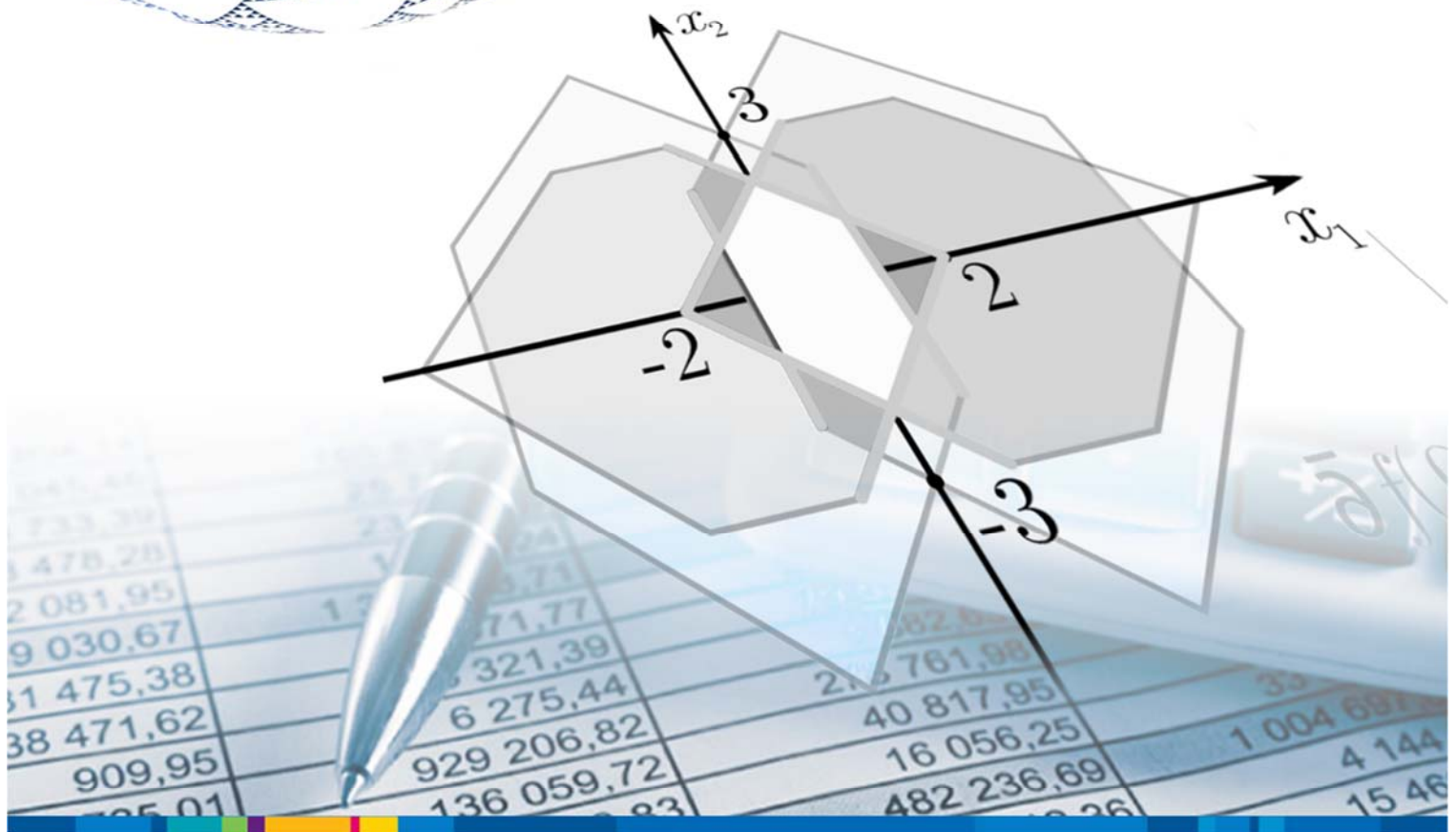


CIAO Newsletter

Centre for Informatics and
Applied Optimization

Edition #41: July-September 2019



Director's section

Welcome to our third Newsletter of 2019. It covers the period July to September.

In this issue, the Internet Commerce Security Lab (ICSL) features prominently. This reflects good work done by its staff, research students and collaborators. Federation University obtained almost \$1M of funding from Skills First Regional and Specialist Funds to support training in Cyber Security. The grant was announced by Victoria's Minister for Training and Skills, and Minister for Higher Education, the Honourable Gayle Tierney during her visit to Federation University in July. Before that, ICSL hosted another successful Malware and Reverse Engineering (MRE) Conference in Sydney. In addition, Australian Federal Police signed an MOU with Federation University to establish internship program in Cybercrime. The Internship program will provide opportunities for students to work with Australian Federal Police officers to learn about Cyber Crime investigation in a real world environment.

I am very happy to congratulate CIAO Adjunct Professor and my long-time collaborator Professor Marco Antonio López Cerdá on his 70th birthday. Since ICOTA6 in Ballarat in December 2004, Marco has visited Mount Helen many times. He has been involved in joint research with us, including several ARC Discovery projects, and actively promoted CIAO and Federation University internationally in his capacity of a member of CIAO International Academic Advisory Group. It is very pleasing to see the world optimisation community paying respect to Marco on the occasion of his birthday.

Consultations are still under way concerning the structure of management of research at the university including the funding arrangements for the newly determined Research Priority Areas. We are hoping to have more clarity on this issue by the end of the year.

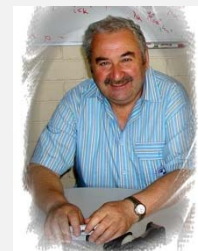
All available previous issues starting from 2003 as well as the series of the *School of Information Technology & Mathematical Sciences* Research Newsletters dating from 1998 can be accessed from the CIAO web site: <http://federation.edu.au/ciao>.



Prof Alex Kruger

In this issue:

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



Prof Alex Rubinov
CIAO Founding
Director



Prof Alex Kruger
CIAO Research
Director



A/Prof David Yost
Editor of CIAO
Newsletter

Grants, awards and recognition

Cyber security training funding announced for Federation University

Victoria's Minister for Training and Skills, and Minister for Higher Education, the Honourable Gayle Tierney, and the Member for Wendouree Juliana Addison, visited Federation University on July 11 and announced funding of \$943,000 from Skills First Regional and Specialist Funds to support training in Cyber Security. This grant will fund cutting edge cybersecurity training and equipment for the establishment of a dedicated IT laboratory, complete with industry-leading equipment, to create a simulated network environment.



Minister Gayle Tierney, MLA Juliana Addison, and Prof Iqbal Gondal

The Regional and Specialist Training Fund enables the delivery of training that meets industry-led demand for specific skills in regions, and specialist areas that are not being adequately met in the current training market. Federation University provides a range of quality education and training programs, reflecting state and national priorities that address the training needs of individuals and industry.

This funding will assist Federation University to deliver the Certificate IV in Cyber Security. The Federation University Certificate IV in Cyber Security, along with many other TAFE courses, has been made tuition-free from 2019 under the Victorian Government's Free TAFE program. Federation University TAFE is working with IT companies in order to guarantee that this course is fit-for-purpose and that the graduates acquire the skills that they will need for the jobs they want in the booming IT sector.

Federation University researcher gives seminar at Deakin

CIAO researcher **A/Prof David Yost** received an invitation to Deakin University, where he presented a seminar "*Meta-optimisation: minimising over classes of polyhedra*" on 27 September 2019.

CIAO Adjunct Professor honoured



Federation University Adjunct Professor and member of CIAO International Academic Advisory Group Professor Marco Antonio López Cerdá turned 70 on 1 August.

Marco López graduated from the University of Valencia in 1971 and got his PhD degree in 1973. He joined the University of Valencia in 1978, became Full Professor in 1981, and moved to University of Alicante in 1985 as a Professor of Statistics and Operations Research, where he contributed tremendously to the development of a research group in optimization and related topics. Marco López is Doctor Honoris Causa of the University of Limoges (since 2012). In 2013 he was elected a Corresponding Member of the Spanish Royal Academy of Sciences.

Marco López has been a teacher for several generations of Spanish mathematicians, and adviser or co-adviser of 18 PhD students in several branches of Operations Research (OR)

such as semi-infinite programming, network flows, assignment problems, convex optimization, graphs, scheduling, game theory, and variational analysis. He has been the leader of many national and international research projects, both theoretical and applied. Marco has written several books. His book *Linear Semi-Infinite Optimization*, co-authored with Miguel Goberna and published in 1998, has become a classical monograph in the field.

Marco López served as coeditor-in-chief of TOP (the OR journal of SEIO, the Spanish Society of Statistics and Operations Research) from 2000 to 2007. He serves as Associate Editor of several international journals, including International Abstracts of Operations Research, Journal of Industrial and Management Optimization, Journal of Optimization Theory and Applications, Set-Valued and Variational Analysis, RACSAM, etc. Marco was elected vice-president of SEIO in 1985 and 1998, elected president of SEIO in 1986, and served as chair of the Managing Board of EUROPT, the EURO Working Group on Continuous Optimization, from 2008 to 2010. From 2008 to 2012 Marco López was the coordinator of *i-MATH Consolidar*, a huge project of the Spanish Ministry of Education for all areas of mathematics, gathering more than 300 research groups, and with a budget of 7.5 million euros.

To honour Marco's contribution to the field, a special session "*A tribute to Marco López from Continuous Optimization*" was organized within the framework of the *XXXVIII Spanish Conference on Statistics and Operational Research*, held from 3rd to 6th September 2019 in Alcoy, the birthplace of Marco. Special Issues of two international journals: Vietnam Journal of Mathematics and Mathematical Programming, dedicated to Marco López are currently in preparation.

Prof López is going to visit Ballarat in December after attending the Workshop on Metric Bounds and Transversality in Melbourne.

Events

Malware and Reverse Engineering Conference 2019

The Internet Commerce Security Lab (ICSL) hosted another successful Malware and Reverse Engineering (MRE) Conference on 1st and 2nd July, this time at Westpac offices in Sydney. MRE is an annual conference, hosted by ICSL since 2013. MRE is a bridge between industry, law

enforcement and academia, with a strong focus on practical results from research and development projects in malware reversing. The conference aims to cover:

- Reverse engineering methods, analyses and algorithms
- Behavioural and attribution analysis of malware
- Impacts into the financial sector and government agencies
- Advanced monitoring schemes for Malware attacks

Keynote speakers were Prof Richard Brooks (from Clemson University, USA), Dr Jonathan Oliver (from Trend Micro) and Dr Tao Ban (from NICT Japan). Session industry speakers provided unique perspectives of the cyber threats to industry, and mitigation techniques. The conference was opened by Prof Syed Islam, Dean of the School of Science, Engineering and IT, and the opening address was given by Mr Richard Johnson (CISO, Westpac). Ninety delegates from Australian Cyber Security Centre, Defence Science and Technology, Australian Federal Police, banks, cyber security companies, members of Australian Information Security Association, students, members of Australian Women Security Network and academia attended the conference. The conference was sponsored by Westpac, AISA and ACSC. You can view the full conference program [here](#).



Mr Simon Brown from Westpac and Prof Iqbal Gondal with students who won conference support

Australian Federal Police signs MOU with Federation University to establish internship program in Cybercrime

The Australian Federal Police (AFP) will be working with the Internet Commerce Security Lab (ICSL) to establish a cybercrime internship program for our students studying in School of Science, Engineering and IT. Members from AFP, Australian Cyber Security Centre Melbourne, Oceania Cyber Security Centre and Federation University attended the event. The Internship program will provide opportunities for students to work with Australian Federal Police officers to learn about Cyber Crime investigation in a real world environment.

Students will be able to complete internships in a block or in a flexible manner. ICSL will be working with AFP to recruit the students to undertake the internship. Students need to meet security clearance requirement to undertake these internship. AFP and ICSL would be able to guide the students during security clearance process.

Professor Iqbal Gondal said that “these internships will present a win-win situation for students and AFP, as students will learn cybercrime analysis under the mentorship of AFP officers, and this will teach them about the work culture of the organisation as well. Students might be able to secure employment with AFP in the end. Special thanks to Federal Agent Spiros Drossos, Detective Sergeant, Cyber Crime Operations for making the internship program a reality.”

MOU signing took place on 19th July in Joint Cyber Security Centre (JCSC) Melbourne. State Manager Amanda Kates represented AFP and signed the MOU. Bruce Matthews, Director JCSC Melbourne and Kartic Srinivasanwas, OCSC were also present at the signing ceremony.






Ms Ansam Khraisat (Federation University), Dr Giles Oatley (Federation University), Prof Iqbal Gondal (ICSL), Bruce Matthews (Director JCSC Melbourne), State Manager Amanda Kates (AFP), Superintendent Jayne Crossling (AFP), Federal Agent Spiros Drossos, Detective Sergeant Cyber Crime Operations (AFP), Kartic Srinivasanwas (OCSC)

Safety, Security, and Trust in Intelligent Transportation Systems

The 2019 International Workshop on Safety, Security, and Trust in Intelligent Transportation Systems (SST-ITS) was held Rotorua, New Zealand, 5-8 August 2019. It focused on solutions that leverage techniques and insights from the domains of cyber security, artificial intelligence, edge computing, big data, and transportation engineering to resolve privacy, security, and trust challenges in Intelligent Transportation Systems. Amongst the organisers were CIAO Researcher Prof Joarder Kamruzzaman, and CIAO Honorary Research Fellow Dr Alireza Jolfaei.

CIAO seminars and research fora

Date	Name	Affiliation	Topic	
8 July	Prof Feng Xia	Dalian University of Technology, China	Social Computing with Scholarly Big Data	

15 August	Prof Alex Kruger	CIAO, Federation University, Australia	Research journey: personal experience	
29 August	Prof Fusheng Bai	Chongqing Normal University, China	Response surface methods based on radial basis function models for global optimization	
				
Prof Fusheng Bai's Seminar, 29 August 2019		Prof Alex Kruger, 15 August 2019		

CIAO visitors

Dates	Name	Institution
19-30 August	Prof Fusheng Bai	Chongqing Normal University, China
15 July - 30 August	Prof Zhiyou Wu	Chongqing Normal University, China

Forthcoming events

Optimization methods in wildfire emergency management

This workshop for early career researchers will take place on 11 November, 2019 at RMIT University in Melbourne. The topics are: Optimisation, Operations Research and Mathematical Models for emergency management

Registration and further info: <http://geosafe.lessonsonfire.eu/2019/07/09/workshop-optimization-methods-in-wildfire-emergency-management/>

China-Australia Workshop on Applied Optimisation

The **Ninth China-Australia Workshop on Optimisation: Theory, Methods and Applications (CAWO 2019)** will be held in Shanghai from 16th to 18th November 2019. The 2nd, 4th and 6th editions

were held in Ballarat (2004, 2009, 2013), with the others in Shanghai, Chongqing and Perth. CIAO continues to be involved, via Federation University's membership of **China-Australia Collaboration in Applied Optimization (CACAO)**, which also includes Shanghai University, Chongqing Normal University and Curtin University. Once again, CAWO 2019 aims to bring researchers and practitioners around the world on optimization and optimal control together to exchange ideas and approaches, to present research findings and state-of-the-art solutions.

AustMS 2019

The 63rd Annual Meeting of the Australian Mathematical Society will take place from Tuesday 3rd to Friday 6th December 2019, at Monash University's main campus at Clayton. There will be a wide variety of special sessions, including Applied and Industrial Mathematics, Computational Mathematics, and Optimisation.

WoMBaT 2019

The fourth **Workshop on Metric Bounds and Transversality (WoMBaT2019)** will be held from 8th to 10th December 2019 at Swinburne University of Technology in Melbourne, organised by CIAO Dr Nadia Sukhorukova (Swinburne University of Technology), Prof Andrew Eberhard (RMIT University), Prof Alex Kruger, Dr Vera Roshchina (UNSW), Dr Julien Ugon (Deakin University). It is expected to attract significant international attention, with confirmed participants from China, Poland, France, USA, Israel, Spain and Chile.

Staff news

Staff arrival

We welcome Associate Professor Feng Xia, Professor of Data/Computer Science, who joined Federation University in September.

Another arrival

Congratulations to CIAO technical officer and PhD student Evan Dekker, his wife Naomi, and son Isla on the arrival of Henley Patrick Dekker into the world on Friday 9th August.



HDR news

HDR conference award

A number of CIAO research students were enthusiastic participants in the University's annual HDR Research Conference, held on 25th July. Our particular congratulations go to Health Informatics student Vishakha Sharma, who won a prize for her oral presentation.

New PhD scholarships at the School of Science, Engineering and Information Technology

We await with anticipation decisions about successful applicants for the Henry Sutton PhD scholarships. These are due to be made by the end of October and should boost the School's and the Centre's research.

PhD examinations

Congratulations to CIAO PhD student **Sam Bell** who has successfully completed all the requirements of the degree of Doctor of Philosophy.

Thesis Title: **Tropical Cyclone Tracks in CMIP5 models: Statistical Assessment and Future Projections**

Principal Supervisor: **Dr Savin Chand**

Associate Supervisor: **Dr Chris Turville**

CIAO in history

20 years ago (Research Newsletter #10, July 1999)

An **Optimization Day** miniconference was held at the Greenhill Enterprise Centre on Friday 16 July 1999. The miniconference was organised by **Alex Rubinov** and **Andrew Stranieri**.

Professors Panos Pardalos (USA), Jonathan Borwein (Canada), Kok Lay Teo (Hong Kong) and Charles Pearce (Adelaide) spent a couple of days in Ballarat after the Optimization Day. Alex had very fruitful discussions with them.

15 years ago (CIAO Newsletter #7, December 2004)

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.

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.

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.

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



10 years ago (CIAO Newsletter #25, Spring 2009)

CACAO is the **China-Australia Collaboration in Applied Optimization**, a Memorandum of Understanding CIAO has entered into with Shanghai University. It formalises a joint alliance which

facilitates collaboration between the two entities. Professor Yearwood participated in further discussions with Professor Yongjian Yang, including arranging for him to visit Ballarat later in 2009.

CIAO congratulates **Dr Adil Bagirov** on being recently named EUROPT Fellow for 2009. EUROPT is the Continuous Optimization Working Group of EURO, with a membership of over 750 scientists from forty countries. EUROPT's goal is to promote and facilitate communication between international researchers working in all areas of continuous optimization. The first EUROPT Fellow was CIAO's Founding Director, the late Professor Alex Rubinov, who received the inaugural award in 2006. It is a terrific honour to receive this award. We take this opportunity to pay tribute to Dr Bagirov's optimization expertise and the international significance of his research work.

Publications: July-September 2019 (SCOPUS)

1. Benko M., Gfrerer H., Outrata J.V. *Calculus for Directional Limiting Normal Cones and Subdifferentials*. (2019), Set-Valued and Variational Analysis, vol. 27, pp. 713-745, 10.1007/s11228-018-0492-5.
2. Benko M., Gfrerer H., Outrata J.V. *Stability Analysis for Parameterized Variational Systems with Implicit Constraints*. (2019), Set-Valued and Variational Analysis, 10.1007/s11228-019-00516-1.
3. Chadha A., Florentine S., Chauhan B.S., Long B., Jayasundera M., Javaid M.M., Turville C. *Environmental factors affecting the germination and seedling emergence of two populations of an emerging agricultural weed: Wild lettuce (*Lactuca serriola*)*. (2019), Crop and Pasture Science, vol. 70, pp. 709-717, 10.1071/CP18594.
4. Chand S.S., Dowdy A.J., Ramsay H.A., Walsh K.J.E., Tory K.J., Power S.B., Bell S.S., Lavender S.L., Ye H., Kuleshov Y. *Review of tropical cyclones in the Australian region: Climatology, variability, predictability, and trends*. (2019), Wiley Interdisciplinary Reviews: Climate Change, vol. 10, 10.1002/wcc.602.
5. Estrada-Moreno A., Ferrer A., Juan A.A., Bagirov A., Panadero J. *A biased-randomised algorithm for the capacitated facility location problem with soft constraints*. (2019), Journal of the Operational Research Society, 10.1080/01605682.2019.1639478.
6. Farivar F., Haghighi M.S., Barchinezhad S., Jolfaei A. *Detection and compensation of covert service-degrading intrusions in cyber physical systems through intelligent adaptive control*. (2019), Proceedings of the IEEE International Conference on Industrial Technology, vol. 2019, pp. 1143-1148, 10.1109/ICIT.2019.8755007.
7. Gfrerer H., Outrata J.V. *On the Aubin property of solution maps to parameterized variational systems with implicit constraints*. (2019), Optimization, 10.1080/02331934.2019.1657427.
8. Jaffar I., Usman M., Jolfaei A. *Security hardening of implantable cardioverter defibrillators*. (2019), Proceedings of the IEEE International Conference on Industrial Technology, vol. 2019, pp. 1173-1178, 10.1109/ICIT.2019.8755126.
9. Jelinek H.F., Stranieri A., Yatsko A., Venkatraman S. *Personalised measures of obesity using waist to height ratios from an Australian health screening program*. (2019), Digital Health, vol. 5, 10.1177/2055207619844362.
10. Jolfaei A., Kant K. *A lightweight integrity protection scheme for low latency smart grid applications*. (2019), Computers and Security, vol. 86, pp. 471-483, 10.1016/j.cose.2018.09.014.
11. Jolfaei A., Kant K. *Privacy and Security of Connected Vehicles in Intelligent Transportation System*. (2019), Proceedings - 49th Annual IEEE/IFIP International Conference on Dependable Systems and Networks - Supplemental Volume, DSN-S 2019, pp. 9-10, 10.1109/DSN-S.2019.00010.
12. Khanh P.Q., Quan N.H. *Versions of the Weierstrass theorem for bifunctions and solution existence in optimization*. (2019), SIAM Journal on Optimization, vol. 29, pp. 1502-1523, 10.1137/18M1163774.
13. Khoda M.E., Kamruzzaman J., Gondal I., Imam T., Rahman A. *Mobile malware detection: An analysis of deep learning model*. (2019), Proceedings of the IEEE International Conference on Industrial Technology, vol. 2019, pp. 1161-1166, 10.1109/ICIT.2019.8755048.
14. Leiderman A., Morris S.A. *Embeddings of free topological vector spaces*. (2019), Bulletin of the Australian Mathematical Society, 10.1017/S000497271900090X.

15. Nassar M.A., Luxford L., Cole P., Oatley G., Koutsakis P. *Adaptive low-power wireless sensor network architecture for smart street furniture-based crowd and environmental measurements.* (2019), 20th IEEE International Symposium on A World of Wireless, Mobile and Multimedia Networks, WoWMoM 2019, 10.1109/WoWMoM.2019.8793006.
16. Ngai H.V., Phu H.X., Rockafellar R.T., Thera M. *Preface to the Special Issue Dedicated to Professor Alexander Davidovich Ioffe.* (2019), Vietnam Journal of Mathematics, 10.1007/s10013-019-00363-5.
17. Oatley G., Williams S., Barnes G.C., Clare J., Chapman B. *Crime concentration in Perth CBD: a comparison of officer predicted hot spots, data derived hot spots and officer GPS patrol data.* (2019), Australian Journal of Forensic Sciences, vol. 51, pp. S136-S140, 10.1080/00450618.2019.1569141.
18. Park S., Gondal I., Kamruzzaman J., Oliver J. *Generative malware outbreak detection.* (2019), Proceedings of the IEEE International Conference on Industrial Technology, vol. 2019, pp. 1149-1154, 10.1109/ICIT.2019.8754939.
19. Sahama T., Stranieri A., Butler-Henderson K. *Patient-empowered electronic health records.* (2019), Studies in Health Technology and Informatics, vol. 264, pp. 1765-1766, 10.3233/SHTI190637.
20. Strang K.D., Sun Z. *Hidden big data analytics issues in the healthcare industry.* (2019), Health Informatics Journal, 10.1177/1460458219854603.
21. Taheri S., Gondal I., Bagirov A., Harkness G., Brown S., Chi C. *Multi-source cyber-attacks detection using machine learning.* (2019), Proceedings of the IEEE International Conference on Industrial Technology, vol. 2019, pp. 1167-1172, 10.1109/ICIT.2019.8755006.
22. Uddin M.A., Stranieri A., Gondal I., Balasubramanian V. *An efficient selective miner consensus protocol in blockchain oriented iot smart monitoring.* (2019), Proceedings of the IEEE International Conference on Industrial Technology, vol. 2019, pp. 1135-1142, 10.1109/ICIT.2019.8754936.
23. Ur-Rehman A., Gondal I., Kamruzzaman J., Jolfaei A. *Vulnerability modelling for hybrid IT systems.* (2019), Proceedings of the IEEE International Conference on Industrial Technology, vol. 2019, pp. 1186-1191, 10.1109/ICIT.2019.8755005.
24. Van Ngai H., Phu H.X., Rockafellar R.T., Thera M. *Alexander Davidovich Ioffe: a Life of Contributions.* (2019), Vietnam Journal of Mathematics, vol. 47, pp. 511-516, 10.1007/s10013-019-00350-w.
25. Van Ngai H., Tron N.H., Thera M. *Metric Regularity Relative to a Cone.* (2019), Vietnam Journal of Mathematics, vol. 47, pp. 733-756, 10.1007/s10013-019-00361-7.
26. Welgama A., Florentine S., Marchante H., Javaid M.M., Turville C. *The germination success of *Acacia longifolia* subsp. *longifolia* (Fabaceae): A comparison between its native and exotic ranges.* (2019), Australian Journal of Botany, vol. 67, pp. 414-424, 10.1071/BT19018.