

CIAO Newsletter

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





CIAO Director: Professor John Yearwood

ARC Linkage Grant Success

Water Pipeline System Optimization: *“Integrating dynamic and optimization models for efficient pipeline system operations in an evolving water and energy market”*

CIAO is delighted to have recently been awarded an Australian Research Council Linkage Grant, with [Grampians Wimmera Mallee Water \(GWM Water\)](#) and the University of Melbourne.

Chief Investigators for the project are CIAO Director [Professor John Yearwood](#), optimization specialist and CIAO research group leader [Dr Adil Bagirov](#), and [Professor Bill Moran](#) from the Department of Electrical and Electronic Engineering at the University of Melbourne.

The Partner Investigator is GWM Water’s [Dr Andrew Barton](#). Dr Barton is Senior Water Resources Engineer in their Water Resources Division, and an Honorary Research Fellow at UB.

The project will develop an integrated dynamical and optimization model for [water pipeline operations and distribution systems](#).

GWM Water’s [Northern Mallee and Wimmera Mallee pipelines](#) will be used as case studies.

This will allow water professionals to analyse and find [optimal operational regimes](#) for water pipeline systems,

and provide [computer aided decision-support](#) to pipeline operators.

The project is significant because it will provide the capability to [secure Australia’s water supplies](#), through the optimal operation of its water delivery systems.

CIAO believes it will also advance Australia’s capacity to deploy the [most recent optimization approaches](#), to achieve the high level of efficiency required in the [delivery of water to dryland regions](#).

The outcomes of this project will be [readily transferable](#) to other regions within Australia, as well as other water distribution systems. There may also be associated benefits to other pipeline operators in the [oil and gas industries](#), both locally and internationally.

The project will run for three years and fund a [PhD research student](#), who will contribute to the development of the optimization model, and provide an evaluation of solutions from the integrated model.



Land Slip Project

CIAO’s Dr Peter Vamplew is leading an interesting new project, investigating the application of data mining techniques to the production of landslip susceptibility maps.

This project examines whether recently obtained high-resolution LiDAR (Light Detection and Ranging) data can be combined with other factor data - using data mining methods - to more accurately identify areas susceptible to landslide.

Dr Vamplew and colleagues Mr Bahadorreza Ofoghi and Mr Marcello Bartoli are collaborating with Dr David Windle from the Victorian Department of Primary Industries, and Dr Anthony Miner and Dr Peter Dahlhaus from UB’s Geology Department in the School of Science and Engineering, on this project.

The initial study has provided proof of concept for a larger project, which will examine landslides and erosion (see photoexample below) in the Corangamite region of South West Victoria.

It is being jointly funded by Corangamite Catchment Management Authority, Colac Otway Shire, the City of Greater Geelong, and the federally funded National Disaster Mitigation Plan (NDMP).



Associate Professor Paul Watters (pictured right) is Director of the **Internet Commerce Security Laboratory (ICSL)**, a \$3.5 million joint venture between Westpac Banking Corporation, IBM Global Technology Services, and the State Government of Victoria.

He moved to Ballarat to take up this position in April 2008, just prior to the formal launch of the ICSL at the University of Ballarat (UB) in May 2008.

Dr Watters is also **Associate Professor in Information Security** within the Graduate School of Information Technology and Mathematical Sciences at UB, where he teaches information security units to undergraduates and supervises post-graduate research students.

Dr Watters is currently leading the **phishing profiling project** at the ICSL.

Phishing is an analogy of the sport of angling, and is a term that has been in use for over ten years.

At phishing's most basic level, fraud is attempted by using emails as lures or bait, to fish for passwords and financial data from the sea of internet users.

Phishing presents a serious problem for the uptake of new technologies in the e-commerce area, and ICSL is working on a number of countermeasures and forensic analysis of phishing attacks.

Currently, the focus is on investigating known attacks on the **Australian financial system**.

Associate Professor Paul Watters *Staff Member Profile*



The ICSL is working to produce an **ongoing capability** to tackle the national and international problems associated with **internet fraud, internet security and identity management**.

It will also provide highly skilled, industry ready Information and Communication Technology (ICT) postgraduate researchers, prepared for employment within the banking and financial services sector.

Prior to joining UB, Dr Watters was Head of Data Services at the Medical Research National Survey of Health and Development in **London**, and is an honorary senior research fellow at University College, London.

He has **extensive experience in research and development**, gained over 16 years in the IT industry and research establishments.

These include the Commonwealth Scientific and Industrial Research Organisation (**CSIRO**) and the Mental Health Research Institute of Victoria, and

the Universities of Sydney, Macquarie and Newcastle, where he held teaching and research roles.

Dr Watters' role at Sydney's Macquarie University was as the Director of Postgraduate Professional Development Programs and Associate Professor in Information Technology.

While there he received Australian Research Council Linkage Grant funding for a project with the National Australia Bank - Australia's largest company - to defeat financial cyber-crime, and established **Macquarie's Cybercrime Research Laboratory**.

Dr Watters gained his **PhD in Computer Science** from Macquarie University, a Masters of Philosophy from Cambridge University, a BA from the University of Newcastle, and a BA (First Class Honours) from the University of Tasmania.

Most recently he undertook a **Post-graduate Certificate in Educational Leadership** (Higher Education), at Macquarie University.

Dr Watters has written numerous research papers which have been published in international journals and presented at conferences. He has also written ten books, the most recent being "**Statistics in a Nutshell**" in 2008 with Dr Sarah Boslaugh.

He is a Chartered IT Professional, and a member of the **Standards Australia IT-032 Biometrics and Identification Committee**.

Dr Watters lives in Ballarat with his wife and two young daughters.

Visitor from UK

Professor George Wright

CIAO was pleased to host a recent 2 week visit by Professor George Wright (pictured right), to discuss **collaboration**.

He is Professor of Management and Head of the Business and Management Department at **Durham Business School**, in the United Kingdom.

Professor Wright is a leading international researcher on the role and quality of **management judgment** in decision making, and in **anticipating the future**.

CIAO will work on 2 joint projects with him: enhancing **group based judgemental forecasting**, and investigating how Delphi approaches may affect '**Footy Tipping**'.

Prof Wright also presented a seminar "**Anticipating rare events: the role & validity of judgmentally-based approaches**".



Research Group News

MAORG: Mathematical Analysis & Optimization

Leader: Dr Adil Bagirov



Preparations are being made for the commencement of the newly awarded Australian Research Council Linkage Grant with Grampians Wimmera Mallee Water (GWM Water) and the University of Melbourne.

The PhD research student scholarship will be advertised shortly, and steps are also being taken to fill the Research Associate role. This Linkage Grant success represents an important next step in CIAO's valued relationship with GWM Water.

An upcoming special issue of "Optimization" dedicated to the memory of Professor Alexander Rubinov has been edited by Dr Adil Bagirov and Deakin University's Dr Gleb Beliakov.

It contains papers which were written by or discussed extensively with Professor Rubinov, including "The Modified Sub-gradient Algorithm Based on Feasible Values" which he wrote with Dr Refail Kasimbeyli and Dr Ozden Ustun.

It will appear during 2009 as Volume 58 Issue 5, and contains six papers written by members of MAORG.



Dr David Yost is an invited speaker and member of the International Program Committee for the 9th International Conference on Fixed Point Theory & Its Applications in Changhua, Taiwan on 16-22 July 2009.

DMIRG: Data Mining and Informatics

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



DMIRG held a second strategic planning meeting recently, and the main outcome was the establishment of three smaller working groups.

These groups have begun meeting on a fortnightly basis, and represent each main stream within DMIRG:

1. Data Mining
2. Decision Sciences
3. Computational Intelligence and Machine Learning.

The Land Slip project with the Victorian Department of Primary Industries and UB's Geology Department in the School of Science and Engineering is progressing well. This project utilises data mining techniques - see separate article and photo in this edition of the CIAO Newsletter.

Work is progressing on an Australian Research Council Linkage Grant application for Round 2 in 2009, with the Victorian Department of Justice as the nominated industry partner.

Chief Investigators will be Dr Andrew Stranieri and Dr Richard Dazeley.

This will follow on from a current decision modelling project with the Department of Justice, where the product has been delivered and is undergoing site testing.

Several papers are in preparation for this year's Artificial Intelligence 2009 (AI-09) Conference, and one has already been submitted by Drs Vamplew, Dazeley, Barker and Kelarev on mixture policies.

Visitors to CIAO

Recent visitors have included:

Professor Bernd Kummer

Institute of Mathematics, Humboldt University, Berlin, Germany

Professor Kummer visited CIAO for four weeks in March-April 2009, as a guest of Dr Alex Kruger.

He is on sabbatical for the 2009 calendar year, and is taking the opportunity to work on a new book on optimization theory, and work on a joint project with Dr Kruger.

This is Professor Kummer's second visit to Ballarat.

A delegation from Zhejiang University of Science & Technology, China

CIAO participated in discussions with this delegation, who are interested in exploring joint collaboration on optimization research.

Associate Professor Burak Ordin

Department of Mathematics, Faculty of Science, Ege University, Izmir, Turkey

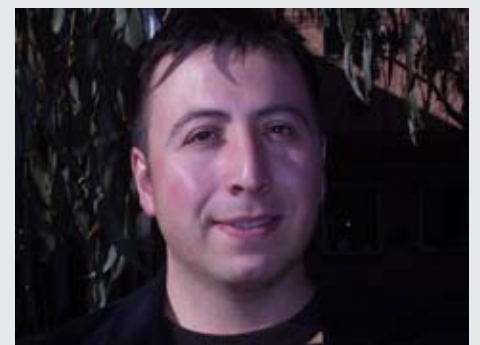
Associate Professor Ordin (pictured below) is currently visiting CIAO for three months - from June to September 2009 - as a guest of Dr Adil Bagirov.

He is here to undertake collaborative research with Dr Bagirov on hybrid methods for global optimization.

During his stay, Associate Professor Ordin will also present a Seminar on new versions of the cutting angle method in global optimization.

He is accompanied on this visit by his wife, who will spend time working with the Head of UB's School of Nursing on surgical nursing and liver transplantation.

This is their first visit to Ballarat.



Research Laboratory News

ICSL: Internet Commerce Security

Director: A/Professor Paul Watters



Associate Professor Paul Watters has been invited - through IBM - to attend a closed 3-day INTERPOL briefing on the underground economy, however this has been postponed until September 2009 due to the Swine Flu outbreak.

The formal agreement between all parties involved in the ICSL has now been signed, with a new contract currently being developed for the proposed ICSL-Australian Federal Police relationship.

ICSL's four project teams meet fortnightly to review progress, and set targets for current active projects in profiling, malware, forensics, and identity theft and recovery.

This model of working together has proven very productive, and produced already produced a number of papers.

Researchers are now preparing to submit a second batch of work to the peak Anti-Phishing and eCrime conference organised by the Anti-Phishing Working Group (APWG). This conference will take place in October 2009 in Washington State, USA.

PhD students Ms Amber Stabek and Ms Kylie Turville recently attended a workshop on Anti-Money Laundering and Counter-Terrorist Financing in Sydney, making useful contacts and learning more about the government's new AML/CTF legislation.

Applications for Semester 1, 2010 research student scholarships will be open until 31 October 2009, and ICSL will offer two further scholarships.

HIL: Health Informatics

Leader: Dr Andrew Stranieri



HIL members meet regularly to discuss research and collaboration on potential new projects.

An ODR (online dispute resolution) program written by PhD Student Mr Niall Muecke, Dr Andrew Stranieri and Dr Charlynn Miller has now been implemented. The case study is about to commence, and volunteers are being sought.

The review being undertaken for the Australian Sports Commission (ASC) on current Information Communication Technology (ICT) in National Sporting Organisations (NSOs) is close to completion.

The review is part of the ongoing ASC support of National Sporting Organisations and examined the extent to which a sport's ICT systems are integrated across national/state jurisdictions, and the extent to which a sport uses ICT to assist in the achievement of its strategic objectives ('e-capability').

The final report is now being prepared after draft findings were presented in Canberra to positive comment.

Discussions are underway to establish a Diabetes and Cardiovascular Disease Screening Clinic, in conjunction with UB's School of Nursing and the School of Community Health at Charles Sturt University.

A Memorandum of Understanding has been drafted by Dr Chris Turville with Endeavour College of Natural Therapies, regarding collaboration on projects including Homeopathic Trials.



HIL Affiliate: AHML

Australian Healthcare Messaging Laboratory

Director: Ms Jane Gilbert



Current projects are progressing well, including those involving sleep diaries, web services, and electronic-Ongoing Needs Identification (eONI).

Ms Jane Gilbert has just returned from a trip to Japan, where she attended a Health Level 7 (HL7) International Working Group Meeting in Kyoto.

Jane was co-chair of the Implementation and Conformance Working Group.

All HL7 Technical Committees and Special Interest Groups met to progress their work and current initiatives.

Jane also recently provided a Guest Editorial for the May 2009 edition of the Australian health IT magazine Pulse+IT.

Her article was headed "Why aren't standards being implemented properly?", and examines Australian standards and barriers to conformance.

AHML was featured in an article in the April 2009 edition of HL7 News, the official international publication of Health Level Seven Inc. in the United States.

The article was titled "Free Web-based HL7 Version 2.x Message Testing: Australian Healthcare Messaging Laboratory", and includes information about AHML's expertise and operations in Australia.

Business Development Manager:

Mr Justin Poole



We welcome Mr Justin Poole to CIAO, as our new Business Development Manager.

Grants Awarded

Research Infrastructure Block Grants

#1RIBG

Applicants: Associate Professor Paul Watters and Professor John Yearwood

Amount: \$29,991

Purpose: Research Assistant for specialised software development in the Internet Commerce Security Laboratory (ICSL)

#2RIBG

Applicants: Dr Adil Bagirov and Professor John Yearwood

Amount: \$24,991

Purpose: Research Assistant for Developing Multi-criteria Optimization Models for Water Supply Systems Operations

#3RIBG

Applicants: Dr Richard Dazeley, Dr Andrew Stranieri and Dr Peter Vamplew

Amount: \$29,298

Purpose: A System Support Tool for a new knowledge based system development environment based on Ripple Down Rules

#4RIBG

Applicants: Mr William Harvey, Dr Phil Smith, Dr David Stratton and Dr Andrew Stranieri

Amount: \$11,531

Purpose: Equipment for Construction of a Flight Simulator

UB Higher Education Incentive Grant

Applicants: Dr Charlynn Miller, Mr Grant Meredith, Mr Blake Peck & Mr Patrick Graz

Amount: \$13,028

The panel considered the project to be innovative, and will contribute to the development of cross-disciplinary team activity in relation to this alternative learning environment.

Grant Applications Submitted

International Science Linkage Grant Application: Australia-China Special Fund

Topic: Protocol weakness analysis and security testing for Next Generation Internet
Project Leader: Assoc Professor Paul Watters
CIAO Personnel: Professor John Yearwood, Dr Zhiyou Wu, Dr Fusheng Bai, Dr Xinwen Wu, Dr Zari Dzalilov

Chinese Partners: Dr Wu Liu, Tsinghua University, Beijing, China

Australian Partners: IPv6 Now Pty Ltd and Westpac Banking Corporation

Funding Sought: \$49,000

Conferences/Seminars/Visits

Future Models for Energy & Water Management under a Regulated Environment

Dr Fusheng Bai will attend this event at Brisbane's Queensland University of Technology on 20-22 July 2009.

The event is hosted by AMSI- Australian Mathematical Sciences Institute - and brings together industry professionals, also offering the opportunity to participate in short courses presented by Dr Shahbaz Khan from UNESCO in Paris, Dr Graham Weir from IRL New Zealand, and Dr Elliot Tonkes from Energy Edge.

ICOTS8: Eighth International Conference on Teaching Statistics

Mr Peter Martin has been invited to present a paper at this conference, in the session on 'Research in vocational education and training in statistics'.

ICOTS8 will take place on 11-16 July 2010 in Ljubljana, Slovenia. The conference is held every four years, and is the largest international conference in the statistics education area.

China: May 2009

Professor Sid Morris visited China for two weeks recently to promote undergraduate and post-graduate research opportunities to potential students.

Institutions visited included Chongqing Normal University, Shanxi University of Science and Technology, Harbin Engineering University, Darlian Foreign Language University, and TsingHua University.

Colloquia at UB

Recent colloquia presentations have been made by the following visitors to CIAO:

> **Professor Bernd Kummer**, Institute of Mathematics, Humboldt University, Berlin, Germany

Topic: Mathematical Optimization and Game Theory - what can and cannot be optimized?

> **Professor Caroline Finch**, School of Human Movement & Sports Sciences, University of Ballarat

Topic: Statistical approaches towards the analysis of population level older persons falls injury data

Seminars at UB

Recent seminars have been presented by:

> **Dr Lei Pan**, Deakin University, Geelong

Topic: Issues in Forensic Tool Testing

> **Associate Professor Gerhard-Wilhelm Webber**, Middle East Technical University (METU), Ankara, Turkey

Topic: Challenges and Opportunities of Continuous Optimization Theory and Applications in Networks of Learning and Research Collaboration

Staff News

"Topology without Tears"

Professor Sid Morris' book is being translated into Chinese, Persian and Spanish, and is available at <http://uob-community.ballarat.edu.au/~smorris/topology.htm>.

No tears have yet been in evidence from respective translators Dr Fusheng Bai, Mr Asef Nazari Gangehlou and Mr Guillermo Pineda-Villavicencio.

Employment in China

Farewell to Dr Prabhu Manyem, who is leaving us to take up a position in China. Very best wishes for the future, Prabhu.

Early Career Researcher Program (ECRP)

Congratulations to Mr Guillermo Pineda-Villavicencio and Mr Bahadorreza Ofoghi, who were recently accepted into this annual UB program, to be provided during the second half of 2009.

Employment on ARC Discovery Project

Congratulations to recent UB PhD graduate Mr Asef Nazari Gangehlou, who has taken up a two year position in Adelaide, working on an Australian Research Council Discovery Project at the University of South Australia.

Research Student Profile:

Mr Guillermo Pineda-Villavicencio



Guillermo Pineda-Villavicencio arrived at the University of Ballarat from his native Cuba in February 2005.

He came here to undertake a PhD on the topic "Improving Upper and Lower Bounds on the Order of Large Undirected Graphs under Degree and Distance Constraints" under the principal supervision of Professor Mirka Miller.

Guillermo's research involved examining large and complex networks, whose sophistication is comparable to real world systems such as the Melbourne rail and tram network.

Networks play a fundamental role in the development of society. Part of their importance is due to their ability to interconnect elements of different natures, and in this way share and process information from different sources.

Networks have become an indispensable element in almost all sectors of daily life. Consequently, issues related to their design have received much attention in the academic environment and constitute an active research area.

Among the many factors to be considered in network design, there are two which appear most frequently and pose the greatest challenge:

1. Extending the number of connections that can be attached to a node.
2. Finding the shortest communication route between any two nodes.

The cornerstones of Guillermo's research results include:

- the construction of large topologies of interconnection networks.
- a complete catalogue of connected

networks.

- proof that certain connected networks must be bipartite.

- identification of several strong necessary conditions for the existence of bipartite topologies.

- presentation of a number of open problems and conjectures, which provide scope for future research in the design of optimal networks.

In April 2008 Professor Miller transferred to the University of Newcastle, and CIAO Director Professor John Yearwood stepped in as Guillermo's UB-based principal supervisor, while Professor Miller continued as his external supervisor.

Guillermo's PhD thesis has recently passed external examination, and he will formally receive his Doctoral degree at the December 2009 Graduation Ceremony.

Prior to coming to Australia, Guillermo worked in the Faculty of Mathematics and Computer Science at the University of Oriente, in Santiago, Cuba, teaching units in discrete mathematics, programming, calculus, algebra and linear algebra, logic, and design and analysis of algorithms.

His research interests include Combinatorics (otherwise known as Graph Theory), Permutation Groups, Combinatorial Optimization and Computational Geometry.

He is currently working as a member of staff on several research projects within CIAO, including projects on network security for CIAO's Internet Commerce Security Laboratory (ICSL).

Guillermo lives in Ballarat, is a keen reader and basketball player, enjoys listening to guitar concerts, and is a talented Latin-American salsa dancer.

Research Student News

Research Student Representative

Sincere thanks to Ms Armita Zarnegar, who recently completed twelve months as Research Student Representative within CIAO and the Graduate School of ITMS.

A new representative will be voted in by current research students shortly.

Confirmation of Candidature

Congratulations to the following students, who have successfully passed their PhD Confirmation of Candidature:

> Mr Alexey Kuznetsov

Topic: Optimization of Suspension Systems for Improved Comfort Level

Supervisors: Dr Musa Mammadov, Dr Eldar Hajilarov & Dr Ibrahim Sultan

> Mr Ather Saeed

Topic: Efficient Information Retrieval and Aggregation of Datasets in Distributed Networks

Supervisors: Dr Andrew Stranieri, Dr Liping Ma & Dr Richard Dazeley

> Ms Faezeh Afshar

Topic: Enhancement of Group Decision-Making Processes Within Organisations Using On-Line Deliberation

Supervisors: Dr Andrew Stranieri & Professor John Yearwood



Pictured above (L to R):
Mr Alexey Kuznetsov & Ms Faezeh Afshar

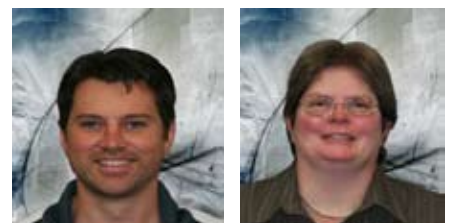
More Staff News

Social Networking Forum

Dr Charlynn Miller (pictured below R) participated as a Panel Member at a recent Australian Computer Society Victorian Branch Forum titled "The Pros and Cons of Social Networking in a Business Context".

Accreditation Panel Member

Mr Greg Simmons (pictured below L) has recently been invited to become a member of the Australian Computer Society's accreditation panel for computing at the University of Wollongong. Congratulations Greg.



Publications

Book Chapters: Submitted/Accepted

Mammadov, M. (2009) Statistical convergence and Turnpike theory, Encyclopedia of Optimization, 2nd Edition (A).

Mammadov, M. (2009) Turnpike theory: Stability of optimal trajectories, Encyclopedia of Optimization, 2nd Edition (A).

Book Chapters: Published

Bagirov, A. (2009) Continuous approximations to subdifferentials, Encyclopedia of Optimization, Second Edition, pp.475-482.

Bagirov, A. (2009) Derivative-free methods for nonsmooth optimization, Encyclopedia of Optimization, 2nd Edition, pp.648-655.

Bagirov, A. & Beliakov, G. (2009) Global optimization: cutting angle method, Encyclopedia of Optimization, 2nd Ed, pp.1304-1311.

Kruger, A. (2009) Nonsmooth analysis: Frechet subdifferentials, Encyclopedia of Optimization, 2nd Ed, pp.2651-2658.

Kruger, A. (2009) Nonsmooth analysis: weak stationarity, Encyclopedia of Optimization, 2nd Ed, pp.2658-2664.

Journal Papers: Submitted/Accepted

Bagirov, A., Rubinov, A. & Zhang, J. (2009) A multidimensional descent method for global optimization, Optimization (A).

Kelarev, A., Yearwood, J. & Watters, P. (2009) Internet Security Applications of Grobner-Shirshov Bases, Asian-European Journal of Mathematics (A).

Kulkarni, S. (2009) Natural language based fuzzy queries and fuzzy mapping of feature database for image retrieval, International Journal of Computer and Information Science and Engineering (S).

Sukhorukova, N. (2009) A necessary optimality condition for free knots linear splines: special cases, Pacific Journal of Optimization (A).

Wu, Z., Yang, Y. & Bai, F. (2009) A filled function method for quadratic problems with binary constraints, Optimization (A).

Wu, Z. (2009) New global descending methods for unconstrained global optimization, Journal of Global Optimization (S).

Yearwood, J. & Stranieri, A. (2009) Group Structured Reasoning for Coalescing Group Decisions, Group Decision and Negotiation (A).

Yearwood, J., Bagirov, A. & Kelarev, A. (2009) Optimization methods and the k-committees algorithm for clustering of ITS sequence data, Journal of Applied Computational Mathematics (A).

Journal Papers: Published

Bagirov, A., Clausen, C. & Kohler, M. (2009) Estimation of a Regression Function by Maxima of Minima of Linear Functions, IEEE Transactions on Information Theory, Vol.55, Issue 2, Feb 2009, pp.833-845.

Bai, F., Wu, Z. & Zhu, D. (2008) Sequential Lagrange Multiplier Condition of ϵ -Optimal Solution in Convex Programming, Optimization, Vol.57, Issue 5, pp.669-680.

Dazeley, R. & Kang, B.H. (2008) Epistemological Approach to the Process of Practice, Minds and Machines: Journal for Artificial Intelligence, Philosophy and Cognitive Science, Vol.18, No.4, Dec 2008, pp.547-567.

Dazeley, R., Kelarev, A., Yearwood, J. & Mammadov, M. (2009) Optimization of multiple classifiers in data mining based on string rewriting systems, Asian-European Journal of Mathematics, Vol.2, No.1. pp.41-56.

Delorme, C., Jorgensen, L., Miller, M. & Pineda-Villavicencio, G. (2009) On bipartite graphs of defect 2, European Journal of Combinatorics, Vol.30, No.4, pp.798-808.

Herbert, S. (2008) Where is the rate in the rule?, Australian Senior Mathematics Journal, Vol.22, No.2, pp.28-36.

Hofmann, K. & Morris, S. (2009) Contributions to the Structure Theory of Connected Pro-Lie Groups, Topology Proceedings, Vol.33, pp.225-237.

Hofmann, K. & Morris, S. (2008) Iwasawa's local splitting theorem for pro-Lie groups, Forum Mathematicum, Vol.20, No.4, pp.607-630.

Kelarev, A., Yearwood, J. & Mammadov, M. (2009) A formula for multiple classifiers in data mining based on Brandt semigroups, Semigroup Forum, Vol.78, pp.293-309.

Kelarev, A., Yearwood, J. & Vamplew, P. (2009) A Polynomial Ring Construction

For Classification of Data, Bulletin of the Australian Mathematical Society, Vol. 79, pp.213-225.

Lee, M., Newnham, L. & Miller, C. (2009) RSS and content syndication in higher education: subscribing to a new model of teaching and learning, Educational Media International, Vol.45, Issue 4, pp.311-322.

Lee, M., Newnham, L. & Miller, C. (2009) Podcasting Syndication and University Students: Why don't they subscribe?, The Internet and Higher Education, Vol.12, Issue 1, pp.53-59.

Morales Silva, D., Rubinov, A. & Sosa, W. (2009) G-coupling functions, Optimization, Vol.58, Issue 2, pp.193-211.

Rubinov, A. & Wu, Z. (2009) Optimality conditions in global optimization and their applications, Mathematical Programming: Series B, Special Issue: Nonsmooth Optimization and Applications, Vol.120, No.1, pp.101-123.

Stranieri, A. & Yearwood, J. (2008) Enhancing Learning Outcomes with an Interactive Knowledge-based Learning Environment providing Narrative Feedback, Interactive Learning Environments, Vol.16, Issue 3, pp.265-281.

Sukhorukova, N., Ugon, J. & Yearwood, J. (2009) Workload coverage through nonsmooth optimization, Optimization Methods and Software, Vol.24, Issue 2, pp.285-298.

Wu, Z. & Bai, F. (2009) Global optimality conditions for mixed nonconvex quadratic programs, Optimization, Vol.58, Issue 1, January 2009, pp.39-47.

Conference Papers: Submitted/Accepted

Bagirov, A., Ugon, J. & Webb, D. (2009) Fast modified global k-means algorithm for clustering large data sets, Proceedings of XIII International Conference ASMDA-2009, Vilnius, Lithuania (A).

Conference Papers: Published

Kulkarni, S. (2008) The Impact of Biometric Systems on Communities: Perceptive and Challenges, 11th Australian Conference on Knowledge Management and Intelligent Decision Support, ACKMIDS 2008.

Saeed, A., Stranieri, A., Dazeley, R. & Ma, L. (2009) Grid-Based Information Retrieval Solution for the Aggregation of Legal Datasets in Online Dispute Resolution (ODR), The Second SIWN Congress, SIWN 2009, Leipzig, Germany.



Centre for Informatics & Applied Optimization

Graduate School of Information Technology & Mathematical Sciences, University of Ballarat

Email: e.matuschka@ballarat.edu.au ~ Tel: (+61) 3 5327 9949 ~ Fax: (+61) 3 5327 9966

Photograph by Marijke Groothuis: winter snow at Mt Helen Campus, University of Ballarat, Ballarat, Australia