

Seminar

# Preference-Based Multi-objective Optimization

Multi-objective Optimization (MOO) is well-known for trade-off analysis between objectives in many real-world problems including embedded systems design, for example [1]. The MOO results in the formation of Pareto Optimal points that allows the decision-maker to select the points based on his desired trade-off in an application. One typical example for MOO is a Genetic Algorithm based on NSGA selection [2]. However, NSGA algorithms often lead to the exploration and optimization of the entire design space in each objective dimension. This is not necessary for many applications and a significant computational effort is wasting for regions outside the threshold values in the decision maker's mind.

This seminar aims to summarize different multi-objective optimization approaches which form Pareto Optimal solutions based on the preference given by the designer (e.g. [3]). Besides, comparisons between each method and the benefits and drawbacks of these methods in real-world applications also need to be investigated.

[1] Manu Manuel, Arne Kreddig, Simon Conrady, Nguyen Anh Vu Doan, Walter Stechele: Model-Based Design Space Exploration for Approximate Image Processing on FPGA. 2020 IEEE Nordic Circuits and Systems Conference (NorCAS), 2020.

[2] K. Deb, S. Agrawal, A. Pratap and T. Meyarivan, "A Fast Elitist Nondominated Sorting Genetic Algorithm for Multi-objective Optimization: NSGA-II", Parallel Problem Solving from Nature PPSN VI ser. Lecture Notes in Computer Science, pp. 849-858, 2000.

[3] Kalyanmoy Deb and J. Sundar. Reference point based multi-objective optimization using evolutionary algorithms. In Proceedings of the 8th Annual Conference on Genetic and Evolutionary Computation, GECCO '06, 635-642. New York, NY, USA, 2006.

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