



Research Newsletter

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A Few Words from the School Research Coordinator.....

Good bye to Dr. Andrew Stranieri. Andrew will be finishing at Ballarat this month. His enthusiasm for research and ideas will be missed. On behalf of all staff and Post-graduate students I would like to thank Andrew for his contributions to the research culture and administration in the school and to wish him well with his Post-doctoral research. The good news is that he will remain an associate of the school and continue to be seen on campus on a weekly basis.

It is a good time to be planning SPIRT grants in IT. Please also remember the opportunity for Visiting Research Fellows.

Congratulations to

Andrew Stranieri, Philip Smith and John Yearwood on the successful completion of their PhDs.

Philip Smith on the official notification of his PhD (Deakin). Philip's thesis was entitled "The Development and Evaluation of a Glass-box Interpreter for Teaching Novice Programmers". Philip developed a system known as 'Bradman', designed to teach novice computer programmers.

The system allows users to see the inner workings of the programming language as it executes. Students often have problems developing adequate internal mental representations of the programming process. Bradman was developed to provide a cognitive framework onto which students can assimilate new knowledge about programming.

Experimental evaluation of Bradman provided evidence that students with access to such a tool perform some programming tasks better than students without access.

Andrew Stranieri

Andrew's PhD (LaTrobe) work looked at automated legal reasoning in discretionary domains. In particular he developed the use of connectionist and rule base inference systems within an argumentation framework to carry out automated reasoning in the domain of Australian Family law. His work has received much publicity along with the Split-Up Family law system.

John Yearwood

John's PhD (RMIT) work was in the area of Case-based retrieval of text cases to support decision making and reasoning in complex domains. The work provides insight into document computing and document reuse where the documents are classed as cases. In particular one of the domains was law and this has provided a springboard for further joint work with Andrew Stranieri.

Projects in Progress.....

David Stratton as a prospective candidate in the DIT Doctor of Information Technology degree has been moving through the exploratory portion of the degree with bated breath. The topic is intentionally inclusive of many possible directions - "Distributed applications- Implementation and Impact" with a postscript that reads "...in Computer Science education". In the pre-confirmation stages David has been learning existing techniques of application distribution, and implementing a useful aid for teaching networking concepts.

Recently, due to the pressure of teaching commitments, David decided to apply for leave of absence from studies until the end of 1999. It is becoming increasingly accepted within ITMS that workloads that are too evenly distributed between teaching and research are destined to fail in one regard or the other. In this case teaching was winning and the quest for excellence in teaching was consuming David's research allocation. With this in mind David accompanied his request for leave with a concerted effort, based on sharing teaching load with colleagues, to organise a more or

less solid "research semester" for 1/2000. This effort has been successful and he is now looking forward to very solid progress in that time frame.

The irony of all this, and the point of this story, is that in the immediate aftermath of David's decision to set his research aside for a while he suddenly became much clearer about where it was all heading! The process - a departmental seminar, followed by detailed discussions with Philip Smith in particular - has lead him to write a paper "Towards a Location and Language Independent Novice Programming Environment" which is available as an ITMS Research Paper and has also been submitted to ICCE99 (International Conference on Computers in Education). The paper can be read on David's home page - follow the research link.

What all this amounts to is that David now has a much clearer idea of where he is headed - and through unexpected circumstances!

Visit to Kazakstan

Alex Rubinov visited Almaty (Kazakstan) from May 19 until June 3 and Zari Dzalilov visited Almaty from May 19 till July 3. The main purpose of these visits was to prepare a draft for a small book on mathematical economics.

The main concept in modern economic theory is that of equilibrium. It is assumed that there are many consumers and producers in the market. Each consumer maximises his/her utility and each producer maximises his/her profit. As a result the equilibrium (market) prices rise, which leads to the balance (an equilibrium state).

However, a different approach is also possible. This approach is based on the following simple axiom: if an organism wishes to live, it needs to maintain its existence, otherwise it will die very soon. An organism is a person, a firm, a university (and a school within the university as well),

a state, mankind as a whole and so on. A mathematical modelling of this approach was undertaken by some researchers and Alex took part in this activity and published a couple of books on this topic. However, this approach is not popular in the West. Recently Alex tried to publish a paper related to this approach, but without success.

It is quite natural and very interesting to join together both of the above mentioned approaches. Eight years ago Alex developed a mathematical model of expanded reproduction, which included them both. This model was studied by Alex and his collaborators (in particular, Zari Dzalilov) and PhD students (in particular, Erik Utembaev). Erik, currently is a Deputy Director of the Institute (faculty) of Economics and Law of Kazak National University in Almaty (Kazakstan). He discussed problems related to the model, in particular a modelling of a government regulation of an economy with Alex, by mail. (Zari assisted Alex in this discussion). Erik invited both Alex and Zari to Almaty, to prepare a small book on this topic.

During Alex's visit the first draft of the main part of the book was prepared in Russian. Erik and Zari have now prepared the final draft. Eric also wants to add some material related to the real economy of Kazakstan and discuss it in the framework of the model. The book will be translated into English (partly in Almaty and partly in Ballarat). Alex and Eric want to publish a piece of the book as a Research Report in August.

Zari also is looking at the possibility of recruiting full fee paying students. She had some fruitful discussions at universities and colleges in Almaty. She also visited her parents and relatives who reside close to Almaty (her parents were exiled to Kazakstan when Stalin killed and exiled some millions of Soviet people in 1937).

Visiting Professors

Professors Yuri Evtushenko and **Vitali Zhadan** from the Computing Centre of the Russian Academy of Sciences (CC RAS) visited our School from June 17 till June 30. Professor Evtushenko is the Director of this great Research Institute. He is a prominent expert in the field of applied optimization, the author of a well-known book in this area and the Editor-in-Chief of the international journal "Optimization Methods and Software" published by The Gordon and Breach Publishing Group. Professor Zhadan is the Head of a Department of CC RAS, and a well-known expert in the area of applied optimisation. Both of them are associate investigators for Professor Alex Rubinov's ARC Large Grant. During the visit Yuri, Vitali and Alex have discussed some problems related to the theoretical study, and numerical methods for the solution of some problems of global optimisation. Some preliminary results have been obtained. Prof. Evtushenko gave a very interesting seminar "Applied projects carried out at CC RAS".

Six Visiting Fellow Positions

At the Research and Higher Degrees Committee meeting on the 19th May it was agreed that 6 visiting fellow positions would be funded, including airfares, and a contribution to living expenses. There would be a maximum of one per school. The positions would be for 1-3 months. It is worth thinking about overseas research people that our school could derive some benefit from.

Published papers

The following papers have recently been published:

M. Yu. Andramonov, A.M. Rubinov and B. M. Glover, "Cutting angle methods in global optimization", Applied Mathematics Letters, vol. 12 (1999), 95-100.

A. Rubinov and B.M. Glover, "Toland-Singer formula cannot discriminate a global minimizer from a choice of stationary points". Numerical Functional Analysis and Optimization, vol. 20 (1999), 99 -120.

A. M. Rubinov, "Towards monotonic analysis", in: Nonlinear Analysis and Related Topics, Proceedings of Institute of Mathematics, Minsk, Belarussia, vol 2 (1999), 147-154.

The following papers have been accepted for publication:

A. M. Rubinov, B.M. Glover and X.Q.Yang, "Extended Lagrange and penalty functions in continuous optimization", Optimization.

S. Reich, A.M. Rubinov, A.J. Zaslavski, "Generic power convergence of order-preserving mappings", to appear, Nonlinear Analysis (Theory, Methods and Applications).

Book in print:

"New Approaches in Medical Image Analysis"

Editors: Binh Pham (UB), Michael Braun (UTS), Anthony Maeder (QUT) & Michael Eckert (UTS).

Publisher: SPIE (The International Society for Optical Engineering), Bellingham WA, USA, 1999.

Book Chapters:

Pham B. and Zhang Z., "Correction of reflection lines using generic algorithms", in Springer's Lecture Notes in Artificial Intelligence (Ed. Yao X., McKay R., Newton C., Kim J.H., Furuhashi T.), in print.

Stranieri A., Yearwood J. and Pham B., "Combining knowledge discovery from databases (KDD) and case-based reasoning (CBR) to support diagnosis of medical images", in New Approaches in Medical Image Analysis (Eds. Pham B., Braun M., Maeder A.J., Eckert M.), SPIE, Bellingham USA, 1999, 169-176.

Refereed Journals:

Pham B., "Aesthetic Factors in Geometric Modelling", Journal of Australian Mathematics Society, Special Issue on the Occasion of David Elliot's 65th Birthday, 1999.

Seminars

David Stratton, of ITMS, presented "Impact of Application Distribution Technology on Novice Programming Environments" on the 10th May, 1999.

Andrew Stranieri, of ITMS, presented "The Evaluation of Legal Knowledge Based Systems" on the 24th May, 1999.

Margaret Kendal, of the Department of Science and Mathematics Education with the University of Melbourne, presented "CAS, Calculus and Classrooms" on the 31st May, 1999.

Professor Yuri Evtushenko, Director of the Computing Centre of Russian Academy of Sciences (Moscow), presented "Applied Projects carried out at Computing Centre of Russian Academy of Sciences (CC RAS) on the 24th June, 1999.

Lyn Roberts and Greg Simmonds, of ITMS, presented "Flexible Delivery in Practice" on the 30th June 1999.

Forthcoming Seminars

Craig Huggins will present a post graduate colloquia "What's all this about? Ojet: an Object database" on the 12th July at 3.30 pm in the School ITMS Meeting Room.

Alex Rubinov will present "Some Approaches to Global Optimization" on the 22nd July 1999 11.30 am in the School ITMS Meeting Room

Conferences.....

Andrew Stranieri and John Yearwood attended the 7th International Conference on Artificial Intelligence and Law in Oslo. Andrew presented a paper on "The evaluation of legal knowledge based systems" (Andrew Stranieri & John Zeleznikow) and John presented a paper on "The integration of retrieval, reasoning and drafting for refugee law: a third generation legal knowledge based system" (John Yearwood and Andrew Stranieri). Both papers were well received. Andrew and John also attended the Second International Workshop on Judicial Support Systems and presented a paper on "Discretion and consistency in legal reasoning"

Refereed Conferences :

Pham B., "Shape Specification in Design using Fuzzy Logic", KES'99 Third International Conference on Knowledge-based Intelligent Information Engineering Systems, Adelaide, August 1999.

Skabar A., Biswas B., Pham B., Maeder A.J., "Contextual classification of multisource geoscientific data using a fuzzy / genetic learner", Proc. AIDA'99 International ICSC Symposium on Advances in Intelligent Data Analysis, Rochester NY, June 1999.

Post Graduate News.....

A new PhD student Adil Bagirov has arrived. His last position was as a chief of sector at the Joint Institute for Nuclear Research. This is an intergovernment research centre, which is supported by Russia, Germany, Poland, the Czech Republic, and also republics from the former Soviet Union. Adil was a representative of Azerbaijan in this joint centre. Adil is a well-known expert in the area of nonsmooth optimisation. He has published 12 papers, 6 of them in international journals. He will be engaged in the study of global and nonsmooth optimisation problems at the University of Ballarat.

Research Reports

99/20	Towards a Language and Location Independent Novice Programming Environment	David Stratton	May 1999
99/21	The integration of retrieval, reasoning and drafting for refugee law: a third generation legal knowledge based system	John Yearwood and Andrew Stranieri	May 1999
99/22	The evaluation of legal knowledge based systems	Andrew Stranieri and John Zeleznikow	May 1999
99/23	Generating a Macroeconomic Fuzzy Forecasting System Using Evolutionary Search	Raouf Veliev, Alex Rubinov and Andrew Stranieri	May 1999
99/24	A Survey of Argumentation Structures for Intelligent Decision Support	Andrew Stranieri and John Zeleznikow	May 1999
99/25	The Efficacy of a Low-Level Program Visualisation Tool for Teaching Programming Concepts to Novice C Programmers	Philip A. Smith and Geoffrey I. Webb	May 1999
99/26	Knowledge Acquisition Benefits of a Non-Conventional Rule Based Reasoning System	Andrew Stranieri and John Zeleznikow	May 1999
99/27	Inductive Concept Learning in the Absence of Labeled Counter-examples	Andrew Skabar ¹ , Kousick Biswas ¹ , Binh Pham ² , and Anthony Maeder ³	June 1999
99/28	A computational story model based on the concept of metastories 1 : Design	Richard Hall, Binh Pham and John Yearwood	June 1999
99/29	A Computational Cognitive Model for Diagnosing Algebra Errors and Misconceptions	Heather Mays, Binh Pham and Andrew Stranieri	June 1999
99/30	A simplicial method for maximizing increasing functions *	Mikhail Andramonov	June 1999

All IT&MS staff members and postgraduate students are encouraged to contribute to the next edition of the monthly ITMS 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 August 1999.



University of Ballarat



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