications.

SaC1-3

Wavelet Packet-based Feature Extraction for Brain-Computer Interfaces

Yang Banghua1, 2，Liu Li1，Zan Peng1，Lu Wenyu1

1.Shanghai Key Laboratory of Power Station Automation Technology; Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University,Shanghai, China

2.State Key Laboratory of Robotics and System (HIT), Harbin, China

A novel feature extraction method of spontaneous electroencephalogram (EEG) signals for brain-computer interfaces (BCIs) is explored. The method takes the wavelet packet transform (WPT) as an analysis tool and utilizes two kinds of information. Firstly, EEG signals are transformed into wavelet packet coefficients by the WPT. And then average coefficient values and average power values of certain subbands are computed, which form initial features. Finally, part of average coefficient values and part of average power values with larger Fisher indexes are combined to form the feature vector. Compared with previous feature extraction methods, the proposed approach can lead to higher classification accuracy.

SaC1-4

Research of Acupuncturing Based on Hilbert-Huang Transform

Xiaoxia LI1, Xiumei GUO2 ,Guizhi XU1, Xiukui Shang3

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2.Hebei Normal University of Science and Technology,Qinhuangdao,China

3.Department of Acupuncture, Tianjin University of Traditional Chinese Medicine, Tianjin, China Acupuncture is one of the first complementary and alternative medicine methods in the world. But the mechanism of the acupuncture is still a mystery, it attracts many researchers to this field. The aim of our research is to explore the regulative effects of acupuncturing Neiguan and Shenmen acupoints. In this paper, a research based on Hilbert-Huang Transform (HHT) is presented. With this method, the energy is redistributed after the acupuncture,

especially after the fourth acupuncture stimulus. It is concluded that, the acupuncture can change the distribution of the energy after several stimuli.

SaC1-5

Total Variation Regularization in Electrocardiographic Mapping

Guofa Shou1, Ling Xia1 and Mingfeng Jiang2

1.Department of Biomedical Engineering, Zhejiang University, Hangzhou, P.R. China

2.The College of Electronics and Informatics, Zhejiang Sci-Tech University, Hangzhou, P.R. China

Electrocardiographic mapping (ECGM) is to estimate the cardiac activities from the measured body surface potentials (BSPs), in which the epicardial potentials (EPs) is often reconstructed. One of the challenges in ECGM problem is its ill-posedness, and regularization techniques are needed to obtain the clinically reasonable solutions. The total variation (TV) method has been validated in keeping the sharp edges and has found some preliminary applications in ECG inverse problem. In this study, we applied and compared two algorithms: lagged diffusivity (LD) fixed point iteration and primal dual-interior point method (PD-IPM), to implement TV regularization method in ECGM problem. With a realistic heart-lung-torso model, the TV methods are tested and compared to the L2-norm regularization methods in zero- and first-order. The simulation results demonstrate that the TV method can generate better EPs compared to the zero-order Tikhonov method. Compared to the first-order Tikhonov method, the TV's results are much sharper. For the two algorithms in TV method, the LD algorithm seems more robust than the PD-IPM in ECGM problem, though the PD-IPM converges faster.

SaC1-6

Analytical solution for the forward problem of magnetic induction tomography with multi-layer sphere model

Zheng Xu, Qian Li, Wei He

State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of the Electrical Engineering, Chongqing University, Chongqing, People's Republic of China

A 4-layer sphere model of human head was built for the forward problem of Magnetic Induction Tomography(MIT). The layers represent the brain, the CFS, the skull, and the scalp, respectively. Helmholtz equation in the spherical coordinates was constructed as control equation, and the vector magnetic potential was taken as a variable, the Variable Separation Method(VSM) was used to solve the equation companying with the boundary and interface conditions. The eddy current distribution in the model was obtained. As a result, the contour line of the eddy current field was plotted, the influence of the frequency to the induced voltage was analyzed. The simulation results demonstrate that this analytical method is validated in solving the forward problem of magnetic induction tomography. It may be used as a fast calculation method to generate the sensitivity matrix of the MIT inverse problem.

SaC2   15:30-18:10
RoomC
Topic:
Biomedical signal processing, speech, imaging and visualization-2

Chair(s):   Gang Li, Jinwu Qian

SaC2-1

Dynamic Spectrum and BP Neural Network for Noninvasive Hemoglobin Measurement

Huiquan Wang, Gang Li, Zhe Zhao, Ling Lin

State Key Laboratory of Precision Measurement Technology and Instruments, Tianjin University, Tianjin, China

To minimize and hopefully to eliminate the discrepancies among the individuals and the complicated conditions during non-invasive hemoglobin measuring by near-infrared spectroscopy, the Dynamic Spectrum (DS) method was applied. DS is more accurate than the traditional method in hemoglobin non-invasively measurement, which is proved by the theoretical derivation. In vivo measurements were carried out in 60 healthy volunteers, and Back Propagation Neural Network (BP-NN) was used to establish the calibration model of hemoglobin concentration against DS data, which were preprocessed by some special algorithms. The correlation coefficient of the predicted values and the true values was 0.907, which showed that DS method can be applied as a new approach to non-invasive hemoglobin analysis by near-infrared spectroscopy.

SaC2-2

Study on Real-time control of exoskeleton knee using electromyographic signal

Jiaxin Jiang, Zhen Zhang, Zhen Wang, Jinwu Qian

School of Mechatronics Engineering and Automation, Shanghai University, Shanghai, P.R.China

This paper is concerned with control method for exoskeleton in real-time by using electromyographic signal (EMGs). EMGs is collected from normal subjects when they move their knee flexion-extension in the sagittal plane. The raw EMGs is processed and then input to a four-layer feed-forward neural network model which uses the back-propagation training algorithm. The output signal from neural network is processed by the wavelet transform. Finally，the control orders are passed to the motor controller and drive the exoskeleton knee move by the same way. In this study, the correlation coefficient is used to evaluate the effects of neural network prediction. The experimental results show that the proposed method can accurately control the movement of the knee joint.

SaC2-3

Characterization of cerebral infarction in multiple channel EEG recordings based on quantifications of timefrequency representation

Li Zhang, Chuanhong He, Wei He

State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of Electrical Engineering, Chongqing University, Chongqing,

China

In this paper, a method for characterizing cerebral infarction (CI) utilizing spontaneous electroencephalogram (EEG) is described. We obtained the time–frequency representations (TFRs) of EEG signals recorded from both normal subjects and CI patients. The corresponding characteristics were depicted by relative frequency band energy (RFBE) and Shannon entropy (SE) of TFR. Comparing with the normal subjects, the CI patients had some changes in EEG as follows: (1) delta and theta rhythms were attenuated while beta and gamma rhythms were enhanced, and the changes of delta and beta were more significant, (2) alpha was also blocked with eyes open, however the blocking action was less evident, (3) SE increase was pronounced. Consequently, the quantitative EEG methods are promising tools to provide helpful and sensitive information for the detection and diagnose of CI.

SaC2-4

Research on a Novel Medical Image Non-rigid Registration Method Based on Improved SIFT Algorithm

Anna Wang1, Dan Lv1, Zhe Wang1, Shiyao Li1
1.College of Information Science and Engineering, Northeastern University, Shenyang, China

In allusion to non-rigid registration of medical images, the paper gives a novel algorithm based on improved Scale Invariant Features Transform (SIFT) feature matching algorithm. First, Harris corner detection algorithm is used in the process of scale invariant feature extraction, so the number of right matching points is increased; with regard to the feature points detected in the scale space, an improved SIFT feature extraction algorithm with global context vector is presented to solve the problem that SIFT descriptors result in a lot of mismatches when an image has many similar regions. On this basis, affine transformation is chosen to implement the non-rigid registration, and weighted mutual information (WMI) measure and Particle Swarm Optimization (PSO) algorithm are also chosen to optimize the registration process. The experimental results show that the method can achieve better registration results than the method based on mutual information.

SaC2-5

Automatic and Reliable Extraction of Dendrite Backbone from Optical Microscopy images

Liang Xiao 1, 2, Xiaosong Yuan2, Zack Galbreath2, Badrinath Roysam2
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2.Department of Electrical, Computer, & Systems Engineering, Rensselaer Polytechnic Institute, Troy, NY ,USA

The morphology and structure of 3D dendritic backbones are the essential to understand the neuronal circuitry and behaviors in the neurodegenerative diseases. As a big challenge, the research of extraction of dendritic backbones using image processing and analysis technology has attracted many computational scientists. This paper proposes a reliable and robust approach for automatically extract dendritic backbones in 3D optical microscopy images. Our systematic scheme is a gradient vector field based skeletonization approach. We first use self-snake based nonlinear diffusion, adaptive segmentation to smooth noise and segment the neuron object. Then we propose a hierarchical skeleton points detection algorithm (HSPD) using the measurement criteria of low divergence and high iso-surface principle curvature. We further create a minimum spanning tree to represent and establish effective connections among skeleton points and prune small and spurious branches. To improve the robustness and reliability, the dendrite backbones are refined by B-Spline kernel based data fitting. Experimental results on different datasets demonstrate that our approach has high reliability, good robustness and requires less user interaction.

SaC2-6

Magnetic induction tomography: simulation study on the forward problem

Wei He, Xiaodong Song, Zheng Xu, Haijun Luo
State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of the Electrical Engineering, Chongqing University, Chongqing, People's Republic of China

Magnetic induction tomography (MIT) is a kind of electromagnetic detecting and imaging technology, which is considered to be useful for diagnoses of the intracranial hemorrhage. The forward problem is the eddy current problem which is useful for improving the resolution of the measurement system and provides basic data for the inverse problem of image reconstruction. Simulation study on the forward problem in this paper includes four parts: illustration of the concept of a new MIT system, establishment of a mathematical model for the forward problem, creation of the human brain model and image visualization of the intracranial hemorrhage. In the results, the mathematical model was established with the edge finite element method, and MIT image visualization was realized under the real human brain 3D model. This study provides a foundation for MIT in the future clinical application.

SaC2-7

Diagnosis of Liver Diseases from P31 MRS Data Based on Feature Selection Using Genetic Algorithm

Jinyong Cheng1 Yihui Liu1, Jun Sang1 , Qiang Liu2, Shaoqing Wang2
1.School of Computer Science and Information Technology, Shandong Institute of Light Industry, Jinan, Shandong, China,
2.Department of Magnetic Resonance Imaging, Shandong Medical Imaging Research Institute Jinan, Shandong, China

P31 MRS technique is important either in diagnosis or in treatment of many hepatic diseases for it can provides non-invasive information about the chemical content of the energy metabolism in cellular level. The data samples

from P31 MRS are classified into three types of hepatocellular carcinoma, hepatic cirrhosis and normal hepatic tissue using computational intelligence methods. A genetic algorithm is used as main feature selection method and the Gaussian model is selected in the mutation operation. Two classification algorithms are used which consist of fisher linear discriminant analysis and quadratic discriminant analysis. Experiments show that the application of genetic algorithm and fisher linear classifier offers more reliable information for diagnostic prediction of liver cancer in vivo. And when the cross-validation method is 10-fold model, this algorithm can improve the average recognition correction rate of three types to 94.28%.

ROOM D

| SaD1   13:30-15:10 |
| RoomD |
| Topic: |
| **Intelligent modeling, monitoring, and control of complex nonlinear systems-1** |

Chair(s):   Xiaojin Zhu, Cheol-Hong Moon

SaD1-1

Research on Steam Generator Water Level Control System Based on Nuclear Power Plant Simulator

Jianghua Guo1

1.School of Power and Mechanical Engineering, Wuhan University Wuhan, Hubei, China

Steam generator (SG) is one of the most important equipments in nuclear power plants．The water level of SG must be kept in a certain range to ensure the plants operate safely, reliably and economically. Nowadays, most SG water levels are controlled by PID in PWR plants．In this paper, the mathematical models of SG level control system are built by Matlab/Simulink; the simulation research based on the Matlab/Simulink models is conducted, too. Then, based on RINSIM simulation platform of nuclear power plant Simulator in Wuhan University，a simulation model on the SG level control system is established．The graphical modeling methods for the SG level control system are provided. By using the model，transient simulation experiments and researches with different conditions are conducted. Contrast with the Matlab/Simulink simulation models, the good preciseness and identification performance of the RINSIM models are verified.

SaD1-2

Stabilization for Networked Control Systems with Packet Dropout Based on Average Dwell Time Method

Xie Jinxia1, Song Yang1,2, Xiaomin Tu1, Fei Minrui1,2

1.School of Mechatronics Engineering and Automation, Shanghai University, Shanghai,China

2.Shanghai Key Laboratory of Power Station Automation Technology, Shanghai, China

This paper proposes a new stabilization method for network control systems with stochastic packet dropout and network-induced delays. In terms of stochastic packet dropout, the NCS is modeled as Bernoulli process with two modes. By using average dwell time method, the sufficient conditions of NCS and the state feedback controller are derived.

SaD1-3

Modeling of Real-time Double Loops System in Predicting Sintering's BTP

Cheng Wushan1

1.   Shanghai University of Engineering Science

In this paper, a double loops system, which based on the property of the large delay and time-varying of sintering process, is proposed to solve a challenging problem for building a system model of dynamic vary structure and vary weights from the given input and output data to predict the burning through point (*BTP*). A position track fuzzy controller is used to adjust the speed of sinter in outer loop, and an optimum Self-organizing Genetic Algorithms Neural Networks is also presented. The comparison of the actual process and the simulative process by OSGANN demonstrate that the performance and capability of the proposed system are superior.

SaD1-4

An Orthogonal Curvature Fiber Bragg Grating Sensor Array for Shape Reconstruction

Jincong Yi, Xiaojin Zhu, Linyong Shen,Bing Sun,Lina Jiang

1.School of Mechatronics Engineering and Automation, Shanghai University, China

2.College of Computer and Information Science, Fujian Agriculture and Forestry University,China

An orthogonal curvature fiber Bragg grating (FBG) sensor array is introduced, and it can detect the deformation and vibration of flexible structures such as rod, keel, etc. The sensor array composed of 20 sensors which were averagely distributed on four optical fibers was mounted on the body of cylindrical shape memory alloy(SMA) substrate with staggered orthogonal arrangement. By the method of calibration, the relation coefficient between curvature and wavelength shift was obtained and the curvature of sensor was calculated accordingly, then, the space shape was reconstructed with the help of the space curve fitting method based on curvature information of discrete points. In this paper, the operation principle, the design, packaging, calibration of FBG sensor array and the method of experiment were expounded in detail. The experiment result shows that the reconstructed spatial shape is lively, thus indicates that the relevant method and technology are feasible and practicable.

SaD1-5

Implementation of the PCB Pattern Matching System to detect Defects

Cheol-Hong Moon1, Hyun-Chul Jang1, and Jin-Kook Jun1

1.Gwangju University, OKins Electronics Co., Korea

FPGA-based PCB Pattern Matching System, which supports a Camera Link (Medium), was used to detect PCB defect patterns. For the automation of the vision

inspection of the PCB production process, the system was optimized by implementing the vision library in IP, which is used to produce high speed processing FPGA-based systems and to detect defect patterns. The implemented IPs comprised of Pattern Matching IP, VGA Control IP, Memory Control IP and Single Clock Processing MAD Pattern Matching IP. Xilinx was used to process the image transmitted in high speed from Digital Camera, Vertex-4 type FPGA chip. It allowed the processing of 2352(H) * 1728(V) *8Bit image data transmitted from the camera without the need for a separate Frame Grabber Board[5] in the FPGA. In addition, it could check the image data on a PC. For pattern matching, it abstracted a 480*480 area out of the image, transmitted the image to each IP and displayed the Pattern Matching output result on a TFT-LCD.

SaD1-6

A New Technique of Camera Calibration Based on X-target

Ruilin Bai1, Jingjing Zhao 1, Du Li 1, Wei Meng1
1.Research Institute of Intelligent Control, Jiangnan University, China

A new technique of camera calibration based on X-target is proposed. Calibration steps include: judging gray saturation, adjusting verticality between optical axis and object surface, two-dimensional plane camera calibration. In the calibration process, the improved Harris operator and spatial moment are used to detect sub-pixel X-target corners, and the accuracy achieves up to 0.1 pixels. It does not need to calculate the specific internal and external camera parameters, and only calculates the relations of world coordinates and image pixel coordinates, and the distortion model. The method has better accuracy and stability, and has been applied in the industrial field of embedded machine vision.

SaD1-7

Application Research of the Wavelet Analysis in Ship Pipeline Leakage Detecting

Zhongbo Peng1, Xin Xie, Xuefeng Han, Xiaobiao Fan
1.College of Maritime, Chongqing Jiaotong Univercity, Chongqing China

Monitoring of ship pipeline leakage detecting is one of the most important techniques to be developed as it can help to prevent damages of ship working safe. Negative pressure wave technique is an effective method for paroxysmal fluid leakage detection and location. However, it is difficult to distinguish sources which led to the fluid pressure drop. In order to solve the problem, wavelet transform algorithm was adopted to define inflexion of the negative pressure wave when it propagates along the pipe, and wavelet threshold denoise technique was used to separate the characteristic inflexion of negative pressure wave when calculating the leaking position. A new pipeline detection and location system on the basis of that was developed.

SaD1-8

Analysis and Implementation of FULMS Algorithm Based Active Vibration Control System

Zhiyuan Gao1, Xiaojin Zhu1, Quanzhen Huang1, Enyu Jiang1, Miao Zhao1
1.School of Mechatronics Engineering and Automation, Shanghai University Shanghai, China Chongqing China

Considering the passive vibration control methods are not effective for low frequencies and will increase the size and weight of the system, an active vibration control (AVC) system is designed in this paper based on the filtered-u least mean square (FULMS) algorithm. Giving the multi-in multi-out (MIMO) FULMS controller structure and taking the configured smart beam with surface bonded lead-zirconate-titanate (PZT) patches as research object, an AVC experimental platform is established to testify the effectiveness of the proposed controller. Experimental results indicate that the designed MIMO FULMS vibration controller has a good control performance to suppress the vibration significantly with rapid convergence.

SaD2   15:30-18:10
RoomD
Topic:
1.Intelligent modeling, monitoring, and control of complex nonlinear systems-2
2.Modeling and simulation of societies and collective behaviour
3.Advanced theory and methodology in fuzzy systems and soft computing

Chair(s): Xiangpei Hu, Tongtao Li

SaD2-1

Performance analysis of industrial wireless networks based on IEEE 802.15.4a

Tongtao Li1 , Minrui Fei1,*, Huosheng Hu2
1. Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics Engineering and Automation, Shanghai University, Shanghai, China
2. School of Computer Science & Electronic Engineering University of Essex,   United Kingdom

The IEEE 802.15.4a standard provides a framework for low data rate communication systems, typically sensor networks. In this paper, we have established a realistic environment for the preliminary performance analysis of the IEEE 802.15.4a. Several sets of practical experiments are conducted to study its various features, including the effects of 1) numeral wireless nodes, 2) numeral data packets, 3) data transmissions with different upper-layer protocol. Time-delay is investigated as the most important performance metric. The results show that IEEE 802.15.4a is suitable for some industrial applications which have more relaxed throughput requirements and time-delay.

SaD2-2

A Hybrid Ant Colony Optimization and Its Application to Vehicle Routing Problem with Time Windows

Xiangpei Hu1, Qiulei Ding1, Yunzeng Wang2
1.Institute of Systems Engineering, Dalian University of Technology, China
2 A. Gary Anderson Graduate School of Management,

University of California, USA

The Ant Colony Optimization (ACO) is a recent meta-heuristic algorithm for solving hard combinatorial optimization problems. The algorithm, however, has the weaknesses of premature convergence and low search speed, which greatly hinder its application. In order to improve the performance of the algorithm, a hybrid ant colony optimization (HACO) is presented by adjusting pheromone approach, introducing a disaster operator, and combining the ACO with the saving algorithm and λ-interchange mechanism. Then, the HACO is applied to solve the vehicle routing problem with time windows. By comparing the computational results with the previous literature, it is concluded that the HACO is an effective way to solve combinatorial optimization problems.

SaD2-3

Modeling and Simulation of a Yacht Propulsion System

Yihuai HU1, Xiaoming WANG1, Huawu ZHANG1

1. Department of marine engineering，Shanghai Maritime University,Shanghai, China

This paper firstly introduces the schematic diagram of a yacht propulsion system. Mathematical models of the yacht propulsion system are then proposed including main diesel engine, reduction gearbox, hydraulic clutch and propeller. The programming of simulation software and the design of simulation hardware are described. The practical operation with this training software is also introduced, which could be used for operation skill training and certificate assessment of Yachtsmen.

SaD2-4

Two-Phase Clock Auction Design

Lanbo Miao1, 2, Jiafu Tang1

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2.China United Network communications Corpration Liaoning Branch, Shenyang, China

We propose the two-phase clock auction as a practical means for auctioning many units, a private values clock phase is followed by an interdependent values clock auction phase. The approach combines the simple and transparent price discovery of the private values clock auction with the efficiency of interdependent values clock auction. The private values clock phase is maintained as long as possible to speed up the auction process, and then is taken over to an interdependent values clock auction to improve efficiency and enhance sellers' revenues.

SaD2-5

Research on Simulation of Multi-agents Competition Model with Negotiation

Liqiao Wu1, Chunyan Yu1, Hongshu Wang1,

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To construct an artificial system with multi-Agents, it is obvious that some important factors, such as different agent's interests, limited resources and so on, will inevitably lead to conflict. To reduce conflict, it is found that effective competition with negotiation among multi-Agents can improve overall performance. Thence, this paper proposes a new Multi-Agents Competition Model with Negotiation, which improves the forecast accuracy of opponent's competing strategies with negotiation information and shortens negotiation time effectively depending on selecting strategies in probability to maximum interest.

SaD2-6

Synchronization of Ghostburster neurons under external electrical stimulation: an adaptive approach

Wei Wei 1, Dong Hai Li 2, Jing Wang 3, Min Zhu 4

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2. State Key Lab of Power Systems, Department of Thermal Engineering, Tsinghua University, Beijing, China

3. Institute of Engineering Research, University of Science and Technology Beijing, Beijing, China

4.Department of Thermal Engineering, Tsinghua University, Beijing, China

The synchronization of two Ghostburster neurons under different external electrical stimulations is considered. Firstly, the periodic and chaotic dynamical behaviors of single Ghostburster neuron under various external electrical stimulations are analysed. Then the synchronization of general master-slave chaotic systems is formulated and an adaptive controller based dynamic compensation is designed to synchronize two Ghostburster neurons. Since the adaptive controller based on dynamic compensation is utilized, the exact knowledge of the systems is not necessarily required. Asymptotic synchronization can be achieved by choosing proper controller parameters. Simulation results confirm that the adaptive control approach employed in this paper is valid in the synchronization of two Ghostburster neurons.

ROOM E

SaE1	13:30-15:10
RoomE	
Topic:	
1.Innovative education in systems modeling and simulation-1	
2.Intelligent methods in developing vehicles, engines and equipments	

Chair(s): Wenshan Wang, Li Xie

SaE1-1

Interactive Identification Method forBox-Jenkins Models

Li Xie, Huizhong Yang, and Feng Ding

Control Science and Engineering Research Center, Jiangnan University, China

This paper converts a Box-Jenkins model into two identification submodels with the system model parameters and the noise model parameters, respectively. However, the information vectors in the submodels contain unmeasurable variables, which leads the conventional recursive least squares algorithm impossible to generate the parameter estimates. In order to overcome this di±culty, the interactive least squares algorithm is derived by using the auxiliary model identification idea and the hierarchical identification principle. The simulation results indicate that the proposed algorithm has less computational burden and more accurate parameter estimation compared with the auxiliary model based recursive generalized extended least squares algorithm.

SaE1-2

Research on Nano-Repositioning of Atomic Force Microscopy based on Nano-manipulation

Sunxin1 Jinxiaoping

1. School of Mechatronics Engineering and Automation, Shanghai University, China

Nano-manipulation technology is an emerging field in the development of modern science and technology. Thus, the improvement of its positioning and repositioning precision has become each nano worker's dream and ultimate goal. However, due to the hysteresis, creep, and other nonlinearity of piezoelectric ceramics tube (PZT) as well as the probe's tip deviations caused by cantilever deformation, it leads larger error of relative displacement between probe and sample, which adds enormous inconvenience to the nano-manipulation and repositioning. The subject is to research and design a 3-D repositioning control technology to improve repositioning accuracy.

SaE1-3

Research on Expression Method of a Unified Constraint Multi-domain Model for Complex Products

Chen Guojin1, Su Shaohui1, Gong Youping1, Zhu Miaofen1

Hangzhou Dianzi University, Hangzhou, China

This paper studies the modeling method based on the unified constraint systems for complex products' designing and analyzing. The method describes the complex product's multi-domain optimization in a unified constraint model. The unified constraint expression for the product's multi-domain simulation and optimization model can implemented by the mapping mechanism transferring the physical models into the mathematical models. Aiming at designing and analyzing for the complex mechanical products of the multi-field mixture and the sub-hierarchy, the paper studies the product's associated constraints of the different areas' hierarchical relationship, the constitutive constraints expressing the product areas' constitutive relations, the body constraints describing the relationship between the association and the constitution, and the discrete constraints representing the discrete events to extract the commonality in different areas for these four constraints on the basis of the geometric constraints' representation and the physical systems' modeling. In connection with the commonality in the

constraints, the products' model formulation in the various fields is unified in the constraint level based on equations using the various structural elements' constraints based on a unified expression of mathematical equations.

SaE1-4

Auto-Creation and Navigation of the Multi-area Topological Map for 3D Large-scale Environment

Wenshan Wang, Qixin Cao, Chengcheng Deng and Zhong Liu

Research institute of Robotics, Shanghai JiaoTong Universcity, No. 800, Rd. Dongchuan Shanghai, China,

The State key Laboratory of Mechanical System and Vibration, Shanghai Jiao Tong University

The widely used topological map is quite essential to localization and navigation for mobile robot, especially in large-scale environment. In this paper, a new structure of topological map is presented and applied in robot navigation. This kind of map, compared to occupancy grid map and conventional topological map, can better represent the environment with certain features, such as multi-floor and multi-type, and reduce time and space complexity to a degree. In this case, it will be more convenient for the creation and maintenance of topological map, and the navigation based on this kind of map become more efficient and robust. Finally, certain experiments demonstrate that this approach is very effective.

SaE1-5

Research on Fire-Engine Pressure Balance Control System Based Upon Neural Networks

Xu Xiao-guang1，Shen Hong-da1

1. Department of Electrical Engineering, Anhui Polytechnic University, China

The pressure produced by the water coming out of the fire-engine pump outlet is controlled by the rotate speed of the fire pump. However, this RS is controlled through fire-engine accelerator voltage which is controlled by the ECU. In order to control and keep the fire-engine pressure balanced, it is necessary to take pressure, rotate speed and current rate as input parameters and control voltage as output parameter through BP neural network control system. Related researches indicate that BP neural network is appropriate for building the system whose target is to keep the pressure balanced. And, some modification can be done to the standard BP neural network algorithm. These modified BP neural network algorithms are BP neural network with momentum factors and self-adapting learning speed which can improve the response speed and performance of this control system dramatically.

SaE1-6

The Summary of Reconstruction method for Energy conservation and emission reduction of furnace

Wangxiaoxiao1 , Sunxin2

1. School of Mechatronics Engineering and Automation, Shanghai University, Shanghai, China
2. Shanghai University, Shanghai, China

With the raising of the third session of the CPPCC national

committee first proposal" promote the development of china's law-carbon economy on the pro- postal", the R&D and result. This article studies deeply and reconstructs cosmically the structure of the furnace, aiming at the energy saving method of the furnace's energy saving application, in order to achieve the saving of fuel as could be under the temperature of material outputting and ensuring the safety. What has been discussed above still need more proofs during the practice, achieving the best result through various kinds of technic improvement and cooperation.

SaE1-7

Osmotic Energy Conversion Techniques from Seawater

Yihuai HU 1, Juan JI 2

1. Shanghai Maritime University, Shanghai, China
2. Qingdao Harbor Vocational and Technical College, Qingdao, P. R. China

This paper firstly introduces the principles of Pressure Retarded Osmosis (PRO) and Reverse Electro Dialysis (RED). It is concluded that the RED method is more suitable than the PRO method for power generation from seawater. Theoretical analysis of RED stack is made for the design of a test RED compartment. Tests were carried out to study the relationship between produced energy power density, test compartment width and ion exchange membrane area. Experimental conclusions are drawn out at the end of the paper.

SaE2   15:30-18:10
RoomE
Topic:
1.Fuzzy, neural, and fuzzy-neuro hybrids
2.Computational methods and intelligence in modeling genetic and biochemical networks and regulation

Chair(s): Yongsheng Ding, Xin Wang

SaE2-1

Vibration Monitoring of Auxiliaries in Power Plants Based on AR (P) Model Using Wireless Sensor Networks

Tongying Li1 , Minrui Fei1,

1. School of Mechatronical Engineering & Automation, Shanghai University, Shanghai China

There are many auxiliaries with high rotating speed in a power plant, such as pumps, fans, motors and so on.To warrant their safe and reliable operation, their state of vibration has to be monitored. But because of their scattered location, the traditional way of online monitoring with shielded cable connections is costly and work expensive and the precision, reliability and safety of itinerant measurements are unable to meet the requirements of customers. A novel method of vibration monitoring for auxiliaries in power plant based on wireless sensor networks (WSN) has therefore been proposed to realize vibration data acquisition, on-line-detection and data analyzing in this paper, which meets the requirements of auxiliaries with less expenditure and

warrants safe operation in the long run. The multi-sink topological structure of WSN can improve the transmission efficiency of multi-hop network to meet the vibration test requirements of low-latency, high frequency sampling and high data throughput. The sensor node can schedule its sampling and communication time to minimize sampling frequency and communication traffic, reduce the energy consumption and prolong the lifetime of WSN according to the prediction value of the sample data probability mode.

SaE2-2

Performance Prediction for a Centrifugal Pump with splitter blades Based on BP Artificial Neural Network

Zhang Jinfeng1, Yuan Shouqi1, Shen Yanning1, Zhang Weijie1

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Based on MATLAB, a BP artificial neural network (BPANN) model for predicting the efficiency and head of centrifugal pumps with splitters were built. 85 groups of test results were used to train and test the network, where the Levenberg—Marquardt algorithm was adopted to train the neural network model. Five parameters Q , Z , β_2 , D_i , b_2 were chosen in the input layer, η and H were the output factors. Through the analysis of prediction results, the conclusion was got that, the accuracy of the BP ANN is good enough for performance prediction. And the BP ANN can be used for assisting design of centrifugal pumps with splitters. Meanwhile, the method of CFD flow field simulation was also used to predict the head and power for a centrifugal pump with splitters, and compared with that from the BPANN model. The comparison of prediction results and experimental value demonstrated that the prediction values acquired through numerical simulation and BPANN were uniform with the test data. Both methods could be used to predict the performance of low specific speed centrifugal pump with splitters.

SaE2-3

Short-Term Traffic Flow Prediction Based on Interval Type-2 Fuzzy Neural Networks

Liang Zhao 1

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In this paper, a TSK interval type-2 fuzzy neural network is proposed for predicting the short-term traffic flow. The proposed fuzzy neural network is adaptively organized from the collected short-term traffic flow data. The whole process includes structure identification and parameter learning. In structure identification, the hierarchical fuzzy clustering algorithm performs the training traffic flow data set in order to generate the network structure. After the structure identification is finished, the BP algorithm is adopted to perform the parameter learning. Then the trained fuzzy neural network is employed the collected short-term traffic flow test set and the prediction result verifies that the TSK interval type-2 fuzzy neural network has high prediction accuracy.

SaE2-4

Neural Network and Sliding Mode Control Combining Based Reconfigurable Control

Gongcai Xin1, Zhengzai Qian1, Weilun Chen1, Qiankun, Lili1

1.Department of Aerial Instrument and Electric Engineering, The First Aeronautical Institute of Air Force, China

This paper introduces a neural network adaptive control and sliding mode control combining reconfigurable control for aircraft. The control law is based on the nonlinear dynamic inversion. Sliding model control and fuzzy neural network adaptive control are used to compensate twice the inversion error induced by aircraft actuator failures. Thereby the robustness of dynamic inversion control is greatly improved, and the modeling accuracy has been solved. The simulation shows that this method is feasible.

SaE2-5

Study on Membrane Protein Interaction Networks byConstructing Gene Regulatory Network Model

Yong-Sheng Ding1,2*, Yi-Zhen Shen1, Li-Jun Cheng1, Jing-Jing Xu1

1.College of Information Sciences and Technology
2.Engineering Research Center of Digitized Textile & Fashion Technology, Ministry of Education Donghua University, Shanghai,China

At present, about a quarter of all genes in most genomes contain transmembrane (TM) helices, and among the overall cellular interactome, helical membrane protein interaction is a major component. Interactions between membrane proteins play a significant role in a variety of cellular phenomena, including the transduction of signals across membranes, the transfer of membrane proteins between the plasma membrane and internal organelles, and the assembly of oligomeric protein structures. However, current experimental techniques for large-scale detection of protein-protein interactions are biased against membrane proteins. In this paper, we construct membrane protein interaction network based on gene regulatory network model. GRN model is proposed to understand the dynamic and collective control of developmental process and the characters of membrane protein interaction network, including small-world network, scale free distributing and robustness, and its significance for biology. The proposed method is proved to be effective for the study of membrane protein interaction network. The results show that the approach holds a high potential to become a useful tool in prediction of membrane protein interactions.

SaE2-6

Impedance Measurement Method Based on DFT

Xin Wang1

1. Institute of Measurement and Process Control, Jiangnan University, China

A principle of the impedance measurement based on DFT is proposed, and an implementation of the principle is designed. The principle raises the requirement of a 2-channel simultaneous sampling. In order to satisfy the requirement with a single A/D converter, both a hardware solution and a software solution are proposed, and the latter, which in fact is a kind of software compensation, is preferred. A larger measurement range requires a larger dynamic range of the data acquisition, and thus a floating-point A/D converter is designed to substitute for a monolithic fixed-point A/D converter, because the dynamic range of a FP-ADC is much larger than that of a fixed-point one. As a digital measurement technique, the method takes full advantage of the powerful arithmetic and processing ability of a digital signal processor. Simulation experiments on two extreme cases are studied to verify the performance of the measurement system and the result curves are plotted.

SaE2-7

A 3D-shape Reconstruction Method Based On Coded Structured Light and Projected Ray Intersecting Location

Hui Chen1, Shiwei Ma*1, Bo Sun1, Zhonghua Hao1, Liusun Fu1

1.School of Mechatronic Engineering & Automation, Shanghai University, Shanghai Key Laboratory of Power Station Automation Technology, China

This paper proposes a 3D-shape reconstruction method based on coded structured light. Projecting color pseudo-random coded pattern on surface of object and using the thought of ray intersecting location, 3D shape reconstruction can be implemented by seeking the intersection point of the projection ray and the imaging ray. The former is projected ray of a feature point at projector side, and the later is image ray of the same feature point received by camera. Experimental results show that this method is effective.

SaE2-8

An Algorithm of Sphere-structure Support Vector Machine Multi-classification Recognition on the Basis of Weighted Relative Distances

Shiwei Yun1,Yunxing Shu1, Bo Ge1

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Theories on sphere-structure support vector machine (SVM) and multi-classification recognition algorithms were studied in the first place, and on this basis, in view of the issue of the difference in the hypersphere radiuses resulted from the difference in the quantity of the training samples and the discrepancy in their distributions, the concepts of relative distance and weight were introduced, and subsequently a new algorithm of sphere-structure SVM multi-classification recognition was proposed on the basis of weighted relative distances. Accordingly, the data from the UCI database were used to conduct simulation experiments, and the results verified the validity of the algorithm propose

September 19, 2010 Sunday

ROOM A

Chair(s):   Guangzhou Zhao, Ma Shiwei

SuA3-1

Multi-Innovation Generalized Extended Stochastic Gradient Algorithm for Multi-Input Multi-Output Nonlinear Box-Jenkins Systems Based on The Auxiliary Model

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Wuxi, PR China
2 Wuxi Professional College of Science and Technology, Wuxi, PR China

An auxiliary model based multi-innovation generalized ex-tended stochastic gradient algorithm is developed for multivariable non-linear Box-Jenkins systems. The basic idea is to construct an auxiliary model using the measured data and to replace the unknown terms in the information vector with their estimates, i.e., the outputs of the auxiliary model. The proposed algorithm can give high accurate parameter estima-tion compared with existing stochastic gradient algorithms. A simulation example is given.

SuA3-2

Research of Parallel-Type Double Inverted Pendulum Model Based on Lagrange Equation and LQR Controller

Jian Fan1,2, Xihong Wang1, Minrui Fei1
1 Shanghai Key Laboratory of Power Station Automation Technology,
Shanghai University, Shanghai, P.R. China
2 School of Information Science and Technology, JiuJiang University,Jiangxi Province, P.R. China

Car inverted pendulum system is often used as a benchmark for verifying the performance and effectiveness of a new control method. However, it's very unusual to use parallel-type double inverted pendulum. Based on Lagrange equation, this paper presents a novel state space model for the parallel-type double inverted pendulum system. In contrast to the modeling of traditional car inverted pendulum, the technical challenge in this system is that the analysis of the spring increases research complexity. Furthermore, this paper designs a LQR controller with the Lagrange modeling method. Simulation results are presented to demonstrate the feasibility and performance of the proposed model and controller.

SuA3-3

A consensus protocol for multi-agent systems with double integrator model

Fang Wang, Lixin Gao, Yanping Luo
Institute of Operations Research and Control Sciences, Wenzhou University, Zhejiang, China

In this paper, we present a consensus protocol for continuous-time multi-agent systems with ¯xed and switching topologies. The agent dynamics is expressed in the form of a double integrator model. The consensus protocol is provided based on the information of each agent's neighbors. By using the graph theory and the Lyapunov function, a suficient condition is obtained to guarantee that each agent can follow the leader if the leader moves at an unknown constant acceleration. Finally, a numerical simulation is given to show the e®ectiveness of our theoretical results.

SuA3-4

A Production-Collaboration Model for Manufacturing Grid

Li-lan Liu, Xue-hua Sun, Zhi-song Shu, Shuai Tian, Tao Yu
Shanghai Enhanced Laboratory of Manufacturing Automation And Robotics, Shanghai University, Shanghai,China

Based on the analysis of current research on manufacturing grid (MG), a model of complex network is firstly proposed to simulate dynamic movements of resource nodes in MG. Then based on Scale-free Network and collaboration networks, with the characteristics of production collaboration and the complexity of self-organized campaign in MG taken into account, a production-collaboration model of MG, MPC Model, is described in this article. Then the formula of the distribution is deduced with mean field theory. Finally, through computer simulation, the distribution of nodes in the model shows the characteristics of power-law tail, of which the attenuation index is consistent with the results of calculated studies under certain conditions.

SuA3-5

Parallel Computation for Stereovision Obstacle Detection of Autonomous Vehicles Using GPU

Zhi-yu XU1, Jie ZHANG1
1 School of Electronics and Information Engineering, Tongji University, Shanghai, China

Due to the parallelism on general-purpose computation, the graphics processing unit (GPU) is applied in autonomous vehicles and a stereovision obstacle detection system is developed. We first perform census transform on the rectified stereo image pair; then employ the epipolar constraint to facilitate the visual correspondence matching. Based on the dense disparity map, the 3D coordinate of each pixel is calculated, according to which obstacles are identified. Furthermore,

several techniques are listed for exploring the specific functionalities of GPU to boost the overall performance. A prototype system is finally implemented and integrated in the onboard PC of autonomous vehicles. Experimental results validate the real-time accuracy under various illuminations and road conditions. Since the low level image-processings are run by GPU in parallel, the proposed design not only merits high speed and efficiency, but also frees up CPU so as to focus on the decision and control.

SuA3-6

Framework Designing of BOA for the Development of Enterprise Management Information System

Ma Shiwei1*, Kong Zhaowen1, Jiang Xuelin1, Liang Chaozu1,
1 School of Mechatronic Engineering & Automation, Shanghai Key Laboratory of Power Station Automation Technology, Shanghai University, China

This paper put forward the definition of business oriented architecture (BOA) for the development of enterprise management information system and its technical components, as well as the designing method of reusable component based on business oriented model (BOM). This method uses JDOM to generate and analyze the properties of configuration files with XML format, and realizes the interaction between basic middleware and configuration software by using AJAX. It can give different page styles using JavaScript and has properties of short period of designing and good flexibility. An example in the development of a management information system based on BOA for a machine manufacturing factory is introduced. In which, most of the components was designed with the proposed method. It manifests that the BOA framework can be a good choice to meet the needs of different customers and to reduce system development cycle.

SuA3-7

Training Support Vector Data Descriptors Using Converging Linear Particle Swarm Optimization

Hongbo Wang, Guangzhou Zhao, Nan Li
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2 Department of Automatic Control and Systems Engineering, University of Sheffield, UK
3 Chongqing Electric Power Company

It is known that Support Vector Domain Description (SVDD) has been introduced to detect novel data or outliers. The key problem of training a SVDD is how to solve constrained quadratic programming (QP) problem. The Linear Particle Swarm Optimization (LPSO) is developed to optimize linear constrained functions, which is intuitive and simple to implement. However, premature convergence is possible with the LPSO. The LPSO is extended to the Converging Liner PSO(CLPSO), which is guaranteed to always find at least a local optimum. A new mmethod using CLPSO to train SVDD is proposed. Experimental results demonstrate that the proposed method is feasible and effective for SVDD training, and its performance is better than traditional method.

SuA3-8

Research on Modeling and Simulation of an Adaptive Combat Agent Infrastructure for Network Centric Warfare

Yaozhong Zhang, An Zhang, Qingjun Xia, Fengjuan Guo
Department of Electronic and Information, Northwestern Ploytechnical University,Xi'an, China

In order to shift from platform centric warfare to Network Centric Warfare (NCW) for the military simulation, a new adaptive combat agent model is designed that with some special sub-agent advisor. The sub-agentm advisor can perform like a specialist to carry out the management of sensors, situational assessment, tactical decision-making, combat mission, and communication management. So we can demonstrate realistic and valid behaviors of military entities in a Computer Generated Forces (CGF) simulation. It provides an effective training environment to exhibit advanced coordination and cooperation capability of military units in NCW with high resolution simulation.

SuA3-9

Genetic Algorithm-based Support Vector Classification method for Multi-spectral Remote Sensing Image

Yi-nan Guo, Da-wei Xiao, Mei Yang
1 School of Information and Electrical Engineering, China University of Mining and Technology, Xuzhou, Jiangsu P. R. China

The traditional classification methods based on asymptotic theory for multi-spectral remote sensing image need the infinite training samples, which is impossible to be satisfied. Support vector classification (SVC) method based on small samples overcome above difficulty. However, the values of hyper-parameters in SVC directly determine the method's performance, which are randomly selected. In order to obtain the optimal parameters, genetic algorithms (GAs) are introduced. Experimental results indicate that this method can not only save time for classification, but also improve the generalization of the SVC model.

SuA3-10

Grids-based Data Parallel Computing for Learning Optimization in a Networked Learning Control Systems

Lijun Xu*, Minrui Fei1,†, T C Yang2 , Wei Yu3
1 Shanghai Key Laboratory of Power Station Automation Technology,
Shanghai University, Shanghai, China
2 University of Sussex, UK
3 CSK Systems(Shanghai) Co., LTD, Shanghai, China

This paper investigates a fast parallel computing scheme for the leaning control of a class of two-layered Networked Learning Control Systems (NLCSs). This class of systems is subject to imperfect Quality of Service (QoS) in signal transmission, and requires a real-time fast learning. A parallel computational model for this task is established in the paper. Based on some of grid computing technologies and optimal scheduling, an effective scheme is developed

to make full use of distributed computing resources, and thus to achieve a fast multi-objective optimization for the learning task under study. Experiments of the scheme show that it indeed provides a required fast on-line learning for NLCSs.

SuA4	15:50-18:10

RoomA
Topic:
1.Autonomy-oriented computing and intelligent agents
2. Advanced theory and methodology in fuzzy systems and soft computing
Chair(s): Dajun Du, Xianxia Zhang

SuA4-1

A New Distributed Intrusion Detection Method Based on Immune Mobile Agent

Yongzhong Li1, Chunwei Jing1, Jing Xu2
1 School of Computer Science and Engineering, Jiangsu University of Science and Technology Zhenjiang ,China
2 College of Information Engineering,Yancheng Institute of technology,Yancheng, China

Intrusion detection system based on mobile agent has overcome the speed-bottleneck problem and reduced network load. Because of the low detection speed and high false positive rate of traditional intrusion detection systems, we have proposed an immune agent by combining immune system with mobile agent. In the distributed intrusion detection systems, the data is collected mostly using distributed component to collect data sent for processing center. Data is often analyzed in the processing center. However, this model has the following problems: bad real time capability, bottleneck, and single point of failure. In order to overcome these shortcomings, a new distributed intrusion detection method based on mobile agent is proposed in this paper by using the intelligent and mobile characteristics of the agent. Analysis shows that the network load can be reduced and the real time capability of the system can be improved with the new method. The system is also robust and fault-tolerant. Since mobile agent only can improve the structure of system, dynamic colonial selection algorithm is adopted for reducing false positive rate. The simulation results on KDD99 data set have shown that the new method can achieve low false positive rate and high detection rate.

SuA4-2

Single-Machine Scheduling Problems with Two Agents Competing for Makespan

Guosheng Ding1;2 and Shijie Sun1
1 Department of Mathematics, Shanghai University, Shanghai, China
2 School of Science, Nantong University, Nantong, China
This paper considers the single-machine scheduling problems in which two distinct agents are concerned. Each agent has a set of jobs with di®erent release times, and both of them expect to complete their respective jobs as early as possible. We take the makespan of each agent as its own criterion and take the linear combination of the two

makespans as our objective function. In this paper, both o®-line and on-line models are considered. When preemption is allowed, we present an exact algorithm for the o®-line model and an optimal algorithm for the on-line model. When preemption is not allowed we point out that the problem is NP-hard for the o®-line model and give a $(2+1=\mu)$-competitive algorithm for the on-line model. We also prove that a lower bound of the competitive ratio for the later model is $1 + \mu=(1 + \mu)$, where μ is a given factor not less than 1 .

SuA4-3

Multi-Agent Asynchronous Negotiation based on Time-Delay

LiangGui Tang1, Bo An2
1 College of Computer Science and Information Engineering, Chongqing Technology and
Business University, Chongqing, P.R. China,
2 Dept. of Computer Science, University of Massachusetts, Amherst, USA
In the Electronic Commerce applications based on MAS (Multi-Agent Systems) etc., because every agent may have different negotiation strategy, reasoning mode, and that for diverse negotiation offers, the time spending in strategy computing, resource allocation and information transmission of the agent are different, so that one to many negotiation generally is asynchronous or with time-delay. This paper puts forward a mechanism with time-delay for one to many negotiation and give a negotiation control mode of multi-agents; considering the aspects of this negotiation including time dependent, opponent influence and other negotiation threads, this paper analyzes the negotiation flow for one to many negotiation with time-delay, designs sub-negotiation strategies for multi-agents; and then discusses when to offer in one to many negotiation with time-delay; brings forward a method for determining the number of negotiation opponents. The research of one to many negotiation with time-delay will improve its applicability and make agent-based automatic negotiation satisfy the needs of practical application. Experimental results validate the correctness and validity of our methods.

SuA4-4

An incremental manifold learning algorithm based on the small world model

Lukui Shi1, Qingxin Yang2, Enhai Liu1, Jianwei Li1, Yongfeng Dong1
1 School of Computer Science and Engineering, Hebei University of Technology, Tianjin, China
2 School of Electrical Engineering and Automation, Tianjin Polytechnic University, Tianjin, China

Manifold learning can perform nonlinear dimensionality reduction in the high dimensional space. ISOMAP, LLE, Laplacian Eigenmaps, LTSA and Multilayer autoencoders are representative algorithms. Most of them are only defined on the training sets and are executed as a batch mode. They don't provide a model or a formula to map the new data into the low dimensional space. In this paper, we

proposed an incremental manifold learning algorithm based on the small world model, which generalizes ISOMAP to new samples. At first, *k* nearest neighbors and some faraway points are selected from the training set for each new sample. Then the low dimensional embedding of the new sample is obtained by preserving the geodesic distances between it and those points. Experiments demonstrate that new samples can effectively be projected into the low dimensional space with the presented method and the algorithm has lower complexity.

SuA4-5

An Automatic Thresholding for Crack Segmentation Based on Convex Residual

Chunhua Guo, Tongqing Wang
The Key Laboratory of Optoelectronic Technology & Systems of the Ministry of Education,
Chong Qing University, Chong Qing, China

Automatic thresholding segmentation has been widely used in machine vision detection. From no crack defect images to crack defect images on the beam surface of straddle-type monorail, the proportion of crack is zero or small comparing to the background, so the histogram distribution is unimodal or close to unimodal. The Otsu method can be successful if the histogram is bimodal or multimodal, but it provides poor results for unimodal distribution. In this paper, a segmentation approach based on convex residual is proposed, according to the convexity and concavity of histogram of detected image, the gray value which is the maximal value of convex residual joining with betweenclass variance is the threshold, experimental results show that the segmentation performance is superior to the Otsu method and the valley-emphasis method.

SuA4-6

A Combined Iteration Method for Probabilistic Load Flow Calculation Applied to Grid-connected Induction Wind Power System

Xue Li, Jianxia Pei, and Dajun Du
Department of Automation, Shanghai University, Shanghai, China

Taking into account the uncertainties of load and wind power outputs, this paper proposes a combined iteration method for probabilistic load flow (PLF) applied to grid-connected induction wind power system. A probabilistic wind farm model is first developed. Then, the slip of induction generator along with the nodal voltages is corrected at each iteration of the PLF calculation, leading to a novel unified PLF iteration method for wind power generation system. Finally, Monte Carlo simulation (MCS) combined with Latin hypercube sampling (LHS) is used to perform the PLF. Simulation results show the effectiveness of the proposed method.

SuA4-7

Associated-conflict Analysis using Covering Based on Granular Computing

Shuang Liu, Jiyi Wang, Huang Lin
Institute of Artificial Intelligence and Parallel Computing, Zhejiang Normal University,
Jinhua, Zhejiang, P.R.China

Conflicts are ubiquitous phenomena in our society, and the research on them is very important both practically and theoretically. Many mathematical models and methods of conflict have been studied and proposed. In this paper, associated-conflict is introduced, and a reasonable and

comprehensive approach to its analysis, using covering based on granular computing, is outlined. The model of associated-conflict analysis, given by the example of service-resource, will provide more profound insight for the conflict resolution in different fields.

SuA4-8

Inspection of Surface Defects in Copper Strip based on Machine Vision

Xue-Wu Zhang, Li-Zhong Xu, Yan-Qiong Ding, Xin-Nan Fan,
Li-Ping Gu, Hao Sun
Computer and Information College, Hohai University, Nanjing, China

Though copper products are important raw materials in industrial production, there is little domestic research focused on copper strip surface defects inspection based on automated visual inspection. According to the defect image characteristics on copper strips surface, a defect detection algorithm is proposed on the basis of wavelet-based multivariate statistical approach. First, the image is divided into several sub-images, and then each sub-image is further decomposed into multiple wavelet processing units. Then each wavelet processing unit is decomposed by 1-D db4 wavelet function. Then multivariate statistics of Hotelling T^2 are applied to detect the defects and SVM is used as defect classifier. Finally, the defect detection performance of the proposed approach is compared with traditional method based on grayscale. Experimental results show that the proposed method has better performance on identification, especially its application in the ripple defects can achieve 96.7% accuracy, which was poor in common algorithms.

SuA4-9

BIBO Stability of Spatial-temporal Fuzzy Control System

Xianxia Zhang1, Meng Sun1, and Guitao Cao2
1 Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics and Automation, Shanghai University，Shanghai, China
2 Software Engineering Institute, East China Normal University, Shanghai, China

Three-dimensional fuzzy logic controller (3-D FLC) is a novel FLC developed recently for spatially-distributed systems. In this study, the BIBO stability issue of the 3-D fuzzy control system is discussed. A sufficient condition is derived and provided as a useful criterion for the controller design of the 3-D FLC. Finally, a catalytic packed-bed reactor is presented as an example of spatially-distributed process to demonstrate the effectiveness of the controller.

ROOM B

SuB3　　　　　　　　　　　　　　　　　　　　**13:30-15:10**
RoomB
Topic:
Advanced neural network and fuzzy system theory and algorithms

Chair(s):　Shujuan Wang，Fang JIA

SuB3-1

An Artificial Bee Colony with Random Key for Resource-Constrained Project Scheduling

Yan-jun Shi1, Fu-Zhen Qu1, Wang Chen2, Bo Li2
School of Mechanical Engineering,
1.Dalian University of Technology, Dalian, P.R. China
2.China North Vehicle Research Institute Beijing, P.R. China

This paper proposes an artificial bee colony (ABC for short) algorithm with random key for resource-constrained project scheduling (RCPSP for short) in real time. Aim at resource saving by the activities, the RCPSP problem attempts to obtain a feasible schedule minimizing the makespan. We modified the artificial bee colony algorithm (named by ABC-RK) for this problem, where the problem representation was based on random key, and a heuristic priority rule to assign activities was also employed. The preliminary experimental results showed the effectiveness of the ABC-RK algorithm.

SuB3-2

Combined Electromagnetism-Like Mechanism Optimization Algorithm and ROLS with D-Optimality Learning for RBF Networks

Fang JIA1, Jun WU2
Department of Control Science and Engineering, Zhejiang University, Hangzhou, Zhe Jiang, China

The paper proposed a new self-constructed radial basis function network designing method via a two-level learning hierarchy. Aiming at getting stronger generalization ability and robustness, an integrated algorithm which combines the regularized orthogonal least square with learning with Doptimality experimental design method was introduced at the lower level, while electromagnetism-like mechanism algorithm for global optimization was employed at the upper level to search the optimal combination of three important learning parameters, i.e., the radial basis function width, regularized parameter and D-optimality weight parameter. Through simulation results, the effectiveness of the proposed algorithm was verified.

SuB3-3

Stochastic Stability and Bifurcation Analysis on Hopˉeld Neural Networks with Noise

Xuewen Qin, Zaitang Huang ?, and Weiming Tan
School of Mathematics and Physics, Wuzhou University, Wuzhou , P. R. China

Abstract. A stochastic di®erential equation modelling a Hopˉeld neu-ral network with two neurons is investigated. Its dynamics are studied in terms of local stability analysis and Hopf bifurcation analysis. By analyzing the Lyapunov exponent, invariant measure and singular boundary theory , its nonlinear stability is investigated and Hopf bifurcations are demonstrated. The stability and direction of the Hopf bifurcation are determined from the dynamical and phenomenological points of view.

SuB3-4

EMD-TEO Based Speech Emotion Recognition

Xiang Li1, Xin Li1,2,3,*, Xiaoming Zheng1,Dexing Zhang1
1 .School of Mechatronical Engineering & Automation, Shanghai University, Shanghai
2 .State Key Laboratory of Robotics and System, HIT
3 .Shanghai Key Laboratory of Power Station Automation Technology

Speech emotion recognition is an important issue in the development of human-robot interactions (HRI). This paper describes the realization of emotional interaction for an intelligent emotional robot, focusing on speech emotion recognition. The empirical mode decomposition based signal reconstruction method is utilized to conduct the feature extraction. With this approach, a novel feature called SMFCC was proposed. Afterwards, two improvements were carried out and novel features were obtained to further increase the recognition rate. One is using the linear weighting rule defined is this paper, while the other is combination with the teager energy operator. In the experiments, seven status of emotion were selected to be recognized and the highest 81.43% recognition rate was achieved. The numerical results indicate that the proposed features are robust and the performance of speech emotion recognition is improved substantially.

SuB3-5

A Novel Fast Algorithm Technique for Evaluating Reliability indices of Radial Distribution Systems

Mohammoud.M.Hadow1.1 , Ahmed.N.Abd Alla1,
and Sazali P. Abdul Karim 1 ,
1.University Malaysia pahang, Faculty of Electrical and Electronics Engineering, Malaysia

. The majority of outage events experienced by customers are due to electrical distribution failures. Increasing network reliability is a necessity in order to reduce interruption events.Various schemes of distribution systems, such as radial, ring, flower, complex, etc., exist in practice, and one can establish the degree of reliability at which a particular configuration serves its customers only by performing a quantitative reliability performance assessment of the different configurations This paper presents a new algorithm for distribution power system reliability evaluation indices based on shortest path from any node to the system energy source, which can be used in complex radial distribution systems. The location and type of protection device has been identified. Then based on type and respective location of the devices to each other, reliability evaluation is performed. The developed algorithm has been tested on a number of test systems and the results presented show the effectiveness and

applicability of the approach.

SuB3-6

An improved adaptive slidng mode observer for sensorless control of PMSM

1Ran Li, 1Guangzhou Zhao

1.College of Electrical Engineering ,Zhejiang University, Hangzhou , China

In this paper, an improved adaptive sliding mode observer is presented for achieving sensorless vector control of permanent magnet synchronous machine. Compared to conventional sliding mode observer, the proposed observer based on sliding mode observer and model reference adaptive system can effectively improve the precision of the rotor position estimation. The simulation and experiment results show that the improved adaptive sliding mode observer is feasible and effective.

SuB3-7

Clustering-based Geometric Support Vector Machines

Jindong Chen1, Feng Pan1

1.Jiangnan University, School of Communication and Control Engineering, Wuxi, China

Training a support vector machines on a data set of huge size may suffer from the problem of slow training. In this paper, a clustering-based geometric support vector machines (CBGSVM) was proposed to resolve this problem, initial classes are got by k-means cluster, then develop a fast iterative algorithm for identifying the support vector machine of the centers of all subclasses. To speed up convergence, we initialize our algorithm with the nearest pair of the center from opposite classes, and then use an optimizationbased approach to increment or prune the candidate support vector set. The algorithm makes repeated passes over the centers to satisfy the KKT constraints The method speeds up the training process fast comparing with standard support vector machines under the almost same classification precision.

SuB3-8

A Fuzzy-PID Depth Control Method with Overshoot Suppression for Underwater Vehicle

Zhijie Tang, Luojun and Qingbo He

School of Mechatronics Engineering and Automation, Shanghai University,Shanghai, China.

This paper presents an underwater vehicle depth fuzzy-PID control method based on overshoot prediction. The underwater vehicle in the shallow waters is affected by the inevitable surge. In order to achieve reliable and stable depth control, this paper realizes the depth and overshoot forecasts by calculating quadratic equation with depth error acceleration and depth error change rate to derive the overshoot time possibility. With this time possibility and depth error, the fuzzy controller calculates the PID controller parameters, and then the underwater vehicle completes the fast and non-overshoot depth control. The simulation results show that the method is effective and feasible.

SuB3-9

Local Class Boundaries for Support Vector Machine

Guihua Wen and Caihui Zhou and Jia Wei and Lijun Jiang

South China University of Technology,Guangzhou, China

The support vector machine (SVM) has proved e®ective in classi¯cation.However,SVM easily becomes intractable in its memory and time requirements to deal with the large data, and also can not nicely deal with noisy, sparse, and imbalanced data. To overcome these issues this paper presents a new local support vector machine that ¯rst ¯nds k nearest neighbors from each class respectively for the query sample and then SVM is trained locally on all these selected nearest neighbors to perform the classi¯cation. This approach is e±cient,simple and easy to implement. The conducted experiments on challenging benchmark data sets validate the proposed approach in terms of classi¯cation accuracy and robustness.

SuB3-10

Research on Detection and Material Identification of Particles in the Aerospace Power

Shujuan Wang1, Rui Chen1, Long Zhang1 and Shicheng Wang2

1.School of Electrical Engineering and Automation, Harbin Institute of Technology,Harbin, P. R. China

2 Army Aviation Institute of PLA, , Beijing, P. R. China

The aerospace power is widely used in the aerospace system. Its reliability directly affects the safety of the whole system. However, the particles generated in the production process usually cause failures to the aerospace power. In this paper, a novel automatic detection method for particles in the aerospace power is proposed based on Particle Impact Noise Detection (PIND) test. Firstly, stochastic resonance algorithm is presented to detect the existence of tiny particles. Secondly, in order to obtain the sources of particles, wavelet packet transform is used to extract energy distribution vectors of different material particles, and Learning Vector Quantization (LVQ) network is brought in for material identification of particles. Finally, the results indicate that the accuracy meets the requirements of practical application.

SuB4	15:50-18:10
RoomB	
Topic:	
1 .Advanced neural network and fuzzy system theory and algorithms	
2. Modeling and simulation of societies and collective behaviour	
3. Biomedical signal processing, imaging, and visualization	

Chair(s):   Jiafu Tang, Min-you CHEN

SuB4-1

The Design of Predictive Fuzzy-PID Controller in Temperature Control System of Electrical Heating Furnace

Ying-hong DUAN

College of Electronic Information and Automation, Tianjin University of Science &Technology,Tianjin, China

An electrical heating furnace temperature control system is characterized by large inertia, pure time-delay and parameters time-varying which needs a long time to control with conventional control methods. It is hard to meet the technical requirements. An improved Smith predictive fuzzy-PID composite control method is therefore presented. A mathematic model of the electrical heating furnace temperature control system is established and the structure of the improved Smith predictive fuzzy PID controller and the method of generating fuzzy control rules are introduced. The simulation result shows that the control system may reduce the overshoot, shorten the time to stabilize, improve control accuracy, and work well for the electrical heating furnace system.

SuB4-2

Stability analysis of an impulsive Cohen-Grossbergtype BAM neural networks with time-varying delays and diffusion terms

Qiming Liu1 , Rui Xu, Yanke Du
Institute of Applied Mathematics, Shijiazhuang
Mechanical Engineering College, Shijiahzuang, China

An impulsive Cohen-Grossberg-type BAM neural network with timevarying delays and diffusion terms is investigated. By using suitable Lypunov functional and the properties of M-matrix, sufficient conditions to guarantee the uniqueness and global exponential stability of the equilibrium solution of such networks are established.

SuB4-3

Characterizing Multiplex Social Dynamics with Autonomy Oriented Computing

Lailei Huang and Jiming Liu
Department of Computer Science, Hong Kong Baptist University,China

Multiplexity, or the fact that people interact through different social contexts with different purposes, is one of the most fundamental characters of social interactions. However, it is rarely addressed in both empirical study and theoretical modeling. In this paper, we intend to address this gap by proposing an autonomy-oriented model that captures the multiplexity of social interactions in two specific contexts: (1) cultural interaction and (2) social resource sharing. The experimental results demonstrate that the positive feedback in local cultural interaction together with the autonomous behavior in resource sharing can clearly capture the emergent multiplex effects, i.e. the nonlinear effect of resource utilization performance corresponds to different level of cultural diversity and cultural support tendency. Therefore, our method offers an alternative view to characterize social behavior and social interactions.

SuB4-4

**A computational method for groundwater flow through industrial waste
by use of digital color image**

Takako Yoshii1 and Hideyuki Koshigoe2
1. Graduate School of Engineering, Chiba University, Japan
2.Faculty of Engineering, Department of Urban Environment Systems,Chiba University, Japan

n this article we propose a computational method coupled with the digital color image and discuss its application to the numerical simulation of the groundwater flow through industrial wastes. The solution method combines finite difference approximations based on fictitious domain method (also called domain embedding method) and pixels which are arranged in two dimensional grid in the color image. The object is the groundwater flow through the industrial waste deposits which were dumped in Teshima Island. The mathematical model of the groundwater flow is formulated by Darcy's law, the water permeability and transmission conditions on geologic boundary surfaces. The result of numerical simulations for two dimensional groundwater flow through industrial wastes is presented.

SuB4-5

A Genetic Algorithm for Solving Patient- Priority- Based Elective Surgery Scheduling Problem

Yu Wang1, Jiafu Tang1, Gang Qu2
1.Dept of Systems Engineering, College of Information Science & Engineering, Key Lab of Integrated Automation of Process Industry, Northeastern University, Shenyang, , China
2.Hospital Affiliated with Dalian University, Dalian, , China

Surgery generates the largest cost and revenue in the hospital. The quality of operation directly affects the level of patient satisfaction and economic benefit. This paper focuses on partitioning patients into different priorities according to the state of illness, an optimization model with the aim of maximizing customer satisfaction is established under the consideration of a three-dimensional parameter constraint related patients, operating rooms and medical staffs. An Genetic algorithm is proposed with two-dimensional 0-1 encoding for solving the surgery scheduling problem with the data derived from an upper first-class hospital, the experimental results show the efficiency of the model and algorithm.

SuB4-6

A Neighborhood Correlated Empirical Weighted Algorithm for Fictitious Play

Hongshu Wang 1, Chunyan Yu*, Liqiao Wu1,
1.College of Mathematics & Computer Science, FuZhou University, Fuzhou, Fujian, China

Fictitious play is a widely used learning model in games. In the fictitious play, players compute their best replies to opponents' decisions. The empirical weighted fictitious play is an improved algorithm of the traditional fictitious play. This paper describes two disadvantages of the empirical weighted fictitious play. The first disadvantage is that distribution of the player's own strategies may be important to make a strategy as times goes. The second is that all pairs of players selected from all players ignore their neighborhood information during playing games. This paper proposes a novel neighborhood correlated empirical weighted algorithm which adopts players' own strategies

and their neighborhood information. The comparison experiment results demonstrate that the neighborhood correlated empirical weighted algorithm can achieve a better convergence value.

SuB4-7

Application of BP Neural Network in Exhaust Emission Estimatation of CAPS

Linqing Wang1 , Jiafu Tang1
1.College of System Engineering, Northeastern University, Shenyang, China

An approach is put forward in this paper to introduce environment factors into transportation system optimization management of enterprises which supply a CAPS. The method of estimatate the exhaust emission of vehicles in CAPS is presented and involves four steps. The designing BP NN(Backprogapation Neural Network), in step 1, is the main content and is for forcasting the pickup demand of CAPS as the basic study of the whole method. In part 3 the process of estimation exhaust emission of vehicles in CAPS is prensented. The case study of pickup demand forecasting in CAPS is given. According to the case study, the structure of the BP NN is proved to be correct and reasonable and can be used to forecast the pickup demand of CAPS as long as there is enough samples to train the designing network. Moreover, the further studies is proposed at last.

SuB4-8

Dynamic Behavior in A Delayed Bioeconomic Model with Stochastic Fluctuations

Yue Zhang1, Qingling Zhang1, and Tiezhi Zhang2
1. Institute of Systems Science, Northeastern University, , Shenyang,Liaoning, China
2.Institute of Design, Northeastern University, , Shenyang,Liaoning, China

The dynamic behavior of a bioeconomic model with time delay is investigated within stochastically °uctuating environment. Local stability and Hopf bifurcation condition are described on the delayed model system within deterministic environment. It reveals the sensitivity of the bioeconomic model dynamics on time delay. A phenomenon of Hopf bifurcation occurs as the time delay increases through a certain threshold. Subsequently, a stochastic model is discussed, which is established by incorporating white noise terms to the above deterministic delayed model system. With the help of numerical simulation, it can be shown that the frequency and amplitude of oscillation for the population density is enhanced as environmental driving forces increase. Keywords. Bioeconomic model system; Time delay; Hopf bifurcation; Stochastic °uctuating environment

SuB4-9

A Feature Points Matching Method Based on Window Unique Property of Pseudo-random Coded Image

Hui Chen, Shiwei Ma*, Hao Zhang, Zhonghua Hao, Junfeng Qian School of Mechatronic Engineering & Automation, Shanghai University,Shanghai Key Laboratory of Power Station Automation Technology,Shanghai, China

Proposed a method for object feature points matching used in active machine vision technique. By projecting pseudo-random coded structured light onto the object to add code information, its feature points can be easily identified exclusively taking advantage of the window unique property of pseudo-random array. Then, the 3D coordinates of object both on camera plane and code plane can be obtained by decoding process, which will provide the foundation for further 3D reconstruction. Result of simulation shows that this
method is easy to operate, calculation simple and of high matching precision for object feature points matching.

SuB4-10

A Reconstruction Method for Electrical Impedance Tomography Using Particle Swarm Optimization

Min-you CHEN, Gang HU, Wei HE, Yan-li YANG, Jin-qian ZHAI
State Key Laboratory of Power Transmission Equipment & System Security and New Technology, Chongqing University, Chongqing, China

The inverse problem of Electrical Impedance Tomography (EIT), especially for open EIT which involves less measurement, is a non-linear illposed problem. In this paper, a novel method based on Particle Swarm Optimization (PSO) is proposed to solve the open EIT inverse problem. This method combines a modified Newton－Raphson algorithm, a conductivity-based clustering algorithm, with an adaptive PSO algorithm to enhance optimal search capability and improve the quality of the reconstructed image. The results of numerical simulations show that the proposed method has a faster convergence to optimal solution and higher spatial resolution on a reconstructed image than a Newton－Raphson type algorithm.

ROOM C

<table>
<tr><td>SuC3</td><td>13:30-15:30</td></tr>
<tr><td colspan="2">RoomC
Topic:
1.Biomedical signal processing, speech, imaging and visualization-3
2.Biological and biomedical data integration, mining and visualization-1</td></tr>
</table>

Chair(s):   Qian Li, Jun Meng

SuC3-1

A New Microphone Array Speech Enhancement Method Based on AR Model

Liyan Zhang1, Fuliang Yin2, Lijun Zhang3
1.School of Electronic Engineering,Dalian JiaoTong University,Dalian ,China
2.School of Electronic and Infomation Engineering,Dalian University of Technology,Dalian ,China
3.Grace International Group,Division R&D,Montreal, Canada

This paper applies the single microphone speech

enhancement method to the microphone array speech enhancement method, and proposes a new speech enhancement method based on autoregressive model (AR). First, for the input matrix, the method adopts the generalized cross correlation method based on onset signals to estimate the time delay. Then according to the time delay information, the method calculates the linear prediction coefficient of signals received by the microphone array by means of Levinson-Durbin algorithm, and then carries out AR model speech enhancement. Finally, the method combines the enhanced speech signals to one channel output signals. The simulation results show that the proposed method can eliminate the plus noise and improve the speech quality effectively.

SuC3-2

A Forecast of RBF Neural Networks on Electrical Signals in Senecio cruentus

Jinli Ding , Lanzhou Wang

1.College of Metrological Technology and Engineering, China Jiliang University, Hangzhou, Zhejiang, China
2.College of Life Sciences,China Jiliang University, Hangzhou, Zhejiang, China

Weak electrical signals in Senecio cruentus were tested by a touching test system of self-made double shields with platinum sensors. Tested data of electrical signals denoised by the wavelet soft threshold and using Gaussian radial base function (RBF) as the time series at a delayed input window chosen at 50. An intelligent RBF forecasting model was set up to forecast the weak signals of all plants in the globe. Testing result shows that it is feasible to forecast the plant electrical signal for a short period. The forecast data is significant and can be used as preferences for the intelligent automatic control system based on the electrical signal adaptive characteristics of plants to achieve the energy saving on the production both greenhouses and or plastic lookum.

SuC3-3

Classification of Malignant Lymphomas by Classifier Ensemble with Multiple Texture Features

Bailing Zhang and Wenjin Lu

Department of Computer Science and Software Engineering Xi'an Jiaotong-Liverpool University Suzhou, Jiangsu Province, China

Lymphoma is a cancer affecting lymph nodes. A reliable and precise classification of malignant lymphoma is essential for successful treatment. Current methods for classifying the malignancies rely on a variety of morphological, clinical and molecular variables. In spite of recent progress, there are still uncertainties in diagnosis. Automatic classification of images taken from slides with hematoxylin and eosin stained biopsy samples can allow more consistent and less labor-consuming diagnosis of this disease. In this paper, three well-known texture feature extraction methods including local binary patterns (LBP), Gabor filtering and Gray Level Coocurrence Matrix (GLCM) have been applied to efficiently represent the three types of malignancies, namely, Chronic Lymphotic Leukemia(CLL), Follicular Lymphoma (FL) cells, and

Mantle Cell Lymphoma (MCL). Three classifiers of *k*-Nearest Neighbor, multiple-layer perceptron and Support Vector Machine have been experimented and the simple classifier ensemble scheme majority-voting demonstrated obvious improvement in the classification performance.

SuC3-4

Denoising of Event-Related Potential Signal Based on Wavelet Method

Zhen Wu 1, Junsong Wang 2, Deli Shen3 and Xuejun Bai3

1.Tianjin University of Technology and Education, He-xi District, Tianjin, China
2.Tsinghua University, Hai-dian District, Beinjing, China
3.Tianjin Nomal University, He-xi District, Tianjin, China

Event-Related brain Potentials (ERP) play an important role in psychology research. In most cases, the measured ERP signals are not clean, in order to extract useful information from ERP measured data, a denoising method is often required. In this paper, we present a denoising technique of ERP signal based on the wavelet transform (WT), which can decompose a signal into several scales that represent different frequency bands, allowing the representation of the temporal features of a signal at different resolutions. The denoising results revealed that the wavelet-based methods outperformed the digital filter in most cases.

SuC3-5

Predict Molecular Interaction Network of Norway Rats Using Data Integration

Qian Li and Qiguo Rong

College of Engineering, Peking University, Beijing, P.R. China

The emergence of systems biology enables us to simulate and analyze organism's microscope features from the level of genome, proteome and interactome. This article utilized data integration method to predict molecular interaction network of Norway rat following the basic principles of systems biology. This research selects microarray related with cardiac hypertrophy, and built the downstream studies on 730 differentially expressed genes.4 heterogeneous kinds of data type including microarray expression, gene sequence, subcellular localization of protein and orthologous data are selected to make the overall model more comprehensive. After processed by specific algorithms, the 4 data types are transformed to 5 types of evidence: Pearson correlation coefficient, SVM model recognition, similarities between gene sequences, distance between proteins and orthologous alignment. A widely used machine learning algorithm, support vector machines (SVM) is introduced here to help deal with single evidence preparation and multiple evidence integration. This article finds that the prediction accuracy of data integration is obviously higher than that of single evidence. Data integration promised that heterogeneous data types could enhance each other's advantages by weakening each other's disadvantages so as to deliver more objective and

comprehensive understanding of molecular interactions.

SuC3-6

The Study of Rats' Active Avoidance Behavior by the Cluster Analysis

Otar Tavdishvili2, Nino Archvadze1, Sulkhan Tsagareli1, Anna Stamateli1, Marika Gvajaia1
1.Iv. Javakhishvili Tbilisi State University, Faculty of Exact and Natural Sciences, University, Georgia
2.Institute of Cybernetics, S.Euli str. 5, 0186, Tbilisi, Georgia

Unsupervised cluster analysis is proposed for the study of active avoidance formation in three groups of albino rats: (a) Intact; (b) neocortex and (c) dorsal hippocampus lesioned. The term 'behavior vector' has been introduced to quantitatively assess the behavior of rats while learning. The proposed approach enables the assessment of active avoidance behavior in rats simultaneously by all the tested parameters and the classification of animals classify the animals into groups by their behavioral resemblance through the learning process.

SuC3-7

MS Based Nonlinear Methods for Gastric Cancer Early Detection

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1.School of Electrical Engineering, Zhejiang University, Hangzhou, China
2.Cancer Institute, The Second Hospital Affiliated to Medical College of Zhejiang University, Hangzhou,China

The mortality rate of gastric cancer (GC) ranks the 2nd among all types of cancers. The earlier it is diagnosed, the better its curative effect becomes. As a powerful analyzing technique, SELDI-TOF serves as a new approach for Gastric Mass Spectrometry (GMS) based GC early detection. This article has developed a set of nonlinear approaches for GMS to differentiate the normal persons from the GC suffers—the adapted box dimension calculation method and the clustering featured data mining method. Comparing with other popular SELDI-TOF process techniques, such as SVM, neural networks, RPS, etc, their individual particularities and perfect performance in nonlinear problem analysis, especially after featured respective working mechanism adaptation, credible outcome is well expected.

SuC3-8

The SEM Statistical Mixture Model of Segmentation Algorithm of Brain Vessel Image

Wang Xing-ce1, Xu Feng1, Zhou Ming-quan1, Wu Zhong-ke1, Liu Xin-yu2
1.College of Information Science and Technology, Beijing Normal University, Beijing, China
2.Institute of computing technology ,Chinese Academy of Science Beijing, China

The brain MRI images are processed with statistical analysis technology, and then the accuracy of segmentation is improved by the random assortment iteration .First the MIP algorithm is applied to decrease the quantity of mixing elements. Then the Gaussian Mixture Model is put forward to fit the stochastic distribution of the brain vessels and brain tissue. Finally, the SEM algorithm is adopted to estimate the parameters of Gaussian Mixture Model. The feasibility and validity of the model is verified by the experiment. With the model, small branches of the brain vessel can be segmented, the speed of the convergent is improved and local minima are avoided.

SuC3-9

Classification and diagnosis of syndromes in Chinese medicine in the context of coronary heart disease model based on data mining methods

Yong Wang, Huihui Zhao, Jianxin Chen, Chun Li, Wenjing Chuo, Shuzhen Guo, Junda Yu, Wei Wang
1. Beijing University of Chinese Medicine
2. Bei San Huan Dong Lu, Chao Yan District Beijing, P. R. China

Objective: To study on the classification and diagnostic of syndromes in Chinese medicine (TCM) based on the coronary heart disease model (CHD, myocardial ischemia) by application of clustering analysis in mathematical statistics methods. Methods: By application of combining disease with syndrome model, dynamically observed and recorded pathologic signs of animal models, a total of 172 frequencies of the signs were collected, and the variables indicators were analyzed by cluster analysis. Results: The results show that CHD model can be divided into four syndromes by cluster analysis. The four categories can cover the ratio of 71.05% models; it gets a diagnostic accuracy rate of 92.11%, which can be used as key points to diagnose various syndromes in CHD. Conclusion: Cluster analysis can help to classify the TCM syndromes reasonably and objectively. What more, it also can discover the pattern of the syndrome evolution, Thus to provide a theoretical basis for the standardization of TCM research.

SuC3-10

An image reconstruction method for Magnetic Induction Tomography：Improved Genetic Algorithm

Wei He, Haijun Luo *, Zheng Xu, Qian Li
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Magnetic induction tomography (MIT) is a new medical functional imaging technique. This paper proposes a multi-layer model of the biological tissue. And a new reconstruction method of magnetic induction tomography based on the improved genetic algorithm(GA) was introduced. The GA was improved from the following aspects: the generation of the initial population, selection, crossover and mutation operation. The simulation results indicate that the method can reflect local and large-area bleeding in the shallow of biological tissue, and construct a base for the future clinical brain disease monitoring.

SuC4	15:50-18:10
RoomC	

Topic:
1.Biological and biomedical data integration, mining and visualization-2
2.Computational intelligence in bioinformatics and biometrics-1

Chair(s): Wanquan Liu, Gang Li

SuC4-1

The Segmentation of the Body of Tongue Based on the Improved Level Set in TCM

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The segmentation of the body of tongue pays an important role for automatic tongue diagnosis in Traditional Chinese Medicine. If there are similar grayscales near the margins of the body of tongue, it is difficult to extract the body of tongue desirably with some popular methods directly. In order to overcome this difficulty, a method that combines priori knowledge with improved level set method is presented. First, the contour of tongue is initialized in the HSV color space and a method which enhances the contrast between tongue and other parts of the tongue image is introduced. Then, a new region-based signed pressure force function is proposed, which can efficiently stop the contour at weak edges. Finally, we use a Gaussian filtering process to further regularize the level set function instead of reinitializing signed distance function. Experiments by numerous real tongue images show desirable performances of our method.

SuC4-2

Transcutaneous Coupling Implantable Stimulator

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Because of low energy transmission efficiency of the transcutaneous coupling power supply device, the factors affecting inefficiency are analyzed and an implantable stimulator external powered is designed. The circuit consists of High-frequency inverter module, transcutaneous transformer and an isolated pulse generator. The circuit realizes that the polarity, amplitude, frequency and pulse width of stimulating pulses are adjustable and controllable. The distance between two transcutaneous coupling coils is the thickness of human skin, usually 5~15mm. Through practical tests at a distance of 10mm, experimental results show that the maximum transmission efficiency is 7.66% at the high-frequency carrier of 300KHz. The variable range of amplitude is between 0 and 10 voltages. The range of frequency is between 100 and 300Hz. So the designed circuit meets the demand of implantable stimulators.

SuC4-3

Simulation analysis on stimulation modes of threedimension electrical impedance tomography

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State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of Electrical Engineering, Chongqing University, Chongqing ,P.R.China

To improve the lack of information and model error of two-dimensional electrical impedance tomography (EIT), a three-dimensional EIT model is set up. Finite element method is used to calculate the forward problem. To compare different stimulation mode, distinguish ability and surface projection method are used. The result shows that back electrode mode has obvious advantages in detecting depth and in clinical use. The conclusion of this paper can provide reference for the study of three-dimensional EIT.

SuC4-4

Researches on Spatio-temporal Expressions of Intestinal Pressure Activity Acquired by the Capsule Robot

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1.School of Medical Instrument and Food Engineering, University of Shanghai for Science and Technology, Shanghai, China;
2.Department of Information Measurement Technology and Instruments, Shanghai Jiaotong University, Shanghai, China

Aim: To give researches on the spatio-temporal expressions of the intestinal pressure activity. Methods: The intestinal pressure activity was acquired by using a capsule robot invented for functional diagnosis of human gastrointestinal diseases, which collected intestinal physiological parameters as it propelled itself within the gastrointestinal tract. Results: a series of different contraction types were systematically analyzed to form the corresponding spatio-temporal expressions of the intestinal pressure activity including (1) standing contractions, (2) propagating segmental contractions, and (3) pendular contractions. Conclusions: Spatio-temporal expressions could provide a method for visualizing a temporally evolving and spatially varying intestinal pressure activity.

SuC4-5

Analysis of Chlorophyll Concentration during the Phytoplankton Spring Bloom in the Yellow Sea Based on the MODIS Data

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2.Tianjin key laboratory of marine resource and chemistry, Tianjin University of Science and Technology, Tianjin, China

The Yellow Sea is semi-enclosed shelf sea located between the mainland of China and the Korea Peninsula. It is one of the most important fishing areas in the world.

Phytoplankton bloom is defined as a relatively rapid increase in the biomass of phytoplankton. The twice bloom in spring and autumn every year is common in Yellow Sea. Chlorophyll concentration is the important parameters to estimate the phytoplankton biomass and its seasonal variation or blooms. Taking the yellow sea as an experimental site, a cruise for phytoplankton bloom was carried out in the Yellow Sea with R/V Beidou founded by 973 projects. Chlorophyll was measured by a fluorescence sensor of sea point installed on a RBR 620 CTD. Using MODIS remote sensing images, unifying the location water quality monitor data, in this paper the model of retrieval of chlorophyll concentration is built using the 250m resolution waveband 1 and 2 reflectivity combination compare with chlorophyll concentration measurements by correlation analysis and multivariate regression. Then, the distribution of chlorophyll concentration in the yellow sea is mapped based on this retrieval model. The intensity, place, process and distributed scope of this phytoplankton spring bloom reflected clearly. The results of this study show that MODIS data is useful in retrieving quantitatively chlorophyll concentration and studying on the onset of phytoplankton spring bloom and its dynamics in the yellow sea.

SuC4-6

A Novel Association Rule Mining Based on Immune Computational intelligence

Xuesong Xu ,Sichun Wang

Institute of Management Engineering, Information College of Hunan University of Commerce Changsha,China.

By inspiration of immune computational intelligence, a novel association rule mining algorithm based immune clonal and cluster was proposed. Aim at the efficiency problem of association rules mining,raw data is regarded as antigen and candidate pattern is regarded as antibody. enhancing the antibody's affinity maturation rate and improving the support of candidate patterns through the cluster competition operation. The simulation and real application illustrate this algorithm can increase the convergence velocity and advance veracity of the association rule, and has the remarkable quality of the global and local research reliability.

SuC4-7

Face Recognition via Two Dimensional Locality Preserving Projection in Frequency Domain

Chong Lu1;3, Xiaodong Liu1, and Wanquan Liu2
1.School of Electronic and Information Engineering DLUT, Dalian, China
2.Curtin University of Technology, Perth WA, 6102, Australia
3.YiLi Normal College, Yining, China

In this paper we investigate the face recognition problem via using the two dimensional locality preserving projection in frequency domain. For this purpose, we ¯rst introduce the two-dimensional locality preserving projections (2DLPP) and the two dimensional discrete cosine transform (2DDCT). Then the 2DLPP in frequency domain is proposed for face recognition. In fact, the 2DDCT is used as a pre-processing step and it converts the image signal from time domain into frequency domain aiming to reduce the e®ects of illumination and pose on face recognition. Then 2DLPP is applied on the upper left corner blocks of the global 2DDCT transform matrices of the original images, which represent the central energy of original images. For demonstration, the Olivetti Research Laboratory (ORL), YALE and FERET face datasets are used to compare the proposed approach with the conventional 2DLPP and 2DDCT approaches with the nearest neighborhood (NN) metric being used for classi¯ers. The experimental results show that the proposed 2DLPP in frequency domain is superior over the 2DLPP in time domain and 2DDCT in frequency domain.

SuC4-8

Prediction of Protein-Protein Interactions Using Subcellular and Functional Localizations

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Keylaboratory of High Con¯dence Software Technologies, Ministry of Education School of Electronic Engineering and Computer Science, Peking University, China

Protein-protein interaction (PPI) plays an important role in the living organisms, and a major goal of proteomics is to determine the PPI networks for the whole organisms. So both experimental and computational approaches to predict PPIs are urgently needed in the field of proteomics. In this paper, four distinct protein encoding methods are proposed, based on the biological significance extracted from the categories of protein subcellular and functional localizations. And then, some classifiers are tested to prediction PPIs. To show the robustness of classification and ensure the reliability of results, each classifier is examined by many independent random experiments of 10-fold cross validations. The model of random forest achieves some promising performance of PPIs.

SuC4-9

Nucleosomes are well positioned at both ends of exons

Liu Hongde, Sun Xiao
State Key Laboratory of Bioelectronics, Southeast University, Nanjing, China

Chromatin structure has an important role in gene regulation. Transcription elongation is closely coupled with the splicing in vivo in eukaryotes. In this paper, nucleosomes near splice sites are predicted for 13 specieses with curvature profile. The results indicate nucleosomes are well positioned at both ends of exons. Nucleosome at 5' end is more conserved than that at 3' end, which probably has a link with alternative splicing. The distance between nucleosome centre and splice site varies among specieses, suggesting an evolution selection. Our analysis reveals that nucleosomes positioned at both ends of exons positioning has a role not only in protecting splice sites, but also in the splicing by placing a barrier at exon ends. Moreover, it is revealed DNA sequence plays an important role in determining nucleosomes at boundary of exons.

Mo C4-10

An Evaluation of DNA Barcoding Using Genetic Programming-Based Process

Masood Zamani and David K.Y. Chiu

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The DNA barcoding is a promising technique for identifications of biological species based on a relatively short sequence of COI gene. A research area to improve the DNA barcoding is to study the classification techniques that utilize common properties of DNA and amino acid sequences such as variable lengths of gene sequences, and the comparison of different reference genes. In this study, we evaluate a classification model for DNA barcoding induced by genetic programming. The proposed method can be adapted for both DNA and amino acid sequences. The performance is evaluated by representing the two types of sequences and one based on their properties. The proposed method evaluates common significant sites on the reference genes which are useful to differentiate between species.

ROOM D

SuD3   **13:30-15:30**
RoomD
Topic:
1. **Advanced theory and methodology in fuzzy systems and soft computing**
2. **Biomedical signal processing, imaging, and visualization**
3. **Computational intelligence in utilization of clean and renewable energy resources**

Chair(s): Sean McLoone，Banghua Yang

SuD3-1

An interactive method to solve the priorities of attributes while the preferences of evaluated units are under considering

Guohua Wang1, Jingxian Chen1, Qiang Guo2, Liang Liang3

1. School of Business, Nantong University, Nantong, China
2. Tourism College, Hainan University, Haikou, China
3. School of Management, University of Science and Technology of China, China

Formerly, the preferences or attitudes of evaluated units are not under considering while the group decision methods are applied in evaluations. In this paper, a new model is proposed for solving the priorities of attributes. By simulating the decision-making process, the model uses an interactive method to optimize the priorities of attributes and determine the scores of evaluated units. An applied example given at the end of the paper shows the process of this method.

SuD3-2

Solving delay differential equations with homotopy analysis method

Qi Wang1, 3, Fenglian Fu2

1. Faculty of Applied Mathematics, Guangdong University of Technology, Guangzhou, China
2.School of Environmental Science and Engineering, Guangdong University of Technology, Guangzhou, China
3 Shenzhen Graduate School, Harbin Institute of Technology, Shenzhen, China

Delay differential equations have a wide range of application in science and engineering. They arise when the rate of change of a time-dependent process in its mathematical modeling is not only determined by its present state but also by a certain past state. In this paper, a nonlinear delay differential equation in biology was investigated. The approximation solution for the model was obtained by homotopy analysis method. Different from other analytic techniques, the homotopy analysis method provides a simple way to ensure the convergence of the solution series, so that one can always get accurate approximations. Compared with the numerical solution, the approximation solution has higher precision. It is showed that the homotopy analysis method was valid and feasible to the study of delay differential equations.

SuD3-3

EEG Classification Based on Artificial Neural Network in Brain Computer Interface

Ting Wu1, Banghua Yang2, Hong Sun3

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2.School of Mechatronics Engineering & Automation, Shanghai University, 200072,
Shanghai, China
3. School of Mechanical and Electrical Engineering, Anhui University of Architecture, Hefei, China

Aiming at the topic of electroencephalogram (EEG) pattern recognition in brain computer interface (BCI), a classification method based on probabilistic neural network (PNN) with supervised learning was presented in this paper. It applied the recognition rate of training samples to the learning progress of network parameters, The learning vector quantization is employed to group training samples and the Genetic algorithm (GA) is used for training the network's smoothing parameters and hidden central vector for determining hidden neurons. Utilizing the standard dataset I(a) of BCI Competition 2003 and comparing with other classification methods, the experiment results show that this way has the best performance of pattern recognition, and the classification accuracy can reach 93.8%, which improves over 5% compared with the best result (88.7%) of the competition. This technology provides an effective way to EEG classification in practical system of BCI.

SuD3-4

Open electrical impedance tomography: computer simulation and system realization

Wei He1, Bing Li1, Chuanhong He1, Haijun Luo1, Zheng Xu1

1.State Key Laboratory of Power Transmission Equipment

& System Security and New Technology,Chongqing University, China

Electrical impedance tomography (EIT) is a non-invasive technique used to image the electrical conductivity and permittivity within a body from measurements taken on body's surface. But the low spatial resolution of imaging, complicated operation and the asymmetrical placement of electrodes make the EIT cannot achieve the requirements of clinical application. In this paper, we proposed a novel idea of open electrical impedance tomography (OEIT) and a new type of electrode to provide more valuable distribution information of electrical impedance for local subsurface biological tissues than closed EIT. The OEIT system is constructed. The electromagnetic mathematical models of OEIT are presented and a method to solving the boundary value problem of half infinite calculating region is proposed for the computer simulations. Furthermore, we have realized the OEIT system, and completed the physics and the clinical experiments. Experiment results show that the OEIT system can obtain a better resolution and positioning accuracy, and is more suitable for clinical application.

SuD3-5

Digital Watermarking Algorithm Based onImage Fusion

Fan Zhang1,2, Dongfang Shang2, and Xinhong Zhang3
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2.College of Computer and Information Engineering, Henan University, China
3.Computing Center, Henan University,China

The process of watermarking can be viewed as a process of image fusion from the original image and the watermark image. Assuming that the watermarked image is the steady-state, Kalman filter is used as an optimal estimation algorithm in the process of image fusion. The math model is built according to the watermark image and the original image. Then the state equation and the corresponding measurement equation are built. The optimal estimation is received in the case of minimum estimation error variance. Experimental results show that the proposed algorithm has a good performance both in robustness and invisibility.

SuD3-6

The Dynamics of Quorum Sensing Mediated by Small RNAs in Vibrio Harveyi

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1.Institute of Applied Mathematics,Xuchang University, China
2.Institute of System Biology, Shanaghai University, Shanghai, China

Quorum sensing (QS)is a important process of communication, we study a mechanism induced QS by coexist of small RNA and signal molecular (AI) in this paper. We construct a mathematical model to investigate phenomenon and find that there are periodic oscillation when the time delay and hill coefficient exceed a critical value. The periodic oscillation produces the change of concentration and induces QS. In addition, we also find the this network is robust against noise.

SuD3-7

An algorithm for Reconstruction of Surface from Parallel Contours and its Section Contour Extraction in any Cutting Plane

Chun GONG1, Can TANG1, Yanhua CHENG1, Sheng CHENG1, Jianwei ZHANG1
1. Kunshan Industrial Technology Research Institute, Jiangsu, China

To obtain reconstruction of surfaces from a given contours stack, this paper presents a new algorithm based on MC-algorithm, which solves the problem that 3D surface model cannot be built because the first/last contour has no previous/next contour information, or there are only isolated contours. Meanwhile, the algorithm is applied to extracting section contour of the 3D model in any cutting plane. The algorithm does not need to do as following: traverse and rebuild each triangle of the 3D model, obtain the points of intersection with the cutting plane, and link all points of intersection to get the contour in cutting plane. The algorithm divides the cutting plane into rectangular grid and gets isoline in each marching rectangle directly, without considering the problem of connections of all points of intersection. The 2D sectional contour can be obtained directly after finishing calculating isoline in the rectangular grid.

SuD3-8

Simulation Modeling of Network Intrusion Detection Based on Artificial Immune System

YU Jing1 WANG Feng1
1. PLA Artillery Academy, China

There is much comparability between natural immune system and computer security, and the key point is how to distinguish self from other. Based on the principles and structures of artificial immune system, the simulation modeling of network intrusion detection was developed. The model consisted of many nodes that distributed across different locations. The nodes needed not be centralized controlled. The purpose of model was to distinguish between illegitimate behavior (non-self) and legitimate behavior (self). In case of finding abnormity, model could give an alarm to user.

SuD3-9

Organic Acid Prediction in Biogas Plants Using UV/vis Spectroscopic Online-Measurements

Christian Wolf1, Daniel Gaida2, André Stuhlsatz3, Seán McLoone1 and Michael Bongards2
1. National University of Ireland Maynooth, Department of Electronic Engineering, Ireland
2 .Cologne University of Applied Sciences, Institute of Automation and Industrial IT, Germany
3. Düsseldorf University of Applied Sciences, Institute for Information Technology, Department of Mechanical and Process Engineering, Germany

The concentration of organic acids in anaerobic digesters is one of the most critical parameters for monitoring and

advanced control of anaerobic digestion processes, making a reliable online-measurement system absolutely necessary. This paper introduces a novel approach to obtaining these measurements indirectly and online using UV/vis spectroscopic probes, in conjunction with powerful pattern recognition methods. An UV/vis spectroscopic probe from S::CAN is used in combination with a custom-built dilution system to monitor the absorption of fully fermented sludge at a spectrum from 200nm to 750nm. Advanced pattern recognition methods, like LDA, Generalized Discriminant Analysis (GerDA) and SVM, are then used to map the measured absorption spectra to laboratory measurements of organic acid concentrations. The validation of the approach at a full-scale 1.3MW industrial biogas plant shows that more than 87% of the measured organic acid concentrations can be detected correctly.

SuD3-10

Power Quality Disturbances Events Recognition based on S-transform and Probabilistic Neural Network Nantian Huang1, 2, Xiaosheng Liu1, Dianguo Xu1 and Jiajin Qi3

1. Department of Electrical Engineering,Harbin Institute of Technology,China,

2. College of Information and Control Engineering, Jilin Institute of Chemical Technology, China

3. Hangzhou Electric Power Bureau, State Grid Corporation of China, China

Power quality (PQ) events recognition is the most important research area of power quality control. A novel high performance classification system based on S-transform and probabilistic neural network is proposed in this paper. Firstly, S-transform processes the original PQ signals into a complex matrix named S-matrix. The time and frequency features of disturbances signal are extracted from the S-matrix. Then, the selected subset of features is used as the input vector of the classifier. Finally, the probabilistic neural network classifier is trained and tested by the simulated simples. The simulation results show the effectiveness of the new approach.

SuD4	15:50-18:10

RoomD

Topic:

1. **Computational intelligence in utilization of clean and renewable energy resources**
2. **Innovative education for sustainable energy and environment**
3. **Intelligent methods in power and energy infrastructure development**
4. **Advanced evolutionary computing theory and algorithms-1**

Chair(s): Xingsheng Gu ， Ling Wang

SuD4-1

A coordinated heat and electricity dispatching model for Microgrid operation via PSO

Li Zhong Xu1, Guang Ya Yang2, Zhao Xu3 Jacob Østergaard2, Quan Yuan Jiang1, Yi Jia Cao1

1.Department of Electrical Engineering, Zhejiang University, China

2.Centre for Electric Technology, Department of Electrical Engineering, Technical University of Denmark, Denmark

3.Department of Electrical Engineering, Hong Kong Polytechnic University, , HONG KONG, China

This paper proposes an optimization model for interconnected Microgrid with hierarchical control. In addition to operation constraints, network loss and physical limits are addressed in this model. As an important component of Microgrid, detailed combined heat and power (CHP) model is provided. The partial load performance of CHP is given by curve fitting method. Meanwhile, electric heater, which supplies heating via electricity, is considered in the model to improve economy of Microgrid operation. The proposed model is formulated into an mixed integer nonlinear optimization problem (MINLP). As an effective tool of nonlinear optimization, particle swarm optimization (PSO) is employed to optimize the operation schedule to minimize the total operational cost of Microgrid considering the jointly optimization of CHP, electric heater and heat storage. Result shows the availability of the proposed algorithm to the model and methodology.

SuD4-2

MPPT Strategy of PV System Based on Adaptive Fuzzy PID Algorithm

Jing Hui1, Xiaoling Sun1

School of IOT engineering, Jiangnan University, China

To further improve the control quality of photovoltaic generation MPPT system, dual-mode adaptive fuzzy PID control strategy was proposed in this paper. On the basis of conventional fuzzy tracking algorithm, the principle of control algorithm was analyzed and the control system was designed. The results show that dual-mode control algorithms can quickly sense the changes in the external environment, and track the maximum power point rapidly. At the same time, oscillation phenomenon near the MPP is eliminated effectively. The proposed MPPT system represents good stability, accuracy and rapidity.

SuD4-3

Optimized Approach to Architecture Thermal Comfort in Hot Summer and Warm Winter Zone

Xianfeng Huang1,1 and Yimin Lu2

1. Education Ministry Key Laboratory of Disaster Prevention and Structural Safety & College of Civil Engineering and Architecture, Guangxi University, China

2. College of Electrical Engineering, Guangxi University, China

According to the Fanger thermal comfort equations and the advantage of artificial immune algorithm in solving combinatorial optimization to engineering problems, the artificial immune algorithm has been applied to the thermal design and optimization of parameters for the HVAC (Heating, Ventilation, and Air Conditioner) within a building. Then, aiming at climate characteristics of high temperature and humidity in hot summer and warm winter zone, the interior thermal comfort objective function is deduced. Then, the

preferable range of indoor air temperatures and air velocities which meet the thermal comfort requirements under different activities and humidity is obtained by simulation. Therefore, the relationship between indoor thermal comfort and energy saving to a building is also managed to reveal. Furthermore, it is evidence that the proposed method in this paper should be employed in the criteria for thermal design to a building and control of an air conditioning system.

SuD4-4

2The Application of Computational Fluid Dynamics (CFD) in HVAC Education

Jiafang Song1 and Xinyu Li1

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In this paper, we show the application of CFD in HVAC education. In the course, it was conducted using Fluent CFD software to improve the ventilation performance in one classroom. The CFD approach provided simulation results with different numbers of fans installed in the classroom. In the CFD simulations, the models with fans or without fans were created. By comparing the different cases simulated by Fluent software, it was found that installing fans could improve the ventilation performance in the classroom effectively. It also can be seen from the CFD simulation results that the numbers of the fans and installing positions of the fans can affect the ventilation performance.

SuD4-5

Power-aware Replacement Algorithm to Deliver Dynamic Mobile Contents

Zhou Su1, and Zhihua Zhang2

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2. Department of Human Life Studies Sanyo Women' College, Japan

As more and more users are using wireless network to access Web contents, the power awareness issue becomes one of the most important concerns for Mobile contents delivery networks (MCDN). Unnecessary power dissipation always brings the disconnection and delay during the time of wireless access. Replacement algorithm is looked upon as one solution to resolve this problem. However, most of the current replacement algorithms have not been taken the power-awareness into consideration. Therefore, in this paper we design a new method where a novel power-aware algorithm is proposed. Both theory analysis and simulations improve that our proposal can outperform other conventional methods.

SuD4-6

Study on High-Frequency Digitally Controlled Boost Converter

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This paper presents a completely digitally controlled high-frequency boost converter. The research focuses on the two key modules: Digital Pulse-Width Modulation (DPWM) and digital control-law. The proposed hybrid DPWM architecture, which takes advantage of Digital Clock Manager (DCM) phase-shift characteristics available in FPGA resource and combines a counter-comparator with a digital dither block, is introduced firstly, and then a digital control algorithm is designed. Finally, based on a Xilinx Virtex-II Pro FPGA board with 32MHz hardware clock, an 11-bit DPWM and a digital controller are implemented for a boost converter. The performance of the converter is validated by experimental results.

SuD4-7

Co-Evolutionary Cultural Based Particle Swarm Optimization Algorithm

Yang Sun1, Lingbo Zhang1, Xingsheng Gu1,

1. Research Institute of Automation, East China University of Science and Technology, China

Particle swarm optimization (PSO), cultural algorithm (CA) and co-evolutionary algorithm (CEA) are all research hotspots in the field of intelligent computing. In order to apply their advantages, a hybrid algorithm CECBPSO is proposed in this paper. In the hybridization, PSO is introduced into the framework of CA, and then a co-evolutionary mechanism between two cultural based PSO algorithms is established. In this way, useful experiences can be exchanged among the populations, and randomly reinitialized particles are introduced into the algorithm. Both of them can help the algorithm improving the efficiency and escape the local optima when the particles get premature. The performance is evaluated on five test functions. Simulation results show that the hybridizing of the three algorithms greatly improves the performance.

SuD4-8

Non-cooperative Game Model Based Bandwidth Scheduling and the Optimization of Quantum-Inspired Weight Adaptive PSO in a Networked Learning Control System

Lijun Xu*, Minrui Fei1, T C Yang2

1. Shanghai Key Laboratory of Power Station Automation Technology, Shanghai University, China

2 University of Sussex, UK

In this paper, under a framework of Networked two-layer Learning Control Systems (NLCSs), optimal network scheduling is studied. Multi networked feedback control loops called subsystems in a NLCS share common communication media and therefore there is a competition for available bandwidth and data rate. A non-cooperative game(NG) model is first formulated for the problem studied. The existence and uniqueness of Nash Equilibrium point is proved. Subsequently, the utility function of subsystems is designed, taking account of both transmission data rate and control sampling period according to the feature of scheduling pattern and network control. Following this, a quantum-inspired weight adaptive particle swarm

optimization algorithm is developed to obtain an optimal solution. Simulation results presented in the paper have demonstrated the effectiveness of the proposed theoretical approach and the algorithm developed.

SuD4-9
A Modified Binary Differential Evolution Algorithm

Ling Wang, Xiping Fu, Muhammad Ilyas Menhas and Minrui Fei,Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics and Automation, Shanghai University,Shanghai, China

Differential evolution (DE) is a simple, yet efficient global optimization algorithm. As the standard DE and most of its variants operate in the continuous space, this paper presents a modified binary differential evolution algorithm (MBDE) to tackle the binary-coded optimization problems A novel probability estimation operator inspired by the concept of distribution of estimation algorithm is developed, which enables MBDE to manipulate binary-valued solutions directly and provides better tradeoff between exploration and exploitation cooperated with the other operators of DE. The effectiveness and efficiency of MBDE is verified in application to numerical optimization problems. The experimental results demonstrate that MBDE outperforms the discrete binary DE, the discrete binary particle swarm optimization and the binary ant system in terms of both accuracy and convergence speed on the suite of benchmark functions.

SuD4-10
A Combined System for Power Quality Improvement in grid-parallel Microgrid

Gao Xiaozhi 1,1, Li Linchuan 1, Chen Wenyan2

1.Key Laboratory of Power System Simulation and Control of Ministry of Education, Tianjin University, China.

The aim of this paper is to investigate the use of combined system constructed by Shunt Active Power Filter (SAPF) and Static Var Compensator (SVC) for power quality improvement in grid-parallel microgrid. Microgrid configuration is introduced first and appropriate control system is designed to ensure the microgrid operate well in grid-connected mode. In order to improve the power quality of the microgrid, this paper proposes a combined system, in which SAPF is adopted near the microsource to mitigate harmonic currents and SVC near the load to compensate reactive power so as to relieve the voltage variation. Simulation results show the effectiveness of the combined system.

ROOM E

SuE3　　　　　　　　　　　　　　　　13:30-15:30
RoomE
Topic:
1.Intelligent modeling, monitoring, and control of complex nonlinear systems
2.Intelligent medical apparatus and clinical applications
Chair(s): Takashi Kuremoto, Peng Zan

SuE3-1
Application and Numerical Simulation on Water Mist Cooling for Urban Environment Regulation

Junfeng Wang 1, Xincheng Tu 2, Zhentao Wang1, Jiwei Huang1

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2．School of Mechanical and Aerospace Engineering, Gyeongsang

The fine water mist is a type of sustainable and environment-friendly cooling technology. This paper concerns the use of water mist flow to improve the quality of urban environment in summer. According to the survey and analysis on the potential for saving energy consumption of household air condition, calculating the energy consumption and carbon reduction of spray cooling system, a theoretical basis for popularization of this technology for regulation in urban environment was provided. In order to character the cooling performance of water mist flow, the CFD simulation was conducted as a design tool to investigate the temperature and relative humidity distribution for different relative Reynolds and environmental conditions. The discrete phase model was used to simulate the performance of the water mist cooling process in terms of microclimate improvement. With the increased of relative Reynolds number, the extent of cooling area was expanded due to the increase of spray penetration length. The effect of relative humidity increasing was degraded by increasing the relative Reynolds number. The temperature distribution for the case of semi-outdoor environment indicates that the presence of roof and the height of roof fixed would influence the cooling effect. In case of ventilation for the cooling is well equipped, the change of environmental condition doesn't make effect on the relative humidity distribution evidently. The results obtained showed that numerical simulation could be used as a predictive manner to optimize the performance of spray cooling process in the outdoor environment.

SuE3-2
Optimal Guaranteed Cost Control for Linear Uncertain System with Pole and H∞ Index Constraint

Xianglan Han1, Gang Zhang2

1．School of Information Science and Engineering, Ningbo Institute of Technology, Zhejiang University, China;
2．The Faculty of Maritime, Ningbo University, Ningbo China

This paper addresses the problem of optimal guaranteed cost reliable control for linear uncertain systems with regional pole and H ∞ disturbance attenuation performance indices constraint. Based on a more practical and general model of continuous actuator gain failures, the reliable controller is designed to guarantee the closed-loop system satisfying the pre-specified regional pole index, H∞ norm-bound constraint and having the optimal quadratic cost performance simultaneously. The

consistency of the performance indices mentioned earlier is also set up for fault-tolerant control. Necessary and sufficient conditions for optimizing guaranteed cost controller design for linear uncertain systems are also given in terms of LMIs. The simulation example shows the effectiveness of the proposed method.

SuE3-3

Statistical Modelling of Glutamate Fermentation Process Based on GAMs

Chunbo Liu1 , Xuan Ju1, Feng Pan1

1．Institute of Automation, Jiangnan University, China

Application of Generalized Additive Models (GAMs) for modelling of Glutamate fermentation process was proposed in this paper. There were so many variables in fermentation process and insignificant variables that might worsen pre-built model performance, so experiments of choosing significant variables were firstly carried out. One new model was constructed after choosing time (Time), dissolved oxygen（DO）and oxygen uptake rate (OUR) as significant variables. The simplified relationships that could reflect each variable effect in fermentation process between Time, DO, OUR and GACD were investigated using the constructed model. The integrated relationships that could provide theoretical base to implement control and optimize in fermentation processes between Glutamate and other significant variables were also explored. Normally, fermentation model was specific with the character of poor generalization, because of the complications of fermentation process, high degree of time-varying and batch changing. However the new model fitting results indicated the advantages, in term of non-parameter identification, prediction accuracy and robust ability. So the new model in this paper was satisfiedly characteristic of generalization. The advocated modelling method potentially supplies an alternative way for optimization and control of fermentation process.

SuE3-4

The application of support vector regression in the dual-axis tilt sensor modeling

Wei Su1, Jingqi Fu1

1. Shanghai Key Laboratory of Power Station Automation Technology, School of Mechanical Engineering and Automation, Shanghai University, Shanghai, China

This paper investigates the dual-axis tilt sensor modeling using support vector regression (SVR). To implement a dual-axis tilt measurement system, the designing structure of this system is firstly presented. Then, to overcome the nonlinear between the input and output signals, support vector regression (SVR) is used to model the input and output of the tilt sensor. Finally, a real dual-axis tilt measurement system experimental platform is constructed, which can provide a lot of experimental data for SVR modeling. Experiments of different modeling ways for the dual-axis tilt sensor are compared. Experimental results show that the proposed modeling scheme can effectively improve the modeling precision.

SuE3-5

Implementing Eco-friendly Reservoir Operation by Using Genetic Algorithm with Dynamic Mutation Operator

Duan chen1,2, Guobing Huang1, Qiuwen Chen2, Feng Jin1

1.Changjiang River Scientific Research Institute, Wuhan, China

2.Research Center for Eco-environmental Science, Chinese Academy of Sciences, Beijing, China

Simple Genetic Algorithms (**SGA**) uses a constant rate in mutation operator and may leads to pre-convergence and local optimal deficiency, especially for the problem with many nonlinear constraints such as eco-friendly reservoir operation. The study adapted SGA with a double dynamic mutation operator and developed an optimization model of eco-friendly reservoir operation, and applied it to the cascade reservoirs in the Southwest of China. It is shown that the adaptive GA with the dynamic mutation operator can fulfil the goal of eco-friendly reservoir operation and it was enhanced in search accuracy and global searching ability in comparison with SGA.

SuE3-6

Research on the Biocompatibility of the Human Rectum and a Novel Artificial Anal Sphincter

Peng Zan1, Jinyi Zhang1, Yong Shao1, and Banghua Yang1

1.Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University; Shanghai Key Laboratory of Power Station Automation Technology, Shanghai, China

This paper discusses biocompatibility issues that are related to the human rectum and a novel artificial anal sphincter. The artificial anal sphincter system is a novel hydraulic-electric muscle to treat fecal incontinence. A high integration of all functional components and no wire linking to the outer device make the surgical implantation more easy and lower risk. However, the human rectum is not a rigid pipe, and motion in it is further complicated by the fact that the bowel is susceptible to damage. With the goal of designing a reliable and safe instrument, the motion model between the artificial anal sphincter and the rectum is developed, the biomechanical material properties of human rectum are analyzed. The results show that the deformation of the artificial anal sphincter can be controlled by the press of reservoir below the upper limit of human tissue ischemia.

SuE3-7

A medical tracking system for contrast media

Chuan Dai1, Zhelong Wang1 and Hongyu Zhao1

1.Faculty of Electronic Information and Electrical Engineering, Dalian University of Technology, CHINA

Contrast media is a kind of chemical substance used to improve the image quality of Computed Tomography. However, due to its high speed of injection, emergencies (such as capillary hemorrhage) always exist. In view of this problem, a video object tracking system is implemented to monitor the injection site. The color feature is abstracted from image sequences and used for

the mean shift tracking algorithm. The experiment results show that the tracking system is real-time, robust and efficient.

SuE3-8

Rapid Planning Method for Robot Assited Minimally Invasive Surgery

Yanhua Cheng1, Chun Gong1, Can Tang1, Jianwei Zhang1, ShengCheng1

1Kunshan Industrial Technology Research Institute, Jiangsu, China

The traditional space mapping and surgical planning method for surgery are time-consuming, and the accuracy of positioning is not high. This paper aims to present a practical and fast way for planning. In the session of visual orientation for spatial location, MicronTracker camera and self-calibration template are used for positioning; in the session of tracking and locating for four markers on patient and robot's template, the coordinates of them are extracted automatically; in the session of DICOM medical image processing, the contour of the tumor is extracted automatically, in terms of the seed filling algorithm, contour tracking algorithm and the B-spline fitting function. Coordinates transformation from the image space to the camera space and to the robot space can be completed rapidly and precisely through this method. Experimental results show that the traditional from 25 to 30 minutes planning time for the entire operation can be reduced to 5 minutes; the space mapping accuracy can be improved from the traditional 5mm to 4mm now.

SuE3-9

Autonomic Behaviors of Swarm Robots Driven by Emotion and Curiosity

Takashi Kuremoto1 , Masanao Obayashi1, Kunikazu Kobayashi1, Liang-Bing Feng1

1.Graduate School of Science and Engineering, Yamaguchi University , Japan

This paper proposes an improved internal model with emotional and curious factors for autonomous robots. Robots acquire adaptive behaviors in the unknown environment according to make observation of behaviors of others. Cooperative relation among the robots and transition of curiosity to the local environments drive robots to achieve the goal of the environment exploration. Simulations showed the effectiveness of the proposed model with interesting motions of robots.

SuE3-10

Modelling and Simulating Dynamic Evolvement of Collective Learning Behaviors by Voronoi Diagram

Xiang-min Gao1 and Ming-yong Pang1

1.Department of Educational Technology, Nanjing Normal UniversityJiangsu, P. R. China

Simulating collective behaviors of human groups with interactions has essential importance in education, economics, psychologyand other social science fields. This paper, we present a Voronoi diagrambased method for modelling and simulating group learning behaviors. The method follows a set of learning rules to update individuals' behaviors during evolution, and uses Voronoi diagram to compute and observerthe change of each individual's behaviors as well as the visualized long-term behaviors of the group at higher group level. We use a large numberof experiments to show that the modelled group behaviors with certain learning rules can reach some limit states under restrictive conditions.In addition, we also discussed how the evolvement of group behaviors is a®ected by quali¯ed rate in initial condition in the sense of statistics and analyzed and explained the special phenomenons appearing in the dynamic evolvement.

SuE4	15:50-18:10

RoomE
Topic:
1.Modeling and simulation of societies and collective behavior
2.Brain stimulation, neural dynamics and neural Interfacing

Chair(s): Guozheng Yan, Renhan Huang

SuE4-1

Study of the Airway Resistance of a Micro Robot System for Direct Tracheal Inspection

Lianzhi Yu1, Guozheng Yan2, Yuesheng Lu1, Xiaofei Zhu1

1.College of Optoelectric Information and Computer Engineering, University of Shanghai for Science and Technology, Shanghai, China
2.School of Electronic, Information and Electrical Engineering, Shanghai Jiaotong University, Shanghai ,China

This paper described the structure of a new flexible and active endoscopy micro robot system for direct tracheal inspection; the mobile mechanism of the robot is based on the inchworm movement actuated by pneumatic rubber actuator. There are five air chambers controlled independently, by adjusting the pressures in air chambers, the robot can move in the straight mode or in the bending mode. According to the physical structure of human's respiratory system and the prototype structure of the micro robot system, the resistance characteristics of the trachea with the micro system were discussed in detail. The airway resistance characteristics models were set up and were analyzed in detail. The simulation experiment results prove that the resistance of the robotic system in airway is small enough for normal breath, and the robot is respectable to be used for inspection in human trachea directly.

SuE4-2

Numerical simulation o the nutrient and phytoplankton dynamics in the Bohai Sea

Hao Liu1 , Wenshan Xu1, Baoshu Yin1

1. College of Marine Science, Shanghai Ocean University, Shanghai, China
2.Institute of Oceanology, CAS, Qingdao, China

A coupled biogeochemical-physical model was developed to reproduce the annual cycle of the nutrient and phytoplankton dynamics in the Bohai Sea. Simulations

were examined first, and then the nutrient and phytoplankton dynamics were investigated further. It was found that it may be the evolution of the thermal stratifications that is responsible for the spring algae bloom to occur later in the deep basin than in shallow bays. The simulation also shows that the phytoplankton dynamics was characterized by the nitrogen limitation as a whole in BS, though the phosphorus limitation appears in the Yellow River Estuary.

SuE4-3

Personalized Reconstruction of 3D Face Based on Different Race

Diming Ai2, Xiaojuan Ban1, Li Song2, Wenxiu Chen1
1.School of Information Engineering,University of Science and Technology Beijing,Beijing,China
2.Beijing Institute of Special Vehicles,Beijing

The 3D face reconstruction method of different race is proposed in this paper. It chose different standard face model according to different race, and adjusted and combined with the extracted character and corresponding model, thereby acquired the personalized model that reflected different race, then created realistic 3D face adding grain information by the texture mapping technique. The final result and quantitative analysis showed that: the character could adapt to standard face model more effectively and reconstruct realistic 3D face successfully

SuE4-4

Lake Eutrophication Evaluation and Diagnosis Based on Bayesian Method and SD Model

Kai Huang1, Xulu Chen1, Huaicheng Guo2
1. College of Environmental Science and Engineering, Beijing Forestry University, Beijing, China
2. College of Environmental Science and Engineering, Peking University, Beijing, China

In order to comprehensively evaluate the eutrophication degree of Lake Dianchi, Bayesian Method was applied in this paper. The evaluation result showed that the eutrophication status of Lake Caohai was more serious than that of Lake Waihai, while the eutrophication degree was turning better these years. Besides, in this paper SD model was established to diagnose the socio-economic factors that caused Lake Dianchi Eutrophication. The relationship between socio-economic development and eutrophication was analyzed, which will provide the theoretical basis for planning the urban population distribution and industrial sectors distribution. Ultimately, the N/P ratios of Lake Dianchi which can influence the growth of cyanobacteria were analyzed. The result showed that Lake Caohai and Lake Waihai were at the opposite side of the inflection point of 15, and the eutrophication in Lake Caohai and Lake Waihai should be treated differently.

SuE4-5

Respiration Simulation of Human Upper Airway for Analysis of Obstructive Sleep Apnea Syndrome

Renhan Huang1 and Qiguo Rong1
1.College of Engineering, Peking University, Beijing, P.R. China

Obstructive sleep apnea syndrome (OSAS) is a disease that the pharyngeal portion collapses repeatedly during sleep and finally results in the cessation of breathing. So far the potential pathogenesis factors that may cause OSAS are discussed from two main aspects: anatomic abnormalities of the upper airway and the weak or absence of nerve control mechanism. In this study, a three-dimensional finite element model which possesses high geometrical similarity with the real anatomical structure is built. By making use of the pressure in upper airway measured in normal expiration and apnea episode, the fluid field in upper airway and the displacement of the soft tissue around the airway are calculated using fluid-structure coupled algorithm, and then the result between normal respiration and apnea episode are compared. According to the result, the region where the maximum negative pressure and the largest displacement occur will be the most domains the airway collapses and breath apnea appears.

SuE4-6

Optimization for Nonlinear Time Series and Forecast for Sleep

Chenxi Shao1,2,3,4, Xiaoxu He1, Songtao Tong1,Huiling Dou1, Ming Yang2, and Zicai Wang2
1.Depatment of Computer Science and Technology, University of Science and Technology of China, China
2.Control & Simulation Center, Harbin Institute of Technology, China
3.MOE-Microsoft Key Laboratory of Multimedia Computing and Communication, University of Science and Technology of China, China
4.Anhui Province Key Laboratory of Software in Computing and Communication, China

It is important processes that phase-space diagram and computation of geometrical eigenvalues are reconstituted in nonlinear dynamical analysis. It's difficult to analyze nonlinear system such as EEG real-time because the algorithms of phase-space diagram reconstitution and geometrical eigenvalue computation are complex on both time and space. The algorithms were optimized to reduce their complexity, after that the algorithms were parallelized, at last the integrated algorithm's running time is 1/30 of the running time before optimization and parallelization. It was found that the value of correlation dimension can reflect sleep stages after analyzing the sleep EEG, final sleep stages were also forecasted simply.

SuE4-7

Classifying EEG using Incremental Support Vector Machine in BCIs

Xiaoming Zheng 1,Banghua Yang1, 2, Xiang Li 1，Peng Zan 1，zheng Dong1
1. Shanghai Key Laboratory of Power Station Automation Technology; Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University, China
2.State Key Laboratory of Robotics and System (HIT), HarbinChina

The discrimination of movement imagery electroencephalography (EEG) is an essential issue in brain-computer interfaces (BCIs). Classifying EEG signals is an important step in the discrimination process. From the physiological standpoint, EEG signal varies with the time elapse, mood, tiredness of the subject, etc. An excellent classifier should be adaptive to tackle the dynamic variations of EEG. In this paper, an incremental support vector machine (ISVM) is adopted to classifying the EEG. The ISVM can consecutively delete some history samples and replenish some new samples obtained lately. And so the classifier model of the ISVM is updated periodically to adapt to the variations of EEG. At the same time, the ISVM can use a small training set to train the classifier, which is better in training speed and memory consuming than the standard SVM.

To the data set 1 on left hand and foot imagery of BCI Competition IV 2008, the empirical mode decomposition (EMD) is employed to decompose the EEG signal into a series of intrinsic mode functions (IMFs), and then AR model parameters and instantaneous energy (IE) can be gained from some important IMFs, which form the initial features. The extracted features are fed into the ISVM classifier. Compared with the standard SVM, elementary results show that the ISVM can obtain better classification performance. The ISVM provides a good way to solve the adaptability of the online BCI system. Even so, the effectiveness of the ISVM should be verified furthermore with more data and subjects.

SuE4-8

Acute Isolation of Neurons Suitable for Patch-Clamping Study from Frontal Cortex of Mice

Yuan-yuan Li1,2, Li-jun Cheng1, Gang Li1, Ling Lin1, Dan-dan Li1

1. College of Precision Instruments and Opto-Electronics Engineering,Tianjin University, Tianjin, China

2.School of Computer Science & Software Engineering, Tianjin Polytechnic University, Tianjin, China

A method was described for the acute isolation of neurons suitable for patch-clamping study from the frontal cortex of 7-10-d-old Kunming mice by a combination of mechanical and enzymatic means. Using inverted microscope and whole-cell configuration of patch-clamp technique, the morphological and electrophysiological properties of cortical neurons were studied respectively. It was shown that the enzymatically isolated neurons had plump profile, smooth surface, strong aureole and long survival time, met the electrophysiological requirements, and exhibited the whole-cell transmembrane currents, voltage-gated sodium and potassium currents. The experiment proves

that this method is simple, efficient, reliable and utility. The dissociated cortical neurons could be obtained and applied to patch-clamping study, which has reference value for studying the effects of physiology, pathology, pharmacology and physical factors on the ion channels of the cortical neurons of mice.

SuE4-9

Palmprint Identification Using PCA Algorithm and Hierarchical Neural Network

Ling Lin1

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Palmprint-based personal identification, as a new member in the biometrics family, has become an active research topic in recent years. The rich texture information of palmprint offers one of the powerful means in the field of personal recognition. In this paper, a novel approach for handprint identification is proposed. Firstly, region of interest is segmented through hand's key points localization, then PCA algorithm is used to extract the palmprint features. A hierarchical neural network structure is employed to measure the degree of similarity in the identification stage. Experimental results show that the designed system achieves an acceptable level of performance.

SuE4-10

Satellite-retrieved Surface Chlorophyll Concentration Variation Based on Statistical Methods in the Bohai Sea

Li Qian1, Wen-ling Liu1, Xiao-shen Zheng1

1.Tianjin Key Laboratory of Marine Resources and Chemistry , Tianjin University of Science and Technology, China.

Data of chlorophyll concentration in the Bohai Sea is obtained by the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) from 1998 to 2009. Empirical Orthogonal Function (EOF) is used to analyze the spatial-temporal variation of chlorophyll concentration in the Bohai Sea. Discrete power spectral density (PSD) is used to calculate variation periods of the first four modes of EOF. All the processes are used IDL language. The results show that spatial distribution of chlorophyll concentration is characterized by decreasing from coastal shore to off shore. The seasonal variations show lowest concentration is in summer. The first four explain 22%,11% ,4% and 3% variation, respectively.

September 20, 2010 Monday

ROOM A

MoA5   **8:30-10:10**
RoomA
Topic:
1.Computational intelligence in utilization of clean and renewable energy resources
2.Intelligent modeling, control and supervision for energy saving and pollution reduction
Chair(s):   Hong Hee Lee, Shihua Li

MoA5-1

Strategic Evaluation of Research and Development into Embedded Energy Storage in Wind Power Generation

T C Yang1, Lixiong Li2,

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2 School of Mechanical Engineering and Automation, Shanghai University,Shanghai Key Laboratory of Power Station Automation Technology,Shanghai, P.R. China

Embedded Energy Storage (EES) is an innovative idea presented in a previous paper. EES is associated with some major configurations of wind power generation and rechargeable batteries. Areas for further research are identified, but before resources are committed it is necessary to assess the likely benefits of ESS. In this paper, the technical and economic potential of the EES are evaluated from the viewpoint of (1) historical and future development of electrical power systems, and (2) globalisation of CO_2 emission reduction and global wind energy utilisation. The evaluation uses four case studies relevant to the United Kingdom and around the world. Based on this work, a practical and low-risk methodology for research and development into this new area is proposed.

MoA5-2

A Mixed-integer Linear Optimization Model for Local Energy System Planning Based on Simplex and Branchand-
bound Algorithms

Hongbo Ren1, Weisheng Zhou2, Weijun Gao3, Qiong Wu3

1 Ritsumeikan Global Innovation Research Organization, Ritsumeikan University,Japan

2 College of Policy Sciences, Ritsumeikan University, Japan

3 Faculty of Environmental Engineering, The University of Kitakyushu,Japan

the decision making for the sustainable use of energy in the local area. It details exploitation of primary energy sources, electrical and thermal generation, enduse sectors and emissions. The model covers both the energy demand and energy supply sides, and can provide valuable information both on the technical options, and on the possible policy measures. By aiming to realize a low-carbon energy system, the proposed optimization process provides feasible generation settlements between utility grid and distributed generations, as well as optimal diffusion of energy efficiency technologies. Moreover, the mathematical methods for solving the developed model are discussed. The focus is paid on the general solution method for mixed-integer linear optimization model including simplex algorithm and branch-and-bound algorithm. By using the suggested solution methods, the local energy system optimization problem is expected to be resolved in a reasonable time with enough precision.

MoA5-3

IEC 61400-25 Protocol based Monitoring and Control Protocol for Tidal Current Power Plant

Jung Woo Kim, Hong Hee Lee

School of Electrical Engineering,University of Ulsan, South Korea

Wind energy and tidal current power have a common operation principle. Tidal current power converts kinetic energy of fluid to electric power. The communication infrastructure is very important to control the system and to monitor the working conditions of tidal current power plant. In this paper, the monitoring using international standard IEC 61400-25, which successfully operate for wind power system, is consequently applied to the tidal current power system. MMS service for communication between the tidal current power system and the remote control center is implemented to verify the performance of the monitoring system.

MoA5-4

Adaptive Maximum Power Point Tracking Algorithm for Variable Speed Wind Power Systems

Moo-Kyoung Hong, Hong-Hee Lee

School of Electrical Engineering,University of Ulsan, Nam-Gu, South of Korea

This paper proposes an adaptive maximum wind power extraction algorithm for variable speed wind power generation systems. The proposed control algorithm is analyzed with the air density effects on the maximum power point tracking (MPPT) method, which is based on the conventional hill climb searching (HCS). To implement this algorithm, the memory features and the initial tip speed ratio (TSR) are taken into account. The control scheme is performed in three separate operation steps according to the power curve of a generator to improve the tracking performance. The feasibility and effectiveness of the proposed MPPT strategy have been verified through simulations and experimental results.

MoA5-5

Modeling and Simulation of Two-leaf Semi-rotary VAWT

Qian Zhang, Haifeng Chen, and Binbin Wang

School of Electronic and Information Engineering
Zhongyuan Institute of Technology

Zhongyuan Middle Road 41, Zhengzhou, China
In this paper, according to the structural characteristics of two-leaf semi-rotary VAWT(vertical axis wind turbine), the micro-element method and the coordinate system rotation method are used to establish the mathematical model of wind turbine and, the mathematical model is simulated in the MATLAB platform by using the PID control method based RBF neural network tuning. The simulation result shows the rev- olution speed of VAWT can converge to rated value in a relative short period time after wind speed increasing.

MoA5-6

Sliding Mode Controller for Switching Mode Power Supply

Yue NIU1, Yanxia GAO1,*, Shuibao GUO1, 2, Xuefang LIN-SHI2,
Bruno ALLARD2
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2 Lab. AMPERE (CNRS UMR 5005)-INSA-Lyon, Villeurbanne Cedex – France

Switching Mode Power Supply (SMPS) is a nonlinear system in nature, for which the performance of linear control strategy is constrained. Therefore, this paper presents a sliding mode controller for SMPS. Due to its simplicity and robustness against parameter variations and disturbances, Sliding Mode Control (SMC) has been widely used in DC-DC power conversion applications. This paper takes a Buck converter as an example to analyse the SMC application in SMPS. The simulation and experimental results are presented.

MoA5-7

An Improved control strategy for ball mill grinding circuits

Xisong Chen1, Jun Yang1, Shihua Li1 and Qi Li1
1School of Automation, Southeast University, Nanjing, Jiangsu Province, China

An improved control strategy is proposed to control ball mill grinding circuits for energy saving and pollution reduction. A two-layer optimization architecture combined by particle size optimization layer and energy optimization layer is developed, where the optimal particle size set-point is calculated first, followed by the energy optimization step. A control method adaptive to the wear of liner in ball mills is also proposed. Simulation studies demonstrate that the fresh ore feed rate has been increased and the energy efficiency has been increased.

MoA6	10:30-12:10

RoomA
Topic:
1. Intelligent methods in developing vehicles, engines and equipments
2. Computational methods and intelligence in modeling genetic and biochemical networks and regulation
Chair(s):   Lin-du Zhao, Abbas Z. Kouzani

MoA6-1

Expression of Design Problem by Design Space Model to Support Collaborative Design in Basic Plan of Architectural Design

Yoshiaki Tegoshi 1, Zhihua Zhang 2 and Zhou Su 3
1 Faculty of Environmental Studies, Hiroshima Institute of Technology,
2-1-1 Miyake, Saeki-ku,Hiroshima   Japan
2 Department of Human Life Science, Sanyo Women' College,
Sagatahonmati 1-1, Hatsukaichi, Hiroshima, Japan
3 Faculty of Science and Engineering, Waseda University,
Ohkubo3-4-1, Shinjyuku, Tokyo, Japan

In collaborative design, the differences between designers are likely to occur in viewpoint and recognition gaps of design problems. It will spend time and labor by the time for designers to acquire the common awareness of the issues. In order to solve the problem and support collaborative design, we propose a structure with three features as an interaction process model: The features are the common view of design space, grasp of mutual search domain, and mutual evaluation of design constraints. Based on the interaction process model, collaboration design of zone arrangement of an elementary school was performed as the verification case, the conversation record and the design history which were accumulated on a server were analyzed and the usefulness of the model was verified.

MoA6-2

Drive Cycle Analysis of the Performance of Hybrid Electric Vehicles

Behnam Ganji, Abbas Z. Kouzani and H.M Trinh
School of Engineering, Deakin University , Australia

This paper presents a drive cycle analysis of hybrid electric vehicle power train configurations. Based on fuel economy and emissions factors, a tradeoff between conventional, series hybrid, parallel hybrid, and a parallel-series hybrid is drawn. The operational characteristics of conventional and hybrid electric vehicles are evaluated from the standpoint of fuel economy and emissions. First, models are formed for conventional, series hybrid, parallel hybrid, and series-parallel hybrid vehicles. Then, the models are simulated for fuel consumption, powertrain average efficiency, and emissions using drive cycles containing target speeds in predefined patterns. The simulation results signify that hybrid electric vehicles achieve lower fuel consumption and emissions. Finally, the powertrain configurations that are suitable for city and highway driving are determined.

MoA6-3

Supply Chain Network Equilibrium with Profit Sharing Contract Responding to Emergencies

A-ting Yang, Lin-du Zhao1
Institute of Systems Engineering, Southeast University,
Nanjing, Jiangsu ,China

In the real market competition, the supply chain network

equilibrium state is too ideal to obtain and contracts can be used to coordinate the supply chain network. In this paper, we establish a supply chain network equilibrium model with random demands and introduce profit sharing contract to the supply chain network model in order to be equilibrium. Then analyze the impacts that emergencies have on this equilibrium state. Through numeral examples we prove that the manufacturers and retailers can adjust the contract parameters to achieve a new supply chain network coordination state through

MoA6-4

Modeling of the Human Bronchial Tree and Simulation of Internal Airflow: A Review

Yijuan Di1, Minrui Fei1,*, Xin Sun1 and T C Yang 2
1 Shanghai Key Laboratory of Power Station Automation Technology,
Shanghai University, Shanghai, China
2 University of Sussex, UK

Human bronchial tree is breath passage between pulmonary capillary vessel and fresh air and it is a key part of the human respiratory system. Clinical experience shows that abnormal or diseases of the respiratory system often occur at some bifurcated segments of the bronchial tree. Therefore, for better diagnosis and treatment of such diseases, it is necessary to investigate morphology structure of human bronchial tree and its internal airflow dynamics. In this paper, approaches for the modeling of bronchial tree are outlined based on the morphology structure data obtained from the two sources, i.e. anatomical experiments and CT/MRI. In addition, the simulation of airflow in bifurcating airways is summarized from the aspect of simulation methods and CFD. Finally, possible future research is suggested to develop: (1) a universal dynamic model of the airflow in the bronchial tree; and (2) a userfriendly software package for modeling and simulation.

MoA6-5

Robust Semi-supervised Learning for Biometrics

Nanhai Yang, Mingming Huang, Ran He, Xiukun Wang
Department of Computer Science and Technology,
Dalian University of Technology,Dalian, China

To deal with the problem of sensitivity to noise in semi-supervised learning for biometrics, this paper proposes a robust Gaussian-Laplacian Regularized (GLR) framework based on maximum correntropy criterion (MCC), called GLR-MCC, along with its convergence analysis. The half quadratic (HQ) optimization technique is used to simplify the correntropy optimization problem to a standard semi-supervised problem in each iteration. Experimental results show that the proposed GRL-MCC can effectively improve the semi-supervised learning performance and is robust to mislabeling noise and occlusion as compared with GLR.

MoA6-6

Research on Virtual Assembly of Supercritical Boiler

Pi-guang Wei1, Wen-hua Zhu1, Hao Zhou1
1CIMS and Robot Center, Shanghai University, Shanghai, China

Supercritical boiler is an important measure to solve problems like electricity shortage or energy intensity, with its high combustion efficiency. As supercritical boiler is a large and complex product, it may appear some problems of collision, location error, or assembly order reverse in assembling process. In order to solve these problems, this paper studies the virtual assembly technology of supercritical boiler. This includes the establishment of model of supercritical boiler, the transformation technology of the model and the Lightweight model technology. Taking 600MW supercritical boiler as an example, a virtual assembly simulation is established in virtools environment. Although the supercritical boiler product contains about 100,000 parts, this technique can achieve fluency of virtual assembly process. It also realizes higher human-machine interaction, and guilds the assembly process of supercritical boiler.

MoA6-7

Validation of veracity on Simulating the Indoor Temperature in PCM Light Weight Building by EnergyPlus

Chun-long Zhuang1,2, Bai-zhan Li2,An-zhong Deng 1, Sheng-bo Li1, Zhi-li Chen1,Hong-yu Zhang1, Guo-zhi Fan
1. Department of Barracks' Management and Environmental Engineering,PLA Logistic Engineering University, Chongqing, China;
2. College of Urban Construction and Environmental Engineering, Chongqing University, Chongqing, China

This article surveys the EnergyPlus constructions solution algorithm and heat balance method in EnergyPlus, presents the new conduction finite difference solution algorithm and enthalpy-temperature function features, describes the implementation of the module, and validates the veracity of the possible applications for the capabilities in EnergyPlus by PCM experiment dates. The most relativity difference is 12.41% and the least is 0.71% between the simulation and testing value in sequential 36h on the A envelope condition, wheras on the B envelope condition the most relativity difference is 8.33% and the least is 0.33% in sequential 72h.The results to date has shown good agreement with well established in this simulation tools and shown that the algorithm incorporated into EnergyPlus can simulate the PCM in building construction. .

MoA6-8

Positive Periodic Solutions of Nonautonomous Lotka-Volterra Dispersal System with Delays

Ting Zhang, Minghui Jiang and Bin Huang
Institute of Nonlinear and Complex System, China Three Gorges University,YiChang, Hubei, China.

In this paper, a general class of nonautonomous Lotka-Volterra dispersal system with discrete and continuous in̄nite delays is investi- gated. This class of Lotka-Volterra systems model the di®usion of a single species into n patches by discrete dispersal. By using Schauder's ̄xed point theorem, we prove the existence of positive periodic solutions of system. The global

asymptotical stability of positive periodic solution is discussed and the su±cient conditions for exponential stability are also given. we give an example to illustrate the validity of the results in the end. The conditions we obtained are more general and it can be extended to several special systems.

ROOM B

MoB5   **8:30-10:10**
RoomB
Topic:
1.Intelligent computing and control in distributed power generation systems
2.Intelligent methods in power and energy infrastructure development
Chair(s): Tim Littler, Jiming Liu

MoB5-1

VLSI Implementation of sub-pixel Interpolator for AVS Encoder

Chen Guanghua1, Wang Anqi1, Hu Dengji1, Ma Shiwei1, Zeng Weimin2
1 School of Mechatronics Engineering and Automation, Shanghai Key Laboratory of Power Station Automation Technology, Shanghai University, Shanghai, P. R. China
2 Key Laboratory of Advanced Display and System Applications, Ministry of Education &Microelectronic Research and Development Center, Shanghai University, Shanghai, P.R. China

Interpolation is the main bottleneck in AVS real-time high definition video encoder for its high memory bandwidth and large calculation complexity caused by the new coding features of variable block size and 4-tap filter. In this paper, a high performance VLSI architecture of interpolation supporting AVS Baseline@L4 is presented. Vertical redundant data reuse, horizontal redundant data reuse and sub-pixel data reuse schemes are presented to reduce memory bandwidth and processing cycle. The separated 1-D interpolation filters are used to improve throughput and hardware utilization. The proposed design is implemented on FPGA with operating frequency of 150MHz and can support 1080p (1920×1080)/30fps AVS real-time encoder. It is a useful intellectual property design for real-time high definition video application.

MoB5-2

Optimization of Refinery Hydrogen Network

Yunqiang Jiao1, Hongye Su1
State Key Laboratory of Industrial Control Technology, Institute of Cyber-Systems and Control,Yuquan Campus, Zhejiang University, Hangzhou, P. R. China

Tighter environmental regulations and more heavy-end upgrading in the petroleum industry lead to increased demand for hydrogen in oil refineries. In this paper, the method proposed to optimize the refinery hydrogen network is based upon mathematical optimization of a superstructure whose objective function is the minimizing total annual cost (TAC) within the hydrogen network in a refinery. The constraints of flowrate, pressure, purifiers, impurities, and compressors were considered. The superstructure considers all the feasible connections and then subjects this to mixed-integer nonlinear programming (MINLP). This approach makes best use of resources and can provide significant environmental and economic benefits. A refinery system from China is used to illustrate the applicability of the approach.

MoB5-3

Overview: A Simulation Based Metaheuristic Optimization Approach to Optimal Power Dispatch Related to a Smart Electric Grid

Stephan Hutterer1, Franz Auinger1, Michael A®enzeller2, and Gerald Steinmaurer3
1 .Upper Austria University of Applied Sciences
2 .Josef Ressel Center Heureka!
3 .Austrian Solar Innovation Center

The implementation of intelligent power grids, in form of smart grids, introduces new challenges to the optimal dispatch of power. Thus, optimization problems need to be solved that become more and more complex in terms of multiple objectives and an increasing number of control parameters. In this paper, a simulation based optimization approach is introduced that uses metaheuristic algorithms for minimizing several objective functions according to operational constraints of the electric power system. The main idea is the application of simulation for computing the ⁻tness- values subject to the solution generated by a metaheuristic optimization algorithm. Concerning the satisfaction of constraints, the central concept is the use of a penalty function as a mea- sure of violation of constraints, which is added to the cost function and thus minimized simultaneously. The corresponding optimization problem is speci⁻ed with respect to the emerging requirements of future smart electric grids.

MoB5-4

A Wavelet-Prony Method for Modeling of Fixed-Speed Wind Farm Low-Frequency Power Pulsations

Daniel McSwiggan and Tim Littler
Electrical Power and Energy Research Cluster, Queen's University Belfast,Northern Ireland

The increasing penetration of wind generation on the Island of Ireland has been accompanied by close investigation of low-frequency pulsations contained within active power flow. A primary concern is excitation of low-frequency oscillation modes already present on the system, particularly the 0.75 Hz mode as a consequence of interconnection between the Northern and Southern power system networks. In order to determine whether the prevalence of wind generation has a negative effect (excites modes) or positive impact (damping of modes) on the power system, oscillations must be measured and characterised. Using time – frequency methods, this paper presents work that has been conducted to extract features from low-frequency active power pulsations to determine the composition of oscillatory modes which may impact on dynamic stability. The paper proposes a

combined wavelet-Prony method to extract modal components and determine damping factors. The method is exemplified using real data obtained from wind farm measurements.

MoB5-5

Research on Short-term Gas Load Forecasting Based on Support Vector Machine Model

Chao ZHANG1,2 , *Yi LIU1,2 , Hui ZHANG1,2 , Hong HUANG1,2 , Wei ZHU3
1,2 Center for Public Safety Research, Department of Engineering Phyiscs,Tsinghua University, , Beijing, CHINA
3 Beijing Research Center of Urban System Engineering, Beijing, CHINA

The short-term gas load forecasting model is developed based on the SVM regression. Gas supply data from a North-China city are taken for model validation. The forecasting error is less than 5% when the through-year data is used in the SVM model training. The un-update model which fits the realistic situation gives only slight error level increase. The data preprocessing, including the grouping and normalization, is effective for increasing accuracy of the regression analysis. In the normalization process, wide data range may be useful to get more accurate forecasting results. The SVM forecasting model developed in this paper may be effective for practical using, especially for the un-updated model.

MoB5-6

Network Reconfiguration at the Distribution System with Distributed Generators

Gao Xiaozhi1,1, Li Linchuan1, Xue Hailong2
Key Laboratory of Power System Simulation and Control of Ministry of Education,Tianjin University, Tianjin, China.

This article proposes a novel model for distribution network reconfiguration to meet current distribution system operating demands. In the model the connection of distributed generators to distribution system is considered, and from the view of the actual operation demands, operating modes are proposed to simulate the load changes and DG fluctuations and can be used to achieve the aim that the network reconfigures only once in a period. Then the binary particle swarm optimization algorithm with dynamic adaptation of inertia weight has been applied to solve the model. A typical example proved the feasibility and validity of the model and the algorithm.

MoB5-7

An Autonomy-Oriented Computing Mechanism for Modeling the Formation of Energy Distribution Networks: Crude Oil Distribution in U.S. and Canada

Benyun Shi, and Jiming Liu
Department of Computer Science, Hong Kong Baptist University

An efficient, economical, as well as reliable energy distribution system plays important roles in distributing energy resources from energy suppliers to energy consumers in different regions. In this paper, we present a decentralized self-organized mechanism that draws on the methodology of autonomy-oriented computing (AOC) to study the formation of an energy distribution network from a bottom-up viewpoint. We utilize ideas from the animals' foraging behaviors (i.e., the L′evy flight) for energy consumers to search for energy suppliers. Simulationbased experimental results based on the real-world data of crude oil production and consumption in U.S. and Canada show that distribution hubs, which are essential to enhance supply opportunities and flexibilities in the real world, can also be observed from the AOC-based mechanism. This work provides a possible way for understanding the fundamental principles behind the formation of an efficient and reliable distribution system.

MoB6	10:30-12:10
RoomB	
Topic:	
Intelligent modeling, monitoring, and control of complex nonlinear systems	

Chair(s): Shiji Song, Fei Liu

MoB6-1

Direct Torque Control for Permanent Magnet Synchronous Motors Based on Novel Control Strategy

Sizhou Sun, Xingzhong Guo, Huacai Lu and Ying Meng
Anhui Provincial Key Laboratory of Electric and Control, Anhui Polytechnic University

In high-performance servo applications a rapid and direct torque control (DTC) is desired. However, the conventional direct torque control based on the 60 degrees region used the position signal to select the proper space voltage vector, results in large torque and flux linkage ripple. In order to solve this problem, a novel DTC scheme for the permanent magnet synchronous motor (PMSM) is proposed, which based on voltage space vector and stator flux linkage sectors subdivision. In this scheme, the traditional six voltage vectors and six flux sectors are subdivided into 12 voltage vectors and 12 flux sectors method to find the optimal voltage vectors. The simulation results show that the presented method is superior to the conventional DTC, and DTC based on sectors subdivision can decrease the torque ripple drastically and enhance the control performance.

MoB6-2

A Monitoring Method Based On Modified Dynamic Factor Analysis and Its Application

Xueyan Yin1, Fei Liu 1
1 Institute of Automation, Jiangnan University, wuxi, China

Aimed at the dynamic characteristic of the process, the autocorrelation and the cross-correlation among process variables, a monitoring method based on Dynamic Factor Analysis was investigated which was widely concerned in academia and industry. However, the traditional Dynamic Factor Analysis utilizes the same time lags currently among all variables, but the computing work is complex and the auto-correlation isn′t adequately exemplified. The paper proposes a new monitoring method based on modified dynamic factor analysis that determines different time lags according to different variables by correlation

analysis, and constructs several statistics as the monitoring indices to monitor the operation condition of the dynamic process. The improved monitoring method is applied in the Tennessee-Eastman process and compared with DFA, the validity and superiority are proved.

MoB6-3

A Novel Approach to System Stabilization over Constrained Channels

Weihua Deng1, Minrui Fei1;and Huosheng Hu2

1 School of Mechatronical Engineering and Automation, Shanghai University, Shanghai, China

2 School of Computer Science and Electronic Engineering, University of Essex, United Kingdom

This paper addresses the problem of stabilization of a networked control system (NCS) over signal-to-noise ratios (SNRs) con- strained channels in the continuous-time domain. The minimal SNRs re- quired for stabilisability are obtained by a novel linear matrix inequality (LMI) approach. The e®ectiveness of the proposed approach is demon-strated by a numerical example.

MoB6-4

Iterative Learning Control based on Integrated Dynamic Quadratic Criterion for Batch Processes

JIA Li1，SHI Jiping 1，Cheng Dashuai 1，Cao Luming 1，CHIU Min-Sen2

1.Shanghai Key Laboratory of Power Station Automation Technology, Department of Automation, College of Mechatronics Engineering and Automation, Shanghai University,

Shanghai 200072, China;

2. Faculty of Engineering, National University of Singapore, Singapore

An integrated neuro-fuzzy model and dynamic R-parameter based quadratic criterion-iterative learning control is proposed in this paper. Quadratic criterion-iterative learning control with dynamic parameters is used to improve the performance of iterative learning control. As a result, the proposed method can avoid the problem of initialization of the optimization controller parameters, which are usually resorted to trial and error procedure in the existing iterative algorithms. Lastly, example is used to illustrate the performance and applicability of the proposed method.

MoB6-5

A Novel Method for Modeling and Analysis of Meander-Line-Coil Surface Wave EMATs

Shujuan Wang1, Lei Kang1, Zhichao Li1, Guofu Zhai1 and Long Zhang1

1 School of Electrical Engineering and Automation, Harbin Institute of Technology, Harbin, P. R. China

A novel 3-D model for meander-line-coil surface wave electromagnetic acoustic transducers (EMATs) operating on the Lorentz principle is established by combining numerical calculations and analytical solutions. Simulation and analysis find that surface waves generated by the Lorentz force due to dynamic magnetic field is more sensitive to flaws, and the force due to the dynamic

magnetic field generates surface waves more efficiently than that due to the static one when the excitation current exceeds 528.9 A. The accuracy of the established model is verified by experiment.

MoB6-6

The Design of Neuron-PID Controller for a Class of Networked Control System under Data Rate Constraints

Lixiong Li, Rui Ming and Minrui Fei,

School of Mechanical Engineering and Automation, Shanghai University,Shanghai Key Laboratory of Power Station Automation Technology,Shanghai, P.R. China

In networked control system where control loop is closed over communication network, limited data rate may deteriorate control performance even destabilize the control system. In this paper, for a second-order control system closed over typical control networks, performance analysis with data rate constraints is conducted and Critical Data Rate (CDR) is explored. Furthermore, under the circumstances that CDR is available, Neuron-PID controller with Smith predictor is employed to eliminate the negative influence cause by communication network. Finally, case study is provided and acceptable control performance can be guaranteed with this design methodology.

MoB6-7

Stochastic Optimization of Two-stage Multi-item Inventory System with Hybrid Genetic Algorithm

Yuli Zhang1, Shiji Song1, Cheng Wu1, Wenjun Yin2

1. Department of Automation, Tsinghua University, Beijing ,China

2. IBM China Research Lab, Beijing,China

This paper considers a two-stage, multi-item inventory system with stochastic demand. First we propose two types of exact stochastic optimization models to minimize the long-run average system cost under installation and echelon (r, nQ) policy. Second we provide an effective hybrid genetic algorithm (HGA) based on the property of the optimization problem. In the proposed HGA, a heuristic search technique, based on the tradeoff between inventory cost and setup cost, is introduced. The long-run average cost of each solution in the model is estimated by Monte Carlo method. At last, computation tests indicate that when variance of stochastic demand increases, echelon policy

outperforms installation policy and the proposed heuristic search technique greatly enhances the search capacity of HGA.

ROOM C

MoC5	8:30-10:10
RoomC	
Topic:	
Computational intelligence in bioinformatics and biometrics-2	

Chair(s): Wenhua Zhu, Yibo Zhang

MoC5-1

Artificial intelligence based optimization of fermentation medium for β-glucosidase production from newly isolated strain Tolypocladium cylindrosporum

Yibo Zhang1, Lirong Teng1, Yutong Quan1, Hongru Tian1, Yuan Dong, Qingfan Meng1, Jiahui Lu1, Feng Lin1, Xueqing Zhen2
1.College of life science, Jilin University, Changchun, China
2.The Frist hospital of Jilin University, Changchun, China

A Tolypocladium cylindrosporum strain was isolated for efficiently produce extracellular thermoacidophilic β-glucosidase (BGL). This objective of the present paper is to integrate two different artificial intelligence techniques namely artificial neural network(ANN) and genetic algorithm(GA) for optimizing medium composition for the production of BGL on submerged fermentations(SmF). Specifically, the ANN and GA were used for modeling non-linear process and optimizing the process. The experimental data reported in a previous study for statistical optimization were used to build the ANN model. The concentrations of the four medium components served as inputs to the ANN model and the β-glucosidase activity as the output of the model. The average error (%) and correlation coefficient for the ANN model were 1.36 and 0.998, respectively. The input parameters of ANN model were subsequently optimized using the GA. The ANN-GA model predicted a maximum β-glucosidase activity of 2.679U/ml at the optimun medium composition. The ANN-GA model predicted gave a 22% increase of β-glucosidase activity over the statistical optimization, which was in good agreement with the actual experiment under the optimum conditions.

MoC5-2

The Human Computer Interaction Technology Based on Virtual Scene

Huimeng Tan1, Wenhua Zhu1, Tianpeng Wang1
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Assembly simulation technology which is based on virtual reality can benefit a lot to the optimization of product design as well as the training and coaching of workers. At present, the effect of common assembly simulation is not very good, because it only pays attention on the process of assembly and ignores the environment, and it is not interactive just like a movie. In order to change this, we introduce the virtual scene and human computer interaction technology on the basis of Assembly simulation technology, which is through the control of keyboard and mouse to view the details and the assembly simulation in virtual scene from different angle. Also through the control of mouse, we can drag those parts to achieve the assembly, this will surely more conducive to the training and guidance of employees. At Last, an example of assembly simulation for airplane horizontal tail was given, and the result is proved to be effective.

MoC5-3

ICA-Based Automatic Classiˉcation of Magnetic Resonance Images From ADNI Data

Wenlu Yang1;2, Xinyun Chen1, Hong Xie1, and Xudong Huang2
1.Department of Electronic Engineering, Shanghai Maritime University, Shanghai, China.
2.Department of Radiology, Brigham and Women's Hospital, and Harvard Medical School,Boston, MA, USA.

This paper proposes a novel method of automatic classification of magnetic resonance images based on independent component analysis (ICA). The ICA-based method is composed of three steps. First, all magnetic resonance imaging (MRI) scans are aligned and normalized by statistical parametric mapping. Then FastICA is applied to the preprocessed images for extracting specific neuroimaging components as potential classifying feature. Finally, the separated independent coefflcients are fed into a classifying machine that discriminates among Alzheimer's patients, and mild cognitive impairment, and control subjects. In this study, the MRI data is selected from the Alzheimer's Disease Neuroimaging Initiative databases. The experimental results show that our methocan successfully di®erentiate subjects with Alzheimer's disease and mild cognitive impairment from normal controls.

MoC5-4

Label Propagation Algorithm based on Non-negative Sparse Representation

Nanhai Yang ,Yuanyuan Sang, Ran He , Xiukun Wang
Department of Computer Science and Technology, Dalian University of Technology, Dalian, China

Graph-based semi-supervised learning strategy plays an important role in the semi-supervised learning area. This paper presents a novel label propagation algorithm based on nonnegative sparse representation (NSR) for bioinformatics and biometrics. Firstly, we construct a sparse probability graph (SPG) whose nonnegative weight coefficients are derived by nonnegative sparse representation algorithm. The weights of SPG naturally reveal the clustering relationship of labeled and unlabeled samples; meanwhile automatically select appropriate adjacency structure as compared to traditional semi-supervised learning algorithm. Then the labels of unlabeled samples are propagated until algorithm converges. Extensive experimental results on biometrics, UCI machine learning and TDT2 text datasets demonstrate that label propagation algorithm based on NSR outperforms the standard label propagation algorithm

MoC5-5

Multiple Sequence Alignment by Improved Hidden Markov Model Training and Quantum-behaved Particle Swarm Optimization

Li Cheng-yuan1, Long Hai-xia2, Ding Yan-rui1, Sun Jun1, Xu Wen-bo1
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Road 1800, WuXi, JiangSu, China
2.School of Education, Jiangnan University , Lihu Road 1800, WuXi, JiangSu, China
Multiple sequence alignment (MSA), known as NP-complete problem, is one of the basic problems in computational biology. Presently, profile hidden Markov model (HMM) is widely used for multiple sequence alignment. In this paper, Quantum-behaved Particle Swarm Optimization (QPSO) is used to train profile HMM. Furthermore, an integration algorithm based on the profile HMM and QPSO for the MSA is proposed. In order to evaluate the approach protein sequences are taken. Finally, compared with other algorithms, the results show that the proposed algorithm not only finds out perfect profile HMM, but also produces the optimal alignment of multiple sequences.

MoC5-6
Breast Cancer Diagnosis Using WNN Based on GA
Xiaomei Yi, Peng Wu, Jian Li, Lijuan Liu
Department of Information Engineering of ZheJiang Agricultural & Forestry University, Hangzhou, China
Breast cancer diagnosis is an important field of medical research. In order to improve the accuracy of diagnosis, this article proposed a model of breast cancer diagnosis with wavelet neural network (WNN) based on genetic algorithm (GA). In this model, wavelet is used as the excitation function of the neural network, and genetic algorithm is used to optimize the weight of neural network. On the basis of it the WNN-GA implements learning step and built the WNN-GA model of breast cancer diagnosis. The result of the experiment shows that this algorithm can be used in breast cancer diagnosis effective and reliable.

MoC5-7
Lattice-based Artificial Endocrine System
Qingzheng Xu1,2, Lei Wang1, Na Wang2
1.School of Computer Science and Engineering, Xi'an University of Technology, Xi'an,China
2.Xi'an Communication Institute, Xi'an, China
For the problem of homogeneous endocrine cells and lacking time concept in hormone transportation and metabolism in digital hormone model, a lattice-based artificial endocrine system (LAES) model which is inspired from modern endocrinology theory is proposed. Based upon environmental latticed, supported by cell intellectualization, jointed by cumulative hormone, and directed by target cells, LAES model finally adapts itself to continuous changes of external environment and maintains relevant stability stable of internal environment. Endocrine cells are classed as regular endocrine cells and optimum endocrine cells reflecting the diversity and complexity of endocrine system. The model mimics dynamic process of hormone transportation and the hormone concentration is determined not only by the current distribution of endocrine cells, but also by the past distribution. The experiments show it can eliminate complex interference, such as multi-target cells and multi-obstacles.

MoC5-8
Direct Sparse Nearest Feature Classifier for Face Recognition
Ran He, Nan-Hai Yang, Xiu-Kun Wang, Guo-Zhen Tan
School of Computer Science, Dalian University of Technolgoy, Dalian, China
Sparse signal representation proposes a novel insight to solve face recognition problem. Based on the sparse assumption that a new object can be sparsely represented by other objects, we propose a simple yet efficient direct sparse nearest feature classifier to deal with the problem of automatically real-time face recognition. Firstly, we present a new method, which calculates an approximate sparse code to alleviate the extrapolation and interpolation inaccuracy in nearest feature classifier. Secondly, a sparse score normalization method is developed to normalize the calculated scores and to achieve a high receiver operator characteristic (ROC) curve. Experiments on FRGC and PIE face databases show that our method can get comparable results against sparse representation-based classification on both recognition rate and ROC curve.

MoC6	10:30-12:10
RoomC	
Topic:	
1.Computational methods and intelligence in modeling molecular, cellular and multi-cellular behavior and dynamics	
2.Intelligent modeling, monitoring, and control of complex nonlinear systems	

Chair(s):   Jingtao Lei, Xiaoming Wu

MoC6-1
A Mathematical Model of Myelodysplastic Syndromes: the Effect of Stem Cell Niches
Xiuwei ZHU , Ling XIA , Luyao LU
Key Lab of Biomedical Engineering of Ministry of Education, Department of Biomedical Engineering, Zhejiang University, Hangzhou, China
While myelodysplastic syndromes (MDS) are commonly observed nowadays, the underlying mechanisms remain unclear, not to mention mathematical models for MDS. In this work, by incorporating the concept of stem cell niches, we proposed a minimal mathematical model that can be used as a platform for studying the formation and treatment of MDS. Our model includes two main compartments: bone marrow and peripheral blood, in both compartment normal and abnormal cells exist. Simulation results show that 1) under normal condition, our model is robust to reproduce the hemopoiesis even with different perturbations; 2) by reducing stem cell niches, formation of MDS can be observed in our model; 3) treatments should be used to improve environment in bone marrow, rather than to kill the abnormal cells only.

MoC6-2
Ion Channel Modeling and Simulation using Hybrid Functional Petri Net
Yin Tang1,*, Fei Wang1

1. Shanghai Key Lab of Intelligent Information Processing, Fudan University, Shanghai, China.

Neural system and ion channels remain one of the most intractable issues in biology over years because of its complexity. A representation that takes in both the intuition of biologists and the computational ability of the ion channel system is of great importance. In this paper, we exploit Hybrid Functional Petri net (HFPN) for representing ion channel dynamics. As an extension of Petri net, HFPN allows both discrete and continuous factors and realizes ordinary differential equations (ODE) which make it easy to handle biological factors in the ion channel system such as the open(close) state of ion channels and the influx (efflux) of various ions. We prove that neural elements can be naturally translated into HFPN. Simulation results of the action potential show our model very effective. Our work explores a novel approach for neuroscience research and a new application for Petri-net based method.

MoC6-3

Computer Simulation on the Compaction of Chromatin Fiber Induced by Salt

Chun-Cheng Zuo, Yong-Wu Zhao, Yong-Xia Zuo, Feng Ji, Hao Zheng

Jilin University, College of Mechanical Science and Engineering, China

We present a computer simulation on the compaction of 30-nanometer chromatin fiber induced by salt. The nucleosome is represented as rigid oblate ellipsoids without consideration of DNA-histone wrapping conformation. It is found that equilibrium conformations of multi-nucleosome chains at physiological ionic concentrations are more or less random "zig-zag" structures. Moreover, the diameter, the linear mass density and the persistence length of fiber show a strong dependence on the ion strength. The computational results show us that decreasing the salt strength from 0.15M to 0.01M leads to an increase in the diameter and the linear mass density and a decrease in the persistence length.

MoC6-4

Electrical remolding and mechanical changes in heart failure: a model study

Yunliang Zang, Ling Xia

Department of Biomedical Engineering, Zhejiang University, Hangzhou, China

We have developed a canine cardiac cellular electromechanics model to simulate electrophysiological remodeling of heart failure (HF) and predicted cardiomyocyte contractility after HF. $I_{Na,L}$ is integrated into this model to study its role to the prolongation of action potential (AP) in control and HF conditions, which was not established well in the past. It may have a great contribution to prolongation of AP in control and even greater contribution to that of HF. Ionic remolding after HF is modeled by downregulation of I_{to1}, I_{K1}, I_{Ks}, SR pump function and upregulation of Na^+-Ca^{2+} exchange (NCX) and $I_{Na,L}$. The HF model could successfully simulate the prolonged AP, reduced I_{CaL}, enhanced I_{NaCa} and blunted Ca^{2+} transient. With computed Ca^{2+} being the input to myofilament model, myofilament forces are determined. Compared with control, reduced amplitude, increased latency to onset of contraction, increased time to peak (TTP) and attenuated cell shortening are found in HF model. The model could also be embedded into tissue electromechanics model to simulate the altered activation sequence and mechanical function.

MoC6-5

Modeling Conformation of Protein Loops by Bayesian Network

Peng Yang1 Qiang LÄu1;2;+ Lingyun Yang1 and Jinzhen Wu1

1. School of Computer Science and Technology, Soochow University

2. Jiangsu Provincial Key Lab for Information Processing Technologies Suzhou, China

Modeling protein loops is important for understanding characteristics and functions for protein, but remains an unsolved problem of computational biology. By employing a general Bayesian network, this paper constructs a fully probabilistic continuous model of protein loops, refered to as LoopBN. Direct affection between amino acids and backbone torsion angles can be learned under the framework of LoopBN. The continuous torsion angle pair of the loops can be captured by bivariate von Mises distribution. Empirical tests are conducted to evaluate the performance of LoopBN based on 8 free modeling targets of CASP8. Experimental results show that LoopBN not only performs better than the state-of-the-art modeling method on the quality of loop sample set, but also helps de novo prediction of protein structure by providing better sample set for loop refinement.

MoC6-6

Towards constraint optimal control of greenhouse climate

Feng Chen1, Yongning Tang2

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Greenhouse climate is a multiple coupled variable, nonlinear and uncertain system. It consists of several major environmental factors, such as temperature, humidity, light intensity, and CO_2 concentration. In this work, we propose a constraint optimal control approach for greenhouse climate. Instead of modeling greenhouse climate, Q-learning is introduced to search for optimal control strategy through trial-and-error interaction with the dynamic environment. The coupled relations among greenhouse environmental factors are handled by coordinating the different control actions. The reinforcement signal is designed with consideration of the control action costs. To decrease systematic trial-and-error risk and reduce the computational complexity in Q-learning algorithm Case Based Reasoning (CBR) is seamlessly incorporated into Q-learning process of the optimal control.

The experimental results show this approach is practical, highly effective and efficient.

MoC6-7

A kernel spatial complexity-based nonlinear unmixing method of hyperspectral imagery

Xiaoming Wu1, Xiaorun Li1, Liaoying Zhao2
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2.Institute of Computer Application Technology, Hangzhou Dianzi University, Hangzhou, China

In the hyperspectral analysis, the spatial correlation information is potentially valuable for hyperspectral unmixing. In this paper, we propose a new model, denoted "kernel spatial complexity-based nonnegative matrix factorization" (KSCNMF), to unmix the nonlinear mixed data. The method is derived in the feature space, which is kernelized in terms of the kernel functions in order to avoid explicit computation in the high-dimension feature space. In the algorithm, input data are implicitly mapped into a high-dimensional feature space by a nonlinear mapping, which is associated with a kernel function. As a result the high order relationships and more useful features between the spectral data can be exploited. Experimental results based on a set of simulated data and a real hyperspectral image demonstrate that the proposed method for decomposition of nonlinear mixed pixels has excellent performance.

MoC6-8

Study on Machine Vision Fuzzy Recognition based on Matching Degree of Multi-Characteristics

Jingtao Lei1, Tianmiao Wang2, Zhenbang Gong1
1. School of Mechanical Engineering & Automation, Shanghai University, Shanghai,China
2. School of Mechanical Engineering & Automation, Beihang University, Beijing,China

This paper presents a new method used for fruit category recognition based on machine vision and total matching degree of fruit's multi-characteristics. The ladder membership function was used to express each characteristic. The matching degree of each characteristic was calculated by its membership function, and then the total matching degree was calculated, fruit category recognition can be determined by the total matching degree. In this paper, a 5-input 1-output zero-order Takagi-Sugeno fuzzy neural network was constructed to achieve non-linear mapping between fruit characteristics and fruit type, then the parameters of membership function for each characteristic was designed as learning parameters of the network. Training the fuzzy neural network through a large amount of sample data, the corresponding parameters of the membership functions of recognized fruit can be determined. Taking apple recognition as an example, the experimental results show that the method is simple, effective, highly precise, easy to implement.

ROOM D

Chair(s):   Xingsheng Gu, Ruochen Liu

MoD5-1

CFBB PID Controller tuning with Probability based Binary Particle Swarm Optimization Algorithm

Menhas Muhammad Ilyas1,2, Ling Wang2, Hui Pan2, Minrui Fei2
1. Ali Ahmed Shah University College of Engineering and Technology Mirpur Azad Kashmir, University of Azad Jammu and Kashmir, Pakistan.
2. Shanghai Key Laboratory of Power Station Automation Technology, School of Mechatronics and Automation Shanghai University, China

The high combustion efficiency, extensive fuel flexibility and environment friendly characteristics have made circulating fluidized bed boiler (CFBB) an alternate choice for coal fired thermal power plants for clean energy production. But CFBB is a highly nonlinear and complex combustion system because of coupling characteristics and time delays. PID controller tuning of such a complex system with traditional tuning methods cannot meet required control performance. In this paper, a new variant of binary particle swarm optimization algorithm (PSO), called probability based binary PSO is presented to tune the parameters of CFBB. The simulation results show that PBPSO can effectively optimize the controller parameters and achieve s a better control performance than those based on that of a standard discrete binary PSO and a modified binary PSO.

MoD5-2

A Novel Cultural Algorithm and Its Application to the Constrained Optimization in Ammonia Synthesis

Wei Xu1, Lingbo Zhang 1, Xingsheng Gu 1
1.Research Institute of Automation, East China University of Science and Technology, China

A novel cultural differential evolution algorithm with multiple populations (MCDE) is proposed. The single individual in each population is affected by the situational and normative knowledge from belief space simultaneously. The populations communicate with each other following a rule of knowledge exchange, which helps to enhance the search rate of evolution. The concept of culture fusion is introduced to develop an adaptive mechanism of preserving the population diversity. The mechanism ensures that populations are diverse along the whole evolution and excellent candidate solutions are not rejected. The performance of MCDE algorithm is validated by typical constrained optimization problems. Finally, MCDE is applied to maximizing the net value of ammonia in an ammonia synthesis loop. The results

indicate that the proposed algorithm has the potential to be used in other problems.

MoD5-3

Pareto ant colony Algorithm for building life cycle energy consumption optimization

Yan Yuan 1, Jingling Yuan 2, Hongfu Du 2, and Li Li1
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2. Computer Science and Technology school, Wuhan University of Technology , China

This article aims at realizing optimal building energy consumption in its whole life cycle, and develops building life cycle energy consumption model (BLCECM), as well as optimizes the model by Ant Colony Algorithm (ACA). Aiming at the complexity and multi-objective principle of building life cycle energy consumption, this research tries to modify Pareto Ant Colony Algorithm (PACA), making it fit the needs of finding solution to least energy consumption in a building's whole life cycle. In the initial stage of ant colony constructing solution, each objective weighing is defined randomly, which improves the optimal determination mechanism of Pareto solution, perfects the renovation principle of pheromone, and finally realize the goal of optimization. This research is a innovative application of ACA in building energy-saving area, and it provides definite as well as practical calculation method for building energy consumption optimization in terms of a whole life cycle.

MoD5-4

Particle Swarm Optimization based Clustering: A Comparison of Different Cluster Validity Indices

Ruochen Liu1, Xiaojuan Sun1, Licheng Jiao1
1.Key Laboratory of Intelligent Perception and Image Understanding of Ministry of Education of China, Institute of Intelligent Information Processing, Xidian University, China

Most of clustering algorithms based on natural computation aim to find the proper partition of data to be processed by optimizing certain criteria, so–called as cluster validity index, which must be effective and can reflect a similarity measure among objects properly. Up to now, four typical cluster validity indices such as Euclid distance-based PBM index, the kernel function induced CS measure, Point Symmetry (PS) distance-based index, Manifold Distance (MD) induced index have been proposed. But, there is not a detailed comparison among these indexes. In this paper, we design a particle swarm optimization based clustering algorithm, in which, four different cluster validity index above mentioned are used as the fitness of a particle respectively. By applying the proposed algorithm to a number of artificial synthesized data and UCI data, the performance of different validity indices are compared in terms of clustering accuracy and robustness at length.

MoD5-5

A General Framework for High-Dimensional Data Reduction Using Unsupervised Bayesian Model

Longcun Jin1, Wanggen Wan1, Yongliang Wu1, Bin Cui1, Xiaoqing Yu1
1. School of Communication and Information Engineering, Shanghai University, China

In this paper, we propose a general framework for high-dimensional data reduction using unsupervised Bayesian model. The framework assumes that the pixel reflectance results from linear combinations of pure component spectra contaminated by an additive noise. The constraints are naturally expressed in unsupervised Bayesian literature by using appropriate abundance prior distributions. The posterior distributions of the unknown model parameters are then derived. Experimental results on hyperspectral data demonstrate useful properties of the proposed reduction algorithm.

MoD5-6

An Estimation of Distribution Algorithm based on Clayton Copula and Empirical Margins

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Estimation of Distribution Algorithms (EDAs) are new evolutionary algorithms which based on the estimation and sampling the distribution model of the selected population in each generation. The way of copula used in EDAs is introduced in this paper. The joint distribution of the selected population is separated into the univariate marginal distribution and a function called copula to represent the dependence structure. And the new individuals are obtained by sampling from copula and then calculating the inverse of the univariate marginal distribution function. The empirical distribution and Clayton copula are used to implement the proposed copula Estimation of Distribution Algorithm (copula EDA). The experimental results show that the proposed algorithm is equivalent to some conventional continuous EDAs in performance.

MoD5-7

Clonal Selection Classification Algorithm for High-Dimensional Data

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Many important problems involve classifying high-dimensional data sets, which is very difficult because learning methods suffer from the curse of dimensionality. In this paper, Clonal Selection Classification Algorithm is proposed for high-dimensional data. First, an automatic non-parameter uncorrelated discriminant analysis (UDA) is adopted for dimensionality reduction (DR). Due to the favorable global search and local search, Clonal Selection Algorithm (CSA) is used to design classifier. The proposed method has been extensively compared with nearest

neighbor (NN) based on Principal Component Analysis and linear discrimination analysis (PCA+LDA), nearest neighbor (NN) based on UDA (UDA+NN) and FCM based on UDA (FCM+UDA) when classifying six UCI data sets and a SAR image classification problems. The results of experiment indicate the superiority of the proposed algorithm over the three other classification algorithms in term of classification accuracy and stability.

MoD6	10:30-12:10

MoD6   **10:30-12:10**
RoomD
Topic:
1.Advanced neural network theory and algorithms
2.Innovative education in systems modeling and simulation-1
Chair(s):   Ming Huei Chu, David Tormey

MoD6-1

The Model following Neural Control Applied to Energy-saving BLDC Air Conditioner System

Ming Huei Chu 1, Yi Wei Chen 1 and Zhi Wei Chen 1
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An AC inverter has been widely used to air conditioner systems for energy saving. But the AC driver will generate high heat dissipation and induce high operating temperature in low speed operation conditions. The modern brushless DC motor (BLDC motor) will improve the high heat generation problem in wide operation speed. This study utilizes the model following neural control applied to modern BLDC driver. A simple approximation of plant Jacobian is proposed, the appropriate speed performance of the BLDC motor for energy saving is defined. The simulation results reveal that the proposed control system is available to control the DC air conditioner system and save energy.

MoD6-2

Develop of specific sewage pretreatment and network monitoring system

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1. School of Electrical Engineering and Automation，Hefei University of Technology, China
2. Environmental Protection Office of Huangshan Beauty Spots, Huangshan, China
3. School of Resources and Environment, Hefei University of Technology, Hefei, China
4.Chizhou University, Chizhou China

After analyzing the current status of sewage treatment system, a construction method of specialization and specificity of sewage treatment is proposed. The huge urban sewage treatment pipe network and processing of mixed water to sewage treatment of specific sources of pollution are simplified, which not only reduces the urban construction scale of urban sewage pipe network but also creates the conditions of reclaimed water using. Therefore, the sewage treatment system can bring many advantages including low cost of investment, incremental regulation, and good treatment effect.

MoD6-3

Application of Radial Basis Function Neural Network in Modeling Wastewater sludge recycle system

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Guangzhou Institute of Railway Technology , China

Sludge recycle system is an important part of wastewater treatment plants(WWTP), which can ensure the required reactor sludge concentration, maintenance the dynamic balance between secondary sedimentation tanks and sludge reactor sludge concentration. This work proposes development of a Radial Basis Function (RBF) Neural Network model for prediction of the Sludge recycling flowrate, which ultimately affect the Sludge recycling process. Compared with the traditional constant sludge recycle ratio control, new idea is better in response to actual situation. According to analyzing and Evolutionary RBF Neural Network theory, a RBF Neural Network is designed. The data obtained from wastewater treatment were used to train and verify the model. Simulation shows good estimates for the sludge recycling flowrate. So the idea and model is a good way to the sludge recycle flow rate control. It is a meaningful Evolutionary Neural Network application in industry.

MoD6-4

Improved Stability Criteria for Delayed Neural Networks

Min Zheng1,2, Minrui Fei1,2, Taicheng Yang3, and Yang Li1,2
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2.Shanghai Key Laboratory of Power Station Automation Technology, China
3.Department of Engineering and Design, University of Sussex, UK

This paper is concerned with the stability problem of delayed neural networks. An improved integral inequality Lemma is proposed to handle the cross-product terms occurred in the derivative of Lyapunov functional. By using the new lemma and a novel delay decomposition approach, we propose the new delay-range-dependent stability criteria for time varying delay neural networks. The su±cient conditions obtained in this paper are less conservative than those in the former literature.

MoD6-5

Aplication of the Single Neuron PID Controller on the Simulated Chassis Dynamometer

1.Weichun Zhang1, Bingbing Ma1, Peng Yu1 , Baohao Pei1
Shandong University of Technology Zibo, Shandong Province, China

The single neuron self-adaptive PID controller was introduced after analyzing MCG-200 simulated chassis dynamometer control system. The simulation process of running resistance in the laboratory was improved. The suitable single neuron self-adaptive PID controller was designed, the new control system using single neuron self-adaptive PID algorithm was simulated and laboratory

dates obtained on the improved chassis dynamometer was compared with datas conducted on the real road. Results show that: the single neuron self-adaptive PID controller has simpler structure, stronger self-adaptive ability and can replace the traditional PID controller.

MoD6-6
Research on the Neural Network Information Fusion Technology for Distinguishing Chemical Agents

Minghu Zhang1,1, Dehu Wang1, Lv Shijun1, Jian Song2, Yi Huang1
1.Dept. of Shipboard Weaponry, Dalian Naval Academy, China
2.Arms Tactics Research Center, Naval Arms Command Academy, China

For implementing effectively detection and rapid exact identification for the chemical agents in sea-battlefield, firstly, the conception, treatment model and system structure of the information fusion, are introduced; secondly, the neural network(NN) information fusion system model are built by the multi-sensors information fusion (MSIF) technology; At the same time, connecting the wavelet analysis with the NN organically, and based on the wavelet transfer and the NN, the system of the speedy features extraction and identification for chemical agents -the NN Distinguishing Chemical Agents (NNDCA) system- is founded. The model of the NNDCA and the method of the feature extraction for the chemical agents based on the wavelet analysis are established, and the hardware accomplishment and the software structure of the NNDCA system are put forward; lastly, the experimental and simulated results show: it is feasible that the analyses for the chemical agents with the NNDCA system based on the MSIF technology and the wavelet analysis. The method can remarkably heighten the accuracy and credibility of the measurement results, and the results are of repeatability.

MoD6-7
Simulating Energy Requirements for an MDF Production Plant

Cristina Maria Luminea1, Dr. David Tormey1
1.Centre For Design Innovation, Institute of Technology Sligo, Ballinode, Sligo, Ireland

The main focus of this paper is to look at production management in a manufacturing facility and correlate it with the energy consumption. The end result of this process will be a better understanding of the production system and the energy loses. This will be closely followed by the creation of different scenarios that ideally will lead to a lowering in the energy consumption. So far, simulation has been used in manufacturing facilities for modelling supply chain management, production management and business processes. This research brings a novel approach to investigating the adaptability of industrial simulation processes and tools for modelling the energy consumption with respect to a variable production output.

MoD6-8

Three-Dimensional Mesh Generation For Human Heart Model

Dongdong Deng1, Junjie Zhang1, Ling Xia1
1.Department of Biomedical Engineering, Zhejiang University, China

Mesh generation is the precondition of finite element analysis. The quality of the mesh determines the precision of the computational results, and low-quality meshes might lead to incorrect results. Therefore,   it is necessary to produce high-quality meshes for finite element analysis. Most commercial software generates meshes on the basis of the entity of an object, while seldom uses the discrete point data to produce meshes directly. Furthermore, the compatibility problem among different software always slows down the progress of research. This paper aims at producing Constrained Delaunay Tetrahedral meshes for human heart anatomy model with TetGen.

ROOM E

MoE5   8:30-10:10
RoomE
Topic:
1. Intelligent construction and energy saving techniques for sustainable and green built environment
2. Intelligent water treatment and waste management technologies

Chair(s): Shihu Shu, Ben Niu

MoE5 -1
A study on the Cooling Effects of Greenery on the Surrounding Areas by Computer Simulation for Green Built Environment

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This paper discusses the effects of greenery on the surrounding environment in a sub-urban landscape in Singapore. The case study involved is Clementi Woods and its surrounding vicinity. Using computational tools such as ENVI-MET and Leonardo, we focused on the simulation works with the main objectives of the study including: to evaluate the cooling effects of the green area in Clementi Woods on the surrounding environment and to determine the impact of future removal of the green area on the surrounding environment. It was found that cooling effects of greenery can be confirmed by the results derived from the simulation. Clementi Woods is consistently 0.3 to 0.6 ^{o}C lower than other zones.

MoE5-2
Spatial-temporal Variation of Chlorophyll-a Concentration in the Bohai Sea

Wen-ling Liu1, Li Qian1, Xiao-shen Zheng1
Tianjin Key Laboratory of Marine Resources and Chemistry , Tianjin University of Science and Technology, China

Spatial-temporal variation of Chlorophyll-a concentration

retrieved by Moderate Resolution Imaging Spectroradiometer (MODIS-Auqa, aboard Auqa satellite) was analyzed since the starting MODIS-Auqa mission in July 2002 till July 2009 in Bohai Sea. Statistical methods including anomaly, sliding average, power spectral density were used to analyze the spatial-temporal variation of Chlorophyll-a concentration. The results showed that seasonal variation of Chlorophyll-a concentration represented the maximum values in February-March, the minimum values in July. Monthly anomalies showed about 2-year cycle. Spatial variation showed high concentration in coastal shore and decreased slowly to offshore. The whole Bohai Sea showed high Chlorophyll-a concentration in the year 2006.

MoE5-3

Modified Bacterial Foraging Optimizer for Liquidity Risk Portfolio Optimization

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2. College of Management, Shenzhen University, China
3. Measurement Specialties Inc.China

Recently, bacterial foraging optimizer (BFO) is gaining popularity in the community of researchers because of its efficiency in solving some real-world optimization problems. But very little research work has been undertaken to deal with portfolio optimization problem using BFO approach. This article comes up with a novel approach by involving a linear variation of chemotaxis step in the basic BFO for finding the optimal portfolios. Our proposed approach is evaluated on application on an improved portfolio optimization model considering both the market and liquidity risk. The experimental results demonstrate the positive effects of the strategy.

MoE5-4

Comparison of Two Models for Calculating Water Environment Capacity of Songhua River

Shihu. Shu1, Huan Ma2
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2.Anglian Water Services Ltd , Anglian House, Ambury Road, Cambridgeshire, UK

Water environment capacity is an important conception in environmental science. As a basic theory applied in EIA (Environmental Impact Assessment), water environmental capacity is also an indispensable factor in making District Environmental Planning and total water pollutant control. With the statistic monitoring data of 17 water quality indexes from 2001 to 2005 of six monitor sections offered by Harbin Environmental Protection Administration, assessment of water quality of Songhua River along Harbin City was made. Sensitivity analysis was performed to identify the critical model parameters from 17 indexes. COD and NH_3-N were selected as the key parameters to be calculated. Both one-dimension and two-dimension water quality model were calibrated and used to derive the water environmental capacity in Songhua River. Discussion was developed to show the model performance

evaluation. The conclusion was generated that two-dimension water quality model provides a more conservative water environmental capacity than one-dimension model. There is no water environmental capacity in Harbin City region of Songhua River, which needs pollutant reduction. Up stream and down stream of Harbin City can bear with the current wastewater discharge.

MoE5-5

Growth Characteristics and Fermentation Kinetics of Flocculants-producing Bacterium F2

Jie Xing1, Jixian Yang1, Fang Ma1 , Wei Wang1, Kexin Liu1
1.State Key Lab of Urban Water Resource and Environment, School of Municipal and Environmental Engineering, Harbin Institute of Technology, China

We isolated flocculants-producing bacteria F2 from soil. It shows high and stable flocculating activity for Kaolin clay suspension. In order to comprehend their growth characteristics to make good use of them, we measured the changes of several parameters using shaking flask experiment, including pH, temperature, the content of glucose and nitrogen source. And we built the model about the cell growth and substrate consumption. Through the comparison of experimental data and the corresponding calculated values from the models, we found that the data joint well and the model can provide theoretical basis for large-scale fermentation of flocculants-producing bacteria F2.

MoE5-6

Research on Enrichment for Anammox Bacteria Inoculated via Enhanced Endogenous Denitrification

Yi Yuan 1,2 , Yong Huang 2, Huiping Deng1, Yong Li2, Yang Pan2
1.School of Environmental Science and Engineering，Tongji University, Shanghai ,China
2.Department of Environmental Science and Engineering，Suzhou university of Science and technology, Suzhou, China

The project of this study is to research the feasibility of anammox sludge enrichment with endogenous denitrification method and the characteristics of the enrichment anammox sludge. SBR was used as reactor which operation mode of continuously influent when operation would benefit for anammox reaction because of substrates dilution. Lower nitrogen concentrations and shorter operation periodic time would also benefit for the bacteria culture while at the same nitrogen load. The sludge selected from aerobic sludge treating municipal wastewater with endogenous-denitrification method could steadily react as anammox with the nitrogen load of 0.156kgN/m3·d. In this study the highest influent nitrogen concentrations were 500mgNH4+-N/l and 580mgNO2--N/l，the removed NH4+-N/ NO2--N ratio was 1:1.12 closely to the reported value, and sludge became red, which all indicated that endogenous-denitrification sludge could be adopted to anammox bacteria enrichment, and endogenous-denitrification method could be adopted

to treating sludge digestive liquid. The research showed that SBR for anammox sludge enrichment was most stable to flow rate shock, but it was very sensitive to substrate shock because of nitrite inhibition.

MoE5-7

Evaluation of Geological Disaster with Extenics Based on Entropy Method

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A new evaluation method of geological disaster combining extenics and entropy is presented. According to the data of geological disaster monitoring in Jilin province, based on matter element theory, extension set and dependent function, the classical domain and section field of geological disaster is decided, the weights of the evaluation indexes are calculated based on entropy method, and a comprehensive evaluation model of geological disaster is established by extenics theory. The method indicates that the adoption of extenics theory in comprehensive assessment of geological disaster is reasonable and feasible.

MoE5-8

Crack Image Enhancement of Track Beam Surface Based on Nonsubsampled Contourlet Transform

Chunhua Guo, Tongqing Wang
The Key Laboratory of Optoelectronic Technology & Systems of the Ministry of Education,
Chong Qing University, Chong Qing,

A new algorithm of crack image enhancement of straddle-type monorail track beam surface based on nonsubsampled contourlet transform (NSCT) is presented. It is according to the characteristics of different domain in NSCT, and the fractional differentiation can enhance the mid-frequency and retain the low frequency nonlinearly. Then a new enhancement method has been proposed that the smooth sub-band texture of NSCT domain can be enhanced by the fractional differentiation; while in the high-frequency subbands of NSCT domain, each pixel of high-frequency sub-bands is divided into strong edge, weak edge and noise on the basis of direction sensitivity characteristics, then the weak edge can be enhanced nonlinearly, strong edge be retained, and noise be removed. Experimental results show that the method proposed in this paper have greatly improved visual effects and larger contrast improve index (CII) as compared with wavelet transform, and the enhancement effect is very good.

MoE6	10:30-12:10
RoomE	
Topic:	
Synthetical Topic	

Chair(s): Minghu Ha, Jianghong Dou

MoE6-1

The Class-2 Linguistic Dynamic Trajectories of the Interval Type-2 Fuzzy Sets

Liang Zhao
College of Electrical Engineering, Henan University of Technology,Zhengzhou, China

The subjects of the class-2 linguistic dynamic system (LDS) are a class of complex systems. We employ interval type-2 fuzzy rules base to describe their dynamic behaviors. This paper presents the basic procedure of the class-2 LDS based on the computing with words by using interval type-2 fuzzy sets (IT2 FSs). Several numerical examples verify that our proposing method is effective.

MoE6-2

The Key Theorem of Learning Theory Based on Sugeno Measure and Fuzzy Random Samples

Minghu Ha 1, Chao Wang 2, Witold Pedrycz3
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2 College of Physics Science & Technology, Hebei University,Baoding, , P. R. China.
3 Department of Electrical & Computer Engineering, University of Alberta, Canada. and Systems Research Institute, Polish Academy of Sciences,Warsaw, Poland.

Statistical Learning Theory is one of the well-developed theories to deal with learning problems about small samples, and it has become an important conceptual and algorithmic vehicle of machine learning. The theory is based on the concepts of probability measure and random samples. Given this, it becomes difficult to take advantage of the theory when dealing with learning problems based on Sugeno measure and fuzzy random samples which we encounter in real-world problems. It is well known that Sugeno measure and fuzzy random samples are interesting and important extensions of the concepts of probability measure and random samples, respectively. This motivates us to discuss the Statistical Learning Theory based on Sugeno measure and fuzzy random samples. Firstly, some definitions of the distribution function and the expectation of fuzzy random variables based on Sugeno measure are given, and the law of large numbers of fuzzy random variables based on Sugeno measure is proved. Secondly, the expected risk functional, the empirical risk functional and the principle of empirical risk minimization based on Sugeno measure and fuzzy random samples are introduced. Finally, the key theorem of learning theory based on Sugeno measure and fuzzy random samples is proved, which will play an important role in the systematic and comprehensive development of the Statistical Learning Theory based on Sugeno measure and fuzzy random samples.

MoE6-3

Recognition of Fire Detection Based on Neural Network

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University,Shanghai,China

Aiming to the fire detection, a fire detection system based on temperature and pyroelectric infrared sensors is designed in this paper. According to the National Fire Detection Standard, a great number of test data are acquired. A model based on Levenberg-Marquardt Back Propagation (LM-BP) neutral network is established to recognize the fire status using the acquired data. Among the data, 200 groups of samples are used to train the established LM-BP networks while 1500 groups of samples test the LM-BP model. A 90% recognition rate is obtained by the LM-BP model. Compared with the other neutral networks such as Radial Basis Function (RBF) network the LM-BP neural network has a significantly higher recognition rate (90%) than the RBF net (70%). The initial results show that the LM-BP recognition method has a favourable performance, which provides an effective way for fire detection.

MoE6-4

Relation of Infarct Location and Size to Extent of Infarct Expansion After Acute Myocardial Infarction: A Quantitative Study Based on a Canine Model

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1.Department of Anesthesiaology, Guangzhou General Hospital of Guangzhou Military Command Guangzhou, China
2.Department of Biomedical Engineering, Zhejiang University Hangzhou, China

The paper analyzes the influence of size and location of myocardial infarction (MI) to the extent of infarct expansion (IE), based on a coupled electromechanical bi-ventricular model of canine. The ventricular motion and distributions of principal strain and stress during systole were used to contrast the effect of IE at different locations and with different sizes. The results showed that IE occured more in anterior wall (AW) near apex than posterior wall (PW), and large transmural MI may contribute a lot to the development of IE, which was in agreement with clinical results.

MoE6-5

A Distance Sorting Based Multi-Objective Particle Swarm Optimizer and Its Applications

Zhongkai Li1, Zhencai Zhu1, Shanzeng Liu1, Zhongbin Wang1
1.School of Mechatronics Engineering, China University of Mining and Technology, China

Multi-objective particle swarm optimization (MOPSO) is an optimization technique inspired by bird flocking, which has been steadily gaining attention from the research community because of its high convergence speed. On the other hand, in the face of increasing complexity and dimensionality of today's application coupled with its tendency of premature convergence due to the high convergence speeds, there is a need to improve the efficiency and effectiveness of MOPSO. A novel crowding distance sorting based particle swarm optimizer is proposed (called DSMOPSO). It includes three major

improvements: (I) With the elitism strategy, the evolution of the external population is achieved based on individuals' crowding distance sorting by descending order, to delete the redundant individuals in the crowded area; (II) The update of the global optimum is performed by selecting individuals with a relatively bigger crowding distance, which leading particles evolve to the disperse region; (III) A small ratio mutation is introduced to the inner swarm to enhance the global searching capability. Experiment results on the design of single-stage air compressor show that DSMOPSO handling problems with two and three objectives efficiently, and outperforms SPEA2 in the convergence and diversity of the Pareto front.

MoE6-6

A discrete harmony search algorithm

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Harmony search (HS), inspired by the music improvisation process, is a new meta-heuristic optimization method and has been used to tackle various optimization problems in discrete and continuous space successfully. However, the standard HS algorithm is not suitable for settling discrete binary problems. To extend HS to solve the binary-coded problems effectively, a novel discrete binary harmony search (DBHS) algorithm is proposed in this paper. A new pitch adjustment rule is developed to enhance the optimization ability of DBHS. Then parameter studies are performed to investigate the properties of DBHS, and the recommended parameter values are given. The results of numerical experiments demonstrate that the proposed DBHS is valid and outperforms the discrete binary particle swarm optimization algorithm and the standard HS.

MoE6-7

Image Fusion Using Self-constraint Pulse-coupled Neural Network

Zhuqing Jiao1, Weili Xiong1 and Baoguo Xu1
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In this paper, an image fusion method using self-constraint pulse coupled neural network (PCNN) is proposed. A self-constraint restrictive function is introduced to PCNN neuron, so that the relation among neuron linking strength, pixel clarity and historical linking strength is adjusted adaptively. Then the pixels of original images corresponding to the fired and unfired neurons of PCNN are considered as target and background respectively, after which new fire mapping images are obtained for original images. Finally, the clear objects of original images are decided by the weighted fusion rule with the fire mapping images and merged into a new image. Experiment result indicates that the proposed method has better fusion performance than several traditional approaches.

MoE6-8

Segmentation for SAR Image Based on a New

Spectral Clustering Algorithm

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2. Tianjin Key Laboratory of Intelligence Computing and Novel Software Technology, China

A new spectral clustering (SC) algorithm with Nyström method is proposed for SAR image segmentation in this paper. The proposed algorithm differs from previous approaches in that not only with Nyström method are employed for alleviating the computational and storage burdens of the SC algorithm, but also a new similarity function is constructed by combining the pixel value and the spatial location of each pixel to depict the intrinsic structure of the original SAR image better. Our algorithm and the classic spectral clustering algorithm with Nyström method are evaluated using the real-world SAR images. The results demonstrate the running time and the error rate of the proposed approach and the classic spectral clustering algorithm with Nyström method.

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Dou,Huiling	**SuE4-6**	Galbreath,Zack	**SaC2-5**
Dou,Jianhong	**MoE6-4**	Ganji,Behnam	**MoA6-2**
Du ,Hongfu	**MoD5-3**	Gao,Lixin	**SuA3-3**
Du,Dajun	**SB1-2**	Gao,Weijun	**MoA5-2**
Du,Dajun	**SuA4-6**	Gao,Xiangmin	**SuE3-10**
Du,Yanke	**SuB4-2**	Gao,Xiaozhi	**SuD4-10**
Duan,Yinghong	**SuB4-1**	Gao,Xiaozhi	**MoB5-6**
		Gao,Xing-Xing	**MoE6-8**

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		Gao,Yanxia	**SuD4-6**
		Gao,Yanxia	**MoA5-6**

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		Gao,Zhiyuan	**SaD1-8**
		Ge,Bo	**SaE2-8**
		Geng,Zhiqiang	**SaB2-2**
Fan,Guozhi	**MoA6-7**	Gong,Chun	**SuD3-7**
Fan,Jian	**SuA3-2**	Gong,Chun	**SuE3-8**
Fan,Xiaobiao	**SaD1-7**	Gong,Youping	**SaE1-3**
Fan,Xinnan	**SuA4-8**	Gong,Zhenbang	**MoC6-8**
Fan,Zhaoyong	**SaA2-5**	Gou,Xiaowei	**SaB1-5**
Fei,Minrui	**SB1-1**	Gu ,Xingsheng	**MoD5-2**
Fei,Minrui	**SB1-2**	Gu,Hong	**SaA1-1**
Fei,Minrui	**SB2-1**	Gu,Hong	**SB2-5**
Fei,Minrui	**SB2-4**	Gu,Xingsheng	**SuD4-7**
Fei,Minrui	**SaA2-3**	Guo,Chunhua	**SuA4-5**
Fei,Minrui	**SaD2-1**	Guo,Chunhua	**MoE5-8**

Guo,Fengjuan	**SuA3-8**	Hu,Yihuai	**SaD2-3**
GUO,Huaicheng	**SaA2-7**	Hu,Yihuai	**SaE1-7**
Guo,Huaicheng	**SuE4-4**	Huang,Bin	**MoA6-8**
Guo,Qiang	**SuD3-1**	Huang,Guobing	**SuE3-5**
GUO,Shuibao	**SuD4-6**	Huang,Hong	**MoB5-5**
GUO,Shuibao	**MoA5-6**	Huang,Jian	**SuC3-7**
Guo,Xingzhong	**MoB6-1**	Huang,Jiwei	**SuE3-1**
Guo,Xiumei	**SaC1-4**	Huang,Kai	**SuE4-4**
Guo,Xudong	**SuC4-4**	Huang,Lailei	**SuB4-3**
Guo,Yinan	**SuA3-9**	Huang,Mingming	**MoA6-5**
Gvajaia,Marika	**SuC3-6**	Huang,Nantian	**SuD3-10**
		Huang,Quanzhen	**SaA2-4**
		Huang,Quanzhen	**SaD1-8**

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		Huang,Renhan	**SuE4-5**
Ha,Minghu	**MoE6-2**	Huang,Xianfeng	**SuD4-3**
Hadow,Mohammoud.M.	**SuB3-5**	Huang,Xudong	**MoC5-3**
Han,Xianglan	**SuE3-2**	Huang,Yi	**MoD6-6**
Han,Xuefeng	**SaD1-7**	Huang,Yong	**MoE5-6**
Han,Yongming	**SaB2-2**	Huang,Yuntian	**SB1-3**
Hao,Zhonghua	**SuB4-9**	Huang,Zaitang	**SuB3-3**
Hao,Zhonghua	**SaE2-7**	Hui,Jing	**SuD4-2**
Harris,Gordon J.	**PL-8**	Hutterer,Stephan	**MoB5-3**
He,Chuanhong	**SaC2-3**		
He,Chuanhong	**SuC4-3**		
He,Chuanhong	**SuD3-4**		

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He,Qingbo	**SuB3-8**	Ilyas,Menhas Muhammad	**MoD5-1**
He,Ran	**MoA6-5**	Irwin,George W	**SB1-5**
He,Ran	**MoC5-4**	Irwin,George W.	**SB1-6**
He,Ran	**MoC5-8**	Irwin,George W.	**SB2-4**
He,Tianchi	**SaB1-1**		
He,Wei	**SuB4-10**		
He,Wei	**SaC1-6**		

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He,Wei	**SaC2-3**	Jang,Hyun-Chul	**SaD1-5**
He,Wei	**SaC2-6**	Ji,Feng	**MoC6-3**
He,Wei	**SuC3-10**	Ji,Juan	**SaE1-7**
He,Wei	**SuC4-3**	Jia,Fang	**SuB3-2**
He,Wei	**SuD3-4**	Jia,Li	**MoB6-4**
He,Xiaoxu	**SuE4-6**	Jia,Li	**SaA1-5**
Hong,Moo-Kyoung	**MoA5-4**	Jia,Li	**SaB1-5**
Hong,Y.	**MoD5-6**	Jiang,Enyu	**SaA2-4**
Hou,Weiyan	**SaA2-8**	Jiang,Enyu	**SaD1-8**
Hu,Dengji	**MoB5-1**	Jiang,Jiaxin	**SaC2-2**
Hu,Gang	**SuB4-10**	Jiang,Jingping	**SaA2-2**
Hu,Huosheng	**SaD2-1**	Jiang,Lijun	**SuB3-9**
Hu,Huosheng	**MoB6-3**	Jiang,Lina	**SaD1-4**
Hu,Xiangpei	**SaD2-2**	Jiang,Maokui	**SB1-7**

Jiang,Ming	**SaA2-3**	Li,Du	**SaD1-6**
Jiang,Mingfeng	**SaC1-5**	Li,Gang	**SuC4-2**
Jiang,Minghui	**MoA6-8**	Li,Gang	**SuE4-8**
Jiang,Quanyuan	**SuD4-1**	Li,Gang	**SaC2-1**
Jiang,Xuelin	**SuA3-6**	Li,Jia	**SaA2-6**
Jianghua,Guo	**SaD1-1**	Li,Jian	**MoC5-6**
Jiao,Licheng	**MoD5-4**	Li,Jianwei	**SuA4-4**
Jiao,Licheng	**MoD5-7**	Li,Kang	**SB1-1**
Jiao,Yunqiang	**MoB5-2**	Li,Kang	**SaA1-2**
Jiao,Zhuqing	**MoE6-7**	Li,Kang	**SB1-2**
Jin,Feng	**SuE3-5**	Li,Kang	**SB1-5**
Jin,Longcun	**MoD5-5**	Li,Kang	**SB2-1**
Jin,Xiaoping	**SaE1-2**	Li,Kang	**SB2-2**
Jing,Chunwei	**SuA4-1**	Li,Kang	**SB2-3**
Jing,Deng	**SaA1-2**	Li,Kang	**SB2-4**
Ju,Kang	**SuC4-3**	Li,Kang	**SB2-6**
Ju,Xuan	**SuE3-3**	Li,Kang	**SB2-7**
Jun,Jin-Kook	**SaD1-5**	Li,Li	**SaE2-4**
		Li,Li	**MoD5-3**

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		Li,Li	**MoE5-3**
Kang,Lei	**MoB6-5**	Li,Linchuan	**SuD4-10**
Karim,Sazali P. Abdul	**SuB3-5**	Li,Linchuan	**MoB5-6**
Kelly,Adrian L.	**SB2-3**	Li,Lixiong	**MoA5-1**
Kim,Jung Woo	**MoA5-3**	Li,Lixiong	**MoB6-6**
Kobayashi,Kunikazu	**SuE3-9**	Li,Nan	**SuA3-7**
Kong,Zhaowen	**SuA3-6**	Li,Qi	**MoA5-7**
Koshigoe,Hideyuki	**SuB4-4**	Li,Qian	**SaC1-6**
Kouzani,Abbas Z.	**MoA6-2**	Li,Qian	**SuC3-5**
Kuremoto,Takashi	**SuE3-9**	Li,Qian	**SuC3-10**
		Li,Ran	**SuB3-6**

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		Li,Sheng-bo	**MoA6-7**
		Li,Shihua	**MoA5-7**
		Li,Shiyao	**SaC2-4**
Lang,Ziqiang	**SaA2-5**	Li,Tongtao	**SaD2-1**
Läu,Qiang	**MoC6-5**	Li,Tongying	**SaE2-1**
Lee,Hong Hee	**MoA5-3**	Li,Wenshu	**SuC4-1**
Lee,Hong Hee	**MoA5-4**	Li,Xiang	**SuB3-4**
Lei,Jingtao	**MoC6-8**	Li,Xiang	**SuE4-7**
Li,Baizhan	**MoA6-7**	Li,Xiaorun	**MoC6-7**
Li,Bing	**SuC4-3**	LI,Xiaoxia	**SaC1-4**
Li,Bing	**SuD3-4**	Li,Xin	**SuB3-4**
Li,Bo	**SuB3-1**	Li,Xinyu	**SuD4-4**
Li,Chengyuan	**MoC5-5**	Li,Xinyu	**MoE5 -1**
Li,Chun	**SuC3-9**	Li,Xuanyu	**MoD6-2**
Li,Dandan	**SuE4-8**	Li,Xue	**SuA4-6**
Li,Donghai	**SaD2-6**	Li,Yang	**MoD6-4**

Li,Yaqin	**SaA1-6**	Liu,Xueqin	**SaA1-2**
Li,Yong	**MoE5-6**	Liu,Yi	**MoB5-5**
Li,Yonghong	**SaA1-4**	Liu,Yihui	**SaC2-7**
Li,Yongzhong	**SuA4-1**	Liu,YuLiang	**SaB1-6**
Li,Yuanyuan	**SuE4-8**	Liu,Yunhui	**SB1-7**
Li,Zhichao	**MoB6-5**	Liu,Zhong	**SaE1-4**
Li,Zhongkai	**MoE6-5**	Long,Haixia	**MoC5-5**
Liang,Chaozu	**SuA3-6**	Lu,Chong	**SuC4-7**
Liang,Liang	**SuD3-1**	Lu,Da	**SB2-2**
Liao,Jucheng	**SaA2-5**	Lu,Huacai	**MoB6-1**
Lin,Feng	**MoC5-1**	Lu,Jiahui	**MoC5-1**
Lin,Huang	**SuA4-7**	Lu,Luyao	**MoC6-1**
Lin,Ling	**SaC2-1**	Lu,Wenjin	**SuC3-3**
Lin,Ling	**SuC4-2**	Lu,Wenyu	**SaC1-3**
Lin,Ling	**SuE4-8**	Lu,Yimin	**SuD4-3**
Lin,Ling	**SuE4-9**	Lu,Yuesheng	**SuE4-1**
Linshi,Xuefang	**SuD4-6**	Luminea,Cristina Maria	**MoD6-7**
Linshi,Xuefang	**MoA5-6**	Luo,Haijun	**SaC2-6**
Littler,Tim	**MoB5-4**	Luo,Haijun	**SuC3-10**
Liu ,Fei	**MoB6-2**	Luo,Haijun	**SuD3-4**
Liu,Chunbo	**SuE3-3**	Luo,Jun	**SuB3-8**
Liu,Enhai	**SuA4-4**	Luo,Yanping	**SuA3-3**
Liu,Hao	**SuE4-2**	Luo,long	**MoD6-3**
Liu,Hongde	**SuC4-9**	Lv,Dan	**SaC2-4**
Liu,Jiming	**SuB4-3**	Lv,Shijun	**MoD6-6**
Liu,Jiming	**MoB5-7**		
Liu,Kexin	**MoE5-5**		
Liu,Li	**SaC1-3**		

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Liu,Lijuan	**MoC5-6**	Ma,Bingbing	**MoD6-5**
Liu,Lilan	**SuA3-4**	Ma,Fang	**MoE5-5**
Liu,Lilan	**SaB2-4**	Ma,Huan	**MoE5-4**
Liu,LiLi	**MoE6-8**	Ma,Shiwei	**SaB1-5**
Liu,Qiang	**SaC2-7**	Ma,Shiwei	**SaE2-7**
Liu,Qiming	**SuB4-2**	Ma,Shiwei	**SuA3-6**
Liu,Ruochen	**MoD5-4**	Ma,Shiwei	**SuB4-9**
Liu,Ruochen	**MoD5-7**	Ma,Shiwei	**MoB5-1**
Liu,Shanzeng	**MoE6-5**	Mao,Yunfei	**MoE6-6**
Liu,Shuang	**SuA4-7**	Martin,Peter J.	**SB2-3**
Liu,Wanquan	**SuC4-7**	McAfee,Marion	**SaA1-2**
Liu,Wenling	**SuE4-10**	McAfee,Marion	**SB2-3**
Liu,Wenling	**MoE5-2**	McLoone,Seán	**SuD3-9**
Liu,Xiangyin	**SuC3-7**	McSwiggan,Daniel	**MoB5-4**
Liu,Xiaodong	**SuC4-7**	Meng,Jun	**SuC3-7**
Liu,Xiaoli	**SaB2-3**	Meng,Qingfan	**MoC5-1**
Liu,Xiaosheng	**SuD3-10**	Meng,Wei	**SaD1-6**
Liu,Xinyu	**SuC3-8**	Meng,Ying	**MoB6-1**

Menhas,Muhammad Ilyas	**SuD4-9**
Miao,Lanbo	**SaD2-4**
Ming,Rui	**MoB6-6**
Moon,Cheol-Hong	**SaD1-5**

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Naeem,Wasif	**SB1-6**
Niu,Ben	**MoE5-3**
Niu,Qun	**SaB1-3**
Niu,Qun	**SB1-5**
NIU,Yue	**MoA5-6**

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Obayashi,Masanao	**SuE3-9**
Østergaard,Jacob	**SuD4-1**

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Pan,Feng	**SuB3-7**
Pan,Feng	**SuE3-3**
Pan,Hui	**MoD5-1**
Pan,Hui	**SB2-1**
Pan,Yang	**MoE5-6**
Pang,Mingyong	**SuE3-10**
Pang,Shunan	**SaB1-4**
Pedrycz,Witold	**MoE6-2**
Pei,Baohao	**MoD6-5**
Pei,Jianxia	**SuA4-6**
Peng,LingXi	**SaB2-8**
Peng,Zhongbo	**SaD1-7**

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Qi,Jiajin	**SuD3-10**
Qi,Jie	**SaB1-4**
Qian,Jinwu	**SaC2-2**
Qian,Junfeng	**SuB4-9**
Qian,kun	**SaE2-4**
Qian,Li	**SuE4-10**
Qian,Li	**MoE5-2**
Qian,Liyou	**MoD6-2**
Qian,Zhengzai	**SaE2-4**
Qin,Xiwen	**MoE5-7**
Qin,Xuewen	**SuB3-3**

Qin,Zhaohui	**SaA2-8**
Qiu,Fuming	**SuC3-7**
Qu,Fuzhen	**SuB3-1**
Qu,Gang	**SuB4-5**
Quan,Yutong	**MoC5-1**

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Rao,Junjun	**MoE5-3**
Ren,Hongbo	**MoA5-2**
Rong,Qiguo	**SuC3-5**
Rong,Qiguo	**SuE4-5**
Roysam,Badrinath	**SaC2-5**

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Sang,Jun	**SaC2-7**
Sang,Yuanyuan	**MoC5-4**
Shang,Dongfang	**SuD3-5**
Shang,Xiukui	**SaC1-4**
Shao,Chenxi	**SuE4-6**
Shao,Yong	**SaA2-4**
Shao,Yong	**SuE3-6**
Shen,Deli	**SuC3-4**
Shen,Hongda	**SaE1-5**
Shen,Jianwei	**SuD3-6**
Shen,Linyong	**SaD1-4**
Shen,Yanning	**SaE2-2**
Shen,Yizhen	**SaE2-5**
Shi,Benyun	**MoB5-7**
S,Jiping	**SaA2-6**
Shi,Jiping	**MoB6-4**
Shi,Lukui	**SuA4-4**
Shi,Xiaoyun	**SaB2-2**
Shi,Yanjun	**SuB3-1**
Shou,Guofa	**SaC1-5**
Shou,Guofa	**MoE6-4**
Shu,Shihu.	**MoE5-4**
Shu,Yunxing	**SaE2-8**
Shu,Zhisong	**SuA3-4**
Shu,Zhisong	**SaB2-4**
Si,WenJie	**SaB1-6**
Song, Xiaodong	**SaC2-6**
Song,Jiafang	**SuD4-4**
Song,Jiafang	**MoE5 -1**
Song,Jian	**MoD6-6**

Song,Lantian	**SaC1-1**	Tang,Yin	**MoC6-2**
Song,Li	**SuE4-3**	Tang,Yongning	**MoC6-6**
Song,Shiji	**SB2-6**	Tang,Zhijie	**SuB3-8**
Song,Shiji	**MoB6-7**	Tao,Jili	**SaB2-6**
Song,Yang	**SaD1-2**	Tao,Zhansheng	**MoE5-7**
Song,Yang	**SB1-1**	Tavdishvili,Otar	**SuC3-6**
Song,Yang	**SaA2-8**	Tegoshi ,Yoshiaki	**MoA6-1**
Song,Yixu	**SaC1-2**	Teng,Lirong	**MoC5-1**
Stamateli,Anna	**SuC3-6**	Tian,Hongru	**MoC5-1**
Steinmaurer,Gerald	**MoB5-3**	Tian,Shuai	**SuA3-4**
Stuhlsatz,André	**SuD3-9**	Tong,Songtao	**SuE4-6**
Su,Hongye	**MoB5-2**	Tormey,Dr. David	**MoD6-7**
Su,Shaohui	**SaE1-3**	Trinh,H.M	**MoA6-2**
Su,Wei	**SuE3-4**	Tsagareli,Sulkhan	**SuC3-6**
Su,Zhou	**SuD4-5**	Tu,Xiaomin	**SaD1-2**
Su,Zhou	**MoA6-1**	Tu,Xincheng	**SuE3-1**
Sun,Bing	**SaD1-4**		
Sun,Bo	**SaE2-7**		
Sun,Hong	**SuD3-3**		
Sun,Jun	**MoC5-5**		
Sun,Meng	**SuA4-9**		
Sun,Shijie	**SuA4-2**		
Sun,Sizhou	**MoB6-1**		
Sun,Xiao	**SuC4-9**		
Sun,Xiaojuan	**MoD5-4**		
Sun,Xiaoling	**SuD4-2**	Wan,Wanggen	**MoD5-5**
Sun,xin	**SaE1-2**	Wang,Anna	**SaC2-4**
Sun,xin	**SaE1-6**	Wang,Anqi	**MoB5-1**
Sun,Xin	**MoA6-4**	Wang,Binbin	**MoA5-5**
Sun,Xuehua	**SuA3-4**	Wang,Chao	**MoE6-2**
Sun,Xuehua	**SaB2-4**	Wang,Dehu	**MoD6-6**
Sun,Yang	**SuD4-7**	Wang,Fang	**SuA3-3**
Sun,Yixiang	**SB1-3**	Wang,Fei	**MoC6-2**
		Wang,Feng	**SuD3-8**
		Wang,Guohua	**SuD3-1**
		Wang,Haikuan	**SaA2-8**
Tan,Guozhen	**MoC5-8**	Wang,Hanpin	**SuC4-8**
Tan,Huimeng	**MoC5-2**	Wang,Hesheng	**SB1-7**
Tan,Lijing	**MoE5-3**	Wang,Hong	**SaC1-2**
Tan,Weiming	**SuB3-3**	Wang,Hongbo	**SuA3-7**
Tang,Can	**SuD3-7**	Wang,Hongshu	**SuB4-6**
Tang,Can	**SuE3-8**	Wang,Hongshu	**SaD2-5**
Tang,Jiafu	**SuB4-5**	Wang,Huiquan	**SaC2-1**
Tang,Jiafu	**SuB4-7**	Wang,Jiang	**SaB1-6**
Tang,Jiafu	**SaD2-4**	Wang,Jia	**SaB2-7**
Tang,Lianggui	**SuA4-3**	Wang,Jianguo	**SaB1-5**

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Wang,Jing	**SaD2-6**	Wang,Zhe	**SaC2-4**
Wang,Jingchuan	**SB1-4**	Wang,Zhelong	**SuE3-7**
Wang,Jiyi	**SuA4-7**	Wang,Zhen	**SaC2-2**
Wang,Junfeng	**SuE3-1**	Wang,Zhentao	**SuE3-1**
Wang,Junsong	**SaA2-1**	Wang,Zhongbin	**MoE6-5**
Wang,Junsong	**SuC3-4**	Wang,Zicai	**SuE4-6**
Wang,L.F.	**MoD5-6**	Wei,Hao	**SuC4-5**
Wang,Lanzhou	**SuC3-2**	Wei,Jia	**SuB3-9**
Wang,Lei	**MoC5-7**	Wei,Lisheng	**SaA2-3**
Wang,Ling	**SB2-1**	Wei,Piguang	**MoA6-6**
Wang,Ling	**SaB1-5**	Wei,Wei	**SaD2-6**
Wang,Ling	**SuD4-9**	Wei,Xile	**SaB1-6**
Wang,Ling	**MoD5-1**	Wen,Guangrui	**SaA1-3**
Wang,Ling	**MoE6-6**	Wen,Guihua	**SuB3-9**
Wang,Lingzhi	**SaB2-5**	Wen,Xianbin	**MoE6-8**
Wang,Linqing	**SuB4-7**	Wolf,Christian	**SuD3-9**
Wang,Na	**MoC5-7**	Wu,Cheng	**SB2-7**
Wang,Nam Sun	**SaA1-6**	Wu,Cheng	**SB2-6**
Wang,Qi	**SuD3-2**	Wu,Cheng	**MoB6-7**
Wang,Qiang	**SaB1-2**	Wu,Jinzhen	**MoC6-5**
Wang,Shaoqing	**SaC2-7**	Wu,Jue	**SaB2-8**
Wang,Shentao	**SaB2-3**	Wu,Jun	**SuB3-2**
Wang,Shicheng	**SuB3-10**	Wu,Liqiao	**SuB4-6**
Wang,Shujuan	**SuB3-10**	Wu,Liqiao	**SaD2-5**
Wang,Shujuan	**MoB6-5**	Wu,Mingliang	**SaB2-3**
Wang,Sichun	**SuC4-6**	Wu,Peng	**MoC5-6**
Wang,Tianmiao	**MoC6-8**	Wu,Qiong	**MoA5-2**
Wang,Tianpeng	**MoC5-2**	Wu,Ting	**SuD3-3**
Wang,Tongqing	**MoE5-8**	Wu,Xiaoming	**MoC6-7**
Wang,Tongqing	**SuA4-5**	Wu,Yongliang	**MoD5-5**
Wang,Wei	**MoE5-5**	Wu,Zhen	**SuC3-4**
Wang,Wenshan	**SaE1-4**	Wu,Zhongke	**SuC3-8**
Wang,Xiaoming	**SaD2-3**		
Wang,Xiaoxiao	**SaE1-6**	X	
Wang,Xihong	**SuA3-2**		
Wang,Xin	**SaE2-6**	Xia,Ling	**SaC1-5**
Wang,Xingce	**SuC3-8**	Xia,Ling	**MoC6-1**
Wang,Xinmin	**MoE5-7**	Xia,Ling	**MoC6-4**
Wang,Xiukun	**MoA6-5**	Xia,Ling	**MoD6-8**
Wang,Xiukun	**MoC5-4**	Xia,Ling	**MoE6-4**
Wang,Xiukun	**MoC5-8**	Xia,Qingjun	**SuA3-8**
Wang,Xiuping	**SuA3-1**	Xiao,Dawei	**SuA3-9**
Wang,Y.C.	**MoD5-6**	Xiao,Han	**MoE5-3**
Wang,Yong	**SuC3-9**	Xiao,Liang	**SaC2-5**
Wang,Yu	**SuB4-5**	Xie,Hong	**MoC5-3**
Wang,Yunzeng	**SaD2-2**	Xie,Jinxia	**SaD1-2**

Xie,Li	**SaE1-1**	Yang,Banghua	**SuE3-6**
Xin,Gongcai	**SaE2-4**	Yang,Banghua	**SuE4-7**
Xin,Xie	**SaD1-7**	Yang,Bo	**SaB2-1**
Xing,Jie	**MoE5-5**	Yang,Fan	**SaC1-2**
Xiong,Hui	**SuC4-2**	Yang,Guangya	**SuD4-1**
Xiong,Weili	**MoE6-7**	Yang,Huizhong	**SaA1-6**
Xu,Baoguo	**MoE6-7**	Yang,Huizhong	**SaE1-1**
Xu,Dianguo	**SuD3-10**	Yang,Jixian	**MoE5-5**
Xu,Feng	**SuC3-8**	Yang,Jun	**MoA5-7**
Xu,Guizhi	**SaC1-4**	Yang,Lei	**SaB2-8**
Xu,Jing	**SuA4-1**	Yang,Lingyun	**MoC6-5**
Xu,Jingjing	**SaE2-5**	Yang,Mei	**SuA3-9**
Xu,Lijun	**SuA3-10**	Yang,Ming	**SuE4-6**
Xu,Lijun	**SuD4-8**	Yang,Nanhai	**MoA6-5**
Xu,Lizhong	**SuD4-1**	Yang,Nanhai	**MoC5-4**
Xu,Lizhong	**SuA4-8**	Yang,Nanhai	**MoC5-8**
Xu,Qingzheng	**MoC5-7**	Yang,Peng	**MoC6-5**
Xu,Rui	**SuB4-2**	Yang,Qingxin	**SuA4-4**
Xu,Ruxiang	**SuC4-2**	Yang,Taicheng	**SuA3-10**
Xu,Wei	**MoD5-2**	Yang,Taicheng	**SuD4-8**
Xu,Wenbo	**MoC5-5**	Yang,Taicheng	**MoA5-1**
Xu,Wenshan	**SuE4-2**	Yang,Taicheng	**MoD6-4**
Xu,Xiaoguang	**SaE1-5**	Yang,Wenlu	**MoC5-3**
Xu,Xuesong	**SuC4-6**	Yang,Yanli	**SuB4-10**
Xu,Yanping	**SuD4-6**	Yao,Jianfu	**SuC4-1**
Xu,Yin	**MoE6-6**	Ye,Longhao	**SaA2-7**
Xu,Zhao	**SuD4-1**	Yi,Jincong	**SaD1-4**
Xu,Zheng	**SaC1-6**	Yi,Xiaomei	**MoC5-6**
Xu,Zheng	**SuC3-10**	Yin,Baoshu	**SuE4-2**
Xu,Zheng	**SuC4-3**	Yin,Fuliang	**SuC3-1**
Xu,Zheng	**SuD3-4**	Yin,Wenjun	**MoB6-7**
Xu,Zhiyu	**SuA3-5**	Yin,Xueyan	**MoB6-2**
Xue,Hailong	**MoB5-6**	Yoshii,Takako	**SuB4-4**
Xu,Zheng	**SaC2-6**	Yu,Chunyan	**SuB4-6**
		Yu,Chunyan	**SaD2-5**
		Yu,Fengqin	**SaC1-1**
		Yu,Jiangsheng	**SuC4-8**

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		Yu,Jing	**SuD3-8**
Yan,Guozheng	**SuC4-4**	Yu,Lianzhi	**SuE4-1**
Yan,Guozheng	**SuE4-1**	Yu,Peng	**MoD6-5**
Yan,Rongguo	**SuC4-4**	Yu,Shuxia	**SaA2-7**
Yang ,T C	**MoA6-4**	Yu,Tao	**SuA3-4**
Yang,Aolei	**SB1-5**	Yu,Tao	**SaB2-4**
Yang,A-ting	**MoA6-3**	Yu,Wei	**SuA3-10**
Yang,Banghua	**SaC1-3**	Yu,Xiaoming	**SaA2-2**
Yang,Banghua	**MoE6-3**	Yu,Xiaoqing	**MoD5-5**
Yang,Banghua	**SuD3-3**		

Yu,Yajuan	**SaA2-7**	Zhang,Junjie	**MoD6-8**
Yuan ,Jingling	**MoD5-3**	Zhang,Li	**SaC2-3**
Yuan,Linlin	**SuC4-1**	Zhang,Lijun	**SuC3-1**
Yuan,Ruixi	**SaA2-1**	Zhang,Lingbo	**SuD4-7**
Yuan,Shouqi	**SaE2-2**	Zhang,Lingbo	**MoD5-2**
Yuan,Xiaosong	**SaC2-5**	Zhang,Liyan	**SuC3-1**
Yuan,Yan	**MoD5-3**	Zhang,Long	**SuB3-10**
Yuan,Yi	**MoE5-6**	Zhang,Long	**MoB6-5**
Yun,Shiwei	**SaE2-8**	Zhang,Ping	**MoD5-7**
		Zhang,Qian	**MoA5-5**

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		Zhang,Qingling	**SuB4-8**
		Zhang,Tiezhi	**SuB4-8**
Zamani,Masood	**SuC4-10**	Zhang,Ting	**MoA6-8**
Zan,Peng	**SaC1-3**	Zhang,Wangming	**SuC4-2**
Zan,Peng	**SuE3-6**	Zhang,Weichun	**MoD6-5**
Zan,Peng	**SuE4-7**	Zhang,Weijie	**SaE2-2**
Zang,Yunliang	**MoC6-4**	Zhang,Xianxia	**SuA4-9**
Zang,Yunliang	**MoE6-4**	Zhang,Xinhong	**SuD3-5**
Zeng,J.C.	**MoD5-6**	Zhang,Xining	**SaA1-3**
Zeng,Weimin	**MoB5-1**	Zhang,Xuewu	**SuA4-8**
Zeng,Xiangqiang	**SaA2-4**	Zhang,Yaozhong	**SuA3-8**
Zhai,Guofu	**MoB6-5**	Zhang,Yibo	**MoC5-1**
Zhai,Jinqian	**SaA2-5**	Zhang,Yonghuai	**MoE6-3**
Zhai,Jinqian	**SuB4-10**	Zhang,Yu	**MoE6-4**
Zhai,Weiming	**SaC1-2**	Zhang,Yuanyuan	**SaB2-2**
Zhan,Minghu	**MoD6-6**	Zhang,Yue	**SuB4-8**
Zhang,An	**SuA3-8**	Zhang,Yukui	**SB2-6**
Zhang,An	**SaB1-2**	Zhang,Yuli	**MoB6-7**
Zhang,Bailing	**SuC3-3**	Zhang,Zhen	**SaC2-2**
Zhang,Changjiang	**SaB2-1**	Zhang,Zhihua	**SuD4-5**
Zhang,Chao	**MoB5-5**	Zhang,Zhihua	**MoA6-1**
Zhang,Dexing	**SuB3-4**	Zhao,Guangzhou	**SaA1-1**
Zhang,Fan	**SuD3-5**	Zhao,Guangzhou	**SuA3-7**
Zhang,Gang	**SuE3-2**	Zhao,Guangzhou	**SuB3-6**
Zhang,Hao	**SB2-7**	Zhao,Guangzhou	**SB2-2**
Zhang,Hao	**SuB4-9**	Zhao,Guangzhou	**SB2-5**
Zhang,Hongyu	**MoA6-7**	Zhao,Hongyu	**SuE3-7**
Zhang,Huawu	**SaD2-3**	Zhao,Huihui	**SuC3-9**
Zhang,Hui	**MoB5-5**	Zhao,Jingjing	**SaD1-6**
Zhang,Jianliang	**SB2-5**	Zhao,Liang	**SaE2-3**
Zhang,Jianwei	**SuD3-7**	Zhao,Liang	**MoE6-1**
Zhang,Jianwei	**SuE3-8**	Zhao,Liaoying	**MoC6-7**
Zhang,Jie	**SuA3-5**	Zhao,Lindu	**SaA1-4**
Zhang,Jinfeng	**SaE2-2**	Zhao,Lindu	**MoA6-3**
Zhang,Jinyi	**SuE3-6**	Zhao,Miao	**SaD1-8**
Zhang ,Jun	**SaA1-1**	Zhao,Ming	**SaA1-3**

Zhao,Mingsheng	**SaB1-1**	Zhou,Qinian	**SuC4-1**
Zhao,Shian	**SaB2-5**	Zhou,Taijin	**SaB1-3**
Zhao,Wanqing	**SB1-5**	Zhou,Weisheng	**MoA5-2**
Zhao,Yannan	**SaC1-2**	Zhou,Yuanxiang	**MoD6-2**
Zhao,Yongwu	**MoC6-3**	Zhou,Liyou	**MoD6-3**
Zhao,Zhe	**SaC2-1**	Zhu,Miaofen	**SaE1-3**
Zhen,Xueqing	**MoC5-1**	Zhu,Min	**SaD2-6**
Zheng,Hao	**MoC6-3**	Zhu,Peng	**SaB1-1**
Zheng,Min	**MoD6-4**	Zhu,Wei	**MoB5-5**
Zheng,Xiaoming	**MoE6-3**	Zhu,Wenhua	**MoC5-2**
Zheng,Xiaoming	**SuB3-4**	Zhu,Wenhua	**MoA6-6**
Zheng,Xiaoming	**SuE4-7**	Zhu,Xiaofei	**SuE4-1**
Zheng,Xiaoshen	**SuC4-5**	Zhu,Xiaojin	**SaD1-4**
Zheng,Xiaoshen	**SuE4-10**	Zhu,Xiaojin	**SaD1-8**
Zheng,Xiaoshen	**MoE5-2**	Zhu,Xiuwei	**MoC6-1**
Zhou,Caihui	**SuB3-9**	Zhu,Yong	**SaB2-6**
Zhou,Fang	**SaB1-3**	Zhu,Zhencai	**MoE6-5**
Zhou,Hao	**MoA6-6**	Zhuang,Chunlong	**MoA6-7**
Zhou,Hongxian	**SuD3-6**	Zuo,Chuncheng	**MoC6-3**
Zhou,Mingquan	**SuC3-8**	Zuo,Yongxia	**MoC6-3**