LARGE SCALE MIXED INTEGER GLOBAL OPTIMIZATION

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Large scale

Large scale optimization problems are typically classified as problems containing thousands of variables and constraints. These types of problems are becoming more and more common in industry as they are connected to greater economical savings, and the methods and computers used to solve these problems are becoming more efficient.

In our case, we have focused on typical engineering optimization problems of large scale like process and production planning problems, as well as logistics problems.

Method and algorithm development

The MINLP solver problem AlphaICP, developed in the group, is one of the state-of-the-art solvers available today on a worldwide basis for academic and industrial use, for example, via the GAMS modeling framework and the NEOS server for optimization.

The recently developed sequential cutting plane (SCP) algorithm is another MINLP solver, created in the group.

Methods for solving nonconvex MINLP problems containing so called signomial functions have been studied for some time, resulting in different advances in the area of convex underestimators for signomial terms. The global optimization algorithm, GEPUCF, is an implementation of the results obtained.

Academic results


Academic collaborators

Beyond Nordic universities: Princeton University (USA), Carnegie Mellon University (USA), University of Dundee (UK), Imperial College of Science and Medicine (UK), University College of London (UK), University of Braunschweig (GER), Ecole Polytechnique Paris (FRA), Universidad Politecnica de Cataluna (ESP), University of Maribor (SI), University of Alberta (CAN) and partners in the MINLP World forum.

Industrial applications

Several large scale optimization problems for which tailored solution tools and systems have been developed in the group, are today in continuous industrial use.

- MSIFT: A production planning tool for retailing.
- CPU: Production planning tool for soft drink industry.
- Trest: A production planning tool for soft drink industry.
- Vistema: A production planning tool for soft drink industry.
- Production planning tool for soft drink industry.
- MRAP: A production planning tool for soft drink industry.

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