

asor news

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The AUSTRALIAN SOCIETY for OPERATIONS RESEARCH Inc.
MELBOURNE CHAPTER

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On Efficient Management of Complex Systems

Speaker : Victor Korotkikh and Galina Korotkikh, School of Computing Sciences, Faculty of Business and Informatics, Central Queensland University

Date : 18th April 2007,

Location: ICT Building, 111 Barry Street Carlton.

Time: 6.00pm.

Abstract: Complex systems profoundly change human activities of the day. However, it is still unknown how to deal with complex systems efficiently without confronting NP-hard problems. Existing concepts of complexity are very important on many occasions, but they do not explain how the performance of a system is dependent on its complexity and whether efficient management of complex systems may be possible at all.

In the talk we present a concept of complexity based on self-organization processes of prime integer relations, called the structural complexity [1]. By computational experiments we investigate whether the performance of an optimisation algorithm for a NP-hard problem could behave as a concave function of the algorithm's structural complexity [2]. The results of the experiments offer the possibility of a general optimality condition of complex systems:

a complex system demonstrates the optimal performance for a problem, if the structural complexity of the system is in a certain relationship with the structural complexity of the problem.

The optimality condition presents the structural complexity of a system as a key to its optimisation and provides instructions for management of complex systems. From its perspective the optimisation of a system would be all about the control of the structural complexity of the system to make it consistent with the structural complexity of the problem.

The experiments indicate that the performance of a complex system may indeed behave as a concave function of the structural complexity. Therefore, once the structural complexity could be controlled as a single entity, the optimisation of a complex system would be potentially reduced to a one-dimensional concave optimisation irrespective of the number of variables involved its description.

This may open a way to efficient management of complex systems.

We also discuss how the results have been used in the development of Mackay transport technology. The technology is capable in real-time optimise the performance of a fleet of vehicles operating in dynamic and uncertain environment.

References

- [1]. V. Korotkikh, "A Mathematical Structure for Emergent Computation", Kluwer Academic Publishers, Dordrecht/Boston/London, 1999; V. Korotkikh and G. Korotkikh, "On an Irreducible Theory of Complex Systems", InterJournal of Complex Systems, 2006, 1751.
- [2]. V. Korotkikh, G. Korotkikh and D. Bond, "On Optimality Condition of Complex Systems: Computational Evidence", V. Korotkikh and G. Korotkikh,

“On Basic Principles of Intelligent Systems Design”,
Proceedings of the Sixth International
Conference on Hybrid Intelligent Systems, IEEE
Computer Society Press, Washington, DC,
2006.

Biographies: Dr. Victor Korotkikh is an Associate Professor at the Central Queensland University. He held a senior research position at the Computing Centre of the Russian Academy of Sciences in Moscow till 1995 as well as a visiting position at the University of California, Berkeley in 2002-2003. Dr. Victor Korotkikh's main theoretical result is the discovery of self-organization processes of prime integer relations, which can describe complex systems through the unity of its two equivalent forms, i.e., arithmetical and geometrical. The description has the potential to become an irreducible theory of complex systems. Dr. Victor Korotkikh is also interested in industrial applications of his theoretical results and has made successful realizations in aerospace, oil and taxi industries.

Dr. Galina Korotkikh obtained an Honours degree in satellite surveying through the Moscow Engineering Institute of Geodesy. She received a PhD in computer science from the Central Queensland University in 2003. Galina's PhD thesis is devoted to quantification of nonlinear correlations in financial markets. Currently, her research interests focus on optimisation of complex systems.

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**Report on March Meeting
ACERA, its objectives and some
first results**

Speaker : Prof. Mark Burgman, Director
Australian Centre of Excellence for Risk Analysis
(ACERA),
Date : 14th March 2007,
Location: ICT Building, 111 Barry Street
Carlton.
Time: 6.00pm.

The Australian Centre of Excellence for Risk Analysis commenced operations in March 2006, so it is just on a year old. It is a research network including initially the University of Queensland, the University of New South Wales, Monash University and the CSIRO and draws on expertise throughout Australia and overseas. Some of its first round major projects have included, Bayes Net and Loop analysis, research on Surveillance and Process Control as well as the softer side methods to arrive at Formal Consensus, Eliciting Expert Judgment and Stakeholder Mapping.

There are numerous application areas including Quarantine Systems, Biodiversity Investment and the development of guidelines to identify potential environmental pests.

An aim of the Centre is to advance the theory and practice of risk analysis under each of the following themes:

1. Biosecurity framework development
2. Eliciting judgements
3. Risk analysis methods
4. Surveillance and monitoring
5. Communication and decision making

More information on ACERA and its projects can be found on its website, <http://www.acera.unimelb.edu.au/>

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**19th National Conference of the
Australian Society for Operations
Research**
**RMIT University,
Melbourne Victoria**
3-5 December, 2007
***Operations Research for Today
and Tomorrow***

The 19th National Conference of the Australian Society for Operations research will be held in December 2007. The conference will feature a number of invited sessions and contributed papers on all aspects of operations research in the modern world, including (but not restricted to) critical international issues such as environmental problems, major industrial concerns like supply chain management and modern methods of communication which can be used in the shared teaching of operations research. A CD of papers and abstracts contributed in advance will be supplied and it is anticipated that a selection of papers be submitted for a refereed journal special edition.

The conference is being held partly in conjunction with the conference on Supply Chain Management and the Information System (SCMIS), 9-12 December, 2007.

The conference will be preceded on the evening of Sunday December 2 with a welcoming drinks function at initial registration and there will be a

conference dinner included on the night of Tuesday December 4.

Full details will soon be available on the conference website currently being established. This will include information on critical dates for submission of abstracts and papers as well as registration.

For further information please contact Dr Patrick Tobin, Chair – Local Organising Committee (email: ptobin@swin.edu.au)

What Else is On

ORSUM Lecture Series

The program has now recommenced.
In the second lecture Assistant Prof Nelly Litvak (University of Twente, Netherlands) spoke on:

The asymptotic behavior of the Google PageRank distribution.

Date and Time: Friday, 9 March, 1:05-2:10 pm

Venue: Room 213, Department of Mathematics and Statistics, Richard Berry Building, University of Melbourne

Note that if you wish to have advance notice of these meetings then you should put yourself on the ASOR email list.

Victorian Statisticians

The Statistics Society of Australia (in Victoria), typically have meetings on every 3rd Tuesday of the Month starting in March 2007.

Next Meeting on: Tuesday 24 April

Speaker: Associate Professor Paul Kabaila, Department of Mathematics and Statistics, La Trobe University .

Valid inference after preliminary statistical model selection.

Location: La Trobe University, Szental Lecture Theatre,

For latest information check at:
<http://www.statsoc.org.au/Branches/VIC/meetings.htm>

The AOQ (Vic)

The next monthly forum will take place on Tuesday, 17th April at 6pm, with Mike Allison speaking on

Risk Exposures in Poor Management Practices.

Location: Level 2, Management House, 181 Fitzroy St , St Kilda Vic

AOQ (Vic) is pleased to give advance notice of the annual National AOQ Conference **QUALCON 2007**, to be held on 14-17 October 2007 at the Bayview Eden in Queens Road, Melbourne.

Themed as "The Quality of Management", QUALCON 2007 aims to provide Australian businesses with highly focused workshops and experiences to assist in the pursuit of management excellence. The Conference Program will include technical papers, workshops, factory tours, and networking events. For further details....

Conference web site: www.qualcon2007.com.au

Conference Chairman:
Anthony Pilli qpulse5@bigpond.com

For the latest AOQ information check at:
<http://www.aoqvic.org.au/>

Web Pages of Interest

We are affiliated with FASTS through AMSC
To keep abreast of FASTS activities
consult : [http:// www.usyd.edu.au/fasts/](http://www.usyd.edu.au/fasts/)

ASOR National: <http://www.asor.ms.unimelb.edu.au>
Melbourne Chapter

<http://www.asor.ms.unimelb.edu.au/melbourne>

The new website for ASOR - Sydney is:

<http://www.asor-sydney.asn.au/>

Queensland Chapter

<http://www.math.fsc.qut.edu.au/asor/>

NZ OR Society <http://www.orsnz.org.nz/>

ORS (UK): <http://www.orsoc.org.uk/>

INFORMS (US): <http://www.informs.org/>

IFORS: <http://www.ifors.org>

For the latest International news, conference and jobs details see:

<http://www.ifors.org/panorama/index.html>

tutOR: <http://www.tutor.ms.unimelb.edu.au>

CSIRO's Double Helix Club <http://www.csiro.au/>

Committee Membership for **2007/8**

Chair – Patrick Tobin 9214 8013
email: ptobin@swin.edu.au

Vice Chair - Harry Burley 9458 1872
email: h.burley@latrobe.edu.au

Secretary - Kaye Marion 9925 3162
email: k.marion@rmit.edu.au

Treasurer - Paul Lochert 9802 4628
email: plochert@bigpond.net.au

Minute Secretary – to be appointed

Committee –

Harry Gielewski 9350 4726
email: harrygie@ozemail.com.au

Santosh Kumar 9816 3401
email: skumar@csm.vu.edu.au

Ruth Luscombe
email: r.luscombe@ms.unimelb.edu.au

Jaeger Renn-Jones
email: j.renn-jones@ugrad.melbourne.edu.au

Alana Moore
email: a.moore@ms.unimelb.edu.au

Moshe Sniedovich 8344 5559
email: m.sniedovich@ms.unimelb.edu.au

Co-opted

Ejanul Haque
email: ejanul.haque@rmit.edu.au

Office Manager –

Kaye Marion 9925 3162
email: k.marion@rmit.edu.au

Newsletter Editor –

Harry Gielewski 9350 4726
email: harrygie@ozemail.com.au

Student Representative –

Rafiul Hassan 8344 1426
email: mrhassan@cs.mu.OZ.AU

Ex Officio: - Baikunth Nath 8344 1400
email: baikunth@unimelb.edu.au
bnath@csse.unimelb.edu.au