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Description of Research Seminars

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Participants:	UGOE UNIKL DTU UOA UC
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Research Seminar

offered by Morten Tiedemann (ES-UGOE-8)

in February 2014,

in Auckland, New Zealand

Subject: Competitive Analysis for Multi-Objective Online Optimization Problems

Problem: In online optimization, an algorithm has to make decisions based on a sequence of incoming bits of information without knowledge of future inputs. The performance of an online algorithms is commonly evaluated by comparing its objective value to the optimal offline solution, also referred to as competitive analysis. Thus far, the notion of online algorithms and competitive analysis is only known for single-objective optimization problems. We transfer the concept to multiple objectives and introduce competitive analysis for multi-objective optimization problems. Due to the shift from a single optimal solution in single-objective optimization to a set of efficient solutions in multi-objective optimization, the transformation of the concept of competitive analysis to multiple objectives is not straightforward. In this talk, the novel definition of multi-objective online optimization is discussed and substantiated by the analysis of multi-objective counterparts of classical online optimization problems.

Main Results: The concept of competitive analysis for multi-objective online problems seems highly promising. It yields strong and consistent results and provides further insight into the nature of online problems. We applied this novel concept to multi-objective extensions of well-known online problems such as the online time series search problem, the ski rental problem, the linear search problem, the Canadian traveller problem, and the k-server problem. For specific variants of all these problems, we deduced (strongly) competitive algorithms and lower bounds.

Furthermore, as in the case of single-objective online optimization, we extended the definition of competitiveness to randomized algorithms and achieved encouraging results.

Participants: Students and researchers from the University of Auckland

Publication: -