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Aims and Scope

Optimization has been expanding in all directions at an astonishing rate during the last few decades. New algorithmic and theoretical techniques have been developed, the diffusion into other disciplines has proceeded at a rapid pace, and our knowledge of all aspects of the field has grown even more profound. At the same time, one of the most striking trends in optimization is the constantly increasing emphasis on the interdisciplinary nature of the field. Optimization has been a basic tool in all areas of applied mathematics, engineering, medicine, economics, and other sciences.

The series *Springer Optimization and Its Applications* publishes undergraduate and graduate textbooks, monographs and state-of-the-art expository work that focus on algorithms for solving optimization problems and also study applications involving such problems. Some of the topics covered include nonlinear optimization (convex and nonconvex), network flow problems, stochastic optimization, optimal control, discrete optimization, multi-objective programming, description of software packages, approximation techniques and heuristic approaches.

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Ding-Zhu Du • Peng-Jun Wan

Connected Dominating Set: Theory and Applications

 Springer

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Preface

As a combinatorial subject, the connected dominating set has been studied in as early as 1970s. However, it was not a major subject and hence did not attract much attention. This situation had changed since 1998 due to its important applications in communication and computer networks, especially its role as a virtual backbone in wireless networks. During the last fourteen years, a large amount of research papers have been published in the theory and applications of the connected dominating set. However, until this book, no attempt has been made to put results on this topic into a collection. When we started to collect references and to make our plan, we realized that actually there exist too much materials in the literature to put into a single book. All materials can be classified into three categories, study in combinatorial structures, applications in networking systems, and theory with computational nature. We decided to give up the first two categories and hence keep this book as a theory-oriented one with computational nature. Therefore, in each topic, we emphasize on theoretical developments on computational complexity and algorithm designs and analysis. Since each theoretical development is motivated from some applications in the real world, we start each chapter, except the first one for introduction, with a section on motivation and overview. This is a reference book which presents the state of art in research from a computational aspect of the connected dominating set. It may also serve as a textbook for advanced topics in a graduate course in applied mathematics, operations research, and computer science. Indeed, we have used some chapters of this book to teach a seminar course (CS7301) in the University of Texas at Dallas, a wireless networking course (CS547) in the Illinois Institute of Technology, and some short courses in graduate summer schools in China. We wish to express our thanks to Hejiao Huang, Hong Zhu, Zhenhua Duan, and Tiende Guo for the organization of such summer courses.

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