

Centre for Informatics and Applied Optimization

CIAO Newsletter



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

December 2004

Edition 7

Successful "TAFE Skills to Work" Proof of Concept

The consortium of UB, JustSys and i4Talent have been successful in their Proof of Concept (POC) presentation to the Office of Training and Tertiary Education (OTTE). OTTE have now given approval for the project to proceed. The project calls for the development of a web-based careers counselling product, which will form part of the TAFE Virtual Campus website.

The project achievements to date were so well received, that there was discussion led by OTTE on what could be achieved after the \$600,000 project is completed.

Congratulations must go to Andrew Stranieri and his team for the quality of work carried out, and to Steve Mabbs, under whose project management leadership the POC was completed on time.

Congratulations to Rana Ghosh, Jason Giri, Greg Simmons and Phil Smith on winning several thousand dollars each from the Early Career Researchers Program for their grant applications.

In recognition of their wins, the School of ITMS will top up each of their grants to make a total of \$13,000 each.

Congratulations to Adil, Musa, Keyur, Rana, John, and Heping on winning Research Infrastructure Block Grants:

Rana Ghosh and John Yearwood:	\$15,000
Heping Pan:	\$3,000
Adil Bagirov, Musa Mammadov and Keyur Patel:	\$10,000

Research Networks

1. Research Network for a Secure Australia (RNSA)
2. ARC Research Network on Intelligent Sensors, Sensor Networks and Information Processing convened by the University of Melbourne, which is funded for a total of \$2,250,000 over five years.

Professor Alex Rubinov is a member of both networks.

Highlights of Next Newsletter:

- ICOTA6 Conference Report
- First International Workshop on Intelligent Finance Report (IWIF1)
- Australia-China Workshop on Optimization Report
- 2004 Publication list

Appointment of Visiting Professor

Professor Karl Hofmann accepted an offer of appointment from the University of Ballarat Council as Visiting Professor in ITMS, for the period 1 October 2004 until 31 January 2005.

Karl and his wife, Isolde, arrived Monday 17 September 2004, and will stay for a period of three months. Both Karl and Isolde participated in the ITMS Retreat held in Geelong on 31 October and 1 November 2004.

While here, Karl and Sid Morris will concentrate on the completion of their co-authored book, "Lie Theory and Structure of Pro-Lie groups and Locally Compact Groups", of which approximately 420 pages have been typed.

Karl is a scholar of international stature, having published nearly 200 papers, 20 books and

monographs, has been the Editor of three journals, and supervised the research of over 30 students.

During Karl's visit to ITMS two years ago, he made very significant contributions to our research and teaching, including suggesting the ITMS Learning Centre.

Karl is also well-known for his artistic contributions. A sample of this can be found at his Ballarat Diary at <http://uob-community.ballarat.edu.au/~smorris/ballaratdiary.htm>. He also provided the calligraphy and artwork for the 2004 Outstanding Service to ITMS Certificates.

Visitors to CIAO

1. Thomas Mason

Dr Thomas Mason from Woodside and Shell International Exploration and Production B.V. visited CIAO in November-December 2004, for the joint research project with Adil Baghirov entitled "Application of non-linear optimization techniques for production optimisation"

2. Manfred Hauben

Dr. Manfred Hauben from the Pfizer pharmaceutical company visited us in August 2004. Dr Hauben is interested in the work being done in the ADRAC project.

Professor Kenneth Kortanek from the University of Pittsburgh, USA, is a world-leading financial mathematician with about 50 years' research and teaching experience in operations research, optimization, differential equations, interest rate modelling, and option pricing.

Professor Alex Rubinov and Dr Heping Pan invited Professor Kortanek to visit CIAO for the period 17 November to 15 December 2004.

He was a prominent speaker at both ICOTA6 and IWIF in early December 2004, and gave a series of internal lectures on his latest work on building dynamical systems models for interest rates and option pricing, in the week prior to ICOTA6.

Professor Kortanek is also a highly successful investor, which is testimony of his successful research in high finance.

Visiting Postgraduate Student

Mr Yus Mochamad Cholily, a PhD candidate at ITB Bandung, Indonesia visited his Co-supervisor Professor Mirka Miller from 28/6/04 - 2/7/04.

He gave an informal talk 'On the structure of almost Moore digraphs containing selfrepeats' to postgraduate students at the Global Innovations Centre on 2 July 2004.

Telematics Course Development Fund Grant

Mr Glen Auld, a PhD student with ITMS (assisted by Mr Sasha Ivkovic, Dr Andrew Stranieri and Professor Sidney Morris), was awarded a grant from the Telematics Course Development Fund of \$10,000.

Glenn's application calls for the development of an indigenous Australian talking-book CD. This is an interactive application, which will allow for indigenous Australian stories to be captured in their native dialect, illustrated, and made available not only to the indigenous community, but also the broader community

Tenders

ADF Anthropometry

This is a consortium of University of South Australia, University of Ballarat and SKM. The project seeks assessment of the "fit" of a cross-section of Australian Adults into the cockpits of RAAF aircraft through computer modelling.

The consortium has been the selected as the preferred tenderer and contract negotiations are continuing.

A contract between the RAAF and UniSA was signed on the 25 February 2004. The Contract between UniSA and UB has been drawn up and will be signed as soon as possible. Sub-contracts and agreements are also required to be signed with Permian and for leasing of floor space at Greenhill Centre, Mt Helen.

Department of Infrastructure, Planning and Natural Resources (DIPNR)

A joint submission to the Department of Infrastructure, Planning and Natural Resources (DIPNR) by CIAO and CEM (Centre for Environmental Management) was successful in obtaining \$50,000.

Thanks must go to Mr Wayne Hurst (Business Development Manager, ITMS) and Mr Jim O'May (Research and Consultancy Manager CEM) for the submission. Considerable statistical analysis will be undertaken by Mr Cameron Hurst (ITMS).

DIPNR has developed a Flow-Response Monitoring Project to assess existing environmental conditions, and to monitor changes in condition following flow-releases to the Snowy River downstream of Jindabyne Dam.

The vegetation component of the Snowy River Flow Response Monitoring Project will provide useful information on the impact of increasing the flows in the Snowy River on environmental processes.

It will benchmark conditions of vegetation prior to environmental flows, then measure changes in vegetation relative to pre-flow conditions and conditions in other rivers.

CIAO Reports

Distributed Simulation Laboratory (DSL)

ADF Anthropometry Project

Work is continuing with this project. Currently we are seeking some clarification of what appear to be small anomalies in Jack's Advanced Scaling facility. Attempts are being made to get a Jack expert to Australia to help resolve these issues.

The validation trial for the project was held in Edinburgh, South Australia in August 2004.

Conferences

The annual Simulation Industry of Australia conference, SimTecT was held in May 2004 in Canberra.

Building on strong representations at previous conferences, the DSL sent a delegation of three students and DSL leader Dr David Stratton. Three papers were presented, and much interest was shown by the community regarding research

undertaken by the DSL. The three papers presented were:

fedWS: Web Services Access to Active HLA Simulations by T.Pokorny

A General Purpose Visualisation Architecture for Distributed Simulation by Michael Fraser and David Stratton

Generic 3-Dimensional Visualisation For Distributed Simulations by James Miller and David Stratton

The workshop run by Dr.David Stratton at previous conferences was once again held, with help from Dr John Wharington of the Defence Science Technology Organisation. As in previously years, the workshop received positive feedback and also incorporated tools developed by DSL students Michael Fraser and Tim Pokorny.

The European Simulation Interoperability Workshop was held in Edinburgh, Scotland in June 2004. DSL student Tim Pokorny presented a paper, co-authored by Michael Fraser, which gained much attention and was mentioned in later presentations given by world experts in the eXtensible Modelling and Simulation Framework. (Thanks to Tim for the above summary).

Later on, Tim's paper received the Best Student Paper award of \$2500, which he can put towards next year's trip to Edinburgh. Well done, Tim!

Holden Linkage Project

The Linkage grant was unfortunately unsuccessful.

It is unfortunate that we cannot receive feedback from the ARC about the reasons for the rejection.

We believe some sort of meeting with the co-ordinators at the Office of Research might shed some light on this issue, to improve the chances of future applications.

Mathematical and Statistical Analysis Research Group (MASARG)

Conference Attendances:

Dr Alex Kruger, Dr Adil Bagirov and Dr Musa Mammadov attended the Third International Conference on Optimization and Control with Applications (OCA2004) in Chongqing-Chengdu-Jiuzhaigou, Chongqing City and Sichuan Province, China, on 25-31 July 2004.

Alex Kruger's presentation was entitled "*Weak Stationarity in Nonsmooth Optimization*".

Musa's presentation was entitled "*A new class of dynamical systems with applications to global optimization*".

Adil's presentation was entitled "*An approximate bundle method with applications*" and the presentation he gave on Alex Rubinov's behalf was entitled "*A multidimensional search method in optimization*".

Professor Alex Rubinov's trip to China, Hong Kong and Taiwan

Professor Alex Rubinov gave the following plenary lectures:

'*On the Absence of Duality Gap for Lagrange-type Functions*' at the International workshop on Optimisation Conference held 17-20 May 2004 at the National Chen-Kung University, Taiwan

'*A multidimensional descent method in optimization*' at the Australian-Chinese Workshop on Optimization: Theory, Methods and Applications held 21-23 May 2004 at Shanghai University, Shanghai, China.

Plenary lecture '*Monotonic analysis*' plus two talks:

1. *Abstract convexity: general concepts*; and
2. *Convex-along-rays functions, convex-along-lines functions and abstract convexity* at the International Conference on Analysis and its Applications Conference held 28-31 May 2004 at the National Chung Hua University, Taiwan.

Professor Rubinov visited Hong Kong Polytechnic University to undertake joint research with Prof. X.Q. Yang Project Title: *Lagrange-type functions in constrained non-convex optimization*, 24-27 May and 1-6 June 2004.

Professor Rubinov visits Greece & Turkey

Professor Alex Rubinov presented a talk *Monotonic analysis with applications to optimisation* at the Workshop in challenges of continuous optimization in theory and applications, Rhodes, Greece, on 2-3 July 2004.

He also gave a Semi-plenary lecture *Local Optimization Method with Global Multidimensional Search for descent* at the EURO XX Conference, 4-7 July 2004, Rhodes, Greece

Professor Rubinov also gave three invited (plenary) lectures:

1. *Clustering and Classification via Nonsmooth and Global Optimization* (two lectures)
2. *Abstract convexity and Lagrange-type functions* at the EURO Summer Institute (ESI): Optimization and

Data Mining Conference, at METU, Ankara, Turkey, 9-16 July 2004.

The International Workshop on Optimization was held at the National Chen-Kung University, Taiwan. Professor Alex Rubinov, Dr Adil Bagirov and Dr Musa Mammadov presented lectures at this meeting.

The first China-Australia Workshop on Optimization: Theory, Methods and Applications was held in Shanghai on 21-23 May 2004. Dr Adil Bagirov, Dr Musa Mammadov, Prof Alex Rubinov, Mr Jason Giri, Ms Zari Dzalilov and Mr Julien Ugon presented lectures at this workshop.

The second Australia-China Workshop on Optimization: Theory, Methods and Applications is being held at the University of Ballarat, 12-13 December 2004 and is being organised jointly by CIAO and WACEIO (Curtin University), in the framework of CHESI grant.

Published Book

The book *Lagrange-type functions in constrained non-convex optimization* by A.M. Rubinov and X.Q. Yang was published by Kluwer Academic Publishers in 2003.

Professor Sid Morris visited the Technion, the Israel Institute of Technology, where he gave a colloquium called '*The Topology of Compact Groups*', and also visited the Hebrew University of Jerusalem where he delivered a seminar with the same title.

Professor Sid Morris is now a member of the Program Committee of the international conference on Noise & Fluctuations in Econophysics & Finance.

New Research Group...

Combinatorics, Graphs & Networks Technology (CGANT)

Graph Techniques

The application of graph theory covers almost all aspects of life, from representing the delicate ecosystem of a rainforest to scheduling juggernauts in nationwide routes, from a physical function like microchip processor design to something entirely abstract such as social relationships and interactions.

Graphs enable the simple visualisation of complex systems, and are used to study communication and transportation networks, algorithm design, scheduling, database management and design, diagnostics, codes, relationships and many other applications in science, humanities, engineering, art and entertainment.

Fundamental discoveries in graph theory therefore impact on many other areas of research. CIAO researchers are interested in graph applications, as well as studying some of the surprising results emanating from such inherently simple structures.

Areas of research include:

- Optimal graph structures and properties,
- Network topologies
- Properties of dynamic networks, eg: internet
- Transportation systems
- Analysis of graph eccentricities
- Genetics

Data Security

The general populace is concerned with their personal information being stored on vast computer systems.

Governments have enacted privacy legislation to safeguard this personal information but organisations and/or unscrupulous individuals, whether unknowingly or with malicious intent, breach existing security levels, either by password theft or by more sinister methods such as statistical inference, and invade an individual's privacy.

Information which is particularly vulnerable is an individual's medical information, stored within hospital systems. Other areas of concern include the Australian Bureau of Statistics, Medicare, Centrelink and private health insurance organisations.

At present, database management systems rely on user authentication and user access rights to limit potential misuse of data. There is a need for these systems to contain sophisticated security mechanisms to safeguard an individual's privacy.

CGANT researchers are involved in developing security systems which include:

- Encryption/decryption
- Key Management
- Statistical Inference algorithms

Members:

Professor Mirka Miller (Leader)
Professor Sidney Morris
Professor Alex Rubinov
Dr Joe Ryan
Dr Adil Bagirov
Dr Musa Mammadov
Dr Eldar Hajilarov
Mr Keyur Patel
Mr Greg Simmons
Ms Zari Dzalilov

Current projects:

- Construction of Large Networks
- Graph Labelling and its Applications

- Combinatorics of Finite Sets
- Application of Combinatorics to Data Security
- Secret Sharing
- Graph Domination
- Wireless Security and Application Development
- Smart Computer Caring System (SCCS)
- Wireless and Telecommunication Networks: Performance and Optimization

Research Associates:

Professor Brendan McKay, ANU
Professor Nguyen Tran, Swinburne University of Technology
Professor Jozef Siran, University of Auckland, NZ
Professor Joan Gimbert, University of Lleida, Spain
Professor Camino Balbuena, UPC Barcelona, Spain
Professor Zdenek Ryjacek, University of West Bohemia, Czech Republic
Professor Stanislav Jendrol, P.J. Safarik University, Kosice, Slovakia
Professor Martin Baca, Technical University, Kosice, Slovakia
Professor Bill Smyth, McMaster University, Canada
Dr Edy Tri Baskoro, ITB Bandung, Indonesia
Dr Rinovia Simanjuntak, ITB Bandung, Indonesia
Dr Slamun, University of Jember, Indonesia
Dr Ljiljana Brankovic, University of Newcastle
Dr Jim MacDougall, University of Newcastle

Research Fellows:

Dr. Wing Keung Tam (Group Sense PDA Ltd., Hong Kong)

Research Students:

Kiki Sugeng (PhD)
Scott Hebbard (PhD)
Wendy Rodgers (Research Master)
Dafik (PhD, to start in 2004)
Guillermo Pineda Villavicencio (PhD, to start in 2004)
Wei Xie (Research Master, to start in 2004)
Abeed Ahmad (Research Master, enrolled in Newcastle)
Minh Hoang Nguyen (PhD, enrolled in Newcastle)
Mauritsius Tuga (PhD, enrolled in Newcastle)
Kim Marshall (PhD, enrolled in Newcastle)
Geoff Skinner (PhD, enrolled in Curtin)
Yus Cholily (PhD, enrolled in ITB Bandung)
Nacho Lopez (PhD, enrolled in Lleida)
Jakub Teska (PhD, enrolled in Plzen)

Conferences

Professor Mirka Miller was an Invited Speaker at the Czech-Slovak Conference GRAPHS 2004, Vyšné Ružbachy, Slovakia, "Moore Bound and Beyond: A Survey", 24-28 May 2004.

Professor Mirka Miller will be an Invited Speaker at the next Polish Graph Theory Conference .

Professor Mirka Miller presented a talk at the Czech-Slovak Conference GRAPHS 2004, Vyšné Ružbachy, Slovakia, "Exclusive Sum Labellings of Graphs on 24 May 2004.

Professor Mirka Miller attended a conference Privacy in Statistical Databases (PSD 2004), Barcelona, Spain, 9-11 June 2004.

Referee

Professor Mirka Miller refereed six papers for the AWOCA 2004 Workshop.

Seminars

Professor Mirka Miller was a guest lecturer to a third year class in Discrete Maths at the University de Lleida, Spain, "Applications of Graph Theory" (two hours) on 5 May 2004.

Professor Mirka Miller gave a seminar on 7 May 2004 at the University de Lleida, Spain *Graphs Close to Moore Bound*.

Professor Mirka Miller gave a seminar on 20 May 2004 at Charles University, Prague, Czech Republic, *Degree/Diameter Problem for Graphs and Digraphs*.

PhD Defence Jury

Professor Mirka Miller has been invited to be a member of a PhD Defence Jury at Technical University, Ostrava, Czech Republic, Dec, 2004

Editor

Professor Mirka Miller was one of three editors of published papers for the Thirteenth Australasian Workshop on Combinatorial Algorithms, Fraser Island, Queensland. Proceedings of the workshop were published in the Journal of Automata, Languages and Combinatorics Vol 8 No 4, Otto-von-Guericke-Universitat Magdeburg.

Data Mining and Informatics Group (DMIRG) ...

ADRAC Project

This ARC funded Linkage project will draw to an end this year. It has involved 3 CIs, 1 Team Leader, 1 Post doctoral fellow and 3 Ph D students.

Patrick Purcell, from the Therapeutic Goods Administration (TGA) visited earlier in the year 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.

The PhDs of Michelle O'Brien, Gary Saunders, and Simon Barty are due for completion by October 2004.

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 closer collaboration with CCEH need further development. Strategies for continuing this focus on Health Informatics need to be developed.

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 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 from AusIndustry is being investigated.

GOANN (Global Optimization for Artificial Neural Networks)

After many problems with programming and research assistance, this project has provided 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 led 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

In second semester there were three seminars: one research student, one staff member, and one external researcher.

DMIRG Notice Board and Web site

Dr Rana Ghosh and Assoc Prof John Yearwood have been working on this and would appreciate any ideas that you may have.

DMKD Research Network

John Yearwood has been approached to act as Region Co-ordinator for the DMKD research network for Tasmania and Regional VIC/NSW.

Book Submitted for Publication

Andrew Stranieri and John Zeleznikow's book "Knowledge discovery from legal databases" has been submitted to the publisher (Springer) and should be in circulation by early 2005.

Emerging Communications Technologies Cluster (ECT):

During a visit to ITMS in early June, the following was mutually agreed with Dr W. K Tam (Research Fellow for ECT Research Cluster, CIAO):

1. GSL Pty. Ltd, Hong Kong is willing to be an industrial partner for all future ARC linkage grants, especially for Age Care IPv6 Proposal and ECT-related research activities.
2. Dr. Tam has agreed to donate to ITMS One Bluetooth Development Kit, consisting of five Palmtops and five Bluetooth Chips worth over HK\$15,000. This will enable us to do hands-on experiments to develop applications for Bluetooth enabled devices, which includes mobile phones, palmtops, tablet PCs etc. The kit will arrive soon.
3. We have set up a path for future research activities until February 2005, the result of which will produce eleven research studies in highly recognised journals and refereed conferences. (list to be finalised).

Dr. Tam's visit was very fruitful for both the ECT Research Cluster and the School of ITMS.

Conference Co-Chair for a Session

Mr Keyur Patel has been selected to be a Co-Chair for a session at the 8th World Multiconference on Systemics, Cybernetics and Informatics (SCI 2004) 18-21 July, 2004 Orlando, Florida.

Intelligent Finance Cluster:

Collaboration with ANZ Investment Bank has been going well.

The Intelligent Finance team (Heping, John, Musa, Cam, Rana, Nadejda and Chandima) from CIAO have developed a leading-edge approach for modelling and predicting international interest rate swap markets.

Dr Heping Pan proposed a theory of Super Bayesian Influence Networks (SBIN), and initiated a potentially huge financial engineering system called Global Influence Networks (GIN) for modelling and predicting world major financial markets.

A component of GIN for Australia is already able to predict Australian All Ordinary Index (AORD) High, Low and Close with 80-90% correctness and 0.3% root-mean-square-error. This is the first unique

system created for predicting AORD with such a significant performance.

This result was recently reported in several international and national conferences on financial mathematics and artificial intelligence. A large scale development is going on for modelling and predicting 20-50 world major financial markets using SBIN and GIN.

Intelligent Finance Cluster

Notes on Meeting held on 3 February 2004 between the ANZ Investment Bank and Centre for Informatics and Applied Optimization (CIAO) - Intelligent Finance Cluster.

In attendance:

ANZ Bank Investment Bank:

Dr Dzung Le

Global Head of Quantitative Applications

Global Capital Markets, Sydney

Centre for Informatics and Applied Optimization

- Intelligent Finance:

Professor Alex Rubinov, Director, CIAO

Assoc Prof John Yearwood, Deputy Director, CIAO

Dr Heping Pan, Leader, Intelligent Finance Cluster

Dr Musa Mammadov

Mr Cameron Hurst

Dr Rana Ghosh

Notes:

1. CIAO will provide a report for ANZ Investment Bank, summarizing the preliminary findings from their old and new data, including problems, numbers, graphs & preliminary conclusions and suggestions.

2. If ANZ after reading this report is interested to proceed, we plan to carry out three consecutive projects:

Project 1	Influence patterns
Project 2	Predictions
Project 3	Trading strategies

For each project CIAO will be required to deliver complete systems for each of these aspects. ANZ will need to provide funding for each project. Each project may last 3-6 months to minimize the risk on either side.

3. Current Plan:

Heping Pan, Musa Mammadov, Cameron Hurst and Nadeja Soukhoroukova will work together to produce a summary report

1st International Workshop on Intelligent Finance (IWIF 1), 13-14 December 2004

Academic researchers and professional traders/investors from overseas and Australia attended and presented papers.

Dr Heping Pan reports ..

7-11 June 2004, Heping and Nadejda attended AMSI Workshop and the 3rd National Symposium on Financial Mathematics (3rd NSF), Melbourne, where Heping gave a talk "Super Bayesian Influence Networks (SBIN) for Modelling and Predicting Financial Markets".

In the 3rd NSF, there were about 20 presentations. It appears that most Australian financial mathematicians focus on option pricing, with stochastic differential equations (SDE) as the main mathematical framework.

Several presentations from Australian banks pointed out the gaps between theoretical financial mathematics and market reality.

Heping's SBIN is a completely different framework of thought, which attracted genuine attention and interest. In particular, our current development on SBIN was able to give over 80% accuracy in directional prediction of Australian stock index.

Apparently, there is a mutual attraction. Heping also thinks we should learn SDE, and it may be possible to develop multivariate stochastic nonlinear models based on SBIN and SDE, that can capture not only intermarket influences but also fractal dynamics.

4-7 July 2004, John, Heping and Marcelo ran a session on Financial Market Prediction in the 24th International Symposium on Forecasting, Sydney.

Heping introduced the first part of his Swingum Theory of Intelligent Finance, mainly the 10 Swingum Market Hypotheses. John presented a joint work with Heping and Rana on Probability Ensembles of Neural Networks. Marcelo presented a joint work with Andrew Stranieri on Association Rules for Stock Index Prediction.

While there were a large number of forecasting researchers and practitioners present, there were only a small number of original researchers on financial market prediction.

Our session attracted some genuine interest from real money managers and investors. This was the first appearance of our group in the international community of forecasters. We plan to run this session series in every annual International Symposium on Forecasting.

After the Symposium, Heping visited ANZ Investment Bank and had some interesting discussions with ANZ traders and managers. Heping also gave a talk on Swing Theory to the Mathematics Department of University of Sydney, attended by University staff and several ANZ staff.

The talk was considered very informative and stimulating. Heping's key point in that talk was that the multi-market movement should be modelled as stochastic chains of evaporating chaotic and dynamic patterns.

12-14 July 2004, Heping presented two papers on Super Bayesian Influence Networks (SBIN) and Asymmetrical Correlation Test at the International Conference on Computational Intelligence, Gold Coast.

Collaborative Centre for e-Health CCEH...

The Australian Healthcare Messaging Laboratory (AHML) was established in 2000 by the Collaborative Centre for eHealth (CCEH).

AHML is a message testing and certification facility, which undertakes the online testing of messages generated by healthcare software products, to ensure conformance with existing and newly emerging local and international Healthcare Standards.

AHML also provides formal certification of interface messages (HL7, UN/EDIFACT, X12, etc.) for system vendors, purchasers and users. Certification offers the formal recognition and assurance that the messages produced by systems comply with the standards and specifications stated by the developers and vendors.

AHML was accredited in October 2002 by the National Association of Testing Authorities (NATA) as a Testing Laboratory in the field of Information Technology. It tests healthcare messages to the requirements of HL7 V 2.3.1, AS 4700.1 and similar specifications, and is compliant with ISO/IEC 17025 (1999). The AHML NATA Accredited Laboratory number is 14544.

AHML underwent accreditation reassessment in February 2004 with NATA, which made several

recommendations for change to AHML's Quality Management System policies and procedures, to ensure AHML could retain accreditation.

Health Level Seven (HL7) is one of several ANSI-accredited Standards Developing Organisations (SDOs) operating in the healthcare arena. Most SDOs produce standards for a particular healthcare domain such as pharmacy, medical devices, imaging or insurance (claims processing) transactions. Health Level Seven's domain is clinical and administrative data.

Currently, AHML tests and certifies HL7 messages to v2.3.1. AHML can test messages from global standards, such as HL7 v2.3.1, to very specific one off implementation specifications. The on-line testing service is available 24/7 and is currently a free service.

Conference

Jane Darby and Chris Lynton-Moll CCEH and **Andrew Measday** from Radiology Department, East Grampians Health Service presented a talk *Electronic Transfer of Radiology Requests and Reports with Decision Support* at the HIC 2004 conference in Brisbane

CIAO Seminars Series:

Mondays at 2.30 p.m. in the ITMS Meeting Room

19/4/04

Adil Bagirov, School of Information Technology and Mathematical Sciences, *A Model Development and Solver System for Global & Local Nonlinear Optimization*

23/4/04

J. Giri, School of Information Technology and Mathematical Sciences, *Improvement Through Reformulation*

12/5/04

Hugh Roberts Business Analyst Institutional and Business Services - Information Technology, Sydney Commonwealth Bank of Australia *E-Money: Past, Present, and Future*

28/5/04

Dr Heping Pan and Dr Nadejda Soukhoroukova School of Information Technology and Mathematical Sciences *An Asymmetrical Correlation Test for Financial Intermarket Influence Analysis.*

11/6/04

Jiapu Zhang, Adil M. Bagirov, and Alex M. Rubinov. School of Information Technology and Mathematical Sciences. *Hybrid discrete gradient genetic algorithm for getting the lowest energy structures of Lennard-Jones clusters.*

16/6/04

Moumita Ghosh, School of Information Technology and Mathematical Sciences. *Development of Non-linear Optimization Techniques for Production Optimization.*

14/7/04

Sandra Herbert School of Information Technology and Mathematical Sciences *Using Endnote to Support the Writing of Academic Papers*

11/8/04

Joe Ryan School of Information Technology and Mathematical Sciences *The Train Marshalling Problem*

Invited Speakers

5/5/04

Giri Ramachandran, Head of Alliances & Market Development Wireless Data Solutions, Telstra Business & Government, Sydney *Wireless Data Solutions.*

12/5/04

Hugh Roberts, Business Analyst, Institutional and Business Services – Information Technology, Sydney Commonwealth Bank of Australia *E Money: Past, Present, and Future.*

19/5/04

Adam Todhunter, Chief Technology Director, Kx Solutions and **Brian Wills**, Marketing Director, Kx Solutions *Enterprise Wide Secure Wireless Control and Managing Mobility.*

28/6/04

Professor Gopal Gupta Faculty of Information Technology, Monash University. *Online Handwritten Signature Verification*

2/7/04

Y.M. Cholily PhD candidate, ITB Bandung, Indonesia Supervisor Dr Edy Tri Baskoro Co-Supervisor Prof Mirka Miller. *On the structure of almost Moore digraphs containing selfrepeats*

5/7/04

Andrei V. Kelarev, University of Tasmania, *Labelled Graphs in Bioinformatics and Coding.*

Post Graduate News....

New PhD Student

Ms Kiki Sugan has relocated from Newcastle to continue her studies under the supervision of Professor Mirka Miller. Dr Chris Turville will be her Associate Supervisor. Kiki's project is 'Graph

labelling and its application in data security and data base'.

Graduands



Ms Nadejda Soukhoroukova received her Doctor of Philosophy at the conferring ceremony on 12 May 2003. Nadejda's thesis was entitled '*Data classification through nonsmooth optimization*'. Her supervisors were Professor Alex Rubinov and Dr Adil Bagirov.



Mr Sasha Ivkovic received his Master of Information Technology. Sasha's thesis was entitled '*Visual Grouping of Association Rules of Hypotheses Suggestion*'. His supervisors were Associate Professor John Yearwood and Dr Andrew Stranieri.

Tim Pokorny Receives Award

Congratulations to **Tim Pokorny** for receiving the award for Best Student Paper at the SIAA (Simulation Industry Association of Australia) SimTecT conference.

Tim's paper was titled '*fedWS: Dynamic, Web Services Based Access To Active HLA Simulation*'. He will

receive \$2,500 towards the cost of his next SimTecT attendance in Sydney 2005.

Honours Students ...

Honours degree awarded

Edward Jackman (2152171) Bachelor of Information Technology (Hons) **II(2)**

Supervisor: Mr Scott Hebbard

Project: Use Profile Development and Learning Styles

Honours Research Day was held on 30 July 2004, and attended by nine students and their supervisors. Thanks to Robyn Pearce, David Yost, Greg Simmons, Andrew Stranieri for their invaluable input.

During the day students filled in a short **Honours Program Survey**. The students' comments were mostly positive, however there is a problem with lack of space in the Honours room.

It was agreed that holding Honours Research Days is useful and the students would like to continue them.

Timetable of Honours Research Days, Sem 2, 2004:

1. Friday 30 July 2004
2. Monday 30 August 2004 (including Initial presentations by Honours students who are starting in Semester 2, 2004)
3. Monday 27 September 2004 (including presentations by interested supervisors for Honours and research postgraduate students starting in 2005)
4. Friday 29 October 2004 (including Final presentations by Honours students finishing in 2004)

Research Reports

4/13: Stationarity and Regularity of Set Systems, Alexander Kruger, June 2004

4/14: Best approximation in a class of Banach ordered spaces, H Mohebi & A M Rubinov, June 2004

4/15: Topical Functions & their Properties in a Class of Ordered Banach Spaces, H Mohebi, June 2004

4/16: Sequential Dual Characterizations of Constrained Best Approximation, V Jeyakumar & H Mohebi, June 2004

4/17: Downward Sets and their Best Simultaneous Approximation Properties with Applications, H Mohebi, June 2004

4/18: A Global Approach to Nonlinearly Constrained Best Approximation, V Jeyakumar & H Mohebi, June 2004

4/19: Teaching linear functions in context with graphics calculators: students' responses and the impact of the approach on their use of algebraic symbols, Caroline Bardini, Robyn Pierce and Kaye Stacey, July 2004

4/20: Performance using suspected drugs only on drug-reaction relationships in Australian drug safety data, M A Mammadov and G W Saunders, Sep 2004

4/21: The study of drug-reaction relationships in Australian drug safety data, Musa A Mammadov and Gary W Saunders, September 2004

4/22: Draft anatomical therapeutic chemical (ATC) classification of Australian drug safety data, Gary W Saunders, September 2004

4/23: The maximum and minimum degree in a super-vertex-magic graph, K C Das, M Miller, D Patel and W Xie, December 2004

4/24: Editors' Cut: Managing Scholarly Journals in Mathematics and IT, Karl H Hofmann and Sidney A Morris, November 2004

4/25: An open mapping theorem for pro-lie groups, Karl H Hofmann and Sidney A Morris, Dec 2004

All IT&MS staff members and postgraduate students are encouraged to contribute to the next edition of the CIAO Research Newsletter.

Examples of newsletter items staff should consider are: projects in process, papers accepted, research in process, publications, grants, seminars, visitors, visits, scholarships, reports from school research groups/centres, events, conferences, new discoveries, and general items of interest.

All items should be provided to Elizabeth Matuschka or Wayne Hurst no later than Monday 28 February 2005.



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