Workshop Proposal for IDEAL 2017

Workshop Title: Empowering Data Mining Techniques through Metaheuristic (EDMM)

Duration: Full-day

Description of the workshop:

Hybridizing techniques embrace the advantages of more than any one of them alone. On one hand metaheuristic approaches are general strategies for guiding heuristic procedures usually for improving the efficiency of optimization methods. Recently there have been strong momentums centered on metaheuristics research in computer science communities especially those of evolutionary computing, swarm intelligence which taps on the power of collective and bio-inspired collaborative behaviours for distributed search. Many contemporary algorithms and their applications to solve computationally intensive problems have emerged, ranging from swarm intelligence methods inspired by bee pollination to wolf-pack hunting.

While novel metaheuristics are being developed from time to time, hybrid versions of them across the data mining techniques are not uncommon. Hybridization comes in two major directions – data mining approaches are combined within an optimization process, and vice-versa. In the first case, data mining is the core function with the objective of analyzing data and revealing the hidden patterns, just as if it is in its original form. The data mining function is wrapped by the iterative process of optimization, driven by some metaheuristics for the sake of stochastically finding the optimal data mining result out of many possible runs. On the other hand, data mining methods are used as a part of the heuristic search in the metaheuristics. In this case, search patterns and search directives are learnt from data mining the past trials during the optimization process. So the heuristic searches are better guided by incorporating the knowledge learnt from the heuristic trails; hence it enhances the optimization results at the end.

The main focus of this workshop is to investigate new methods and desirable properties of the new hybrids resulted from combining metaheuristics and data mining, either in metaheuristics wrapping data mining or data mining enhancing the metaheuristic searches. Most metaheuristics strategies have already been applied to data mining tasks but there are still open research lines to improve their usefulness. The workshop is intended to serve as a platform for exchanging the latest progresses along these two types of hybridization of the two important computational techniques. Sharing of experiences of applications using hybrid metaheuristics and data mining are encouraged too, both from academia and industries in the following theoretical and application areas (but not limited):

Topics:

Algorithms and metaheuristics
- Ant colony optimization
- Artificial immune systems
- Bee algorithms
- Cuckoo search
- Differential evolution
- Genetic algorithms

- Genetic programming
- Firefly algorithm
- Harmony search
- Particle swarm optimization
- Simulated annealing
- Tabu search
- and others

Applications based on Nature-Inspired Computing and Metaheuristics
- Decision support systems
- Swarm intelligence and optimization
- Data mining
- Scheduling optimization
- Big data analytics
- Intelligent information technology
- Intelligent agents and nature-inspired computing
- Real-world applications

Short description on how the organizers' plans to attract quality submissions:

The topic consists of two research fields are some of the hottest. There are substantial amount of research efforts in cross-breeding them for further enhancement in performance. Naturally it is expected to have a high number of submissions.

The organizers will broadcast to their networks, including but not limited to: International Consortium for Optimization and Modelling in Science and Industry (iCOMSI), International Neural Network Society regional chapter, and Data Analytics and Collaborative Computing Research Group.

Preliminary list of invited speakers (if any)

Professor Slawomir Koziel, Director of Engineering Optimization & Modeling Center, Reykjavik University, Iceland
Prof. Saman Halgamuge, Associate Dean, School of Engineering, The University of Melbourne, Australia
Professor Asim Roy, Department of Information Systems, Arizona State University, USA

Short bio of the organizers

Dr. Simon Fong, Associate Professor of Computer and Information Science, University of Macau, Macau SAR Simon Fong graduated from La Trobe University, Australia, with a 1st Class Honours BEng. Computer Systems degree and a PhD. Computer Science degree in 1993 and 1998 respectively. Simon is now working as an Associate Professor at the Computer and Information Science Department of the University of Macau. He is also one of the founding members of the Data Analytics and Collaborative Computing Research Group in the Faculty of Science and Technology. Before joining the University of Macau, he

worked as an Assistant Professor in the School of Computer Engineering, Nanyang Technological University, Singapore. Prior to his academic career, Simon took up various managerial and technical posts, such as systems engineer, IT consultant and e-commerce director in Melbourne, Hong Kong and Singapore. Some companies that he worked before include Hong Kong Telecom, Singapore Network Services, AES Pro-Data and United Oversea Bank, Singapore. Dr. Fong has published over 300 international conference and peer-reviewed journal papers, mostly in the area of E-Commerce technology, Business Intelligence and Data-mining. http://simonjamesfong.com

Dr. Thomas Hanne, Head of Competence Center Systems Engineering, Professor of Institute for Information Systems, University of Applied Sciences and Arts Northwestern Switzerland, Switzerland Online CV: http://www.fhnw.ch/people/thomas-hanne/

Dr. Sabah Mohammed is a Professor of Computer Science at Lakehead University, Thunder Bay, Ontario, Canada. Sabah was also a Visiting Scholar at the Math and Computer Science Department, Laurentian University (Winter 2008) and Sultan Qaboos University (Summer 2015). He holds the status of Professional Software Engineer of Ontario (P.Eng) and Canada's Information Processing Professional (ISP) as well as IEEE Senior Member. During 2005 and 2006, Sabah was the recipient of the LU Merit Award in Research and Teaching as well as the LU Contribution to Teaching Award. Also LU has awarded Dr. Sabah the Merit Award for in excellence in Teaching and Research during 2015. Sabah has also some notable administrative services as he chaired prior to his LU position three Computer Science and Information Systems departments as well as being on several notable LU Senate Committees. Sabah served on the LU Senate for the period 2010- 2013. Moreover, Sabah has published more than 90 refereed articles, chapters in books and four textbooks. His research interest is in intelligent systems that have to operate in large, nondeterministic, cooperative, survivable, adaptive or partially known domains. Although his research is inspired by his PhD work back in 1981 on the employment of some Brain Activity Structures based techniques for decision making (planning and learning) that enable processes (e.g. agents, mobile objects) and collaborative processes to act intelligently in their environments to timely achieve the required goals. Sabah has extended his research vision to include constructivism and focus more on the nature of knowledge. Since knowledge is created by people and influenced by their values and culture, Sabah's research has been shifted more towards net centric systems (e.g. Cloud Computing, Social Networking and Enterprise Systems, Web-Based Systems and Big Data). During the last nine years at Lakehead, Sabah's research is focused on developing ubiquitous healthcare systems that enable sharing securely medical knowledge and data. In particular sharing Electronic Health Records (EHRs) over the Web/cloud is one of the very challenging problems that Sabah is trying to solve. Sabah believes that finding good solutions for sharing EHRs requires approaches that cut across many different fields (e.g. Semantic Web, Web 2.0, Web 3.0, Ubiquitous Computing, Cloud Computing, Medical Informatics, XML Security, Artificial Intelligence and Big Data). He has published several notable publications related to this hybrid area.

Tentative program committee

Nikola Kasabov (AUT University, New Zealand)
Irwin King (The Chinese University of Hong Kong, Hong Kong)
Nikhil Ranjan Pal (Indian Statistical Institute, India)
Ganapati Panda (Indian Institute of Technology Bhubaneswar, India)
Lipo Wang (Nanyang Technological University, Singapore)

Ron Sun (President-INNS, Rensselaer Polytechnic Institute, USA)
International Program Committee (in alphabetic order):
Andy Ip (University of Macau, Macau) A
lok Kanti Deb (Indian Institute of Technology Kharagpur, India)
Basabi Chakraborty (Iwate Prefectural University, Japan)
Dimitris E. Simos (National Technical University of Athens, Greece)
Vijayalakshmi Pai (PSG College of Technology, Coimbatore)
Monica Chis (Frequentis, Romania)
Muhammad Abulaish (King Saud University, Riyadh, Kingdom of Saudi Arabia)
Niladri Chatterjee (Indian Institute of Technology New Delhi, India)
Ping-Feng Pai (National Chi Nan University, Taiwan)
Praveen Ranjan Srivastava (BITS-Pilani, India)
Stelios Joannou (University of Leicester, UK)
Yu-Xin Zhao (Harbin Engineering University, China)
Zong Woo Geem (Johns Hopkins University, USA)

Contact information of the organizers (including name, affiliation, mailing address, and e-mail address)

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