

Centre for Informatics and Applied Optimization

C I A O Newsletter

<http://www.ballarat.edu.au/itms/ciao.shtml>

April 2004

Edition 6

Another Successful Tender....

OTTE 'TAFE Skills to Work' - The University has been successful in being selected as the preferred tenderer in this knowledge based system which will form part of the TAFE Virtual Campus. The tender is worth approximately \$690,000 to UB. See page 4 for details.

New Product....

CIAO-GO Software - Dr Adil Bagirov along with Dr Janos Pinter of Pinter Consulting Services, Canada have developed an optimization software solution called 'CIAO-GO', (GO meaning Global Optimization). The purpose of this optimization software is to assist in the formulation and solution of highly nonlinear models under general structural assumptions. The product is now commercially available. CIAO-GO integrates global and local scope solver modules. CIAO-GO can also be embedded under a menu-driven user interface, to assist the application development process. CIAO-GO is also available for workstations; furthermore, it can be connected to a broad variety of advanced numerical modelling environments, and to customized user applications. Visit www.ciao-go.com.au for more information.

Visitors to CIAO

Mr Zhiwen Qi (Chee) arrived from Shen Zhen, China on the 30th March. Chee has been sponsored for six months by Shen Zhen Polytechnic to observe and compare how Western universities teach. Chee's research area of interest is Aspect-Oriented Programming. Whilst here he will be working on database aspects of a group decision support system with Associate Professor John Yearwood, Ms Faezeh Afshar, Dr Andrew Stranieri and Ms Rachel Naus.

Dr Yuqing Lin from the School of Engineering and Computer Science of the University of Newcastle visited CIAO on Thursday 1 April 2003 and presented a seminar titled '*Topology of Interconnection*

Networks'. In his talk, he presented an overview of the study of network topology for both static networks and dynamic networks. He then highlighted some of the research conducted during his PhD candidature, namely, the connectivity of (k;g)-cages and extremal graphs.

Associate Professor Naipeng Ding from the School of International Business and Management, Shanghai University, visited CIAO for the period, 3 December 2003 to 16 February 2004, to further his research in Comparative Analysis of On-Line Retailers.

CIAO Reports

Distributed Simulation Laboratory (DSL)

The DSL is growing, both in terms of numbers of students and in terms of placement in the global and Australian simulation community.

The Laboratory and Federation Square

The research group title "Distributed Simulation Laboratory" evokes, for many, a picture of benches and furniture. The furniture has finally arrived! T153 has been set up with benches that provide not only workspace for Phil and David but also an environment in which "Federation Square" can be established. Fed Square is a set of computers on which various configurations of HLA simulations can be set up and left running permanently to support research activity.

DSL Students

Tim Pokorny, the second DSL PhD student, had his candidature confirmed in March. He is an APA(I) student under the Linkage project, "Applying the Lessons of the Virtual Battlefield to Financial Modelling - Investigating Innovative use of Distributed Simulation", with linkage partner Calytrix in Perth. The focus is on architectures that facilitate the automated application of technologies such as Distributed Simulation to novel domains.

Tim Pokorny and David Andrews both have refereed papers accepted for the May SIAA (Simulation Industry Association of Australia) conference in

Canberra and, in addition the two current DSL honours students, James Miller and Michael Fraser, have papers accepted as well.

Two new students are commencing their studies within the DSL. Anirban Das, is in the process of selecting his topic for a Masters by Research degree and Lance Burns is defining an Honours topic within the emerging Computer Games/HLA field.

"Doctors" (Dave's Referencing System)

This online, web based reference management tool, devised and developed by David Andrews, enables researchers to maintain, and accumulate an interlinked repository of research references for any projects they are developing. The secure online access is through a web browser interface and is therefore available wherever the researcher might be working and the server-based storage of research resources provides a safe, backed-up location for these critical resources. David will shortly be presenting his system to ITMS researchers in a seminar and making the resource available to any who would like to make use of such a system.

ADF Anthropometry Project

The DSL group continues to be involved in the modelling deliverables required under the Contract with the ADF.

OpenRTI

The RTI is the central "switchboard" of an HLA simulation and the project, which seeks to establish an RTI implementation that is to some extent or other free is gathering momentum internationally. David Stratton recently presented a paper entitled "Developing an Open-Source RTI Community" at the SISO (Simulation Interoperability Standards Organisation) conference in Washington, Dc. This paper, co-authored with James Miller and Shawn Parr (Tom Calytrix, makes the case for an RTI that is based on openly available source code, in order that research and development of the RTI may flourish. Such an endeavour will also minimise the entry costs to HLA simulation developers and implementers.

There was considerable interest in this endeavour at the conference and the DSL has been invited to prepare a Terms of Reference for a Standards Group to be convened at the next SISO conference in November 2004. The focus of this group would be to codify the SISO support for, and involvement in, an open RTI.

In the meantime several other developments are proceeding:

Source code base

The DSL OpenRTI proposal explicitly avoids proposing the writing of a new RTI. A number of existing, to varying extents open, RTI's have been evaluated and discussions are at an advanced state with the French organisation ONERA (Office National d'Etudes et de Recherches Aeronautiques) whose CERTI fulfils many of the requirements for a code base for the OpenRTI.

Support subscriptions

An OpenRTI will only be widely adopted in commercial circles if commercial-grade support is available. David Andrews has been employed to survey major Australian simulation industry partners to canvas the interest in subscription to a support service for an OpenRTI. Such support would be planned to be made available, as a commercial service, from within the DSL.

Industry partners

Although the core of RTI services would be made available free-of-charge the effect of an open RTI architecture would be to make it feasible for commercial developments, exposing enhanced RTI features such as security, to flourish. The "business model" for the OpenRTI should be one that supports such activity.

Mathematical and Statistical Analysis Research Group (MASARG)

Dr Alex Kruger gave a presentation at the Victoria International Conference 2004 held during February 2004, in Wellington New Zealand.

Professor Sid Morris gave a presentation at the Victoria International Conference 2004. Professor Morris's paper, co-authored with Professor Karl Hofmann, called "The structure of Alebian pro-Lie Groups" has been accepted to appear in Math Z.

Professor A. M. Rubinov was elected a member of International Scientific Committee of the 'Working Group on Generalized Convexity'.

Professor A.M. Rubinov was selected to be one of the four Editor-in-Chiefs of the *Pacific Optimization Journal* and also to be a member of the editorial board of the international *Journal of Industrial and Management Optimization* and *Australian Journal on Mathematical Analysis and Applications*.

Professor Karl Hofmann has been appointed as a Visiting Professor from 1 Oct 2004 until 31 Jan 2005.

Dr Robyn Pierce has a paper, co authored with K. Stacey, "Learning to use CAS: Voices from a classroom" which has been accepted for presentation at the 28th Conference of the International Group for the Psychology of Mathematics Education.

Dr Caroline Bardini from Brazil is currently visiting MASARG. She has recently completed her PhD in Paris, is working with Dr Robyn Pierce on a short project investigating the development of secondary students' understanding of the meaning of algebraic symbols, in a technology active learning environment.

Data Mining and Informatics Group (DMIRG) ...

Patrick Purcell, from the Therapeutic Goods Administration (TGA) visited last month and was satisfied with the progress. Patrick and the TGA have been exemplary industry partners. The Ballarat Division of General Practice has also played a very supportive role as an industry partner mainly to the Decision Support aspect of the project. Michelle O'Brien's PhD is due to be completed by September. Gary Saunders' PhD is to be completed by October. Simon Barty's PhD is due to be completed by October.

A visit from Dr. Manfred Hauben from the Pfizer pharmaceutical company is being organised. Dr Hauben is interested in the work being done in the ADRAC project. There have been a considerable number of publications that have resulted from this project and it has been a major direction for CIAO.

Attempts to have a closer collaboration with CCeH require further work to develop strategies for continuing CIAO's focus on Health Informatics.

Decision Support.

John Yearwood and Andrew Stranieri visited the Refugee Review Tribunal of Australia in late March to deliver the final report on the ARC funded Linkage project with the RRT as an industry partner. Despite the withdrawal of the doctoral student funded by this grant, the representatives from the tribunal were impressed by the final research outcomes presented and the software prototypes developed.

The joint project between CIAO and Ballarat Health Services (BHS) for developing a training system for ICU nursing staff has been completed. A paper describing the work has been submitted to the Health Informatics Conference (HIC).

A project involving a risk management decision support system with the ARK consulting group is being developed and funding through AusIndustry being investigated?

GOANN (Global Optimization for Artificial Neural Networks (ANN))

After many problems with programming and research assistance this project has resulted in some interesting results. CIAO optimisation algorithms have been applied to studying weight determination and architectures for ANNs. One conference paper has been accepted and a journal paper is in preparation.

Text Categorization

This project has been delayed due to problems with research assistance.

Bio-informatics

Publication of our paper in the journal Bio-informatics has lead to high citation rates and much interest. A second paper is under way.

Ontologies

Work in ontologies and the semantic web is progressing. John Avery was successful in his confirmation of candidature. A paper has been accepted for publication. Avery J. and Yearwood J. (2004) *Supporting Evolving Ontologies by Capturing the Semantics of Change*, In Proceedings of The Tenth Australian World Wide Web Conference (AusWeb'04). There is some interest from DSL students in using ontologies in their work.

Data mining Software

Some consideration is being given to commercialisation of clustering and classification algorithms that have been developed within CIAO.

DMIRG seminars

For second semester we will have 3 seminars: 1 research student, 1 staff member and 1 external researcher.

DMKD Research Network

John Yearwood has been asked to be the region coordinator for the DMKD research network for Tasmania and Regional VIC/NSW.

Emerging Communications Technologies Cluster (ECT):

Submitted Paper

Keyurkumar J Patel, Zari Dzalilov, Dynamic Reconfiguration and Graph Theory Approaches to Failures in IT based Telecommunication Networks, ISATED conference on Modelling, Simulation, and Optimization (MSO), Kauai, Hawaii, USA - August 17-19, 2004.

Appointment

Dr Wing Keung Tam has been appointed as Research Fellow for one year from 1st June 2004. Dr Tam obtained his BEng (EE) with First Class Honours from the University of Salford, UK in 1989 and PhD (IT) from RMIT in 1997. Since then he has been employed as R & D Director for Group Sense PDA Ltd., Hong Kong. Dr Tam has more than 20 years of industrial experience. He presently has dual nationality (Hong Kong and Australia). The main advantage of Dr Tam's appointment to the University and CIAO will be that he can use affiliations in all research publications which would significantly improve the research performance of the ECT cluster.

Workshops and Conference Participation

Mr Keyurkumar Patel and Professor Nguyen Tran (Swinburne University of Technology and Research Associate, ECT Cluster) attended the Australian Wireless Summit 2004, 3-4 March 2004, Sydney. This attendance was aimed at establishing the

awareness of Emerging Communication Technologies (ECT) Research Cluster to the wide audience representing various industries and academic institutions. Topics included in the summit were: Wireless Security; Business Models; ROI; Standards; Convergence; WWAN; wVoIP; Hot Spots; WiFi; Policies; and Australian Business Cases. This venture was successful as useful contacts were made and agreed upon for mutual research collaboration in the field of Wireless Technology.



Keyur Patel (University of Ballarat) and Professor Nguyen Tran (Swinburne University of Technology)

Intelligent Finance Cluster ...

ARC Discovery Grant Application

The Intelligent Finance Cluster has submitted an ARC Discovery Grant Application entitled: "*Nonlinear Dynamic Bayesian Networks of Neural Network Ensembles for Multivariate Time Series Prediction*". The significance of this project idea has been highly recognized both by Professor Wayne Robinson from our University and by Professor Didier Sornette from University of California at Los Angeles, USA, and CNRS, France.

The 1st International Workshop on Intelligent Finance (IWIF 1) has been initiated. A truly international Program Committee has been successfully formed, which has already gathered some of world brightest minds and most experienced analysts and traders. Its official website: www.iwif.org has been created and regularly managed by Rachel Naus. This website is live to public. A healthy stream of expressions of interest has come, most of them are from overseas. As the organizer, the School of ITMS is expected to submit 5-10 quality papers to IWIF 1. As the Workshop will run for two days comprising a single track of presentations, we shall limit the total number of oral presentations to 30. But the proceedings may include more accepted papers after review.

The Cluster has established a collaborative relationship with a major Australian bank. A preliminary study on feasibility for detecting intermarket influences has been conducted with

significantly positive results. Dr Musa Mammadov and Ms Najeda Soukhoroukova have made significant contributions to this study. The Bank has been impressed by the preliminary study results, and has expressed their favorable interest in funding the continuation of this research for years to come.

The Cluster has made healthy progresses on several fronts, including: Probability Ensembles of Neural Networks, Super Bayesian Influence Networks, Fuzzy Dynamical Systems, Neural Nets and Association Rules for Stock Index Prediction.

CCeH

The Collaborative Centre for e-Health (CCeH) has been restructured and now forms an integral part of the School of Information Technology and Mathematical Sciences. CCeH now reports directly to the School with activity in commercialisation of electronic commerce in the health field.

The Centre will continue to work with its Health Partners in delivering successful outcomes.

Tenders

Office of Training and Tertiary Education, (OTTE) 'TAFE Skill to Work'

The Office of Training and Tertiary Education, (OTTE) tender proposal called for an online service for students, prospective students, the general public and other interested groups. It aims to provide a skills matching process to identify gaps in the competencies of individuals and address these gaps by providing educational options through a knowledge based system. The tender was originally submitted in June 2003 but due to structural changes within the Office of Training and Tertiary Education the tender process was put on hold. Many thanks to Professor Wayne Robinson who intervened and eventually had the process back on track with UB being selected as the preferred tenderer. The Contract is almost ready for signing with the project set to commence in June 2004. Enormous effort has been expended by Prof Sid Morris, Dr Andrew Stranieri and Assoc Prof John Yearwood in keeping this project alive and now it is all hands on deck to setup and deliver. Subcontracts with Justsys and i4Talent are being developed.

ADF Anthropometry

The project is gearing up to deliver a successful outcome to the Department of Defence. The consortium involving the University of South Australia, University of Ballarat, Sinclair Knight Merz and Permian are putting in place the necessary contracts and subcontracts. The project seeks assessment of "fit" of a cross section of Australian Adults into the cockpits of RAAF aircraft through

computer modelling. A contract between the ADF and UniSA was signed on the 25 Feb. The Contract between UniSA and UB has been drawn up and will be signed as soon as possible. In conjunction sub-contracts and agreements are also required for signing with Permian and for leasing of floor space in the Global Innovations Centre.

Joint Projects

ANZ International Bank

A preliminary meeting was held in Sydney involving members from the ANZ Investment Services and Dr Heping Pan and John Yearwood of CIAO. Discussion centred on Intelligent Finance and predicting market trends. A further meeting was held on the 3rd February to determine possible collaborative venture. On the 19 April a funding model was presented to Dr Dzung Le, Global Head, ANZ Quantitative. Dr Le verbally agreed to consider funding on one or more of the models presented. Further meetings are scheduled.

Rural Ambulance Victoria (RAV) MOU – To progress the relationship with RAV a meeting was held on the 16 Feb with their Acting Corporate Services Director, Phil Hanson. Various options for collaboration were discussed but it was agreed to meet again after RAV had moved into their new premises in the Ballarat Technology Park. This move took place on the 23 February.

Published Papers

Keyur Patel, *Book Review - E-Business and Change Management by Mohini Singh and Dianne Waddell*, (eds.), J. Res. Prac. Inf. Tech. pp 125-126 Vol 36 No. 2, 2004

Dr Alexander Kruger's paper *Weak stationarity: eliminating the gap between necessary and sufficient conditions* was published in the journal *Optimization* by Taylor & Francis Issue: Volume 53, Number 2 April 2004 Pages: 147 - 164

Z. Dzalilov, I. Ouveysi and A. Rubinov, "A lifetime measure for telecommunication network - Theoretical aspects, Proceedings" of The 11th IEEE International Conference on Networks (ICON 2003), p. 75-79, 2003.

R.N. Gasimov and A.M. Rubinov, *On augmented Lagrangians for optimization problems with a single constraint*, Journal Global Optimization, vol. 28, 153-173, February 2004

J. Dutta, J.E. Martinez Legaz and A.M. Rubinov, *Monotonic Analysis over cones*. Optimization, vol. 53, 165-177, April 2004.

Accepted Books, Chapters and Papers

Pierce R and Herbert S *CAS: Student engagement requires unambiguous advantages* has been **accepted** for presentation at MERGA 27 and for publication in the Conference Proceedings.

Pierce R. and Stacey K. *Learning to use CAS: voices from a classroom* has been reviewed and accepted for the Proceedings of the 28th annual meeting of the International Group for the Psychology of Mathematics Education.

Wing K. Tam, Nguyen Tran and Keyurkumar J. Patel, "Developing Wireless Application for Secure Electric Power Meter Reading using Bluetooth, International Conference on Computing, Communications and Control Technologies: CCCT'04, Aug. 14-17, 2004 - Austin, Texas, USA.

Keyurkumar J. Patel, Steven McCubben, *Addressing Wireless Security Issues during Implementation of Wireless Applications in a Highly Mobile Organisation*, International Conference on Computing, Communications and Control Technologies: CCCT'04, Aug. 14-17, 2004 – Austin, Texas, USA.

Sasha Ivkovic, Ranadhir Ghosh and John Yearwood's paper 'The Automated Identification and Description of Clusters for Categorical Data using Conditional Probabilities' has been accepted for the International Conference on Computational Intelligence for Modelling, Control and Automation - CIMCA04", 12-14 July 2004, Gold Coast – Australia.

Seminars

CIAO Seminars Series:

29/3/04

Alex Rubinov *Monotonic Analysis with applications to optimization*

19/4/04

Adil Bagirov, *A Model Development and Solver System for Global and Local Nonlinear Optimization*

28/5/04

Dr Heping Pan and Dr Nadejda Soukhoroukova *An Asymmetrical Correlation Test for Financial Intermarket Influence Analysis*.

Invited Speakers:

1/4/04

Yuqing Lin, School of Electrical Engineering and Computer Science, The University of New Castle. *Topology of Interconnection Networks*.

Post Graduate Seminar Series:

Fridays at 2:30pm – 4.30 pm, in the ITMS Meeting Room.

12/3/04

Gary Saunders *Data Mining Australian Drug Safety Data – an overview.*

23/4/04

J. Giri, *Improvement Through Reformulation?*

Confirmation of Candidature Seminars:

26/3/04

Tim Pokorny *Applying the Lessons of the Virtual Battlefield to Financial Modelling: Investigating Innovative use of Distributed Simulation.*

31/3/04

Shanaz Kouhbor *Optimal Placement of Network Infrastructure in Wireless Networks.*

30/4/04

John Avery *Managing Evolving Ontologies: Capturing the Semantics of Change.*

Post Graduate News....

Students move to the Global Innovations Centre

A section of the Global Innovations Centre (GIC) has been fitted out to accommodate all ITMS Post Graduate students. These students have now been relocated to GIC.

Welcome to **Ms Kiki Ariyanti Sugén** who was a Senior Lecturer for UI, Jakarta. Kiki transferred her PhD from the University of Newcastle. Her Principal Supervisor is Professor Mirka Miller and her Associate Supervisor is Dr Chris Turville. The title of Kiki's project is *Graphic Labeling and its Application to Database and Data Security.*

Confirmation of Candidatures:

Tim Pokorny's Confirmation of Candidature was confirmed on 26th March 2004. The title of Tim's talk was *'Applying the Lessons of the Virtual Battlefield to Financial Modelling- Investigating Innovative use of Distributed Simulation'*. Tim's Principal Supervisor is Dr Philip Smith and his Associate Supervisor is Dr David Stratton.

Shanaz Kouhbor's Confirmation of Candidature was confirmed the 31st March 2004. The title of Shanaz's talk was *'Optimal Placement of Network Infrastructure in Wireless Networks'*. Her Principal Supervisor is Professor Alex Rubinov and her Associate Supervisor is Dr Philip Smith.

John Avery's Confirmation of Candidature was confirmed on the 30th April 2004. The title of John's talk was *Managing Evolving Ontologies: Capturing the Semantics of Change.* John's Principal Supervisor is Associate Professor John Yearwood and his Associate Supervisor is Dr Leila Alem from CSIRO.

Research Reports

04/08	Stability of the Lower Level Sets of ICAR Functions	Marco a. Lopez, Alex M Rubinov and Virginia N. Vera De Serio	March 2004
04/09	Stability of Semi-infinite Inequality Systems Involving Min-type Functions	Marco A. Lopez, Alex M. Rubinov, and Virginia N. Vera De Serio	March 2004
04/10	Convex along lines functions and abstract convexity	Giovanni P. Crespi, Ivan Ginchev, Matteo Rocca and Alex Rubinov	March 2004
04/11	CAS: Student engagement requires unambiguous advantages	Robyn Pierce and Sandra Herbert	April 2004
04/12	Monitoring Progress in Algebra in a CAS Active Context: Symbol Sense, Algebraic Insight and Algebraic Expectation	Robyn Pierce and Kaye Stacey	April 2004

All IT&MS staff members and postgraduate students are encouraged to contribute to the next edition of the monthly CIAO Research Newsletter. Examples of newsletter items staff should consider are: projects in process, papers accepted, research in process, publications, grants, seminars, visitors, visits by ITMS staff and Post graduates, scholarships, reports from school research groups / centres, events, conferences, new discoveries, general items of interest, etc. All items should be received by Maxine Kingston or Wayne Hurst no later than the 30th July 2004.



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