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Routing, Flow, and Capacity Design in Communication and Computer Networks SIAM

Vehicle routing problems, among the most studied in combinatorial optimization, arise in many practical contexts (freight distribution and collection, transportation, garbage collection, newspaper delivery, etc.). Operations researchers have made significant developments in the algorithms for their solution, and *Vehicle Routing: Problems, Methods, and Applications, Second Edition* reflects these advances. The text of the new edition is either completely new or significantly revised

and provides extensive and complete state-of-the-art coverage of vehicle routing by those who have done most of the innovative research in the area; it emphasizes methodology related to specific classes of vehicle routing problems and, since vehicle routing is used as a benchmark for all new solution techniques, contains a complete overview of current solutions to combinatorial optimization problems. It also includes several chapters on important and emerging applications, such as disaster relief and green vehicle routing.

Scatter Search Springer Nature

The two-volume set of LNCS 10385 and 10386, constitutes the proceedings of the 8th International Conference on Advances in Swarm Intelligence, ICSI 2017, held in Fukuoka, Japan, in July/August 2017. The total of 133 papers presented in these

volumes was carefully reviewed and selected from 267 submissions. The papers were organized in topical sections as follows: Part I: theories and models of swarm intelligence; novel swarm-based optimization algorithms; particle swarm optimization; applications of particle swarm optimization; ant colony optimization; artificial bee colony algorithms; genetic algorithms; differential evolution; fireworks algorithm; brain storm optimization algorithm; cuckoo search; and firefly algorithm. Part II: multi-objective optimization; portfolio optimization; community detection; multi-agent systems and swarm robotics; hybrid optimization algorithms and applications; fuzzy and swarm approach; clustering and forecast; classification and detection; planning and routing problems; dialog system applications; robotic control; and other applications.

Bio-inspired Algorithms for the Vehicle Routing Problem Springer Nature

This highly acclaimed work, first published by Prentice Hall in 1989, is a comprehensive and theoretically sound treatment of parallel and distributed numerical methods. It focuses on algorithms that are naturally suited for massive parallelization, and it explores the fundamental convergence, rate of convergence, communication, and synchronization issues associated with such algorithms. This is an extensive book, which aside from its focus on parallel and distributed algorithms, contains a wealth of material on a broad variety of computation and optimization topics. It is an excellent supplement to several of our other books, including *Convex Optimization Algorithms* (Athena Scientific, 2015), *Nonlinear Programming* (Athena Scientific, 1999), *Dynamic Programming and Optimal Control*

(Athena Scientific, 2012), *Neuro-Dynamic Programming* (Athena Scientific, 1996), and *Network Optimization* (Athena Scientific, 1998). The on-line edition of the book contains a 95-page solutions manual.

Computational Logistics Springer Science & Business Media
The book *Scatter Search* by Manuel Laguna and Rafael Martí represents a long-awaited "missing link" in the literature of evolutionary methods. Scatter Search (SS)-together with its generalized form called Path Relinking-constitutes the only evolutionary approach that embraces a collection of principles from Tabu Search (TS), an approach popularly regarded to be divorced from evolutionary procedures. The TS perspective, which is responsible for introducing adaptive memory strategies into the metaheuristic literature (at purposeful level beyond simple inheritance mechanisms), may at first seem to be at odds with population-based approaches. Yet this perspective equips SS with a remarkably effective foundation for solving a wide range of practical problems. The successes documented by Scatter Search come not so much from the adoption of adaptive memory in the range of ways proposed in Tabu Search (except where, as often happens, SS is advantageously coupled with TS), but from the use of strategic ideas initially proposed for exploiting adaptive memory, which blend harmoniously with the structure of Scatter Search. From a historical perspective, the dedicated use of heuristic strategies both to guide the process of combining solutions and to enhance the quality of offspring has been heralded as a key innovation in evolutionary methods, giving rise to what are sometimes called "hybrid" (or "memetic") evolutionary procedures. The underlying processes have been

introduced into the mainstream of evolutionary methods (such as genetic algorithms, for example) by a series of gradual steps beginning in the late 1980s.

Advances in Swarm Intelligence John Wiley & Sons

Solving Transport Problems establishes fundamental points and good practice in resolving matters regarding green transportation. This is to prompt further research in conveyance issues by providing readers with new knowledge and grounds for integrated models and solution methods. Focusing on green transportation, this book covers various sub-topics and thus consists of diverse content. Traditionally, academia and transport practitioners have mainly concentrated on efficient fleet management to achieve economic benefits and better-quality service. More recently, due to growing public environmental concerns and the industry understanding of the issue, the academic community has started to address environmental issues. The studies of green transportation compiled in this book have identified certain areas of interest, such as references, viewpoints, algorithms and ideas. *Solving Transport Problems* is for researchers, environmental decision-makers and other concerned parties, to start discussion on developing optimized technology and alternative fuel-based integrated models for environmentally cleaner transport systems.

Metaheuristics for Vehicle Routing Problems Springer

The vehicle routing problem (VRP) is one of the most famous combinatorial optimization problems. In simple terms, the goal is to determine a set of routes with overall minimum cost that can satisfy several geographical scattered demands. Biological inspired computation is a field devoted to the development of

computational tools modeled after principles that exist in natural systems. The adoption of such design principles enables the production of problem solving techniques with enhanced robustness and flexibility, able to tackle complex optimization situations. The goal of the volume is to present a collection of state-of-the-art contributions describing recent developments concerning the application of bio-inspired algorithms to the VRP. Over the 9 chapters, different algorithmic approaches are considered and a diverse set of problem variants are addressed. Some contributions focus on standard benchmarks widely adopted by the research community, while others address real-world situations.

Orienteering Problems Routledge

This volume constitutes the refereed proceedings of the 9th International Symposium on Experimental Algorithms, SEA 2010, held on Ischia Island, Naples, Italy, in May 2010. The 40 revised full papers presented together with two invited papers were carefully reviewed and selected from 73 submissions. The topics covered include algorithm engineering, algorithmic libraries, algorithmic mechanism design, analysis of algorithms, algorithms for memory hierarchies, approximation techniques, bioinformatics, branch and bound algorithms, combinatorial and irregular problems, combinatorial structures and graphs, communication networks, complex networks, computational geometry, computational learning theory, computational optimization, computer systems, cryptography and security, data streams, data structures, distributed and parallel algorithms, evaluation of algorithms for realistic environments, experimental techniques and statistics, graph drawing, heuristics for

combinatorial optimization

The Vehicle Routing Problem Springer

In network design, the gap between theory and practice is woefully broad. This book narrows it, comprehensively and critically examining current network design models and methods. You will learn where mathematical modeling and algorithmic optimization have been under-utilized. At the opposite extreme, you will learn where they tend to fail to contribute to the twin goals of network efficiency and cost-savings. Most of all, you will learn precisely how to tailor theoretical models to make them as useful as possible in practice. Throughout, the authors focus on the traffic demands encountered in the real world of network design. Their generic approach, however, allows problem formulations and solutions to be applied across the board to virtually any type of backbone communication or computer network. For beginners, this book is an excellent introduction. For seasoned professionals, it provides immediate solutions and a strong foundation for further advances in the use of mathematical modeling for network design. - Written by leading researchers with a combined 40 years of industrial and academic network design experience. - Considers the development of design models for different technologies, including TCP/IP, IDN, MPLS, ATM, SONET/SDH, and WDM. - Discusses recent topics such as shortest path routing and fair bandwidth assignment in IP/MPLS networks. - Addresses proper multi-layer modeling across network layers using different technologies—for example, IP over ATM over SONET, IP over WDM, and IDN over SONET. - Covers restoration-oriented design methods that allow recovery from failures of large-capacity transport links and transit nodes. -

Presents, at the end of each chapter, exercises useful to both students and practitioners.

Fleet Management and Logistics SIAM

Column Generation is an insightful overview of the state of the art in integer programming column generation and its many applications. The volume begins with "A Primer in Column Generation" which outlines the theory and ideas necessary to solve large-scale practical problems, illustrated with a variety of examples. Other chapters follow this introduction on "Shortest Path Problems with Resource Constraints," "Vehicle Routing Problem with Time Window," "Branch-and-Price Heuristics," "Cutting Stock Problems," each dealing with methodological aspects of the field. Three chapters deal with transportation applications: "Large-scale Models in the Airline Industry," "Robust Inventory Ship Routing by Column Generation," and "Ship Scheduling with Recurring Visits and Visit Separation Requirements." Production is the focus of another three chapters: "Combining Column Generation and Lagrangian Relaxation," "Dantzig-Wolfe Decomposition for Job Shop Scheduling," and "Applying Column Generation to Machine Scheduling." The final chapter by François Vanderbeck, "Implementing Mixed Integer Column Generation," reviews how to set-up the Dantzig-Wolfe reformulation, adapt standard MIP techniques to the column generation context (branching, preprocessing, primal heuristics), and deal with specific column generation issues (initialization, stabilization, column management strategies).

Ant Colony Optimization SIAM

TEODOR GABRIEL CRAINIC, DIRECTOR The Centre for Research on Transportation (C.R.T.) was founded in 1971 by the Universite

de Montreal. From 1988 on, it is jointly managed by the Universite de Montreal and its affiliated schools, the Ecole des Hautes Etudes Commerciales and Ecole Poly technique. Professors, students and researchers from many institutions in the Montreal area join forces at the C.R.T. to analyze transportation, logistics and telecommunication systems from a multidisciplinary perspective. The C.R.T. pursues three major, complementary objectives: training of high-level specialists; the advancement of knowledge and technology; the transfer of technology towards industry and the public sector. Its main field of expertise is the development of quantitative and computer-based models and methods for the analysis of urban, regional and intercity transportation networks, as well as telecommunication systems. This applies to the study of passenger and commodity flows, as well as to the socioeconomic aspects of transportation: policy, regulation, economics. The twenty-fifth anniversary of the C.R.T. offered the opportunity to evaluate past accomplishments and to identify future trends and challenges. Five colloquia were thus organized on major research and application themes that also reflected our main research areas. They gathered together internationally renowned researchers who linked recent scientific and technological advances to modeling and methodological challenges waiting to be tackled, particularly concerning new problems and applications, and the increasingly widespread use of new technologies.

Vehicle Routing Springer Science & Business Media
Hybrid Optimization focuses on the application of artificial intelligence and operations research techniques to constraint programming for solving combinatorial optimization problems.

This book covers the most relevant topics investigated in the last ten years by leading experts in the field, and speculates about future directions for research. This book includes contributions by experts from different but related areas of research including constraint programming, decision theory, operations research, SAT, artificial intelligence, as well as others. These diverse perspectives are actively combined and contrasted in order to evaluate their relative advantages. This volume presents techniques for hybrid modeling, integrated solving strategies including global constraints, decomposition techniques, use of relaxations, and search strategies including tree search local search and metaheuristics. Various applications of the techniques presented as well as supplementary computational tools are also discussed.

Column Generation Springer Science & Business Media

This book constitutes the proceedings of the 18th International Conference on Mathematical Optimization Theory and Operations Research, MOTOR 2019, held in Ekaterinburg, Russia, in July 2019. The 48 full papers presented in this volume were carefully reviewed and selected from 170 submissions. MOTOR 2019 is a successor of the well-known International and All-Russian conference series, which were organized in Ural, Siberia, and the Far East for a long time. The selected papers are organized in the following topical sections: mathematical programming; bi-level optimization; integer programming; combinatorial optimization; optimal control and approximation; data mining and computational geometry; games and mathematical economics.

Encyclopedia of Optimization Springer Nature

With the advent of approximation algorithms for NP-hard

combinatorial optimization problems, several techniques from exact optimization such as the primal-dual method have proven their staying power and versatility. This book describes a simple and powerful method that is iterative in essence and similarly useful in a variety of settings for exact and approximate optimization. The authors highlight the commonality and uses of this method to prove a variety of classical polyhedral results on matchings, trees, matroids and flows. The presentation style is elementary enough to be accessible to anyone with exposure to basic linear algebra and graph theory, making the book suitable for introductory courses in combinatorial optimization at the upper undergraduate and beginning graduate levels. Discussions of advanced applications illustrate their potential for future application in research in approximation algorithms.

Experimental Algorithms Springer Science & Business Media
Arc Routing: Theory, Solutions and Applications is about arc traversal and the wide variety of arc routing problems, which has had its foundations in the modern graph theory work of Leonhard Euler. Arc routing methods and computation has become a fundamental optimization concept in operations research and has numerous applications in transportation, telecommunications, manufacturing, the Internet, and many other areas of modern life. The book draws from a variety of sources including the traveling salesman problem (TSP) and graph theory, which are used and studied by operations research, engineers, computer scientists, and mathematicians. In the last ten years or so, there has been extensive coverage of arc routing problems in the research literature, especially from a graph theory perspective; however, the field has not had the benefit of a uniform,

systematic treatment. With this book, there is now a single volume that focuses on state-of-the-art exposition of arc routing problems, that explores its graph theoretical foundations, and that presents a number of solution methodologies in a variety of application settings. Moshe Dror has succeeded in working with an elite group of ARC routing scholars to develop the highest quality treatment of the current state-of-the-art in arc routing.

Routledge Handbook of Transportation Springer Science & Business Media

This comprehensive and clearly structured book presents essential information on modern Location Science. The book is divided into three parts: basic concepts, advanced concepts and applications. Written by the most respected specialists in the field and thoroughly reviewed by the editors, it first lays out the fundamental problems in Location Science and provides the reader with basic background information on location theory. Part II covers advanced models and concepts, broadening and expanding on the content presented in Part I. It provides the reader with important tools to help them understand and solve real-world location problems. Part III is dedicated to linking Location Science with other areas like GIS, telecommunications, healthcare, rapid transit networks, districting problems and disaster events, presenting a wide range of applications. This part enables the reader to understand the role of facility location in such areas, as well as to learn how to handle realistic location problems. The book is intended for researchers working on theory and applications involving location problems and models. It is also suitable as a textbook for graduate courses on facility location.

Arc Routing Elsevier

This book reports on cutting-edge design methods and tools in industrial engineering, advanced findings in mechanics and material science, and relevant technological applications. Topics span from geometric modelling tools to applications of virtual/augmented reality, from interactive design to ergonomics, human factors research and reverse engineering. Further topics include integrated design and optimization methods, as well as experimental validation techniques for product, processes and systems development, such as additive manufacturing technologies. This book is based on the International Conference on Design Tools and Methods in Industrial Engineering, ADM 2019, held on September 9–10, 2019, in Modena, Italy, and organized by the Italian Association of Design Methods and Tools for Industrial Engineering, and the Department of Engineering “Enzo Ferrari” of the University of Modena and Reggio Emilia, Italy. It provides academics and professionals with a timely overview and extensive information on trends and technologies in industrial design and manufacturing.

Springer Handbook of Computational Intelligence Springer

This two-volume set (CCIS 915 and CCIS 916) constitutes the refereed proceedings of the 5th Workshop on Engineering Applications, WEA 2018, held in Medellín, Colombia, in October 2018. The 41 revised full papers presented in this volume were carefully reviewed and selected from 101 submissions. The papers are organized in topical sections such as green logistics

and optimization, Internet of Things (IoT), digital signal processing (DSP), network applications, miscellaneous applications.

Computational Logistics Springer

Covers key recent advances in combinatorial algorithms.

Selfish Routing and the Price of Anarchy MIT Press

This book presents recent work that analyzes general issues of green transportation. The contributed chapters consider environmental objectives in transportation, including topics such as battery swap stations for electric vehicles, efficient home healthcare routing, waste collection, and various vehicle routing problems. The content will be valuable for researchers and postgraduate students in computer science, operations research, and urban planning.

The State of the Art in the Routing and Scheduling of Vehicles and Crews Springer

Smart Delivery Systems: Solving Complex Vehicle Routing

Problems examines both exact and approximate methods for delivering optimal solutions to rich vehicle routing problems, showing both the advantages and disadvantages of each approach. It shows how to apply machine learning and advanced data analysis techniques to improve routing systems, familiarizing readers with the concepts and technologies used in successfully implemented delivery systems. The book explains both the latest theoretical and practical advances in intelligent delivery and scheduling systems and presents practical applications for designing new algorithms for real-life scenarios.

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