NOTEBOOK OF ABSTRACTS

AND

OTHER RELEVANT INFORMATION

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CONTRIBUTED TALKS

Variants of the A-HPE and large-step A-HPE algorithms for strongly convex problems with applications to accelerated high-order tensor methods

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Keywords: Convex optimization, strongly convex, accelerated methods, proximal-point algorithm, high-order tensor methods

Abstract

For solving strongly convex optimization problems, we propose and study the global convergence of variants of the accelerated hybrid proximal extragradient (A-HPE) and large-step A-HPE algorithms of Monteiro and Svaiter (2013). We prove *linear* and *superlinear* $O\left(k^{-k\left(\frac{p-1}{p+1}\right)}\right)$ global rates for the proposed variants of the A-HPE and large-step A-HPE methods, respectively. The parameter $p \geq 2$ appears in the (high-order) large-step condition of the new large-step A-HPE algorithm. We apply our results to high-order tensor methods, obtaining a new inexact (relative-error) tensor method for (smooth) strongly convex optimization with iteration-complexity $O\left(k^{-k\left(\frac{p-1}{p+1}\right)}\right)$. In particular, for $p=2$, we obtain an inexact proximal-Newton algorithm with fast global $O\left(k^{-k/3}\right)$ convergence rate.

Weak notions of nondegeneracy in nonlinear semidefinite programming

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Keywords: constraint qualifications, nonlinear semidefinite programming, nondegeneracy condition

Abstract

The constraint nondegeneracy condition is one of the most relevant and useful constraint qualifications in nonlinear semidefinite programming. It can be characterized in terms of any fixed orthonormal basis of the, let us say, *n*-dimensional kernel of the constraint matrix, by the linear independence of a set of $n(n+1)/2$ derivative vectors. We show that this linear independence requirement can be equivalently formulated in a smaller set, of *n* derivative vectors, by considering all orthonormal bases of the kernel instead. This allows us to identify that not all bases are relevant for a constraint qualification to be defined, giving rise to a strictly weaker variant of nondegeneracy related to the global convergence of an external penalty method. We use some of these ideas to revisit an approach of Forsgren (Math. Program. 88, 105–128, 2000) for exploiting the sparsity

structure of a transformation of the constraints to define a constraint qualification, which led us to develop another relaxed notion of nondegeneracy using a simpler transformation. If the zeros of the derivatives of the constraint function at a given point are considered, instead of the zeros of the function themselves in a neighborhood of that point, we obtain an even weaker constraint qualification that connects Forsgren's condition and ours.

Solution concepts for interval-valued optimization problems via combined gradient based algorithm

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Keywords: Interval-valued programming, Gradient-based methods, complexity analysis,

Abstract

The talk will focus on an innovative method for solving interval-valued optimization problems that makes use of blended gradient techniques. In order to enable a more comprehensive exploration of the solution space, our method combines standard gradient-based optimization techniques with interval arithmetic. We will investigate the application of gradient information for each interval-valued objective function in this talk's first part, keeping in mind the particular structure of the problem. A subsequence that converges to the problem's local Pareto point is produced in the second part, assuming that the objective function's gradient is linearly independent. Additionally, in order to demonstrate the algorithm's effectiveness, the discussion will go over the numerical findings. The proposed approach determines the most effective solutions within intervals and gauges resilience, which can help decision-makers arrive at sound decisions in uncertain situations.

Bibliography

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