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proposed for engineering business computer science and statistics as essential tools in this tutorial we ll study deterministic and stochastic optimization methods we ll focus on understanding the similarities and differences of these categories of optimization methods and describe scenarios where they are typically employed first we ll have a brief review of optimization methods stochastic optimization refers to a collection of methods for minimizing or maximizing an objective function when randomness is present over the last few decades these methods have become essential tools for science engineering business computer science and statistics reinforcement learning and stochastic optimization a unified framework for sequential decisions is the first textbook to offer a comprehensive unified framework of the rich field of sequential decisions under uncertainty modern stochastic heuristic and meta heuristic optimisation methods are efficient tools to deal with the black box problems in which the objective and constraint functions cannot be expressed as explicit functions of decision variables in the field of mathematical optimization stochastic programming is a framework for modeling optimization problems that involve uncertainty a stochastic program is an optimization problem in which some or all problem parameters are uncertain but follow known probability distributions scribed above is the stochastic optimization approachon which we focus in the remainder of this article suppose that the demand d canbeviewedasarandom variable this means that the probability distri bution of d is known or at least can be estimated by using historical data and or a priori information available to the manager stochastic optimization algorithms were designed to deal with highly complex optimization problems this chapter will first introduce the notion of complexity and then present the main stochastic optimization algorithms np complete problems and combinatorial explosion this chapter has been a whirlwind tour through some important issues and methods in stochastic optimization stochastic optimization applies when there are noisy measurements of the criterion being optimized and or there is an injected monte carlo randomness as part of the algorithm overview authors kurt marti features optimization problems that in practice involve random model parameters provides applications from the fields of robust optimal control design in case of stochastic uncertainty contains numerous references to stochastic optimization stochastic programming and applications search within this book 4 introduction to stochastic optimization 129 4 1 illustrations of the basic stochastic optimization problem 130 4 2 deterministic methods 132 4 2 1 a stochastic shortest path problem 133 4 2 2 a newsvendor problem with known distribution 133 4 2 3 chance constrained optimization 134 4 2 4 optimal control 134 625 743 primary program applied and computational mathematics course format in 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