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Faster Infeasibility Analysis for Linear Programs

Presolving a linear program is important for fast solution and can sometimes detect infeasibility before the reduced model is solved. But presolving typically interferes with finding an Irreducible Infeasible Subset (IIS) of row constraints and variable bounds, the main way to analyze infeasibility. Early attempts to backtrack the set of logical model reductions when the presolver detects infeasibility, with the goal of finding an IIS, were abandoned as impractical. However, the OptVerse solver has now implemented a very fast backtrack capability that greatly speeds IIS isolation whether or not the presolver detects infeasibility. In both cases, the backtracker isolates a small subset of the model that is then subjected to typical IIS isolation procedures. The speed advantage is demonstrated experimentally vs. other major LP solvers.