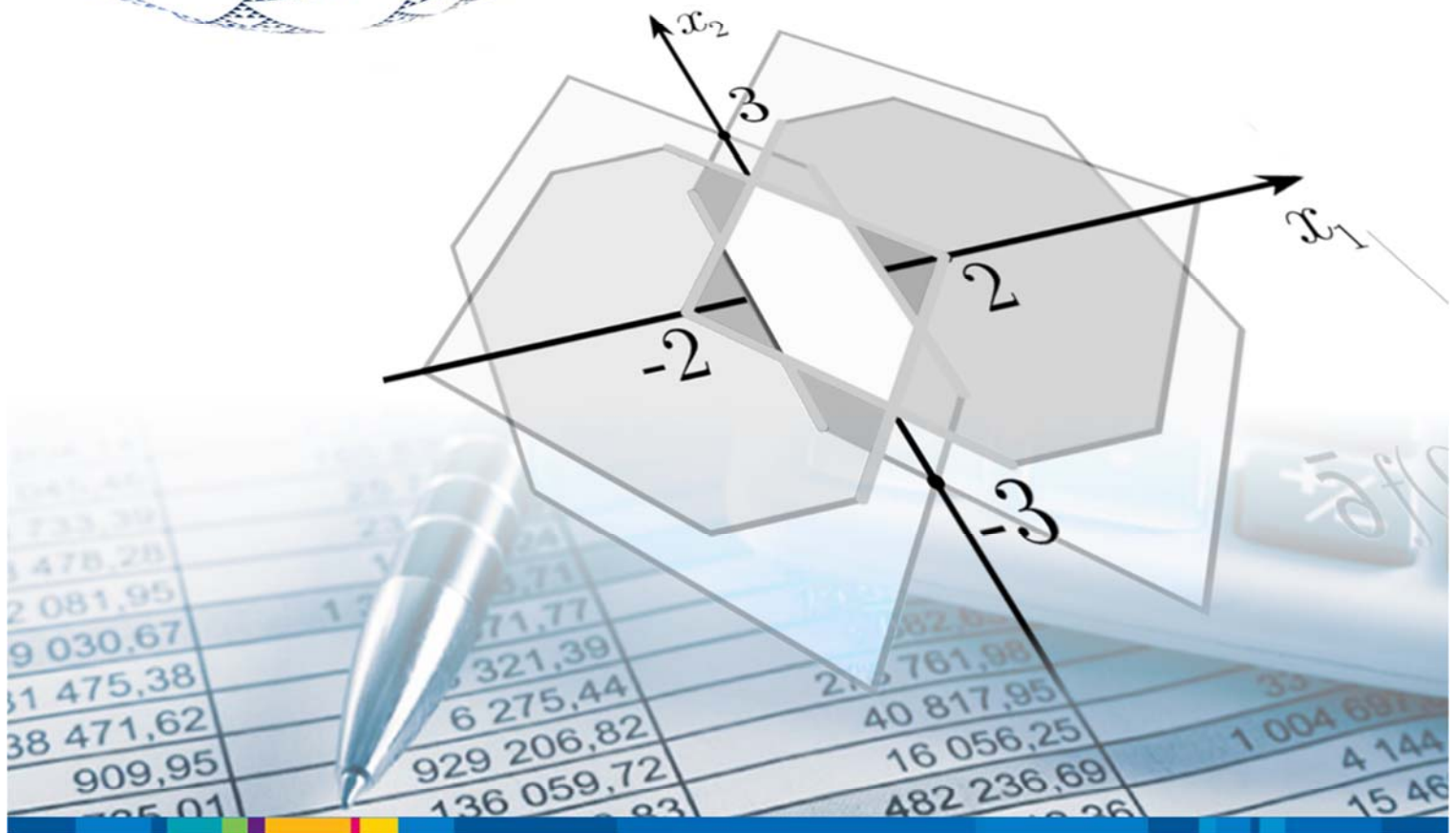


CIAO Newsletter

Centre for Informatics and
Applied Optimization

Edition #37: Jul-Sep 2018



Director's section

Welcome to our third Newsletter this year. It covers the period July – September 2018.

During this period we had some success with our grant applications including international ones. We organised several successful workshops. As always, CIAO members participated in international conferences, including one of the key events on the 2018 conference calendar – International Congress of Mathematicians. Congratulations to the Editor of CIAO Newsletter and from now also CIAO Deputy Director Dr Guillermo Pineda-Villavicencio being a member of the official Australian delegation at the Congress and also at the meeting of the General Assembly of the International Mathematical Union which preceded the Congress.

Regular series of CIAO optimisation seminars continues at Mount Helen campus. Remote access via Visimeet is available. This year we have had 22 research talks so far, including 4 presentations by international visitors. The seminars are not strongly restricted to optimisation. It is good to see that CIAO seminars on information technology are getting more frequent.

Our general research support forums started at the end of 2017 are getting regular too. They are not limited to CIAO researchers. All are welcome. Recently we had interesting discussions of ways of measuring research performance: citation numbers and other quantitative metrics.

We continue hosting international visitors. From the beginning of this year we have had 14 visitors.

A new section "*CIAO in history*" started in the previous edition continues in this one. I hope that I am not the only one who finds it very interesting to look back a little, rediscover some (almost) forgotten facts, find familiar names and (slightly younger) faces. The current section contains three subsections: '20 years ago', '15 years ago' and '10 years ago'.

As always, the newsletter contains the list of recent publications by CIAO members.

Enjoy the reading.

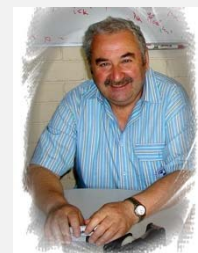


A/Prof Alex Kruger

All available previous issues starting from 2003 as well as the series of the *School of Information Technology & Mathematical Sciences* Research Newsletters dating from 1998 can be accessed from the CIAO web site: <http://federation.edu.au/ciao>.

In this issue:

- Grants, awards and recognition
- Past and forthcoming events
- CIAO visitors
- HDR news
- Announcements
- CIAO in history
- New publications



Prof Alex Rubinov
CIAO Founding
Director



A/Prof Alex Kruger
CIAO Research
Director



Dr Guillermo Pineda
Editor of CIAO
Newsletter

Grants, awards and recognition

Optimising water quality in water resource systems and water grids

Grampians Wimmera Mallee Water (GMMWater) together with **FedUni** will fund an industry PhD scholarship looking to research the problem of optimising water quality in water resource systems and water grids. The project has a total value of \$126,000 over three years. **A/Prof Andrew Barton** said "this project provides an example of how industry and FedUni can work together to solve nationally significant problems."

GMMWater supplies water to much of north-western Victoria, which includes some of the driest parts of the State. As part of its operations GMMWater uses multiple reservoirs and a complex system of interconnected pipelines and channels, or water grid, to supply water to a range of users for waterway health, industry, towns, and farms. The quality of the water available for supply can often vary considerably. This is a challenge because different water users will usually have different water quality preferences, but these preferences may not always be possible to meet in the context of overall system constraints or other competing objectives.

It is anticipated that this research project will assist GMMWater, and the broader water industry, to understand the options available in maximising the quality of water to users.

Further information on the project can be obtained from A/Prof Andrew Barton at a.barton@federation.edu.au.

Oceania Cyber Security Centre grants

Contracts have been finalised for a number of grants that the **Internet Commerce Security Laboratory** received from the Oceania Cyber Security Centre. The following funded projects form part of the Oceania **Proof of Concept Program**:

- "*Real Time Zero Day Ransomware Attack Detection*", a collaboration with Latrobe University and University of Melbourne (AUD \$69,741),
- "*Detection of Internet of Things Devices to Prevent Distributed Denial of Service Attacks*", a collaboration with the University of Melbourne, RMIT, and Deakin University. (AUD \$10,506),
- "*A Multi-Layered approach to Detecting Malicious Mobile Advertising*", a collaboration with Latrobe University (AUD \$78,540).

Horizon 2020 MSCA-RISE international project

CIAO Research Director A/Prof Alex Kruger has been advised that a Horizon 2020 MSCA-RISE international project on *Nonsmooth Contact Dynamics* has been successful in securing funding from the European Union. The project is a collaboration of 10 universities in Europe, Asia, North and South America.

Horizon 2020 is the biggest European Union Research and Innovation programme ever with nearly EUR \$80 billion of funding available over 7 years (2014 to 2020). The programme promises breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market and vice versa.

As part of Horizon 2020, **Marie Skłodowska-Curie actions (MSCA)** provide grants for all stages of researchers' careers to encourage transnational, intersectoral and interdisciplinary mobility. MSCA enable research-focused organisations to host talented foreign researchers and to create strategic partnerships with leading institutions worldwide. Within MSCA, the **Research and**

Innovation Staff Exchanges (RISE) scheme supports short-term mobility of research and innovation staff at all career levels, from the most junior (post-graduate) to the most senior (management), including also administrative and technical staff. It is open to partnerships of universities, research institutions, and non-academic organisations both within and beyond Europe.

Gaspard Monge Program for Optimization international project

The project “*VA-Heat Tools from variational analysis for understanding heat network optimization*” has received a funding of EUR \$15K as part of the Gaspard Monge Program for Optimization. The project is a collaboration of researchers from France, Australia, Brazil, Peru and Vietnam. The team includes CIAO Research Director A/Prof Alex Kruger and FedUni Adjunct Professor Prof Michel Thera (University of Limoges).

The **Gaspard Monge Program for Optimization**, operations research and their interactions with data science aims to support research projects through collaborative actions between academic researchers and industrial researchers by focusing on solving industrial problems in the fields of energy and complex systems. These projects are encouraged to be a kick-off for a future partnership between academic and industrial researchers.

The program was launched in 2012 by **EDF**, an energy company in France and **Jacques Hadamard Mathematical Foundation**.

Research grants by the School of Science, Engineering and Information Technology

The SEIT School allocated \$44,700 for the Research Support Program (RSP) and \$19,000 for the Research Training Program (RTP) to support research across the school.

The RSP fund can be used for any research-related activity/item but cannot be used as scholarships or to directly support HDR students. The RTP fund could be used for any activity/item related to research training and to provide direct support to HDR students to undertake research activities.

CIAO researchers and HDR students have been successful in securing a portion of the RSP-RTP 2018 funding and are grateful to the School for its continuing support of CIAO research.

A/Prof David Yost's role as Esquire Bedell

What's in a name you might ask? Everything if you're a nervous graduate about to cross the stage to receive your testamur on graduation day and your name is awkwardly or incorrectly pronounced. FedUni students come from 130 countries and 120 language backgrounds. So spare a thought for the *Esquire Bedell*, a ceremonial officer whose role is to announce each student by name – or in many cases - names, with many international graduates having multiple names such as Padmalal Maheesha Herath Pinnawala Appuhamillage, Yogeshavaran.



A/Prof David Yost is one of several appointed Esquire Bedells in Australian universities. He has held the Esquire Bedell position for the past four years, and hasn't missed a FedUni graduation ceremony, perfecting thousands of students' names from dozens of different nationalities. His faultless pronunciations are often acknowledged with rapturous applause from his audience.

It's no surprise that David is a seasoned traveller, having lived in eight countries including Thailand, Saudi Arabia, France, Italy, Spain, Germany and Scotland, before he and his wife settled in Ballarat.

At a time when many Australian Universities are now hiring professional name readers to oversee the announcing duties at graduation ceremonies, A/Prof Yost feels honoured to be in the role.

At a graduation ceremony years before he stepped into the role, the Faculty-appointed MC on the day inadvertently announced a student's name as Angelina Jolie (much to the amusement of the forgiving audience and the graduating student, Angelina Kelly).

David Yost's colleagues describe him as a calming influence on stage for the students anxiously waiting at the top of the stairs. He always makes eye contact with the graduates before eloquently reading their name.

"It is a very satisfying role and I believe a mark of respect by the University in terms of ensuring a memorable graduation experience, for all the right reasons," David said.

Revolutionary remote patient monitoring system gets media attention

CIAO researchers Dr Venki Subramaani and A/Prof Andrew Stranieri were interviewed by **WIN News Bendigo** to showcase their revolutionary remote patient monitoring system. Check the video at https://m.facebook.com/story.php?story_fbid=10214882686373369&id=1613577491. The invention came about as part of the inaugural La Trobe University's **Accelerator Program** (<https://www.latrobe.edu.au/industry-and-community/research-partnerships-with-industry/accelerator>).

CIAO researchers appointed to prestigious international committee

CIAO researchers Grant Meredith and Evan Dekker have been appointed to the **International Virtual Reality Steering Group** for people who stutter. The steering group was announced at the 2018 British Stammering Association Conference in Cardiff on the 2nd September 2018.

Grant and Evan were invited based upon their work associated with the CIAO-based Technologies for Empowering People for Participation in Society (TEPPS) Programme and individual studies in emerging technologies.



A/Prof Andrew Stranieri



Dr Venki Balasubramanian



Grant Meredith



Evan Dekker

Steering Group

Grŵp Llywio

 Rachel Ewerat Reg MRCSLP City UK, London, UK	 Grant Meredith Lecturer Research Program Leader Developer of Stammer-Prof Federation University Australia	 Mitchell Trichas, Ph.D. CCC-SLP Co-Founder of Stutter Social Philadelphia, USA	 Prof. Peter Howell, Ph.D. Professor of Experimental Psychology University College London, UK	 Annie Braafferry Chair of ISA ISA Executive Director (1993-2003) California, USA
 Prof. J. Scott Ramsay, Ph.D. Professor of Communicative Sciences & Disorders Michigan State University, USA	 Prof. Shelley Brundage, Ph.D. Professor of Speech, Language & Hearing Sciences George Washington University, USA	 Caryn Herring Ph.D. Student CCC-SLP Michigan State University, USA	 Evan Dekker Technical Officer Ph.D. Candidate Federation University Australia	 Jane Powell CEO of SSA London, UK

Professor Nalini Joshi elected Vice-President of the International Mathematical Union

Our 2016 Alexander Rubinov lecturer Prof Nalini Joshi has been elected the first Australian Vice-President of the **International Mathematical Union**, from the start of 2019.

Prof Nalini Joshi is a Georgina Sweet Australian Laureate Fellow in mathematics at the University of Sydney. She develops mathematical methods to study solutions of integrable systems, which arise as universal models in physics, such as the Painleve equations.

Congratulations to Nalini!



Events

Malware Reverse Engineering Conference 2018

The 2018 Malware Reverse Engineering Conference was held by ICSL on 2-3 July 2018 at the Telstra Conference Centre in Melbourne. A wide variety of industry presentations occurred over both days, including ones from DST Group, University of Melbourne, Cydarm, Synopsis, Trend Micro, Secureworks, University of NSW, ACSC, aizoOn, Flashpoint, Microsoft Australia, and Kaspersky Lab.

IEEE Workshops

Two IEEE workshops were held on 24 July 2018: on authorship – process, integrity and ethics in publishing, and on techniques for effective research in IEEE Xplore.

CIAO acknowledges support received from IEEE to run the workshops.

IMU General Assembly

The General Assembly of the International Mathematical Union (IMU) was held in Sao Paolo on 29-30 July before the International Congress of Mathematicians. CIAO member Dr Guillermo Pineda-Villavicencio was part of the Australian delegation, which also comprised Prof Nalini Joshi, Prof Benjamin Burton and Prof Cheryl Prager.

The assembly selected St. Petersburg as the venue for the ICM 2022.

International Congress of Mathematicians

The International Congress of Mathematicians was held in Rio de Janeiro on 1-9 August 2018. The congress is held every four years and is the largest gathering of mathematicians in the world. During the congress several very prestigious prizes were awarded, including

- the **Fields Medals** to Akshay Venkatesh, Peter Scholze, Alessio Figalli and Caucher Birkar for outstanding contributions to mathematics by mathematicians under 40 years of age;
- the **Nevanlinna Prize** to Constantinos Daskalakis for his transformations of our understanding of the computational complexity of fundamental problems in markets, auctions, equilibria, and other economic structure;
- the **Gauss Prize** to David Leigh Donoho for his fundamental contributions to the mathematical, statistical and computational analysis of important problems in signal processing;

- the **Chern Medal** to Masaki Kashiwara for his outstanding and foundational contributions to algebraic analysis and representation theory sustained over a period of almost 50 years; and
- the **Leelavati award** to Ali Nesin his outstanding contributions towards increasing public awareness of mathematics in Turkey.

Dr Guillermo Pineda-Villavicencio attended the Congress.

For more information check the congress website <http://www.icm2018.org/portal/en/>, where you can find all the videos of all the talks!



Australian delegation to the IMU General Assembly with Brazilian volunteers

Dynamical Systems: Stability, Control, Optimization (DSSCO'18)

A/Prof Alex Kruger gave a plenary lecture at the International Conference "Dynamical Systems: Stability, Control, Optimization (DSSCO'18)", which took place in Minsk on 24-29 September 2018. He was also the conference Program Committee member.






He also visited Weierstrass Institute for Applied Analysis and Stochastics in Berlin for collaboration with Partner Investigator on the current ARC Discovery project Prof Rene Henrion and gave a lecture there for members of Prof Henrion's group.



Alex Kruger with Karl Weierstrass

CIAO Seminars

Optimisation

Date	Name	Affiliation	Topic	
27 Sep	Dr Vera Roshchina	University of NSW	Projection methods: convergence and counterexamples	
20 Sep	Dr Rolando Trujillo	Deakin University	Anonymity properties in social graphs	
6 Sep	Prof Sid Morris	CIAO, FedUni	Meandering through millenia of solving polynomials. Part 2: The Abel-Ruffini Theorem	
23 Aug	Prof Sid Morris	CIAO, FedUni	Meandering through millenia of solving polynomials. Part 1: To the Year 1800	
16 Aug	Mr Rubén Campoy	University of Alicante, Spain	Coloring the vertices of a graph via projection algorithms	
5 Jul	A/Prof David Yost	CIAO, FedUni	How to decompose a polyhedron	



Dr Vera Roshchina, 27 Sep 2018



Dr Rolando Trujillo, 20 Sep 2018




Dr David Yost, 27 Sep 2018



Prof Sid Morris, 23 Aug 2018

Information technology

Date	Name	Affiliation	Topic	
29 Aug	Dr Sunil Aryal	CIAO, FedUni	A simple data-dependent dissimilarity measure: An effective alternative to distance measures	

Research support forums

Date	Name	Affiliation	Topic
30 Aug	Katie Donnelly, Research Services, A/Prof Alex Kruger, and Dr Lauren Fortington.	FedUni	Measuring research performance: it is not only about numbers
12 Jul	Prof Fadi Charchar, A/Prof Andrew Stranieri, and Dr Alireza Jolfaei	FedUni	Citations don't measure the quality of research

For more information please visit <https://federation.edu.au/ciao>.

Teachers from Mount Clear College visited CIAO

Jenny Bromley, Assistant Principal, and Scott Brown, mathematics teacher at Mount Clear College, visited CIAO on 16 July 2018 to find a way to build a systematic relationship between the college and the university.

Mt Clear College is doing great work to advance STEM at the Earth Ed Centre at Mt Clear (<https://earthed.vic.edu.au>). The Earth Centre is an engaging specialist science and mathematics facility providing real world Earth Science educational experiences for Victorian students.

Forthcoming events

WoMBaT 2018

The third Workshop on Metric Bounds and Transversality will be dedicated to A/Prof Alex Kruger's contribution to the field on the occasion of his 65th birthday. The workshop will be held at Deakin University (Melbourne Burwood Campus) on 29 November - 1 December 2018. This workshop is free of charge, and the budget is limited. However, the participants in the need of financial support are encouraged to contact the organisers.

Please register here <https://www.wombat.rmitopt.org/reg/>

62nd AustMS Annual Meeting

The 62nd Annual meeting of the Australian Mathematical Society will be held at the University of Adelaide on 4-7 December 2018. A number of CIAO researchers and HDR students will give talks in the Optimisation and other sections. FedUni Adjunct Professor Prof Marco López Cerdá will give a keynote talk.

CIAO Visitors

Dates	Name	Institution
1 Aug	Prof Dan Hunter	Swinburne University of Technology
23 Jul – 22 Aug	Prof Fusheng Bai	Chongqing Normal University, China
23 Jul – 22 Aug	Prof Zhiyou Wu	Chongqing Normal University, China

HDR News

2018 Higher Degree by Research Conference

More than 70 FedUni students presented their research at the 2018 Higher Degree by Research Conference, which was held at the Mt Helen Campus on 26 July 2018. The conference provided a welcome opportunity for FedUni students to present their research and hone their presentational skills in front of an audience.

PhD confirmations

Budi Kurniawan successfully completed his PhD confirmation with very positive feedback from the panel members. Budi is working on the application of multiobjective reinforcement learning to discovery of novel team-based tactics for air combat, under the supervision of A/Prof Peter Vamplew (FedUni), Dr Cameron Foale (FedUni), A/Prof Richard Dazeley (Deakin University) and Make Papasimeon (Defence Science and Technology Group). His PhD is co-funded by FedUni, DSTG and the Defence Science Institute.

PhD submissions

Adam Bignold, also under the supervision of A/Prof Peter Vamplew (FedUni), Dr Cameron Foale (FedUni), A/Prof Richard Dazeley (Deakin University), has just submitted his PhD thesis on a rule-based approach to assisted reinforcement learning.

PhD examinations

Congratulations to **Elaf Jafaar Ali** on her successful examination. Elaf's thesis is titled "*Canonical Dual Finite Element Method for Solving Nonconvex Mechanics and Topology Optimization*". Supervisor Prof David Gao.

CIAO PhD student presents at the 9th Vietnam Mathematical Congress

From 14-18 August 2018, **Cuong Nguyen**, a PhD student under the supervision of A/Prof Alex Kruger and A/Prof David Yost, attended the 9th Vietnam Mathematical Congress in Nha Trang City, Vietnam. The congress is the largest mathematical conference in Vietnam and is organized every five years.

There were about 750 participants, who came from institutions in Vietnam and overseas.

The conference was divided into eight sessions. Cuong gave a contributed talk in the Optimization session, with the title "*Nonlinear transversality properties of collections of sets*". This is a joint work with A/Prof Alex Kruger.

For more information on the conference, visit <http://viasm.edu.vn/en/hdkh/dhthtq2018>".



Research travel

CIAO PhD student **Bui Thi Hoa** visited the University of New South Wales and University of Newcastle 20-31 August for research collaboration with Dr Vera Roshchina and Dr Minh Dao on topics in optimisation theory and convex geometry that emerged during prior meetings in Ballarat and Melbourne.

New FedUni Student Branch of IEEE

A new **IEEE Student Branch at FedUni** has been established. Our students can now officially run activities that will support their study and development. **Dr Alireza Jolfaei** from the School of Science, Engineering and Information Technology said “this opens opportunities for our students to benefit from running new professional, technical and non-technical activities with the support of IEEE”.

The IEEE Student Branch at FedUni will help students accelerate their career plans and to grow as a technology professional. For more information about the membership benefits please refer to <https://www.ieee.org/membership/benefits/index.html?byCareerPhase=All&byCountry=AU>.

One of the first activities being planned is for a team of student programmers to take part in **IEEEEXTREME** which is a big international programming competition that is open to IEEE student members around the globe.

Dr Jolfaei is the new Student Branch Counsellor. The Chair and Vice Chair of the FedUni IEEE Student Branch are **Victoria Seex** (victoriaseex@students.federation.edu.au) and **Cameron Walker** (cwalker@students.federation.edu.au), respectively. Students are encouraged to contact Victoria or Cameron with their suggestions or enquiries regarding membership or participation in IEEEEXTREME.

Announcements

CIAO Leadership Group

Changes have happened in the CIAO leadership group. Andrew Stranieri announced his decision to step down from his position of CIAO Deputy Director and from membership of the leadership group. Guillermo Pineda-Villavicencio is joining the group. It was decided to have two CIAO Deputy Directors from now on: one from IT and another one from Maths. A/Prof **Peter Vamplew** and Dr **Guillermo Pineda-Villavicencio** have agreed to take up these roles. Thank you Andrew, Guillermo and Peter.

University Research Centres and Research Groups

The Deputy Vice Chancellor, Research and Innovation called for applications from researchers to establish University Research Centres and Research Groups. University Research Centres and Research Groups denote formal groupings of academics and researchers that share common research interests and can successfully demonstrate that their collective activities will be of benefit to the University's ongoing research performance, e.g., by fostering the development of early career researchers, and by enriching the University's research culture.

All existing research centres must submit an application by 30 November 2018 for consideration. The DVC R&I also welcomes applications from new research centres and groups.

The work on CIAO application has begun. All idea and suggestions are welcome.

Defence export controls 2018 outreach

Defence Export Controls (DEC) within the Department of Defence is commencing another year of outreach programs. This year they will be visiting Brisbane, Perth, Melbourne, Adelaide, and Sydney. During these visits DEC will explain what regulations govern export controls and what is required of exporters to ensure efficient and compliant exports.

The outreach program will cover the requirements that companies and organisations, particularly those who are involved in defence industry and academic/research organisations that collaborate

with overseas entities, must meet when exporting controlled goods and technologies or supplying related information overseas by intangible means (e.g. by email). Controlled items include military items or commercial items that may have a military end use or could be used in developing chemical, biological or nuclear weapons systems.

For more information, go to www.defence.gov.au/ExportControls

2018 Victorian defence research university capability map

Following the success of the inaugural Victorian Defence Research University capability map in 2017, Defence Science Institute (DSI) has again worked closely with Victoria's Universities to present the 2018 version, providing a comprehensive view of the capability of defence relevant research across the Victorian University sector. This directory aims to help government and industry to identify the capabilities, expertise and potential solutions held in our universities that can be directed towards research and development priorities for the defence sector.

CIAO's capabilities on Sustainment, Trusted autonomous system, Cyber and IT security, and Big data processing and visualisation featured in the report. ICSL's capabilities on Cyber and IT security also appeared in the report.

More information on the program can be found at

<http://www.defencescienceinstitute.com/2018/08/02/2018-victorian-defence-research-university-capability-map/>

CIAO in history

20 years ago (Research Newsletter #4, September 1998)

The paper "*Quasiconvexity via two step functions*" by **A.M. Rubinov** and **B.M. Glover** was published in Proceedings of the 5th International Symposium "*Generalized Convexity, Generalized Monotonicity: Recent Results*" by *Kluwer Academic Publishers*. Symposium took place in France exactly two years ago. Editors of this Proceeding are J.P. Crouzeix (who visited Ballarat last December), H.J. Martinez Legaz and S. Schaible. The first version of this paper entitled "*Generalized Convex Sets and Subdifferentials*" was published as the Research Report 96/9 in June 1996.

15 years ago (CIAO Newsletter #3, August 2003)

The School of ITMS and CIAO would like to welcome aboard: **Dr David Yost** who has been appointed to take up a position of Senior Lecturer in mathematics. David has an excellent research publication record in functional analysis, is the winner of the **Lester R. Ford Award** for mathematical exposition from the Mathematical Association of America and a former **Queen Elizabeth II (research) Fellow** at ANU and also **Alexander Von Humboldt Fellow** (in Berlin). He brings to UB and ITMS a wealth of experience including experience gained at Edinburgh, Milan, Lyon and other universities. His teaching experience in Saudi Arabia adds to the internationalization of ITMS. David also brings new research strengths which may be applied in optimization in CIAO.

Mr Sasha Ivkovic, **Associate Professor John Yearwood** and **Dr Andrew Stranieri's** paper '*Visualising Association Rules for Feedback within Legal Systems*' was presented at the International Conference on Artificial Intelligence and Law in Edinburgh by Mr Sasha Ivkovic and was well received. Sasha found the conference interesting and sees other possibilities for the data mining and legal data.

Professor Alex Rubinov, **Mr Long Jia**, **Ms Nadia Soukhoroukova**, **Mr Julien Ugon**, **Ms Zari Dzalilov**, **Mr Jiapu Zhang** and **Mr Sergei Dymkaou** attended the 5th International Congress on

Industrial and Applied Mathematics, ICAM 2003. There were approximately 1900 presentations from 61 countries, six embedded meetings, and more than 40 parallel sessions in different fields of mathematics. ICIAM 2003 was held in Sydney, Australia and was a major scientific triumph. The main venue was the Sydney Convention and Exhibition Center (www.scec.com.au), with some embedded meetings and parallel sessions held at the Haymarket Campus of the University of Technology, Sydney. A message from the **State Governor, Professor Marie Bashir**:
“*Mathematics is recognized as the language of high technology and the golden bolt of innovation. In a wider sense, mathematics is a supreme creation of the human spirit and a vital contributor in collaboration with many fields of human endeavour.*”

10 years ago (CIAO Newsletter #21, Spring 2008)

Research Group News

MAORG: Mathematical Analysis & Optimization. Leader: Dr Adil Bagirov

The project “**Pipeline Optimization**” with GWM Water is progressing well. The first version of optimization software for minimizing pumping costs with proper interface is now ready. This software will be modified further after consultation meetings with experts from GWM Water.

All ARC Discovery Projects, involving Chief Investigators **Dr Adil Bagirov**, and **Dr Musa Mammadov**, are progressing well, and the ARC Discovery Grant “*Operations Research without Convexity*” has been successfully completed. New algorithms have been developed for solving supervised data classification, data clustering and data approximation problems in large data sets. One paper has been published in this area, with three more in the pipeline.

DMIRG: Data Mining and Informatics. Leader: Dr Peter Vamplew, deputy Leader: Dr Richard Dazeley

Current projects are being undertaken in the areas of:

- Reasoning Communities.
- Sleep Apnoea.
- Development of a Chinese Traditional Medicine Expert System in collaboration with the Health Informatics Laboratory.
- Text-Mining Surveys.

Dr Peter Vamplew's PhD Student **Ms Armita Zarnegar** recently attended the *Winter School in Mathematics and Computational Biology* at the University of Newcastle.

Five papers have been accepted to AI-2008, the *21st Australasian Joint Conference on Artificial Intelligence*, to be held in Auckland, New Zealand in December 2008.

DMIRG members have also recently submitted a wide range of papers to journals and other conferences.

Publications: July-September 2018 (SCOPUS)

1. [Aryal S.](#) *Anomaly detection technique robust to units and scales of measurement.* (2018), Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), vol. 10937, pp. 589-601, 10.1007/978-3-319-93034-3_47.
2. [Bagirov A.M.](#), [Ozturk G.](#), [Kasimbeyli R.](#) *A sharp augmented Lagrangian-based method in constrained non-convex optimization.* (2018), Optimization Methods and Software, 10.1080/10556788.2018.1496431.
3. [Bauschke H.H.](#), [Mordukhovich B.S.](#), [Sagastizabal C.S.](#), [Thera M.A.](#) *Preface.* (2018), Set-Valued and Variational Analysis, vol. 26, pp. 205-206, 10.1007/s11228-018-0484-5.
4. [Bui H.T.](#), [Lindstrom S.B.](#), [Roshchina V.](#) *Variational Analysis Down Under Open Problem Session.* (2018), Journal of Optimization Theory and Applications, 10.1007/s10957-018-1399-x.
5. [Canovas M.J.](#), [Hall J.A.J.](#), [Lopez M.A.](#), [Parra J.](#) *Calmness of partially perturbed linear systems with an application to the central path.* (2018), Optimization, 10.1080/02331934.2018.1523403.
6. [Choudhury T.A.](#), [Wei J.](#), [Barton A.](#), [Kandra H.](#), [Aziz A.](#) *Exploring the Application of Artificial Neural Network in Rural Streamflow Prediction - A Feasibility Study.* (2018), IEEE International Symposium on Industrial Electronics, vol. 2018, pp. 753-758, 10.1109/ISIE.2018.8433644.
7. [Dinh N.](#), [Goberna M.A.](#), [Lopez M.A.](#), [Volle M.](#) *Convexity and closedness in stable robust duality.* (2018), Optimization Letters, 10.1007/s11590-018-1311-5.
8. [Ebbs D.](#), [Dahlhaus P.](#), [Barton A.](#), [Kandra H.](#) *An unexpected decrease in urban water demand: Making discoveries possible by taking a long-term view.* (2018), Water Policy, vol. 20, pp. 617-630, 10.2166/wp.2018.096.
9. [Gao D.Y.](#) *On topology optimization and canonical duality method.* (2018), Computer Methods in Applied Mechanics and Engineering, vol. 341, pp. 249-277, 10.1016/j.cma.2018.06.027.
10. [Goberna M.A.](#), [Lopez M.A.](#) *Recent contributions to linear semi-infinite optimization: an update.* (2018), Annals of Operations Research, 10.1007/s10479-018-2987-8.
11. [Joki K.](#), [Bagirov A.M.](#), [Karmitsa N.](#), [Makela M.M.](#), [Taheri S.](#) *Double bundle method for finding clarke stationary points in nonsmooth dc programming*.* (2018), SIAM Journal on Optimization, vol. 28, pp. 1892-1919, 10.1137/16M1115733.
12. [Kizhakkethil Youseph A.S.](#), [Chetty M.](#), [Karmakar G.](#) *PCA based population generation for genetic network optimization.* (2018), Cognitive Neurodynamics, vol. 12, pp. 417-429, 10.1007/s11571-018-9486-0.
13. [Klein B.](#), [Clinnick L.](#), [Chesler J.](#), [Stranieri A.](#), [Bignold A.](#), [Dazeley R.](#), [McLAREN S.](#), [Lauder S.](#), [Balasubramanian V.](#) *Supporting regional aged care nursing staff to manage residents' behavioural and psychological symptoms of dementia, in real time, using the nurses' behavioural assistant (NBA): A pilot site ?eEnd-user attitudes' trial.* (2018), Studies in Health Technology and Informatics, vol. 246, pp. 24-28, 10.3233/978-1-61499-845-7-24.
14. [Lin J.](#), [Kandra H.](#), [Choudhury T.A.](#), [Barton A.](#) *Prediction of Clogging in Stormwater Filters Using Artificial Neural Network.* (2018), IEEE International Symposium on Industrial Electronics, vol. 2018, pp. 771-776, 10.1109/ISIE.2018.8433758.
15. [Lou H.](#), [Wang L.](#), [Duan D.](#), [Yang C.](#), [Mammadov M.](#) *RDE: A novel approach to improve the classification performance and expressivity of KDB.* (2018), PLoS ONE, vol. 13, 10.1371/journal.pone.0199822.

16. Perversi P., [Yearwood J.](#), [Bellucci E.](#), [Stranieri A.](#), [Warren J.](#), [Burstein F.](#), [Mays H.](#), [Wolff A.](#) *Exploring reasoning mechanisms in ward rounds: A critical realist multiple case study.* (2018), BMC Health Services Research, vol. 18, 10.1186/s12913-018-3446-6.
17. [Pineda-Villavicencio G.](#), [Ugon J.](#), [Yost D.](#) *The excess degree of a polytope.* (2018), SIAM Journal on Discrete Mathematics, vol. 32, pp. 2011-2046, 10.1137/17M1131994.
18. [Roshchina V.](#) *The Demyanov–Ryabova conjecture is false.* (2018), Optimization Letters, pp. 1-8, 10.1007/s11590-018-1296-0.
19. [Taheri S.M.](#), [Irajian I.](#) *DeepMovRS: A unified framework for deep learning-based movie recommender systems.* (2018), 2018 6th Iranian Joint Congress on Fuzzy and Intelligent Systems, CFIS 2018, vol. 2018, pp. 200-204, 10.1109/CFIS.2018.8336633.
20. [Teo K.L.](#), [Bagirov A.](#), [Yue W.](#) *Preface of the special issue: the 6th International Conference on Optimization and Control with Applications (6th OCA).* (2018), Optimization Letters, vol. 12, pp. 1157-1159, 10.1007/s11590-018-1297-z.
21. [Uddin M.A.](#), [Akther A.](#), [Parvez S.](#), [Stranieri A.](#) *Efficient route selection in ad hoc on-demand distance vector routing.* (2018), 20th International Conference of Computer and Information Technology, ICCIT 2017, vol. 2018, pp. 1-6, 10.1109/ICCITECHN.2017.8281807.
22. [Vamplew P.](#), [Dazeley R.](#), [Foale C.](#), [Choudhury T.](#) *Non-functional regression: A new challenge for neural networks.* (2018), Neurocomputing, 10.1016/j.neucom.2018.06.066.
23. [Wang L.](#), [Chen S.](#), [Mammadov M.](#) *Target learning: A novel framework to mine significant dependencies for unlabeled data.* (2018), Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), vol. 10937, pp. 106-117, 10.1007/978-3-319-93034-3_9.