1. Record Nr. UNINA9911001787603321

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| Titolo | Methods of Nonsmooth Optimization in Stochastic Programming : From Conceptual Algorithms to Real-World Applications / / by Wim Stefanus van Ackooij, Welington Luis de Oliveira |
| Pubbl/distr/stampa | Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2025 |
| ISBN | 3-031-84837-3 |
| Edizione | [1st ed. 2025.] |
| Descrizione fisica | 1 online resource (XVI, 570 p. 39 illus., 30 illus. in color.) |
| Collana | International Series in Operations Research & Management Science, , 2214-7934 ; ; 363 |
| Disciplina | 658.403 |
| Soggetti | Operations research<br>Mathematical optimization<br>Management science<br>Numerical analysis<br>Stochastic processes<br>Calculus<br>Operations Research and Decision Theory<br>Optimization<br>Operations Research, Management Science<br>Numerical Analysis<br>Continuous Optimization<br>Stochastic Calculus |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Nota di contenuto | Introduction -- Primer of convex analysis -- Variational analysis -- Linear and nonlinear optimization problems -- Probability and Statistics -- Fundamental modeling questions in stochastic programming -- Adjusting to uncertainty: modeling recourse -- Probability constraints -- Proximal point algorithms for problems with structure -- Cutting-plane algorithms for nonsmooth convex optimization over simple domains -- Bundle methods for nonsmooth convex optimization over simple domains -- Methods for nonlinearly constrained nonsmooth optimization problems -- Methods for |

nonsmooth optimization with mixed-integer variables -- Methods for nonsmooth nonconvex optimization -- Two-stage stochastic programs -- Progressive decoupling in multistage stochastic programming -- Scenario decomposition with alternating projections -- Methods for multistage stochastic linear programs -- Methods for handling probability.

Sommario/riassunto

This book presents a comprehensive series of methods in nonsmooth optimization, with a particular focus on their application in stochastic programming and dedicated algorithms for decision-making under uncertainty. Each method is accompanied by rigorous mathematical analysis, ensuring a deep understanding of the underlying principles. The theoretical discussions included are essential for comprehending the mechanics of various algorithms and the nature of the solutions they provide—whether they are global, local, stationary, or critical. The book begins by introducing fundamental tools from set-valued analysis, optimization, and probability theory. It then transitions from deterministic to stochastic optimization, starting with a thorough discussion of modeling, understanding uncertainty, and incorporating it into optimization problems. Following this foundation, the book explores numerical algorithms for nonsmooth optimization, covering well-known decomposition techniques and algorithms for convex optimization, mixed-integer convex programming, and nonconvex optimization. Additionally, it introduces numerical algorithms specifically for stochastic programming, focusing on stochastic programming with recourse, chance-constrained optimization, and detailed algorithms for both risk-neutral and risk-averse multistage stochastic programs. The book guides readers through the entire process, from defining optimization models for practical problems to presenting implementable algorithms that can be applied in practice. It is intended for students, practitioners, and scholars who may be unfamiliar with stochastic programming and nonsmooth optimization. The analyses provided are also valuable for practitioners who may not be interested in convergence proofs but wish to understand the nature of the solutions obtained.