Department of Computer Science
香港城市大學
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COMPUTER SCIENCE COLLOQUIUM

Combinatorial Optimisation Can be Different from Continuous Optimisation for MOEAs

SPEAKER **Dr Miqing LI**

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DATE 24 Aug, 2023 (Thu)
TIME 10:00 AM - 11:30 AM
VENUE G7315, CS Discussion Room, 7/F., Yeung Kin Man Academic Building, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon Tong, Hong Kong

ABSTRACT

In this talk, I will first present an interesting yet unwelcome phenomenon for multi-objective evolutionary algorithms (MOEAs) to deal with multi-objective combinatorial optimisation problems (MOCOPs). That is, when dealing with MOCOPs, the search, in different executions of an MOEA (e.g., NSGA-II), tends to stagnate in different areas in the search space. In other words, the final populations obtained by an MOEA under multiple executions, which can be very close in the objective space, are located far away from each other in the search space. Experimental results show a clear difference between multi- objective combinatorial and continuous problems, and suggest a need of more efforts to be put on developing effective MOEAs for combinatorial problems. In the second part of the talk, I will present an "unusual" way to deal with MOCOPs – non-elitist MOEAs. Elite preservation (or elitism) is believed to be one of the major contributing factors that lead to the success of MOEAs and now has been a default way for their population update operation. Yet, here we view this issue from a different perspective. We propose a simple non-elitist MOEA which only considers the Pareto dominance relationship (without a diversity- related criterion) to differentiate solutions. We show that, when configured properly, non-elitist MOEA can compete with well-known elitist MOEAs (NSGA-II, SMS-EMOA and NSGA-III), and even significantly outperform its competitors on hard problems. Lastly, I will discuss implications of this study and suggest possible ways to develop effective MOEAs for MOCOPs.

BIOGRAPHY

Dr Miqing Li (https://sites.google.com/view/miqing-li) is an Assistant Professor at the University of Birmingham and a Turing Fellow of the Alan Turing Institute, UK. Miqing's research focuses on multi-objective optimisation, where he develops population-based randomised algorithms (mainly evolutionary algorithms) for both basic and practical problems. On basic research, Miqing tackles general challenging problems (e.g. problems with many objectives, complex constraints, expensive to evaluate, or combinatorial object). These works were published in mainstream venues in the EC areas such as TEVC, ECJ, TCYB, TELO, IEEE CIM, GECCO, CEC, PPSN and EMO, some of which (e.g., GrEA and SDE) are among the most widely used ones in the field. On applied research, working with experts in different fields (e.g., software engineering, high-performance computing, neural architecture search, and supply chain), Miqing develops novel methods to tackle their practical problems. These works appear in high-profile venues in relevant areas such as TOSEM, TSE, ICSE, FSE, AIJ, NeurIPS, IJCAI, TPDS, TFS, TDSC, TAAS, TSMC-A, TR, EJOR, and CSUR. Some of these methods have become the most cited works in the corresponding venues since they made appearance. His work has received the Best Paper Award/Nomination in mainstream conferences in the EC field (CEC, GECCO, and SEAL). Miqing was the founding chair of the IEEE CIS' Task Force on Many-Objective Optimisation, and is an Associate Editor of IEEE Transactions on Evolutionary Computation.

All are welcome!

In case of questions, please contact Prof. Qingfu Zhang at qingfu.zhang@cityu.edu.hk, or visit the CS Departmental Seminar Web at https://www.cs.cityu.edu.hk/events/cs-seminars/recent-cs-colloquiums.