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17. Control Theory and Optimization

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Confidence intervals for optimal values of simple recourse models

We consider two-stage stochastic programs with simple recourse and random right hand side. The distribution function of the random variables entering the expected recourse function is estimated by smoothed empirical distributions (kernel estimates).

We treat the estimated expected recourse function as a random variable in a certain functional space. A Functional Central Limit Theorem for kernel estimates of distribution functions yields the asymptotic distribution of the estimated expected recourse function. Using explicit formulas for directional derivatives of the optimal value function we derive a second order expansion of the estimated optimal value function. We use the asymptotic expansion to construct bootstrap confidence intervals for the optimal value of the stochastic program and study their coverage accuracies.