



Vehicle Routing Problem

Moshe Dror



Vehicle Routing Problem:

Vehicle Routing Paolo Toth, Daniele Vigo, 2014-12-05 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

The Vehicle Routing Problem: Latest Advances and New Challenges Bruce L. Golden, S. Raghavan, Edward A. Wasil, 2008-07-20 Theoretical research and practical applications in the field of vehicle routing started in 1959 with the truck dispatching problem posed by Dantzig and Ramser 1 and the optimum routing of a fleet of gasoline delivery trucks between a bulk terminal and a large number of service stations supplied by the terminal Using a method based on a linear programming formulation their hand calculations produced a near optimal solution with four routes to a problem with twelve service stations The authors proclaimed No practical applications of the method have been made as yet In the nearly 50 years since the Dantzig and Ramser paper appeared work in the field has exploded dramatically Today a Google Scholar search of the words vehicle routing problem VRP yields more than 21 700 entries The June 2006 issue of OR MS Today provided a survey of 17 vendors of commercial routing software whose packages are currently capable of solving average size problems with 1 000 stops 50 routes and two hour hard time windows in two to ten minutes 2 In practice vehicle routing may be the single biggest success story in operations research For example each day 103 500 drivers at UPS follow computer generated routes The drivers visit 7 9 million customers and handle an average of 15 6 million packages 3

The Evolution of the Vehicle Routing Problem Bruce Golden, Xingyin Wang, Edward Wasil, 2022-12-18 This book presents state of the art research and practice in optimization routing specifically the vehicle routing problem VRP Since its introduction in the late 1950s the VRP has been a very significant area of research and practice in operations research Vehicles are used to make deliveries and for pick ups every day and everywhere Companies such as Amazon UPS FedEx and DHL use route optimization to reduce mileage fuel use number of trucks on the road and carbon dioxide emissions The authors compile and analyze 135 survey and review articles on vehicle routing topics published between 2005 and 2022 in an effort to make key observations about publication and trend history summarize the overall contributions in the field and identify trends in VRP research and practice The authors have compiled published research on models algorithms and applications for specific areas including alternative and multiple objectives arc routing

and general routing drones last mile delivery and urban distribution dynamic and stochastic routing green routing inventory routing loading constraints location routing multiple depots pickup and delivery and dial a ride problems rich and multi attribute routing routing over time shipping two echelon collaborative and inter terminal problems specific variants benchmark datasets and software and exact algorithms and heuristics In addition the book discusses how vehicle routing problems are among the most widely studied problems in combinatorial optimization due to the mathematical complexity and practical significance

Metaheuristics for Vehicle Routing Problems Nacima Labadie, Christian Prins, Caroline Prodhon, 2016-02-11 This book is dedicated to metaheuristics as applied to vehicle routing problems Several implementations are given as illustrative examples along with applications to several typical vehicle routing problems As a first step a general presentation intends to make the reader more familiar with the related field of logistics and combinatorial optimization This preamble is completed with a description of significant heuristic methods classically used to provide feasible solutions quickly and local improvement moves widely used to search for enhanced solutions The overview of these fundamentals allows appreciating the core of the work devoted to an analysis of metaheuristic methods for vehicle routing problems Those methods are exposed according to their feature of working either on a sequence of single solutions or on a set of solutions or even by hybridizing metaheuristic approaches with others kind of methods

Bio-inspired Algorithms for the Vehicle Routing Problem Francisco Baptista Pereira, Jorge Tavares, 2008-09-29 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

The Vehicle Routing Problem Paolo Toth, Daniele Vigo, 2002 In the field of combinatorial optimization problems the Vehicle Routing Problem VRP is one of the most challenging Defined more than 40 years ago the problem involves designing the optimal set of routes for fleets of vehicles for the purpose of serving a given set of customers Interest in VRP is motivated by its practical relevance as well as its considerable difficulty

Green Transportation and New Advances in Vehicle Routing Problems Houda Derbel, Bassem Jarboui, Patrick Siarry, 2020-12-08 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 Evolution of the Vehicle Routing Problem Bruce Golden, Xingyin Wang, Edward Wasil, 2023-01-01 This book presents state of the art research and practice in optimization routing specifically the vehicle routing problem VRP Since its introduction in the late 1950s the VRP has been a very significant area of research and practice in operations research Vehicles are used to make deliveries and for pick ups every day and everywhere Companies such as Amazon UPS FedEx and DHL use route optimization to reduce mileage fuel use number of trucks on the road and carbon dioxide emissions The authors compile and analyze 135 survey and review articles on vehicle routing topics published between 2005 and 2022 in an effort to make key observations about publication and trend history summarize the overall contributions in the field and identify trends in VRP research and practice The authors have compiled published research on models algorithms and applications for specific areas including alternative and multiple objectives arc routing and general routing drones last mile delivery and urban distribution dynamic and stochastic routing green routing inventory routing loading constraints location routing multiple depots pickup and delivery and dial a ride problems rich and multi attribute routing routing over time shipping two echelon collaborative and inter terminal problems specific variants benchmark datasets and software and exact algorithms and heuristics In addition the book discusses how vehicle routing problems are among the most widely studied problems in combinatorial optimization due to the mathematical complexity and practical significance

The Periodical Vehicle Routing Problem: Research Overview and Practical Application to a South German Fast Food Restaurant Claus Friedrich, 2006-03-29 Diploma Thesis from the year 2005 in the subject Business economics General grade 1.3 University of Augsburg language English abstract In the middle of May 1997 Gerd Raupeter CEO of McDonald s Deutschland Inc Mc Donald s Germany Inc had to announce that some restaurants were sold out of shrimps¹ The keen customer s demand for this kind of seafood already exceeded the expected forecasts one week after starting the ongoing Fisch Wochen fish weeks mission As these circumstances highlighted an accurate product choice for the fast food corporation Mr Raupeter has nevertheless been pleased about it Otherwise such an awkward situation could be prevented by developing a demand driven scheduling for each restaurant in the future The Periodical Vehicle Routing Problem PVRP seems to be a tailor made solution for the reason that exact planning has to be done and delivery routes must be constructed over a period of time for example multiple days Observations and analyzes in the literature in most of the industries deal with a constant demand for goods and with only one good Moreover the one of a kind client prevails But for the application of the PVRP to the gastronomy there are some exceptions to be considered As this paper presents a solution approach of the delivery problem for the fast food industry in South Germany there are products to be transported consisting of diverse components Although there are nearly identical opening hours the eating places the clientele to be delivered due to their irregular demand for food and beverages are varying from the unique purchaser Another singularity lies in the

conformity of the foodstuff which is reflected in the comparability of each restaurant Therefore the enduring solution approach will be done in a sample of some fast food restaurants This paper herein is organized as follows In the second and third chapter various theories that could lead depots how to organize its delivery are reviewed with an emphasis on the Vehicle Routing Problem VRP as well as the PVRP Models for Practical Routing Problems in Logistics S. P. Anbuudayasankar,K. Ganesh,Sanjay Mohapatra,2014-07-08 This book deals with complex variants of Travelling Salesman Problem TSP and Vehicle Routing Problem VRP within the manufacturing and service industries The objective is to develop heuristics for these supply chain problems in order to offer practical solutions to improve operational efficiency These heuristics are evaluated using benchmark and derived data sets Case studies pertaining to logistics in different industries including textile machinery manufacturing and banking are also included to demonstrate the created heuristics High competition in today s global market has forced the organizations to invest in and focus on their logistics system The critical function of logistics is the transportation within and across various supply chain entities Both supply and distribution procedure require effective transportation management A small improvement in routing problems can lead to huge logistics savings in absolute terms This book should appeal to executives researchers and consultants seeking supply chain management solutions

Orienteering Problems Pieter Vansteenwegen,Aldy Gunawan,2019-08-30 This tutorial introduces readers to several variants of routing problems with profits In these routing problems each node has a certain profit and not all nodes need to be visited Since the orienteering problem OP is by far the most frequently studied problem in this category of routing problems the book mainly focuses on the OP In turn other problems are presented as variants of the OP focusing on the similarities and differences The goal of the OP is to determine a subset of nodes to visit and in which order so that the total collected profit is maximized and a given time budget is not exceeded The book provides a comprehensive review of variants of the OP such as the team OP the team OP with time windows the profitable tour problem and the prize collecting travelling salesperson problem In addition it presents mathematical models and techniques for solving these OP variants and discusses their complexity Several simple examples and benchmark instances together with their best known results are also included Finally the book reviews the latest applications of these problems in the fields of logistics tourism and others

Vehicle Routing Problem with Availability Constraints Farhana Johar,2015

Arc Routing Angel Corberan,Gilbert Laporte,2015-01-01 This book provides a thorough and up to date discussion of arc routing by world renowned researchers Organized by problem type the book offers a rigorous treatment of complexity issues models algorithms and applications Arc Routing Problems Methods and Applications opens with a historical perspective of the field and is followed by three sections that cover complexity and the Chinese Postman and the Rural Postman problems the Capacitated Arc Routing Problem and routing problems with min max and profit maximization objectives and important applications including meter reading snow removal and waste collection

What You Should Know about the Vehicle

Routing Problem Gilbert Laporte,2007 **The State of the Art in the Routing and Scheduling of Vehicles and Crews**,1981 **Online Vehicle Routing** Luis M. Torres,2004 Smart Delivery Systems Jakub Nalepa,2019-11-21 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 *Vehicle Routing under Consideration of Driving and Working Hours* Manuel Meyer,2011-04-21 In this study the dispatchers problem of combined vehicle routing and break scheduling is modelled and solved using an efficient heuristic solution algorithm Strategies for including the legal rules in the dispatching process are suggested *Solution Methods for Some Variants of the Vehicle Routing Problem* Ivona Gjeroska,2023 Arc Routing Moshe Dror,2000-08-31 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

Whispering the Techniques of Language: An Psychological Quest through **Vehicle Routing Problem**

In a digitally-driven earth where screens reign great and quick transmission drowns out the subtleties of language, the profound techniques and psychological subtleties hidden within words often move unheard. However, situated within the pages of **Vehicle Routing Problem** a interesting fictional prize sporting with fresh feelings, lies a fantastic quest waiting to be undertaken. Composed by a skilled wordsmith, this charming opus encourages viewers on an introspective journey, delicately unraveling the veiled truths and profound influence resonating within ab muscles fabric of each and every word. Within the emotional depths of this touching review, we shall embark upon a heartfelt exploration of the book is primary subjects, dissect its interesting writing fashion, and succumb to the powerful resonance it evokes strong within the recesses of readers hearts.

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