
Mitigating Anomalies in Parallel Branch-and-Bound Based Algorithms for Mixed-Integer Nonlinear Optimization

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Abstract

We address detrimental anomalies in parallel versions of two well-known algorithms for convex mixed-integer nonlinear programs (MINLPs): nonlinear branch-and-bound and LP/NLP based branch-and-bound. A detrimental anomaly is when a parallel algorithm performs worse than its sequential counterpart. We extend the existing notion of unambiguity in node selection functions to branching and cut-generating subroutines to avoid these anomalies and implement them in the open-source MINLP solver Minotaur. Our computational results show that opportunistic versions are faster while the deterministic versions avoid detrimental anomalies and ensure reproducibility of results.

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