

# Sample-Path Optimization for Constrained Problems

Nataša Krejić (speaker), Zorana Lužanin \*

Simulation based optimization integrates optimization technique into the simulation analysis. Computer simulations are used as a model of real systems to evaluate output responses. In this framework the corresponding objective function is a measurement of an experimental simulation. The inevitable inaccuracies of the objective function complicates the optimization procedure and derivative information is typically unavailable. We consider simulated response problem with constraints on decision variables where objective function is computed by taking an expectation over the sample response function and has no explicit form. Therefore gradient information is also unavailable. The constraints on decision variables are given by deterministic functions. The underlying method in this work is the sample-path method. The sample path method approximates the expected value function by averaging sample response functions and thus generates a deterministic problem. The key issues is a number of sample points which is generally large and we adopt a variable sample size strategy. We use a derivative free approach as a sample path solver. A sequence of local quadratic models that approximate the objective function during iterative procedure is constructed. Quadratic models are obtained by interpolating a set of sample points. The sample sizes varies through iterative procedure and is determined as nondecreasing sequence of integers. The sample size in each iterative step is determined using an estimation based on Bayesian approach. Thus a good agreement between the objective function function and the model will be ensured at a cost that might be smaller than in classical sample methods. Convergence is analyzed and numerical results are discussed.

---

\*Department of Mathematics and Informatics, University of Novi Sad, Trg Dositeja Obradovića 4, 21000 Novi Sad, Serbia, e-mail: natasak@uns.ns.ac.yu