# KIT
Karlsruher Institut für Technologie

# aifb
**Institut für Angewandte Informatik
und Formale Beschreibungsverfahren**

## Graduiertenkolloquium Angewandte Informatik

### „Scalarized Preferences in Multi-Objective Optimization"

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**AIFB**

Abstract:

Multi-objective optimization is the discipline of finding solutions to problems that possess more than one objective. Such problems usually do not feature a single solution that has optimal values for each objective. Instead, we obtain a set of Pareto optimal solutions that can only be improved in one objective by simultaneously deteriorating another objective. Preferences of a decision maker are required to make a choice among the Pareto optimal set. Scalarization is a preference articulation method that maps the vector of objective values to a real number. This technique induces a total order on the objective space and thereby allows the identification of global preference optima on the set of Pareto optimal solutions.

Solving a scalarized multi-objective problem usually leads to obtaining only a single solution out of the Pareto optimal set. One solution, however, yields no information about the shape and composition of the Pareto front. Such information, however, is crucial for humans to review their choice as research in economics and psychology has shown. Scalarization might also not capture the true preferences of a decision maker in their entirety, since aggregation always causes loss of information. Therefore, the decision maker might choose differently if he had other options available.

Novel approaches are discussed in this talk that ameliorate the negative impact of the aforementioned issues. Preference-biased Pareto front approximations use scalarized preference information to compute Pareto front approximations that find more solutions in regions that are interesting to the decision maker while retaining the scope of the entire front. Local preference optima are solutions that possess optimal scalarization values in their immediate neighborhood, but may be situated far apart in the objective space. A method for computing such solutions is presented. Both techniques provide a decision maker with more alternatives that allow him to assess additional tradeoffs and thereby make a qualified choice. The talk also features a discussion of said methods to real-world applications in smart building optimization, the optimization of a combined heat and power plant and windmill placement.

Termin:     Mittwoch, 09. November 2016, 15.45 Uhr

Ort:        Kaiserstr. 89, 76133 Karlsruhe
            Kollegiengebäude am Kronenplatz (Geb. 05.20), 1. OG, Raum 1C-04
            (Hinweise für Besucher: www.aifb.kit.edu/web/Kontakt)

Veranstalter:   Institut AIFB, Forschungsgruppe Effiziente Algorithmen

Zu diesem Vortrag lädt das Institut für Angewandte Informatik und Formale Beschreibungsverfahren alle Interessierten herzlich ein.

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