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A column generation approach to exact experimental design

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In this talk, we address the exact D-optimal experimental design problem by proposing an efficient algorithm that rapidly identifies the support of its continuous relaxation. Our method leverages a column generation framework to solve such a continuous relaxation, where each restricted master problem is tackled using a Primal-Dual Interior-Point-based Semidefinite Programming solver. This enables fast and reliable detection of the design's support. The identified support is subsequently used to construct a feasible exact design that is provably close to optimal. We show that, for large-scale instances in which the number of regression points exceeds by far the number of experiments, our approach achieves superior performance compared to existing branch-and-bound-based algorithms in both, computational efficiency and solution quality.

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