

Mixing Gomory mixed integer inequalities with others cutting planes.

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1. Introduction

For several years, most of researches have been carried out on the generation of valid inequalities and their use as cuts in solving mixed integer programs. The scope of these researches is twofold. On the one hand, generation of valid inequalities can be based on specific constraints (flow cover inequalities, inequalities for lot sizing problem ...). On the other hand, there is the generation of general cuts for mixed integer programs. Historically the first cuts were the Gomory mixed integer cuts (Gomory 1960). Other general inequalities such as disjunctive cuts (Balas 1975), mixed integer rounding (MIR) cuts (Nemhauser and Wolsey 1990), and split cuts (Cook and al. 1990) are theoretically equivalent to Gomory mixed integer cuts. These cuts give better results for 0-1 mixed integer programs (Balas 1975 and Lovasz and Schrijver 1990).

Recently, a lift-and-project approach based on a systematic generation of simple disjunctive cuts in a branch-and-cut framework has produced notable computational results (Balas and al. 1996).

Gomory mixed integer inequalities is the most used in commercial solver.

In this talk we discuss the use of Gomory mixed integer inequalities combined with others generations of valid inequalities.

2. Cut generation

The cuts are only generated at the top node of the branch and bound tree. Only 0-1 mixed integer programs are used to test the different combinations. The programs are solved with Xpress Optimizer. The Gomory mixed integer inequalities are obtained with Xpress Optimizer.

The others cutting planes are two forms of MIR inequalities, the complemented MIR (c-MIR, Nemhauser and Wolsey 1988) and the aggregation procedure of Marchand and Wolsey (2000), one round of lift-and-project (Balas and al. 1996).

3. Results

Some cutting plane methods have several parameters which, according to their value, change the value of the cut. We will present the best combination of parameters for each method and their results on several problems. For each cutting plane method, we conclude about its effectiveness in the combination with the Gomory mixed integer cuts.