Scenario-based decomposition technique for selected chance-constrained convex optimization problems

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One of the approaches that allows us to deal with chance-constrained convex optimization problems is the quite recently developed min-max scenario-based approach. One of its serious issues is the enormous number of scenarios one has to take into account in order to get feasible points with high enough probability. To address this, we devised a decomposition algorithm that takes advantage of the problem structure - convexity, and the fact that the number of support scenarios (as defined in [1]) does depend only on the number of variables. The algorithm is based on the suitable modification of generalized Benders decomposition technique that was adopted by the authors for the scenario-based stochastic programs. Furthermore, a heuristic for improving the (often conservative) min-max solution is introduced. The strength of the decomposition is demonstrated on numerical examples. At the end, the applicability in the area of optimal reliable engineering design is discussed.

References

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