

Symposium on Evolutionary Computation

进化计算领域专家系列学术报告会

2017-10-25 08:40–11:10 (AM) 2017年10月25日上午8:40–11:10

Anhui University, Conference Hall on the First Floor below of the Xingzhi Building

安徽大学磬苑校区行知楼负一楼报告厅

organized by the School of Computer Science and Technology, Anhui University
and the IEEE CIS Hefei Chapter

Talk 1

Topic: Approximation-Guided Many-Objective Optimization and the Travelling Thief Problem

Presenter: Senior Lecturer Dr. Markus Wagner

Time: 2017-10-25 8:40–9:30 AM (2017年10月25日上午8:40–9:30)

Location: Anhui University, Conference Hall on the First Floor below of the Xingzhi Building, 安徽大学磬苑校区行知楼负一楼报告厅

Abstract. The members of the Optimisation and Logistics Group in Adelaide research optimisation methods that are frequently used to solve hard and complex optimization problems. These include linear programming, branch and bound, genetic algorithms, evolution strategies, genetic programming, ant colony optimisation, local search, and others.

My areas of interest are heuristic optimisation and applications, thereof my work draws on computational complexity analysis and on performance landscape analysis. In this seminar, I will focus on two topics:

- 1) Most real-world optimisation problems are characterised by multiple objectives, which are often in conflict with each other. The goal of multi-objective optimisation is to find a (not too large) representative subset. However, navigating high-dimensional objective spaces is hard. I will first show how the theoretical concept of “approximation” allowed us in 2011 to be the first who could reliably deal with more than five objectives. Then, I will briefly outline a few of the multi-objective problems that we have been working on since then.
- 2) The so-called Travelling Thief Problem is an academic problem that was created to study problems with interconnected components. Such components are present in integrated planning and scheduling decision-support systems for example in supply-chain operations.

Markus will make the slides available on his website on the day of the presentation. He is grateful for the support of the China Science and Technology Exchange Centre (CSTEC), the Australian Academy of Technology and Engineering (ATSE), and Profs. Li (USTC), Weise (HFUU), and Zhang (AHU).



Brief Biography. Dr. Markus Wagner is a Senior Lecturer at the School of Computer Science, University of Adelaide, Australia. He has done his PhD studies at the Max Planck Institute for Informatics in Saarbrücken, Germany and at the University of Adelaide, Australia. So far, he has been a program committee member for 38 times, and he has written over 80 articles with over 70 different co-authors. He has chaired several education-related committees within the IEEE CIS, is Co-Chair of ACALCI 2017 and General Chair of ACALCI 2018.

Dr. Wagner is also Co-Chair of the International Workshop on Benchmarking of Computational Intelligence Algorithms (BOCIA, <http://iao.hfuu.edu.cn/bocia18>, EI-indexed, deadline 2017-11-15) and the special issue on Benchmarking of Computational Intelligence Algorithms in the Computational Intelligence Journal (<http://iao.hfuu.edu.cn/bocia-ci-si>, published by Wiley Periodicals, Inc., EI and SCI indexed, open CfP + invited extended selected papers from BOCIA).

Talk 2

Topic: Automating Scientific Work in Optimization

Presenter: Prof. Dr. Thomas Weise

Time: 2017-10-25 09:30–10:20 AM (2017年10月25日上午9:30–10:20)

Location: Anhui University, Conference Hall on the First Floor below of the Xingzhi Building, 安徽大学磬苑校区行知楼负一楼报告厅

Abstract. In the fields of heuristic optimization and machine learning, experimentation is the way to assess the performance of an algorithm setup and the hardness of problems. Good experimentation is complicated. Most algorithms in the domain are anytime algorithms, meaning they can improve their approximation quality over time. This means that one algorithm may initially perform better than another one but converge to worse solutions in the end. Instead of single final results, the whole runtime behavior of algorithms needs to be compared (and runtime may be measured in multiple ways). We do not just want to know which algorithm performs best and which problem is the hardest — a researcher wants to know *why*. We introduce a process which can 1) automatically model the progress of algorithm setups on different problem instances based on data collected in experiments, 2) use these models to discover clusters of algorithm (or problem instance) behaviors, and 3) propose reasons why a certain algorithm setup (or problem instance) belongs to a certain algorithm (or problem instance) behavior cluster. These high-level conclusions are presented in form of decision trees relating algorithm parameters (or instance features) to cluster ids. We emphasize the duality of analyzing algorithm setups and problem instances. Our process is implemented as open source software and tested in two case studies, on the Maximum Satisfiability Problem and the Traveling Salesman Problem. Besides its basic application to raw experimental data, yielding clusters and explanations of “quantitative” algorithm behavior, our process also allows for “qualitative” conclusions by feeding it with data which is normalized with problem features or algorithm parameters. It can also be applied recursively, e.g., to further investigate the behavior of the algorithms in the cluster with the best-performing setups on the problem instances belonging to the cluster of hardest instances. Both use cases are investigated in the case studies.



Brief Biography. Prof. Dr. Thomas Weise [汤卫思] obtained his *Diplom Informatiker* (Master of Computer Science) in 2005 from the Chemnitz University of Technology and his PhD from the University of Kassel in 2009. He then joined the University of Science and Technology of China [USTC, 中国科学技术大学] as PostDoc. Dr. Weise was promoted to Associate Professor at the USTC-Birmingham Joint Research Institute in Intelligent Computation and Its Applications (UBRI) at USTC in 2011. In 2016, he joined Hefei University as Full Professor to found the *Institute of Applied Optimization* [应用优化研究所] at the Faculty of Computer Science and Technology. Prof. Weise has more than 80 scientific publications in international peer reviewed journals and conferences. His book “*Global Optimization Algorithms – Theory and Application*” has been cited more than 760 times and he has acted as reviewer, editor, or programme committee member at 70 different venues. Prof. Weise is also Co-Chair of the International Workshop on Benchmarking of Computational Intelligence Algorithms (BOCIA, <http://iao.hfuu.edu.cn/bocia18>, EI-indexed, submission deadline November 15, 2017) and the related Special Issue on Benchmarking of Computational Intelligence Algorithms in the Computational Intelligence Journal (<http://iao.hfuu.edu.cn/bocia-ci-si>, published by Wiley Periodicals, Inc., EI and SCI indexed, open CfP + invited extended selected papers from BOCIA).



Institute Website



Prof. Weise WeChat



optimizationBenchmarking.org



Slides URL

Talk 3

Topic: Species-based PSO for Continuous Dynamic Constrained Optimization
Presenter: Associate Prof. Dr. Wenjian Luo
Time: 2017-10-25 10:20–11:10 AM, 2017 年 10 月 25 日上午 10:20–11:10
Location: Anhui University, Conference Hall on the First Floor below of the Xingzhi Building, 安徽大学磬苑校区行知楼负一楼报告厅

Abstract. Recently, Dynamic Constrained Optimization Problems (DCOPs) have drawn increasing attention. With the presence of constraints, many real-world problems have multiple disconnected feasible regions. If the constraints change with time, the problems can become complex. The feasible regions could shrink, extend, move, appear unpredictably and disappear suddenly, while the global optimum might switch from one feasible region to another. In this talk, based on the Particle Swarm Optimization algorithm, an ensemble of locating and tracking feasible regions strategies to handle different types of dynamics in constraints is discussed. An ensemble is used because for most cases, the change type of the constraints is unknown or variable over time. The typical benchmark problems for DCOPs are introduced in this talk.



Brief Biography. Wenjian Luo is an associate professor at the School of Computer Science, University of Science and Technology of China, Hefei, China. His research interests include computational intelligence, information security and data privacy, machine learning and data mining. He has authored/co-authored over 70 referred papers on international conferences and journals, including top journals IEEE TEC, IEEE TETCI, IEEE TETC, IEEE TDSC, IEEE TPS and ACM TDAES. He is a junior associate editor of *Frontiers of Computer Science* (Higher Education Press and Springer). He has served as the guest co-editor of the special issues/sections for five journals, including *IEEE Transactions on Emerging Topics in Computational Intelligence* (IEEE), *Genetic Programming and Evolvable Machines* (Springer), *Connection Science* (Taylor & Francis), *International Journal of Computational Intelligence and Applications* (World Scientific Press), *Journal of Computer Science and Technology* (Chinese Science Press and Springer).

Related Event at Hefei University

Topic: An Academic Optimisation Problem in Logistics and Two Real-World Optimisation Problems Related to Energy
Presenter: Senior Lecturer Dr. Markus Wagner
Time: 2017-10-26 15:00 (2017 年 10 月 26 日下午 3 点)
Location: Hefei University, Meeting Room of the Faculty of Computer Science and Technology, Building 36, 3rd Floor, Room 305



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