

# Interior point method and column generation for solving large-scale optimization problems

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The column generation technique has proven to be an important tool when solving continuous optimization problems. In practice, the performance of this technique is strongly dependent on the type of the dual solutions used to generate columns. Optimal dual solutions which are extreme points of the feasible set typically oscillate too much between consecutive iterations, which leads to a slow convergence of the column generation technique. To overcome this behavior, non-optimal dual solutions may be used instead. In this talk, we show that the interior point method is more than an alternative to the simplex method in this context. Indeed, it offers advantageous features which can be used to stabilize the dual solutions in the column generation technique. We present the results of computational experiments with classes of problems that arise in important real-life contexts such as vehicle routing, data analysis, decision-making under uncertainty and telecommunication and transportation networks. The results provide evidence of the benefits of appropriately combining the interior point algorithm with column generation, specially for solving large-scale problems. The experiments were run using the PDCGM library, an implementation of the primal-dual column generation method which is publicly available on the Internet.

**Keywords:** column generation, interior point method, stabilization, large-scale problems.