

## Insights Into Using Continuous Constrained Optimization Methods to Solve Black Box Mixed Integer Problems

Angel F. Garcia Contreras  
Department of Computer Science  
University of Texas at El Paso  
El Paso, TX 79968  
afgarciacontreras@miners.utep.edu

DAKOTA (Design Analysis Kit for Optimization and Terascale Applications) is a multi-level parallel object-oriented toolkit framework for optimization, uncertainty quantification, parameter estimation and sensitivity analysis. It features an extensible interface with multiple optimization algorithms, using both gradient and non-gradient methods. As part of a summer internship at Sandia National Labs, I implemented additional optimization libraries for mixed-integer programming into DAKOTA. The work involved testing and comparing possible libraries, and then creating the interface between the selected libraries and the DAKOTA framework. My current research is continuous constrained optimization, which does not directly solve mixed integer problems. The experience acquired working in DAKOTA at Sandia influenced the outlook and scope of my work on optimization algorithms, by introducing two ideas: First, expanding the optimization capabilities of our constrained optimization solvers to include mixed integer capabilities in the form of branch and bound and derived methods, which take advantage of continuous optimization techniques to solve mixed integer programs; and second, doing black box optimization, which would expand the capabilities of the optimization solver to find solutions to a broader category of problems.