



Research Newsletter

OCTOBER 1998

Edition 5.

Inside this Edition:

Projects in process reports: Major survey of visitors to mineral springs reserves conducted by BRIB.
Occupational health and safety training courses evaluation project.

Accepted papers: "Continuous approximation to generalized Jacobians" by Huifu Xu, Alex Rubinov and Barney Glover.

Published papers: "Convex-along-rays functions and star-shaped sets" by Alex Rubinov and Alex Vladimirov.

Special feature: **Profile of the Research Centre for Intelligent Tele Imaging (RCITI).**

Visitors to the School The School welcomes Dr. Alexander Vladimirov, Matthias Kraft and Gesine Schroeter

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

I have returned from the Caribbean to find that all matters of a research nature (in ITMS) were very well looked after in my absence.

I think all members in the School appreciate the excellent work that Andrew Stranieri has done over the three month period. Thanks Andrew and Kirsty.

There are two new visitors to the school this month, Gesine Schroeter and Matthias Kraft both from Berlin. They are off to a flying start with lots of cervical image data for analysis from Dr. Ken Thompson of the Royal Melbourne Hospital.

From my point of view it is nice to return to basically the same bunch of research students. I feared that some may complete and leave in my absence.

Projects in Progress:

Ballarat Regional Information Bureau has been engaged by the Victorian Mineral Water Committee to design and conduct a major survey of visitors to mineral springs reserves during the second half of 1998. The Committee was set up in 1996 to advise the Minister for Conservation and Land Management on matters related to the protection and management of the state's mineral water resources. A survey has been developed with the aim of accumulating baseline data on what sorts of people visit mineral springs and why they do so, and to also seek opinions about existing facilities and suggestions for improvements and enhancements.

After extensive pilot testing and a number of iterative improvements to the interview questionnaire, and

after a last minute delay when the gas crisis led to a shutdown of many of the facilities at the Hepburn Spa Resort, the survey of Visitors to mineral springs reserves being conducted by **Jack Harvey** and **Robyn Pierce** for the Victorian Mineral Water Committee is about to get under way. A team of 14 interviewers has been recruited, including 9 students selected from various specialist Applied Statistics classes. Interviewer training will take place on Monday October 12 and interviewing will commence soon after. It is planned to conduct around 500 interviews over a 4-5 week period. The survey will provide baseline data on what sorts of people visit mineral springs and why they do so, and will also seek opinions about existing facilities and suggestions for improvements and enhancements. The survey is an integral component of the Victorian Mineral Water Committee's strategic plan for improving visitor services and facilities at the Mineral Springs Reserves of Central Victoria.

A team comprising Steve Cowley, Dennis Else and John Culvenor of VIOSH Australia, together with **Jack Harvey** of ITMS, have recently won a Victorian WorkCover tender to evaluate occupational health & safety training courses in Victoria.

Accepted Papers:

The paper "Continuous Approximation to Generalized Jacobians" by H. Xu, A. M. Rubinov and B. M. Glover has been accepted for publication in the international journal "Optimization". This paper is an extended part of the large paper "Continuous Approximations to Generalized Jacobians with Application to Nonsmooth Least-Squares minimization" by the same

authors which was published in the School Research report series as Working Paper 17/96, August 1996.



Published Papers:

The paper "Convex-Along-Rays Functions and Star-Shaped Sets" by A. M. Rubinov and A.A. Vladimirov has been published in the international journal "Numerical Functional Analysis and Optimization". (The first version of this paper was published in the School Research report series as the Research Report 97/8, April 1997.)

The Research Centre for Intelligent Tele-Imaging (RCITI):

The Research Centre for Intelligent Tele-Imaging (RCITI) was established in December 1995 to consolidate and foster niche areas which integrate substantial existing research expertise within the School of Information Technology and Mathematical Sciences. Activities are focused on both basic and applied research to develop techniques underlying computer software systems which can organise text and / or image data, and allow information retrieval and usage in an efficient, effective and intelligent manner. Information access can occur either locally and remotely over communication networks. The nature of these activities requires research knowledge in a number of specialist areas in which ITMS staff already have significant strengths: image analysis, computer graphics, multi-media, user-interfaces, databases, knowledge-based systems, artificial intelligence, information retrieval, data mining and object oriented technology. Such activities also complement those covered by the Ballarat IT 2010 initiative, which was developed by the Ballarat Economic Development Board (BEDB) and endorsed by both Federal and State Governments in 1995.

The Research Centre for Intelligent Tele-imaging aims to

- provide an active research team within SITMS with a sharp focus and an identity recognised by external bodies.
- foster a collaborative team-based research spirit and a productive environment.
- respond quickly to new IT development and needs in both academic and industrial sectors.

MEMBERS OF RCITI 1997/98:

Prof. Binh Pham (Director)

Binh Pham holds the IBM Foundation Chair in Information Technology. She is the Director of both RCITI and IVRIF (Image and Video Research

Infrastructure Facility). Her current research interests cover computer graphics, design for aesthetics, image analysis, content-based image retrieval, intelligent systems, data mining and multimedia. She has been awarded 11 ARC grants (4 Large, 2 SPIRT, 5 Small), numerous other grants and significant funding for industry-related work. During 1997, she spent two weeks at the Faculty of Industrial Design, TUDelft, The Netherlands, for collaborative research at their invitation. Recently, under the sponsorship of DAAD (German Academic Exchange Services), she participated in a collaborative research projects between Daimler-Benz and Fachhochule fur Technik, Esslingen, Germany.

John Yearwood (Deputy Director)

John Yearwood is a Senior Lecturer in the School of Information Technology and Mathematical Sciences. He has been involved in projects in imaging techniques, information retrieval and multimedia technology, in collaboration with industry. He is currently doing research into case-based retrieval of Refugee Review Tribunal case decisions and has worked in the area of intelligent information retrieval of treatment regimens for nursing advice with a database from the Austin Hospital in Melbourne. There is interest both locally and in Melbourne in using similar techniques in case-mix management. This work has been published in the International Journal of Artificial Intelligence in Medicine.



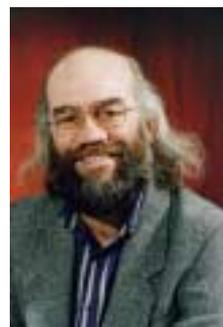
Assoc. Prof. Paul Kelly (ex-officio member)



Paul Kelly is the Head of School of ITMS. His current research interests include object-oriented technology and multimedia and learning technologies.

Jack Harvey

Jack Harvey is a Senior Lecturer in Statistics in the School of Information Technology and Mathematical Sciences. He is also the Director of the University of Ballarat Statistical Consulting Centre, and Director of Ballarat and Western Victoria Regional Information Bureau, a social research and information agency of the university. His primary



research interest is in statistical image analysis in the context of remote sensing. He is also involved in collaborative research in the domains of occupational health and safety, biological sciences and psychology.

During sabbatical leave in the second half of 1999, Jack plans to visit a number of institutions in the UK and North America, for the purpose of collaborative work in applied statistics in general, and statistical image analysis in particular.

Venu Murthy

Dr. Venu Murthy was a Senior Lecturer in Computing and the Deputy Director of the Centre until July 1998 when he left the University of Ballarat to take up a position with the Department of Economic Research in Canberra. His research interests include databases, heterogeneous distributed and parallel computing, content-based multi-media information retrieval and mobile computing.

Andrew Stranieri

Andrew Stranieri is a Lecturer in the School of Information Technology and Mathematical Sciences at the University of Ballarat. He completed his Ph.D. research at La Trobe University involving applying neural networks to family law data collected by him from the Family Court of Australia. Since commencing his doctoral research on the application of artificial intelligence techniques to modeling legal reasoning he has published three journal articles and over 20 conference papers. His research interests include data mining, automating legal reasoning and artificial intelligence.



David Stratton

David Stratton is a Lecturer in Computing and has the following qualifications: Novell MCNI (Master Certified Network Instructor), Microsoft MCSE (Microsoft Certified Systems Engineer) & MCT (Microsoft Certified Trainer). His research interests are focussed on distributed applications and their application to computer science education, with technical focus on CORBA.



Zhongwei Zhang

Zhongwei Zhang joined the RCITI as a Research Fellow after completing a PhD in Computing at Monash University in 1997. His PhD research is on the application of neuro-fuzzy control to improve the



performance of an adaptive information visualisation system. His research interests include artificial intelligence, fuzzy modelling and evolutionary computing, and their applications. He currently works jointly with Binh Pham on a research project involving the use of evolutionary programming for geometric modelling and design for aesthetics. He will present their paper on "Correction of Reflection Lines Using Genetic Algorithms" at the incoming 2nd Asia-Pacific Conference on Simulated Evolution and Learning (SEAL 98) in Canberra.

POSTGRADUATE STUDENT RCITI MEMBERS:

Ross Brown

Ross Brown was an Associate Lecturer from 1990-97 in the Department of Information Technology, LaTrobe University (Bendigo), after graduating with an Honours degree in Computing. He took up an APA scholarship in 1998 to do a PhD in computer graphics. His current research interest is focussed on image rendering techniques and image representation based on human visual system.

Ruth Christie

Ruth Christie is lecturing in Computer Science at the Queensland University of Technology She has a Masters degree from QUT in Computer Science, an Arts degree from UNE in Mathematics and a Diploma in Teaching from NCAE. Her research interests are in the areas of Computer Graphics (geometric modelling), the participation of women in computer science and teaching of programming at an introductory level.



Richard Hall

Richard Hall has an Honours degree in Computer Science and Electronic Engineering from La Trobe University. His research interests include artificial intelligence, simulation, computer graphics and image processing. Richard currently hold an APA(Industry) award for a PhD project on "A dynamic simulation model of stories and the interactions of characters based on situational logic", as part of research collaborations between the University of Ballarat and the Australian Business Theatre.



Heather Mays

Heather Mays is a former lecturer at Footscray Institute of Technology and at the University of Ballarat where she taught Engineering mathematics as well as Interactive Instructional Design and Interactive Multimedia. Her research interests include intelligent



tutoring systems and mathematics education. Her PhD project is on the "Construction of an Intelligent Diagnostic System in Algebra based on Case-Based Reasoning and Cognitive Factors" and she has been invited to give a seminar on this work at the University of Melbourne in October 1998.

Dora Pearce

Dora Pearce commenced her PhD in Feb 1998 after completing Graduate Diploma in Epidemiology by Distance Learning through University of Newcastle while working in Dept Public Health and Community Medicine, University of Melbourne. Prior to this, she worked as a sessional member of staff in Chemistry, at the University of Ballarat. She also has a Grad Dip in Education, and occasionally does casual relief teaching work. Previously, she also worked as a Hospital Scientist, mainly in Darwin, NT. She completed a Bachelor of Applied Science (Biology) part-time at RMIT while working at CSIRO and subsequently the Baker Medical Research Institute. Her research interests include epidemiological research methods and public health effects of environmental pollution.



Bruce Riding

Bruce Riding is the Presbyterian Minister at Scots' in Ballarat and has a special interest in authoring multimedia sermon presentations for use in Christian Church services. His DIT (Doctor of Information Technology) on "Design and knowledge discovery for an intelligent multimedia system" complements his professional interest.

Lloyd Walker

Lloyd Walker holds a Bachelor degree in Informatics and an honours degree in Information Technology from Griffith University. Currently he is writing up his PhD thesis entitled "Efficient Data Structures for Modelling the Combination of Three-Dimensional DTM and CAD Data", under the supervision of Professors Binh Pham and Anthony Maeder. His research interests include CAD (Computer Aided Design), computer graphics, solid-modelling and artificial intelligence.



Visitors to the School:

Dr. Alexander Vladimirov from the research Institute of Information Transmission Problems, Russian Academy of Sciences, visited SITMS for two weeks in September -October. This is his second visit to Ballarat. During his first visit in the February 1997 he carried out joint research with Alex Rubinov in the framework of the Alex's ARC Large grant. Results of this research were presented in the paper "Convex-Along-Rays Functions and Star-Shaped sets" which has recently been published (see section "Published

papers"). During this visit, which is again within the framework of Large grant, both Alexanders (Rubinov and Vladimirov) studied a behavior of efficient trajectories for some classes of dynamical systems. The results of this research can be considered the base of a new research paper.

Matthias Kraft and **Gesine Schroeter** arrived at the University, from Germany on the 12th of October 1998. They will be staying with the School for five months to complete practical training under the supervision of Binh Pham.



Matthias is from the east of Berlin. In Berlin, he studies at the Fachhochschule fur Technik und Wirtschaft of Berlin (FHTW Berlin) and will finish with a Diploma in Information Technology. He is in his third year and is required to undertake practical training in this semester.



Gesine is also from Berlin, the capital of Germany. She studies Applied Computer Technology at a Technical College in Berlin. She will finish her studies with a Diploma in Information Technology and is required to do practical training during her fifth semester.

They are currently working in the IVRIF-Lab to develop an application to process medical X-Ray images using operators from SGI's ImageVision library and their own algorithms. As a second part of their project, they will create a multimedia environment to support telemedicine applications using the internet.

They plan to set up a website to show the progress of their work but it's a lot of work to do this, so there will be nothing to show until the end of the first week in November.

The URL to their website will be published in the next issue of the Research Newsletter.

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 Kirsty Broadbent no later than the 15th November 1998.



University of Ballarat



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