

CIAO Newsletter

Centre for Informatics & Applied Optimization
Graduate School of Information Technology & Mathematical Sciences, University of Ballarat





**Acting CIAO Director:
Associate Professor David Yost**

← **Workshop Participants** (L to R):
Professors Song Wang, Yifan Xu, Yanqin Bai, Xiaoling Sun and Xuefeng Song

4th Australia-China Workshop

CIAO hosted the highly successful **Fourth Australia-China Workshop on Optimization: Theory, Methods and Applications** in Ballarat on 9-11 December 2009.

This Workshop brings together international experts in **optimization theory, methods and applications** from around the world, with a particular focus on Australia, China and the Pacific region.

Keynote speakers were:

> **Professor Marco Lopez, University of Alicante, Spain:** *"Quantitative stability analysis for infinite and semi-infinite optimization problems"*.

> **Professor Tamas Terlaky, Lehigh University, USA:** *"Three decades of polynomial time algorithms for linear optimization"*.

> **Professor Liansheng Zhang, Shanghai University, China:** *"New simple exact penalty function for constrained minimization"*.

This event provides an excellent opportunity for meeting and exchanging results of recent **research findings**, and engaging in discussion about potential **collaboration** and joint project opportunities.

Invited speakers included:

~ Professor Yanqin Bai, Shanghai University, China.

~ Professor David Yang Gao, Virginia Tech, United States of America.

~ Professor Kok Lay Teo, Curtin University of Technology, Perth, Western Australia.

~ Professor Xiaoling Sun, Fudan University, China.

~ Professor Angus Simpson, University of Adelaide, South Australia.

~ Professor Song Wang, University of Western Australia, Perth.

~ a strong contingent of researchers from within CIAO.

The Workshop also incorporated a one-day **"Focussed Meeting on Global and Nonsmooth Optimization Problems in Data Analysis, Engineering and Water"**.

We are grateful for the generous sponsorship and support of **AMSI**, the Australian Mathematical Sciences Institute; **ISSNIP**, the Australian Research Council Network on Intelligent Sensors, Sensor Networks and Information Processing; and the **Victorian State Government**.

The organising committee was led by **Associate Professor Adil Bagirov**, with the support of Dr Fusheng Bai, Associate Professor Zhiyou Wu and Professor John Yearwood.

Special thanks also goes to **Ms Yve Rowe**, for her extensive administrative support and overall coordination of the event.

New Acting Director of CIAO

We are pleased to announce that **Associate Professor David Yost** has recently taken over as Acting Director of CIAO.

At the same time, CIAO Director **Professor John Yearwood** (pictured below) has stepped up into the position of Acting Head of School.

Both Acting appointments are in place until the end of 2010.



CIAO has two Deputy Directors

UB's Professor Andy Smith, Pro Vice-Chancellor (Schools and Programs) pro tem recently announced the appointment of two Deputy Directors to CIAO.

They are:

> **Dr Andrew Stranieri** (below L)

> **A/Professor Adil Bagirov** (below R)

This move provides greater strength and leadership for CIAO, and we welcome their appointments.



CIAO is very pleased to welcome **Professor David Yang Gao**, who joined the University of Ballarat in February 2010.

He is the first appointee to the position of **Alexander Rubinov Professor of Mathematics** within our School, a recently created role named in honour of the late Founding Director of CIAO.

Professor Gao brings a **wealth of research experience and expertise** to CIAO, and a strong international network of research contacts and collaborators.

He gained his Masters Degree from **Beijing University** and his PhD from **Tsinghua University** in China.

His previous role was in the Department of Engineering Science & Mechanics, College of Engineering, **Virginia Polytechnic Institute and State University**, Virginia, USA as an Associate Professor.

Professor Gao's research interest and focus is in modeling, methods and theories of **duality and triality**, including the closely related concepts of complementarity, polarity, symmetry and symmetry breaking in science, engineering and computation.

Application of his research includes **general complex systems**, non-convex/nonsmooth discrete and non-conservative problems in database analysis, decision science, nonlinear analysis, finite deformation field theory.

Other applications include engineering mechanics, global optimization and control, differential equations

Professor David Gao

Staff Member Profile



and geometry, network flows and communications, energy systems, social systems, and large-scale and multi-scale scientific computations.

Professor Gao's work on **duality theory** in convex systems emphasises how it relates to a unified framework in natural phenomena with symmetry.

His work on **trinality in non-convex systems** aims to understand symmetry breaking, to reveal intrinsic duality, and to discover general patterns of duality in complex systems.

Professor Gao has a **solid publication record**. Books published include "**Duality Principles in Nonconvex Systems: Theory Methods and Applications**" and "**Nonconvex/Nonsmooth Mechanics: Modeling, Analysis and Numerical Methods**".

Professor Gao has enjoyed considerable success in obtaining research grants from

the USA's National Science Foundation and the US Army Research Laboratory.

He is currently in the process of transferring his grants to UB.

He also has a strong history of multi-disciplinary research activity.

This has been supported by the **National Science Foundation's Divisions of:**

- ~ Mathematical Science
- ~ Civil and Structural Engineering
- ~ Operations Research & Production Systems
- ~ Computer & Information Science & Engineering.

Professor Gao has significant graduate & undergraduate **teaching expertise** in:

- applied mathematics
- engineering mechanics
- optimization and control
- numerical analysis and simulation
- computational methods.

In the past he has also developed a number of **interdisciplinary courses** in the areas of:

- > nonsmooth and nonconvex analysis and mechanics
- > modeling, simulation and analysis of complex systems
- > global optimization and canonical duality theory
- > advanced primal-dual algorithms and numerical methods.

Professor Gao's personal interests include art, music, photography & philosophy. He is settling into **life in Ballarat** with his wife and daughter, who attends a local secondary school.

Adelaide Visitor

Professor Angus Simpson

CIAO recently hosted a visit from **Professor Angus Simpson** who works at the University of Adelaide.

He holds key roles there, as **Leader of the Water Systems Research Group** and **Director of Research** in the School of Civil, Environmental and Mining Engineering.

Professor Simpson (pictured right) was here as a guest of **Professor David Gao**, to discuss opportunities for collaboration on **water optimization projects**, and meet with other CIAO researchers including Dr Zari Dzalilov and Dr Fusheng Bai.

While here he also presented a **seminar** titled "Simulation Modelling and Genetic Algorithm Optimization of Design and Operation of Water Distribution Systems".



Research Group News

MAORG: Mathematical Analysis & Optimization

Leader: Associate Prof Adil Bagirov



MAORG members were heavily involved in the recent **Fourth Australia-China Workshop on Optimization**.

Invited **MAORG speakers** included:

> **Associate Professor Adil Bagirov**: "A quasisecant method for minimizing non-smooth functions".

> **Dr Musa Mammadov**: "Asymptotical stability of Trajectories in optimal control problems with time delay".

> **Dr Nadezda Sukhorukova**: "Nonsmooth optimisation techniques for data preprocessing in curve classification problems".

> **Dr Julien Ugon**: "Truncated codifferential method for nonsmooth convex optimization".

> **Associate Professor Zhiyou Wu**: "Necessary optimality conditions and optimization methods for cubic programming problems with mixed variables".

> **A/Professor David Yost**: "Minkowski decompositions of polytopes".

A/Prof Zhiyou Wu has recently travelled to the following universities for joint research:

- Singapore**: Nanyang Technological Uni
- China**: Tongji University, Shanghai Uni, China Uni of Mining & Technology, Chongqing Normal Uni, Tsinghua University, Beijing Uni of Technology.

Summer scholarship recipient **Mr Charles Nani** has completed his project titled "An Overview of Quasidifferential Equation", under the supervision of **Dr Nadezda Sukhorukova** and **Dr Julien Ugon**.

DMIRG: Data Mining and Informatics

Leader: Dr Peter Vamplew (below)
Deputy Leader: Dr Richard Dazeley



DMIRG's **land slip susceptibility mapping consultancy project** is nearing completion.

The opportunity for a follow-on project to be based in **Tasmania** is currently being explored.

Regular **informatics meetings** have been organised at Mt Helen Campus during 2010.

This provides a new opportunity for DMIRG Members to have regular contact and interchange of ideas with ICSL and HIL Members.

The format is usually a seminar-styled presentation, by one research staff member or research student from each of the three groups.

DMIRG's **Dr Peter Vamplew** and **Professor John Yearwood** have submitted an application to the **Smart Water Fund**.

This will be a collaborative project with **Central Highlands Water**, and will mine online-sourced community opinions regarding water usage issues.

PhD students from DMIRG have been involved in the following events:

~ **Ms Armita Zarnegar** attended the First Australasian Computational Intelligence Summer School - ACISS 2009 - Dec 2009.

~ **Mr Dean Webb** presented a paper titled "Applying Clustering and Ensemble Clustering Approaches to Phishing Profiling" at AUS-DM 2009.

~ **Mr Mamoun Alazab** presented a paper titled "Towards Automatic Image Segmentation Using Optimised Region Growing Technique" at AI 2009.

iSoGOp

International Society of Global Optimization

The **International Society of Global Optimization (iSoGOp)** is a newly formed professional society focusing on global optimization.

ISoGOp seeks to promote a common understanding among all disciplines in fields related to **global optimization**, and to advance the theory and methodology for academics and practitioners. The iSoGOp motto is "**Unity through Diversity!**"

The Society was **first proposed** at the First World Congress on Global Optimization held in Changsha, Hunan, China in mid-2009, and after considerable effort iSoGO has now been created.

Key personnel who have been instrumental in the initial development of iSoGO are:

President: Professor Panos Pardalos (pictured below), Director, Centre for Applied Optimization, University of Florida, USA.

Vice-Presidents:

> Professor Shu-Cherng Fang, North Carolina State University, USA.

> Professor Christodoulos A Floudas, Princeton University, USA.

> Prof David Gao, University of Ballarat.

> Professor Shouyang Wang, Grad School of the Chinese Academy of Science, China.

Secretary-General: Professor David Gao.

Treasurer: Professor John Yearwood, University of Ballarat.

CIAO is very pleased to be involved with the establishment of iSoGO. Further information can be found at the Society's website: <http://isogop.org>.



Research Laboratory News

ICSL: Internet Commerce Security

Director: A/Professor Paul Watters



ICSL Director - Associate Professor Paul Watters - has been appointed Co-Chair of the **2010 Anti-Phishing Working Group (APWG) Conference on e-Crime**.

Work on the monitoring of **bittorrent tracker sites** and sharing of copyright material is currently being undertaken with the **Australian Federation Against Copyright Theft (AFACT)**.



Here is some of our latest research student news:

Mr Oarabile Maruatona has commenced a PhD on **fraud detection**, under the guidance of Dr Peter Vamplew and Dr Richard Dazeley. He is originally from **Botswana**, and prior to joining UB completed a Masters degree in Melbourne.

Masters by Research student **Ms Amber Stabek** has recently submitted her thesis on **identifying scam genres** for examination.

Mr Desmond Lobo attended the 3rd International Conference on **Knowledge Discovery and Data Mining, WKDD 2010**, in Phuket, Thailand.

HIL: Health Informatics

Leader: Dr Andrew Stranieri



HIL has held its first Forum at **Ballarat Health Services**, and it was highly successful.

This provides an opportunity for greater interaction between HIL researchers and local health professionals.

Two Summer Scholarships on health-related topics were awarded earlier this year:

> **Mr David Moloney**: "Optimizing sleep apnea data", supervised by **Dr Nadezda Sukhorukova** and **Dr Julien Ugon**.

> **Mr Jereme Farrell**: "Applying Fourier Transfer to perform Sleep Stage Identification - SSI", supervised by **Dr Peter Vamplew**.

Both students have now completed their final reports and presented their findings at a seminar.

Current projects being researched by HIL members include:

~ **Homeopathy trial**: Dr Chris Turville and Endeavour College.

~ **Knowledge based system** for Traditional Chinese medicine.

~ **Grid-based patient sensor**: Mr Ather Saeed, Dr Andrew Stranieri, Dr Richard Dazeley, Dr Liping Ma.

~ **Incorporating values in organisations**: Ms Faezeh Afshar, Dr Andrew Stranieri, Professor John Yearwood.

~ **Sleep apnea mining**: Mr Niall Muecke, Dr Andrew Stranieri, Dr Nadezda Sukhorukova and Dr Julien Ugon.

VRSL: Virtual Reality & Simulation

Leader: Dr Phil Smith (below L)



Congratulations to VRSL research student **Mr Adam Hassell**, who recently submitted his PhD thesis for examination.

Adam's topic is **"A Video Game Based Architecture for Remote Asset Tasking"**, and he is supervised by Dr Dr Phil Smith and Dr David Stratton (above right).

Retirement of Head of School: Professor Sid Morris

On 16 April 2010, **Professor Sid Morris** formally retired from UB and his role as Head of the Graduate School of Information Technology & Mathematical Sciences.

This ends a successful **eight-year term** as Head, during which both the School and CIAO grew significantly in strength and influence.

Professor Morris was a member of CIAO's Mathematical Analysis and Optimization Research Group and an active researcher.

His particular research interest is in **algebra, analysis and geometry**, with a focus on **structure-oriented theories**.

Professor Morris (pictured below) has written and published extensively throughout his academic career.

Highlights include the publication of **several books on lie theory** with his colleague, Professor Karl Hofmann.

We wish Professor Morris **all the very best** for the future.



Business Development Manager:

Mr Justin Poole



Commercial Projects:

Grampians Integrated Cancer Services

CIAO Personnel: Dr Alyx Macfadyen and Dr Andrew Stranieri

Project: Self-Assessment of Patient Needs

This is a joint project with Professor Anthony Love from UB's School of Behavioural and Social Sciences and Humanities.

It will allow patients to make an assessment of their needs and options when dealing with their cancer treatment, using this online tool.

Victorian Farm Safety Centre

CIAO Personnel: Mr Grant Meredith

Project: 3-D Tractor Accident Simulations

This recently completed project produced 3-D simulation of accidents involving tractors, for inclusion in a farm safety video.

Next step is to identify more funding to extend the project, with the possibility of developing interactive game-like products to support traditional video and training seminar presentations.

Grant Applications:

ARC Discovery Grant #1

Chief Investigators: Associate Professor Paul Watters, Dr Liping Ma, Associate Professor Adil Bagirov, Dr Musa Mammadov, Professor John Yearwood

Topic: Phishing Profiling Using Optimization Approaches to Data Mining

Funding Requested: \$174,000 over 3 years

ARC Discovery Grant #2

Chief Investigator: Dr Musa Mammadov

Partner Investigator: Professor Anatoli Ivanov, Pennsylvania State University, USA

Topic: Global Dynamics and Optimal Control in Mathematical Models with Delay in Biology, Medicine and Natural Sciences

Funding Requested: \$424,962 over 3 years

ARC Discovery Grant #3

Chief Investigator: Dr Alex Kruger

Partner Investigators: Dr Marco Lopez

Cerda, University of Alicante, Dr Michel Thera, University of Limoges, Dr Jiri Outrata, Academy of Sciences, Czech Republic

Topic: Stationarity & Regularity in Variational Analysis with Applications to Optimization

Funding Requested: \$456,746 over 3 years

Grants Awarded:

UB-Deakin Collaboration Fund

Applicants: Dr Nadia Sukkorukova and Dr Peter Vamplew

Topic: Nonsmooth optimization techniques for data pre-processing in sleep stage identification problems

Deakin Personnel: Dr Gleb Beliakov, Dr Gang Li, Dr Phoebe Chen

Funding Received: \$20,000

Research Infrastructure Block Grant #1

Applicant: Associate Professor Adil Bagirov

Topic: The study of optimization models for electrical distribution networks with upgraded renewable energies

Funding Received: \$10,000

Research Infrastructure Block Grant #2

Applicants: Dr Richard Dazeley, Mr Grant Meredith, Dr Charlynn Miller, Dr Phil Smith, Dr Peter Vamplew

Topic: Improving the immersive nature of the Virtual Reality Facility

Funding Received: \$9,989

Research Infrastructure Block Grant #3

Applicants: Associate Professor Paul Watters, Professor John Yearwood, Dr Xinwen Wu

Topic: Research Assistant for Internet Commerce Security Laboratory (ICSL) and GSITMS research projects

Funding Received: \$29,563

Colloquia @ UB

> **Professor Guy Gable**, Head, IT Professional Services Research Program, Queensland University of Technology, Brisbane

Topic: The Information Systems Academic Discipline in Pacific Asia

Seminars @ UB

> **Prof Angus Simpson**, Univ of Adelaide

Topic: Simulation Modelling and Genetic Algorithm Optimization of Design and Operation of Water Distribution Systems

> **Dr Heping Pan**, University of Ballarat (currently on leave, working in China)

Topic: Yin-Yang Volatility in Scale Space of Price-Time: A Core Structure of Financial Market Risk

Recent Presentations

Recent presentations by CIAO staff have included:

> **Australasian Workshop on Health Informatics & Knowledge Management (HIKM), as part of ACSW 2010**

Dr Peter Vamplew presented a paper titled "Automatic sleep stage identification difficulties & possible solutions" on 16 January 2010 in Brisbane, Queensland.

> **King Fahd University of Petroleum and Minerals**

Associate Professor David Yost presented a seminar titled "Decomposability of polyhedra" at Hafr Al-Batin Community College, a regional campus of King Fahd University.

Staff News

New Deputy Head of School

Dr Charlynn Miller has been appointed as Deputy Head of School for a three-year term, from 1 February 2010. This is an important role supporting the Head of School, and includes stepping in during absences.

Research Higher Degrees Coordinator

Dr Alex Kruger took over this important role on 1 February 2010. He is responsible for all research student matters within our School, including chairing Confirmation of Candidature Panels and the Scholarship Application Sub-Committee.

Research Coordinator

Dr Musa Mammadov assumed this role within our School on 1 February 2010. It includes involvement with our School's response to the Federal Government's Excellence in Research (ERA) program, and assessing and approving travel requests from GSITMS staff members.

New Appointment

We welcome **Ms Sally Firmin** back to our School as a Level A Lecturer, after a stint at UB's SMB Campus in Ballarat.

Farewell

We recently said farewell to:

> **Ms Sandra Herbert**, who has accepted a Lecturer position with Deakin University at their Warrnambool Campus.

> **Dr Bahadorreza Ofoghi**, who has taken up a research position with Victoria University in Melbourne.

> **Dr Xinwen Wu**, who is now working as a Lecturer at Griffith University in New South Wales.

We wish them all well in their new roles.

Research Student Profile:

Ms Sandra Herbert



Ms Sandra Herbert (pictured above) commenced her PhD at the University of Ballarat in 2004.

She made the decision to combine part-time research as a student with her full-time role as a **Lecturer in our School**, which is no easy task.

Ms Herbert's PhD topic is "**An Investigation of Middle Secondary Students' Mathematical Conceptions of Rate**".

Her Principal Supervisor is **Associate Professor Robyn Pierce**, a former Deputy Head of our School.

Dr Pierce is now based at the University of Melbourne, where Ms Herbert's Associate Supervisor **Dr Kaye Stacey** also works.

Rate is an important mathematical concept needed for **everyday numeracy**, and important for more advanced areas of study, such as **calculus**.

Despite considerable research in the area, it remains a **troublesome concept** to teach and learn.

This study aimed to identify **educationally critical aspects (ECA)** of 'rate' through a phenomenographic investigation of conceptions of rate held by a group of **Victorian Year 10 students**.

The **phenomenographic analysis** of videoed interviews determined the range of conceptions of rate held by this cohort. This is the **first time** this concept has been explored from a phenomenographic perspective.

It demonstrates, in one setting, the **efficacy of phenomenography**, with analysis enhanced by interpretation of participants' **non-verbal communications**, to explore

mathematical conceptions.

Analysis revealed the variation in conceptions of rate existing in students at this level, resulting in **eight hierarchically ordered categories**.

Further consideration of the categories resulted in four ECA of rate, necessary to foster a deep understanding of the concept.

The ECA of rate provide a guide for the **development of instructional sequences**, for middle secondary students, to facilitate a better understanding of rate in **everyday contexts** and for **further study in mathematics**.

These ECA formed the basis of a **second analysis of the data**, which examined the impact of different contexts and different mathematical representations on individual student's expression of their understanding of rate.

This study confirms the notion that rate is a **complex concept** and **informs teachers** of the different ways, both correct and incorrect, in which students conceive this difficult mathematical idea.

Ms Herbert has recently **submitted** her thesis for examination, and hopes to graduate in December 2010.

New Research Students

Welcome the following PhD Students:

> Mr Oarabile Maruatona (below L)

Topic: Fraud detection in financial systems, further fraud detection techniques

Supervisors: Dr Peter Vamplew (Principal) and Dr Richard Dazeley (Associate)

> Ms Helena Mala Jetmarova (below R)

Topic: Optimization of Wimmera Mallee Pipeline and Northern Mallee Pipeline
Supervisors: Associate Professor Adil Bagirov (Principal) and Professor John Yearwood (Associate)



> Ms Hijran Mirzayeva (below L)

Topic: "Nonsmooth optimization approaches in cluster analysis"

Supervisors: Associate Professor Adil Bagirov (Principal) and Professor John Yearwood (Associate)

> Mr Md Waliur Rahman Miah (below R)

Topic: Summarizing Multi-Documents by Accumulating the Content Information

Supervisors: Prof J Yearwood (Principal) and Dr Siddhi Kulkarni (Associate)



PhD: Confirmation of Candidature

Congratulations to the following research students on the successful completion of their Confirmation of Candidature:

> Ms Kylie Turville

Topic: "Understanding Victims of Identity Theft and Processes of Recovery"

Supervisors: Prof J Yearwood (Principal) and Dr Charlynn Miller (Associate)

> Ms Rosemary Torney

Topic: "Authorship Characterisation of Phishing Emails"

Supervisors: Dr Peter Vamplew (Principal) and Professor John Yearwood (Associate)

Thesis Submission

It's great news that these students have submitted their theses for examination:

> Mr Adam Hassell - PhD

Topic: A Video Game Based Architecture for Remote Asset Tasking

Supervisors: Dr Phil Smith (Principal) and Dr David Stratton (Associate)

> Ms Sandra Herbert - PhD

Topic: An Investigation of Middle Secondary Students' Mathematical Conceptions of Rate

Supervisors: A/Prof Robyn Pierce (Principal) and Dr Kaye Stacey (Associate)

> Ms Amber Stabek - Master of MS

Topic: The effectiveness of using static features in identifying scam genres

Supervisors: A/Prof Paul Watters (Principal) and Dr Xinwen Wu (Associate)

Research Publications

Book Chapters: Submitted/Accepted

Sun, Z., Li, Y. & Zhao, Sh. (2009) Trust, deception and security in e-commerce, E-Commerce Coming into its Own (A).

Book Chapters: Published

Ollington, R., Vamplew, P. & Swanson, J. (2009) Incorporating Expert Advice into Reinforcement Learning Using Constructive Neural Networks, in Franco, L., Elizondo, D. and Jerez, J.M. (eds), "Constructive Neural Networks", Studies in Computational Intelligence Vol. 258, Springer, pp.207-224.

Journal Papers: Submitted/Accepted

Bagirov, A., Clausen, C. & Kohler, M. (2009) An L2-boosting for estimation of a regression function, IEEE Transactions on Information Theory (A).

Bagirov, A., Ganjehlou, A.N., Ugon, J. & Tor, A.H. (2009) Truncated codifferential method for nonsmooth convex optimization, Pacific Journal of Optimization (A).

Journal Papers: Published

Delorme, C., Jørgensen, L.K., Miller, M. & Pineda-Villavicencio, G. (2009) On bipartite graphs of diameter 3 and defect 2, Journal of Graph Theory, Vol.61, No.4, pp.271-288.

Dzaililov, Z. & Zaslavski, A. (2009) Global attractors for discrete disperse dynamical systems, Journal of Nonlinear and Convex Analysis, Vol.10, pp.191-198.

Huda, S., Yearwood, J. & Togneri, R. (2009) A Stochastic version of Expectation Maximization algorithm for better estimation of Hidden Markov Model", Pattern Recognition Letters, Elsevier Science, Vol.30, Issue 14, pp.1301-1309.

Jagodick, J., Courvisanos, J., Yearwood, J. & Braun, P. (2009) Key Public Sector Individuals as ICT Change Agents: Reflections Based on Australian and German Experience, The Asia Pacific Journal of Public Administration, Vol.31, No.2, December 2009, pp.1-16.

Keogh, K. & Venables, A. (2009) The Importance of Project Management Documentation in Computing Students' Capstone Projects, APJCE – Asia Pacific Journal of Cooperative Education, special edition in WIL Work Integrated Learning,

Vol.10, Issue 3, pp.1-12.

Kelarev, A., Yearwood, J. & Watters, P. (2009) Rees matrix constructions for clustering of data, Journal of the Australian Mathematical Society, Vol.87, pp.377-393.

Kelarev, A., Ryan, J. & Yearwood, J. (2009) An algorithm for the optimization of multiple classifiers in data mining based on graphs, Journal of Combinatorial Mathematics and Combinatorial Computing, Vol.71, pp.65-86.

Kruger, A. (2009) About stationarity and regularity in variational analysis, Taiwan Journal of Mathematics, Vol.13, No.6A, Dec 2009, pp.1737-1785.

Lin, Y., Yang, Y. & Mammadov, M. (2009) A new filled function method for nonlinear equations, Applied Mathematics & Computation, Vol.210, Issue 2, Apr 2009, pp.411-421.

Martin, P., Harvey, J., Culvenor, J. & Payne, W. (2009) Effect of a Nurse Back Injury Prevention Intervention on the Rate of Injury Compensation Claims, Journal of Safety Research, Vol.40, No.1, pp.13-19.

Miller, M., Nguyen, M.H. & Pineda-Villavicencio, G. (2009) On the nonexistence of graphs of diameter 2 and defect 2, Journal of Combinatorial Mathematics & Combinatorial Computing, Vol.71, pp.5-20.

Miller, M. & Pineda-Villavicencio, G. (2009) Complete catalogue of graphs of maximum degree 3 and defect at most 4, Discrete Applied Mathematics, Vol.157, No.13, pp.2983-2996.

Pan, H., Haidar, I. & Kulkarni, S. (2009) Daily Prediction of Short-Term Trends of Crude Oil Prices using Neural Networks Exploiting Multimarket Dynamics, Frontiers of Computer Science in China, Vol.3, No.2, pp.177-191.

Pineda-Villavicencio, G., Gómez, J., Miller, M. & Pérez-Rosés, H. (2009) New largest known graphs of diameter 6, Networks, Vol.53, No.4, pp.315-328.

Conference Papers: Published

Ahmad, S., Huda, S., Bakir, S., Abdollahian, M. & Zeepongsekul, P. (2009) Process Performance Evaluation Using Evolutionary Algorithm, International Conference on Information & Knowledge Engineering, IKE'09.

Ahmad, S., Huda, S., Bakir, S., Abdollahian, M. & Zeepongsekul, P. (2009) Constraint-Based Evolutionary Learning Approach to the Non-normal Process Performance Evaluation, 3rd International Conference on Informatics and Technology 2009.

Bagirov, A.M., Ugon, J. & Webb, D. (2009) An incremental approach for construction of a piecewise linear classifier, XIII International Conference: Applied Stochastic Models & Data Analysis, ASMDA-2009, Lithuania, pp.507-511.

Bagirov, A.M., Ugon, J. & Webb, D. (2009) A new modified global k-means algorithm for clustering large data sets, XIII International Conference: Applied Stochastic Models & Data Analysis, ASMDA-2009, Lithuania, pp.1-5.

Bruck, S. & Watters, P.A. (2009) Estimating cybersickness of simulated motion using the simulator sickness questionnaire (SSQ): A controlled study, 6th International Conference Computer Graphics, Imaging and Visualization, CGIV 2009.

Bruck, S. & Watters, P.A. (2009) Autonomic nervous system factors underlying anxiety in virtual environments, 15th International Conference on Virtual Systems and Multimedia, VSMM 2009.

Islam, M. & Watters, P. (2009) A New Stochastic Model Based Approach for Object Identification & Segmentation in Textured Color Image, CISSE 2009.

Islam, M., Venkatraman, S., & Alazab, M. (2009) Stochastic Model Based Approach for Biometric Identification, CISSE 2009.

McCombie, S., Pieprzyk, J. & Watters, P. (2009) Cybercrime Attribution: An Eastern European Case Study, 7th Australian Digital Forensics Conference, Perth, pp.41-51.

Pradhan, S., Zaslavsky, A. & Tari, Z. (2009) Spring Framework in Smart Proxy Transaction Model, 5th Int'l Conf on Next Generation Web Services Practices 2009, NWESP 2009, Czech Republic, pp.23-28.

Sun, Z., Han, J. & Ma, L. (2009) A unified CBR approach for web services discovery, composition & recommendation, Int'l Conf on Machine Learning & Computing, ICMLC 2009, Perth, pp.85-89.

Yearwood, J., Kang, B. & Kelarev, A. (2009) Experimental investigation of three machine learning algorithms for ITS dataset, Future Generation Information Technology - FGIT 2009, pp.308-316.



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Photograph by Elizabeth Matuschka: Yellow daisies at Mt Helen Campus, University of Ballarat, Ballarat, Victoria, Australia