NOTEBOOK OF ABSTRACTS

AND

OTHER RELEVANT INFORMATION

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Abstract

The minimum sum-of-squares clustering is a very important problem in the context of data mining and machine learning, with many applications in, e.g., medicine or social sciences. However, it is known to be NP-hard in all relevant cases and notoriously hard to be solved to global optimality in practice. We develop and test different tailored mixed-integer programming techniques to improve the performance of state-of-the-art MINLP solvers when applied to the problem—among them are cutting planes, propagation techniques, branching rules, or primal heuristics. Our extensive numerical study shows that our techniques significantly improve the performance of the open-source MINLP solver SCIP. We now solve many instances that are not solvable without our techniques and we obtain much smaller gaps for those instances that can still not be solved to global optimality.

Constraint qualifications and strong global convergence properties of an augmented Lagrangian method on Riemannian manifolds

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Abstract

In the past years, augmented Lagrangian methods have been successfully applied to several classes of non-convex optimization problems, inspiring new developments in both theory and practice. In this talk we bring most of these recent developments from nonlinear programming to the context of optimization on Riemannian manifolds, including equality and inequality constraints. Many research have been conducted on optimization problems on manifolds, however only recently the treatment of the constrained case has been considered. We propose to bridge this gap with respect to the most recent developments in nonlinear programming. In particular, we formulate several well known constraint qualifications from the Euclidean context which are sufficient for guaranteeing global convergence of augmented Lagrangian methods, without requiring boundedness of the set of Lagrange multipliers. Convergence of the dual sequence can also be assured under a weak constraint qualification. The theory presented is based on so-called sequential optimality conditions, which is a powerful tool used in this context. This presentation can also be approached from the perspective of Euclidean context, serving as a review of the most relevant constraint qualifications and global convergence theory of state-of-the-art augmented Lagrangian methods for nonlinear programming.