

Mean-Risk Models in Stochastic Integer Programming

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Abstract: We consider mixed-integer linear programs under uncertainty where data information is revealed stepwise and decisions have to be taken accordingly, based on the information available. Optimization then has to deal with implicitly given random objective functions that arise from the scheme of alternating decision and observation. Traditional risk neutral stochastic programming models aim at optimizing the expectation of these functions. When addressing risk aversion one arrives at mean-risk models that require the selection of proper risk measures. In the talk we introduce different risk measures and discuss consequences of their inclusion into purely expectation-based stochastic integer programs. We study consistency of the risk measures with ordering principles from stochastics, and we investigate well-posedness of the resulting mean-risk models. For discrete probability distributions, the mean-risk models are equivalent to large-scale, block-structured, mixed-integer linear programs. Their block structure depends on the risk measure employed. We identify risk measures that lead to decomposable block structures, and we outline resulting decomposition strategies.

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