

Title: Tuning BARON using derivative-free optimization algorithms

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Abstract:

Optimization solvers include many options that allow users to control algorithmic aspects that may have a considerable impact on solver performance. Tuning solver options is often necessary to reduce execution time and improve solution quality. Previous studies of solver tuning techniques have focused on mixed-integer linear programming and local nonlinear programming solvers. In this paper, we investigate the potential of tuning a global optimization solver for mixed-integer nonlinear programming problems. In particular, derivative-free optimization (DFO) algorithms are used to find optimal values for options of the global optimization solver BARON. A set of 126 problems from the GLOBALlib and MINLPLib collections are utilized in a computational study from which we conclude that tuning options can improve the default performance of BARON for individual problems. Additionally, we present a systematic comparison of 27 DFO solvers in terms of their ability to improve the performance of the global solver. We find that several DFO implementations are much better than others in terms of finding optimal tuning parameters.