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On characterizing maximal covers from the set of covers implied by a knapsack constraint

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ABSTRACT

In this note we introduce the concept of maximal cover and we provide some characterizations that make easier the identification of the maximal covers from the set of covers implied by a 0-1 knapsack constraint. These maximal covers induce non-dominated valid inequalities for the set of feasible solutions for the knapsack constraint that can be used in several ways for tightening the formulation of a 0-1 program, namely, by appending those inequalities to the constraint system of the program and by increasing or reducing the coefficients of some constraints (see [1, 3, 5] among others). We show some situations where a procedure taken from the literature for identifying non-dominated inequalities from certain types of covers only identifies a small subset of maximal covers (see [2, 4]). This fact, together with the computational results that have been obtained in the literature by applying the algorithms given in [2] and by using the resulting covers to tighten a 0-1 model (see [1]
among others), indicates that an approach for identifying maximal covers based on some of the results that we present could become very useful in 0-1 model tightening.

References

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