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On the strengthening of mixed integer Gomory cuts

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Abstract

Split cuts are a famous class of valid inequalities for mixed integer linear programs. For this class of inequalities, the separation problem can be formulated as a (non linear) mixed integer program, which easily reduces to a linear program if the disjunction associated with the split cuts is fixed. Another important class of valid inequalities are Mixed Integer Gomory(MIG) cuts. Violated MIG cuts can be read from the optimal simplex tableau with limited computational effort. We investigate the correspondence between MIG cuts from the simplex tableau and split cuts. In particular, we present a linear programming model for separating violated inequalities (LPSEP), whose feasible solutions correspond to violated split cuts. We show that MIG cuts from the simplex tableau correspond to basic solutions of LPSEP, which can be viewed as a profitable tool for strengthening MIG cuts. A computational analysis trying to highlight both algebraic and geometric aspects of cuts is reported and discussed.

Join work with Matteo Fischetti and Andrea Tramontani.