

Authors: Emmanouil Karantoumanis and Nikolaos Ploskas

Title: A computational comparison of mixed-integer derivative-free optimization solvers in an adaptive sampling surrogate modeling framework

Abstract:

Derivative-free optimization (DFO) has recently received a lot of attention. Expensive black-box optimization problems are becoming more and more common in science and engineering. In this work, we have implemented an adaptive sampling surrogate model framework for solving black-box optimization problems. Initially, a sampling method is utilized to determine initial sampling points. Then, a surrogate model is generated by ALAMO as an approximation model for the original objective function of the problem. The surrogate model is evaluated and if the termination criteria are not met, then a re-sampling strategy is executed. In this step, we utilized DFO solvers to re-sample new points and feed them back to ALAMO in order to generate an updated surrogate model. In this step, we utilize various DFO solvers in order to produce new sampling points. These DFO solvers need to take into account already evaluated points. There are only a few DFO solvers that utilize already evaluated points and can also handle integer variables. The new sampling points are used by the surrogate framework in an adaptive procedure until the termination criteria are met. In this work, we compare various DFO solvers (MATLAB's `surrogateopt`, `MISO`, `Nevergrad`, `SNOBFIT`, and `ZOOpt`) than can be utilized in such an adaptive framework. We present extensive computational results on pure and mixed-integer optimization problems.