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Title

Using dual feasible functions to construct fast lower bounds

Abstract

Dual Feasible Functions (DFF) provide feasible dual solutions of strong models that correspond to lower bounds that are often very close to the lower bounds provided by column generation models. As DFF can be computed quickly, the computational burden can be small when compared to column generation algorithms. We present the basic concepts and definitions, and explore the general properties that identify the best DFF. Additionally, we describe the general approaches that can be followed to derive new non-dominated functions. In particular, it is shown how to derive high-quality DFF from superadditive functions using symmetry. We address applications in cutting, packing and vector packing, which underlie in problem in areas such as telecommunications, transportation and production planning. Computational results show that these DFF can approximate very efficiently the best known lower bounds for application problems, and improve significantly the convergence of branch-and-bound algorithms.