



# Research Newsletter

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## Visiting Fellows .....

**Professor Diane Martin** and **Dr. Paul Mulholland** from the USA will be visiting the school next year. Professor Martin has broad research expertise in the area of computer Science Education and Paul works in the area of CSE, Multimedia and Online learning.

## Visitors to the School .....

Dr **Ann Shveidel** from Karaganda State University, Kazakhstan visited the School during October and November. She is engaged in Star-Shaped Analysis and collaborated with Alex Rubinov, who has a large ARC grant on this topic. During her

visit she prepared a Research Report "Recession cones of star-shaped sets and co-star-shaped sets" and discussed with Professor Alex Rubinov possible directions of the further research.

Professor **Hoang Tuy** from Hanoi visited the School for the second time. His visit last year was very successful.

Professor Alex Rubinov, Professor Hoang Tuy and Heather Mays have prepared a paper, which has been accepted for publication in the international journal "Optimization". Professor Tuy then developed the approach suggested in this paper.

During this visit Professor Tuy also discussed with Alex Rubinov and Adil

Bagirov possible applications of global optimization to Cluster Analysis .

## Grants .....

The following internal grant applications were successful:

Tony Greening was successful in obtaining UoBRG funding for : An investigation into Long Range Dependent Teletraffic and its effects on the bridging of broadband traffic "islands" by satellites, with applications to telemedicine.

Prof. A RUBINOV and Dr. J. Yearwood were successful in obtaining ARC small grant funding for: " Global optimization techniques for clustering and classification with particular application to Medical Diagnosis".

## Seminars and Workshops.....

**ARC- Sponsored Special Research Workshop on Aspects of Telemedicine,** Gold Coast 24 October 1999.

This Workshop was jointly organised by researchers from Queensland University of Technology, University of Ballarat and the University of Technology, Sydney, under the auspices of the ARC Special Research Initiatives scheme. The guest speaker was Dr. David Filby who is the Deputy Director General (Policy and Outcomes) at the Queensland Health. Queensland health system seems to be charging ahead with a big plan to simultaneously install digital PACS (Picture Archive Communication Systems) in five major hospitals. Ross Brown, John Yearwood and Binh Pham contributed 3 out of 14 presentations. Full papers resulted from this Workshop will be sent for review for a Special Issue of the Telemedicine Journal which covers research work on telemedicine in Australia.

The Third Australia–Japan Joint **Workshop on Intelligent and Evolutionary Systems** was held in Canberra from November 23 till November 25. Professor

Alex Rubinov, Adil Bagirov and Zari Dzalilov attended the Operation Research Session at this workshop. Alex and Adil presented a talk "Global Optimization of IPH Functions over the Unit Simplex with Applications to Cluster Analysis". The corresponding paper was published in the Proceedings of the workshop.

## Conferences.....

The **7<sup>th</sup> International Conference of Computers in Education** was held in Chiba, Japan, 4-7 November 1999. Phil Smith and David Stratton from ITMS both presented papers. The ICCE conference is held yearly at different venues in Asia and is organised under the auspices of the Asian Pacific Chapter of the Association for the Advancement of Computers in Education (AACE).

The ICCE conference has a strong focus on our region and a broad overview of all aspects of the use of computing technology in education. The use of the World Wide Web and Multimedia were very popular topics of discussion at ICCE '99. Highlights of the conference were the keynote address by Prof. Betty Collis from the University of Twente in the Netherlands who described and demonstrated a Domino-based architecture for on-line organisation of units throughout her entire university, and the panel discussion which involved contrasting views of the use of verbal and visual media in education.

David presented his paper entitled "Towards a Language and Location Independent Novice Programming Environment" and discussed his ideas of web-based program visualisation environments. His ideas involving ways to decouple a programming language from its environment were particularly well received. Phil presented his paper entitled "Evaluation of Low-Level Program Visualisation for Teaching Novice C Programmers". He discussed his work on program visualisation tools and described an

empirical evaluation that provided evidence as to their efficacy.

In all, 421 papers were accepted for publication with authors from 45 different countries. Out of the total number of accepted papers, 151 (36% of total accepted papers) were accepted as Full-papers, 158 (38% of total accepted papers) were accepted as Short-papers and 112 (27% of total accepted papers) were accepted as Posters. Both David's and Phil's papers were accepted as Full-papers. The two papers were presented in the IT education end of the spectrum.

As well as delivering our papers and making many new and important acquaintances from our area (from all over the world) we developed other important life-skills such as the use of chop-sticks and the consumption of extremely fresh fish in the form of sushi. We both became almost literate in the ancient Japanese and Chinese form of writing called Kanji.

### **AUS-ICOTS2**

Lyn Roberts and Robyn Pierce attended this update on statistics education in Australia, held at Swinburne on 10<sup>th</sup> of December. They presented a paper 'More reflections on teaching sampling variation and the Central Limit Theorem' which included some findings from their research project's semester 2 data.

In November Lyn Roberts and Robyn Pierce attended **Delta99: a symposium** on teaching undergraduate mathematics which was hosted by a group of Queensland universities. Most Australian universities were represented along with 25 overseas delegates. The theme of 'Diversity' was addressed in a number of ways but key reports were on research into the use of technology in teaching mathematics and research on student centred learning and assessment. Both Lyn and Robyn presented papers which were well received and several valuable contacts made for our CAS research, including the possibility of

becoming part of Texas Instruments loan program for institutions on the leading edge of research into the use of CAS in teaching mathematics.

The **Twelfth International Meeting of University Administrators** was held in Edinburgh, Scotland in September 1999. Paul Kelly presented a paper on Online Delivery of Programs and Courses. The paper was co-authored by Lyn Roberts. An invitation has also been extended for publication in an international journal.

### **Jurix'99**

John Yearwood attended Jurix'99 in Leuven Belgium and presented a paper "Mapping inference trees to document structure for text generation in refugee determinations Andrew Stranieri\*, John Yearwood\*\* and John Zeleznikow\*. The conference was held in the historic Groot Beginhof at the 15th C K. E. Leuven University.

Robyn Pierce and Kay Kneebone attended the **36<sup>th</sup> Annual Conference of the Mathematical Association of Victoria** December 1999. Robyn attempted to demonstrate ways of 'using computer algebra systems to promote inquiry' however due to an extended power failure this became a discussion held in the gloom of emergency lighting. The afternoon sessions were more successful. Robyn and Kay facilitated two workshops on 'using your computer to obtain and analyse data'. The participants varied greatly in their experience but most seemed to gain some new knowledge or skill from the session. It was pleasing to meet up with three of our 1998 BEd PhysEd graduates who spoke positively about their experiences of teaching mathematics. They commented on their appreciation *now* of maths studied at UB, but reflected that they lacked experience with handheld technology.

### **Published Book....**

The book "Convex Analysis on the Plane" by **V.D. Matveenko, R.T. Pashaev** and

**A.M. Rubinov** was translated into English in Baku (Azerbaijan). This book was published in Russian in 1994. It is a small textbook for students of high schools and universities with explanation of main ideas of convex analysis and its applications to optimization and economics. There are many pictures and examples in this book.

### Accepted papers....

The papers "*Nondifferentiable optimization: Newton's method and Nondifferentiable optimization: envelope representation*" by **A. Rubinov** has been accepted for publication in *Encyclopaedia of Optimization*, C.A. Floudas and P. Pardalos (eds), Kluwer Academic Publishers. Alex is grateful to Ewan Barker for his help in the preparation of these papers.

The paper *An algorithm for monotonic global optimization problems*, by **A. Rubinov, H. Tuy** and **H. Mays**, has been accepted to publication in international journal *Optimization*.

The paper *P-functions, quasiconvex functions and Hadamard-type inequalities* by **C.E.M. Pearce** and **A.M. Rubinov** has been accepted to publication in international *Journal of Mathematical Analysis and Applications*.

### Published papers....

The following papers have recently been published:

**Pham B.**, "Construction and Retrieval of a Library of Customised 3D Shapes Using Fuzzy Specifications", DICTA99 - 5<sup>th</sup> International Conference on Digital Image Computing: Techniques and Applications, 6-8 December 1999, Perth.

**Skabar A., Biswas K., Pham B., and Maeder A.J.**, "Learning a Concept in the Absence of Labeled Counter-Examples", ICAPRDT '99 - 4<sup>th</sup> International Conference on Advances in Pattern Recognition and

Digital Techniques, 27-29 December 1999, Indian Statistical Institute, Calcutta.

**Brown R., Pham B., Aidman E. and Maeder A.J.**, "*Efficient image rendering using a fuzzy logic model of visual attention*", AISTA2000 - International Conference on Advances in Intelligent Systems: Theory and Applications - 2-4 February 2000, Canberra.

**Skabar A., Pham B., Biswas K. and Maeder A.J.**, "*An Inductive Concept Learning Technique That Does Not Require Labeled Counter-Examples*", AISTA2000 - International Conference on Advances in Intelligent Systems: Theory and Applications - 2-4 February 2000, Canberra.

### Post Graduate News.....

**Lloyd Walker** has submitted his PhD thesis. Currently Lloyd is working in the UK and has been completing his writing up there.

**Glenn Auld** has been successful in his transfer from probationary candidature to full PhD candidature.

### Scholarships/Awards....

The School has offered four Student Summer Scholarships for the summer vacation 1999-2000 of \$2,400 each. Successful applicants and research projects to be undertaken are **Chris Liesfield** *Installation of the Mach micro-kernel and some initial investigations into protocol processing*, **Stephen Day** *Non-intrusive program visualisation for C++*, **Dusan Nikolic** *To build a notepad interface to a parser for short sentences* and **Saul Thurrowgood** *Investigating Application Distribution Scenarios*. The aim of the scholarship is to provide an opportunity for involvement in extra learning activities which have a significant level of current development.

## Research Reports

99/38	Some general approaches to abstract convex programming *	Mikhail Andramonov	October 1999
99/39	Distance to the Intersection of Normal Sets and Applications	A.M. Rubinov <sup>1</sup> and I. Singer <sup>2</sup>	October 1999
99/40	Halanay Inequality, Yorke 3/2 Stability Criterion, and Differential Equations with Maxima	Anatoli Ivanov, Eduardo Liz and Sergei Trofimchuk	November 1999
99/41	Recession cones of star-shaped and co-star-shaped sets <sup>1</sup>	A.P. Shveidel	November 1999
99/42	Mapping inference trees to document structure for text generation in refugee determinations <sup>1</sup>	Andrew Stranieri*, John Yearwood ** and John Zelenzikow*	November 1999
99/43	The use of argumentation to assist in the generation of legal documents	John Yearwood, Andrew Stranieri and Chaula Anjaria	November 1999
99/44	A Problem of Modal Control in a Linear Neutral System *	Anatli F. Ivanov <sup>1</sup> and Denys Ya. Khusainov <sup>2</sup>	November 1999
99/45	The global optimization approach to the clustering analysis <sup>1</sup>	A.M. Bagirov, A.M. Rubinov, A. Stranieri and J. Yearwood	November 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 20<sup>th</sup> June 1999.



**University of Ballarat**



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