
Breaking News

Successful Grant - Woodside Technology ... P 1

This is the first issue of the CIAO Newsletter which will replace the Research Newsletter. The CIAO Newsletter will be more frequent and concise (six issues per year).

Successful Grant.....

Congratulations to **Dr. Adil Bagirov** and **Professor Alex Rubinov**, who were successful in winning a grant from **Woodside Technology** totalling \$160,000 to be paid over three years. This grant will fund a scholarship and supervision for a doctoral research student. The topic of a research is "The development of non-linear optimization techniques for production optimization". Numerical methods developed in CIAO will be modified for application to some non-linear optimization problems that are of interest to Woodside Technology.

CIAO Reports

Distributed Simulation Laboratory (DSL)

The second DSL PhD student, Tim Porkorny, commenced studies in 2003. His place is funded through the ARC linkage grant with partners Calytrix Technologies in Perth. A recent visit to Melbourne on the part of Shawn Parr, the Calytrix investigator, was the occasion for an initial meeting of all the

investigators - and the student! We are particularly excited at the potential input from Hossein Zadeh at RMIT who will help supervise Tim in regards to business and human computer interaction issues.

The DSL is becoming a full member of the Simulation Industry Association of Australia (SIAA). We have been involved for several years now in their annual SimTecT conference and it is time to deepen our involvement in the industry. Our presence at the 2003 SimTecT conference will involve (subject to review) paper presentation, a one day HLA workshop presentation and a booth at which we will be publicizing our HLA short courses. We plan to share this booth with our linkage partners in order to raise the profile of that relationship.

We are receiving many enquiries about alternative deliveries of our HLA short courses and are working on establishing a broader profile in this area.

Mathematical and Statistical Analysis Research Group (MASARG)

The highlights of MASARG activities were:

1. The visit by Professor Karl Hofmann as Mathematician in Residence for 3.5 months during which time he and Professor Sid Morris made considerable progress on the book they are coauthoring on The Structure of Pro-Lie Groups and Locally

Compact Groups [Pro-Lie-tarians by Karl Morix].

2. CIAO conferences and workshops organized by Professor Alex Rubinov.

- 14-15 November 2002
Optimization Theory and Applications Workshop.
- 24-25 November 2002
Computation Chemistry Workshop
- 5-6 December 2002
A short Course in Algorithms and Software for Nonlinear Systems Modelling and Optimization

3. The month long visit by Dr Caz McPhail of the University of Wollongong during which several papers were written.

Data Mining and Informatics Research Group (DMIRG)

The ADRAC ARC Linkage project - Research assistance has been provided for Musa Mammedov to significantly scale up the number of numerical experiments that are being run on the ADRAC data. Patrick Purcell from the TGA visited for Gary Saunders Confirmation of Candidature. He was brought up-to-date on Michelle O'Brien and Simon Barty's work.

The work on gene profiling for cancer prediction by Adil Bagirov, John Yearwood Gary Saunders and Sasha Ivkovic has produced good results. A paper describing this work has been reviewed and is being finalized for publication in The Bioinformatics Journal.

Text categorization – This work is still in progress with some good results from the experiments undertaken so far. An ARC Discovery grant application has just been submitted proposing the development of these new methods for information retrieval, filtering, classification and clustering.

The first stage of the **Biomarkers project** with NRE (Gippsland) has been completed and a paper is about to be submitted to an international Operations Research Journal.

Sasha Ivkovic demonstrated his Association rules tool to the Diabetes Foundation and the Health Insurance Commission foundation. They were very interested in having some analysis of their data done.

Cooperation with Australian Defence Force Academy in Canberra

February 19-21 2003 Dr Adil Bagirov visited the School of Computer Science at the Australian Defence Force Academy. He met with Dr H. Abbas to discuss a joint project on Global Optimization.

The preliminary title of this project is: *Deterministic and heuristic approaches in Global Optimisation: comparative study of selective methods.*

In the first stage of this project there will be a comparative analysis of 14 different deterministic and heuristic algorithms of Global Optimisation based on the results of numerical experiments. Later on we will consider different applications of these algorithms. Representatives from CIAO involved in this project are: Professor A. Rubinov, Dr A. Bagirov and Mr J. Zhang.

Welcome to

Leyla Aliyera who has been appointed on a casual basis over the next four months to work with Professor Alex Rubinov, Dr Adil Bagirov, Dr Musa Mammadov and Associate Professor John Yearwood on data mining.

Rachel Naus who has been appointed research assistant/programmer to work with CIAO members over the next few months.

Louise Thompson who has been employed as an Administrative Assistant on a casual basis to assist in the School's Research Office.

Joint Project ...

The **Centre for Informatics and Applied Optimisation** will be involved in a joint project with **Justsys Pty. Ltd.** on Ethics Support. The opportunity to become familiar with the Bayesian/Neural data mining work of the Dynasty corporation is interesting as this approach is likely to complement our own data mining initiatives using optimization.

The opportunity to work with the European Framework project on tools for the description of ontologies for the automatic generation of XML/RDF documents will be of great interest to PhD students and also Associate Professor John Yearwood who are working on dynamic ontologies.

Applications for ARC Discovery Grants

Dr Heping Pan, Professor Sidney Morris, Dr Musa Mammadov and **Dr Chris Turville** have submitted an ARC Discovery Grant application. The title of their project is 'A computational theory of stock market index swings and cycles'.

Associate Professor V Jeyakumar from the University of New South Wales and **Professor Alex Rubinov** have submitted an ARC Discovery Grant application. The title of their project is 'Necessary and sufficient conditions for global minimum in multi-extremal global continuous optimization'.

Associate Professor John Yearwood, Dr Adil Bagirov and **Associate Professor V. Jeyakumar** have submitted an application for an ARC Discovery. The title of their project is 'A unified framework for new

effective optimisation approaches to text categorization, clustering, retrieval and filtering'.

Also, **Dr Musa Mammadov** has submitted an application for an ARC Discovery Grant. The title of Musa's project is 'A new class of dynamical systems and its applications to intelligent data analysis'.

Ballarat Health Services

Professor Sidney Morris, Associate Professor John Yearwood, Professor Alex Rubinov, Ms Carmel Haynes and Dr Andrew Stranieri met with Ballarat Health Services senior team and presented CIAO's capabilities.

Journal of Research and Practice in Informational Technology

Professor Sidney Morris has taken over as Editor-in-Chief of the Journal of Research and Practice in Informational Technology. Associate Professor John Yearwood is one of the new Associate Editors.

Accepted papers....

SA Morris, Itzkowitz and Tkachuk 'Cardinalities of locally compact groups and their Stone-Cech compactification' to appear in the Bulletin of the Australian Mathematical Society.

A.M Rubinov and **A.P. Shveidel**, On some class of abstract convex functions, to appear as a chapter in one of the kluwer volumes.

A.M. Bagirov and **A. M. Rubinov**, On minimization of max-min functions, to appear as a chapter in one of Kluwer volumes.

H.P. Pan 'A Joint Review of Technical and Quantitative Analysis of Financial Markets Towards A Unified Science of Intelligent Finance'. 2003 Hawaii International Conference on Statistics and Related Fields.

H.P. Pan Singtum – 'A Computational Theory of Fractal Dynamic Swings and Physical Cycles of Stock Market in A Quantum Price-Time Space' to appear in Ibid.

Published papers

The following papers have recently been published:

A. M. Rubinov, X.X. Huang and X.Q. Yang, 'The zero duality gap property and lower semicontinuity of the perturbation function' to appear in Mathematics of Operation Research, vol 27, pp. 775-791, 2002.

S. Ivkovic, J. Yearwood and A. Stranieri 'Discovering Interesting Association Rules from Legal Databases'. Information & Communication Technology Law, Vol. 11, No. 1, 2002

Visitors to CIAO

Dr Jalcin Kaya from the University of South Australia and **Professor Regina Burachik** from Universidade Federal do Rio de Janeiro, Brasil visited CIAO from 24th February 2003 to 28th February 2003. They discussed a possible joint research project with Professor Rubinov and Dr. Adil Bagirov. The goal of this project is to develop a powerful numerical method for solving constraint optimization problems.

Seminars and Workshops.....

English Language Skills Workshops for speakers of English as a second language.

Dr Jack Harvey has been conducting English Language Skills Workshops for speakers of English as a second language and feedback has been very positive from the postgraduate students.

Recent Seminars

29/1/03

Gary Saunders - Mathematical and Data Mining Approaches to Study Drug-Reaction Associations from Australian Drug Safety Data.

14/2/03

Dr Andrew Stranieri – Publish, Commercialise or Perish!

7/3/03

Siarhei Dymkou - Approximations for some classes of optimal control problems with state constraints and repetitive control systems.

14/3/03

Leila Alum (CSIRO) – Coalition formation among e-trading agents.

Forthcoming Seminars

21/3/03

Julien Ugon - Application of optimization techniques to data classification.

28/3/03

John Avery – Do I Really Need an Internet Refrigerator: The What's, How's and Why's of the Semantic Web.

4/4/03

Brent Ferguson – Modular neural network design using a role extraction technique.

Conferences.....

Professor Sidney Morris, Mr Scott Hebbard, Ms Kylie Pegg and Ms Marijke Heywood recently attended the **Australasian Computer Science Week (ACSW)**. The event incorporated 7 conferences and 1 workshop, including **the Fifth Australasian Computing Education Conference (ACE2003)** and the **Fourth Australasian User Interface Conference (AUIC2003)**. A number of good contacts were established with other researchers. Some of these researchers have expressed an interest in collaborative research and in presenting their work to the school.

6th International Conference on Optimization: Techniques and Applications (ICOTA6)

CIAO will host the 6th International Conference on Optimization: Techniques and Applications from 9-11 December 2004. A conference committee is being formed to coordinate the conference.

Post Graduate News.....

Welcome to the following new postgraduate students:

Chandima Tilakaratne who has arrived from Sri Lanka and has commenced her Master of Information Technology, the title of her project is 'Multivariate Financial Time Series Analysis and Prediction Based on Parametric and Nonparametric Statistical Model'. Her Principal Supervisor is Dr Heping Pan and Associate Supervisor is Dr Phil Smith.

Shanaz Kouhbor who has also commenced her PhD. The title of her project is 'Design of Reliable Broadband Networks', her Principal Supervisor is Professor Alex Rubinov and Associate Supervisor is Dr Philip Smith.

Transfer from full PhD Candidature

Siarhei Dymkou has been successful in his transfer from probationary candidature to full PhD candidature. The title of Siarhei's project is '[Approximations for some classes of optimal control problems with state constraints and repetitive control systems](#)'.

Forthcoming Confirmation of Candidatures

Julien Ugon's Confirmation of Candidature will be held on 21st March 2003. The title of his talk is 'Application of optimization techniques to data classification'.

Brent Ferguson's Confirmation of Candidature will be held on 4th April 2003 and the title of his talk is 'Modular neural network design using a rule extraction technique'.

Honours Students ...

The School of ITMS has 16 Honours students enrolled for 2003.

Research Reports

03/01	Parallelization of the Discrete Gradient Method of Non-Smooth Optimization and Its Applications	A.M. Bagirov, J.E. Monsalve Tobon and G. Beliakov	January 2003
03/02	A new nonsmooth optimization algorithm for clustering problems	A.M. Bagirov and J. Yearwood	January 2003
03/03	Are Schools of Education Failing the Tertiary Mathematics Sector?	Heather Mays and John Yearwood	February 2003
03/04	Max-min Separability	A.M. Bagirov	February 2003
03/05	Unsupervised and supervised data classification via nonsmooth and global optimization	A.M. Bagirov, A.M. Rubinov, N.V. Soukhoroukova and J. Yearwood	March 2003
03/06	Skeletons of finite sets of points	A. Rubinov and J. Ugon	March 2003

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 no later than the 20th May 2003.



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