A Genetic Algorithm With Tabu Search For Multimodal And

This book is a collection of some 47 research papers that were presented in June 1997 at the 2nd Online World Conference in Soft Computing. It covers the state-of-the-art techniques and applications of soft computing which will stimulate further advances towards the next generation of intelligent machines. Soft Computing in Engineering Design and Manufacturing will be of interest to graduate students and researchers involved in soft computing. It will also be useful for those working in related industrial environments.

A detailed review of a wide range of meta-heuristic and evolutionary algorithms in a systematic manner and how they relate to engineering optimization problems This book introduces the main metaheuristic algorithms and their applications in optimization. It describes 20 leading meta-heuristic and evolutionary algorithms and presents discussions and assessments of their performance in solving optimization problems from several fields of engineering. The book features clear and concise principles and presents detailed descriptions of leading methods such as the pattern search (PS) algorithm, the genetic algorithm (GA), the simulated annealing (SA) algorithm, the Tabu search (TS) algorithm, the ant colony optimization (ACO), and the particle swarm optimization (PSO) technique. Chapter 1 of Meta-heuristic and Evolutionary Algorithms for Engineering Optimization provides an overview of optimization and defines it by presenting examples of optimization problems in different engineering domains. Chapter 2 presents an introduction to meta-heuristic and evolutionary algorithms and links them to engineering problems. Chapters 3 to 22 are each devoted to a separate algorithm— and they each start with a brief literature review of the development of the algorithm, and its applications to engineering problems. The principles, steps, and execution of the algorithms are described in detail, and a pseudo code of the algorithm is presented, which serves as a guideline for coding the algorithm to solve specific applications. This book: Introduces state-of-the-art metaheuristic algorithms and their applications to engineering optimization; Fills a gap in the current literature by compiling and explaining the various meta-heuristic and evolutionary algorithms in a clear and systematic manner; Provides a step-by-step presentation of each algorithm and guidelines for practical implementation and coding of algorithms; Discusses and assesses the performance of metaheuristic algorithms in multiple problems from many fields of engineering; Relates optimization algorithms to engineering problems employing a unifying approach. Meta-heuristic and Evolutionary Algorithms for Engineering Optimization is a reference intended for students, engineers, researchers, and instructors in the fields of industrial engineering, operations research, optimization/mathematics, engineering optimization, and computer science.

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Practical Handbook of Genetic Algorithms, Volume 3: Complex Coding Systems contains computer-code examples for the development of genetic algorithm systems - compiling them from an array of practitioners in the field. Each contribution of this singular resource includes: unique code segments documentation descripti

This volume is the third in an ongoing series of books that deal with the state of the art in timetabling research. It contains a selection of the papers presented at the 3rd International Conference on the Practice and Theory of Automated Timetabling (PATAT 2000) held in Constance, Germany, on August 16{18th, 2000. The conference, once again, brought together researchers, practitioners, and vendors from all over the world working on all aspects of computer-aided timetable generation. The main aim of the PATAT conference series is to serve as an international and inter-disciplinary forum for new timetabling research results and directions. The conference series particularly aims to foster mul- disciplinary timetabling research. Our eld has always attracted scientists from a number of traditional domains including computer science and operational - search and we believe that the cross-fertilisation of ideas from di erent elds and disciplines is a very important factor in the future development of timetabling research. The Constance conference certainly met these aims. As can be seen from the selection of papers in this volume, there was a wide range of interesting approaches and ideas for a variety of timetabling application areas and there were delegates from many di erent disciplines. It is clear that while considerable progress is being made in many areas of timetabling research, there are a number of important issues that researchers still have to face. In a contribution to the previous PATAT conference, George M.

Operations research models for scheduling railway infrastructure maintenance

Methods and Case Studies

Handbook of Combinatorial Optimization

Evolutionary Algorithms for Solving Multi-Objective Problems

Metaheuristics

Towards an Evolutionary Method : Cooperating Multi-thread Parallel Tabu Search Hybrid

This is a supplementary volume to the major three-volume Handbook of Combinatorial Optimization set. It can also be regarded as a stand-alone volume presenting chapters dealing with various aspects of the subject in a self-contained way.

Meta-Heuristics: Advances and Trends in Local Search Paradigms for Optimizations comprises a carefully refereed selection of extended versions of the best papers presented at the Second Meta-Heuristics Conference (MIC 97). The selected articles describe the most recent developments in theory and applications of meta-heuristics, heuristics for specific problems, and comparative case studies. The book is divided into six parts, grouped mainly by the techniques considered. The extensive first part with twelve papers covers tabu search and its application to a great variety of well-known combinatorial optimization problems (including the resource-constrained project scheduling problem and vehicle routing problems). In the second part we find one paper where tabu search and simulated annealing are investigated comparatively and two papers which consider hybrid methods combining tabu search with genetic algorithms. The third part has four papers on genetic and evolutionary algorithms. Part four arrives at a new paradigm within meta-heuristics. The fifth part studies the behavior of parallel local search algorithms mainly from a tabu search perspective. The final part examines a great variety of additional meta-heuristics topics, including neural networks and variable neighbourhood search as well as guided local search. Furthermore, the integration of meta-heuristics with the branch-and-bound paradigm is investigated.

This book constitutes the refereed proceedings of the Third International Conference on Evolutionary Multi-Criterion Optimization, EMO 2005, held in Guanajuato, Mexico, in March 2005. The 59 revised full papers presented together with 2 invited papers and the summary of a tutorial were carefully reviewed and selected from the 115 papers submitted. The papers are organized in topical sections on algorithm improvements, incorporation of preferences, performance analysis and comparison, uncertainty and noise, alternative methods, and applications in a broad variety of fields.

This interdisciplinary reference and guide provides an introduction to modeling methodologies and models which form the starting point for deriving efficient and effective solution techniques, and presents a series of case studies that demonstrate how heuristic and analytical approaches may be used to solve large and complex problems. Topics and features: introduces the key modeling methods and tools, including heuristic and mathematical programming-based models, and queueing theory and simulation techniques; demonstrates the use of heuristic methods to not only solve complex decision-making problems, but also to derive a simpler solution technique; presents case studies on a broad range of applications that make use of techniques from genetic algorithms and fuzzy logic, tabu search, and queueing theory; reviews examples incorporating system dynamics modeling, cellular automata and agent-based simulations, and the use of big data; supplies expanded descriptions and examples in the appendices.

Computer Decision-Making

The Comparative Study of Genetic Algorithm and Tabu Search for Solving the University Course Timetabling Problem

Genetic Algorithms, Tabu Search, Simulated Annealing and Neural Networks

8th European Conference, EvoCOP 2008, Naples, Italy, March 26-28, 2008, Proceedings

Multiobjective Scheduling by Genetic Algorithms

Guide to Computational Modelling for Decision Processes

Finding exact solutions to many combinatorial optimization problems in busi ness, engineering, and science still poses a real challenge, despite the impact of recent advances in mathematical programming and computer technology. New fields of applications, such as computational biology, electronic commerce, and supply chain management, bring new challenges and needs for algorithms and optimization techniques. Metaheuristics are master procedures that guide and modify the operations of subordinate heuristics, to produce improved approx imate solutions to hard optimization problems with respect to more simple algorithms. They also provide fast and robust tools, producing high-quality solutions in reasonable computation times. The field of metaheuristics has been fast evolving in recent years. Tech niques such as simulated annealing, tabu search, genetic algorithms, scatter search, greedy randomized adaptive search, variable neighborhood search, ant systems, and their hybrids are currently among the most efficient and robust optimization strategies to find high-quality solutions to many real-life optimiza tion problems. A very large nmnber of successful applications of metaheuristics are reported in the literature and spread throughout many books, journals, and conference proceedings. A series of international conferences entirely devoted to the theory, applications, and computational developments in metaheuristics has been attracting an increasing number of participants, from universities and the industry.

Tabu Search (TS) and, more recently, Scatter Search (SS) have proved highly effective in solving a wide range of optimization problems, and have had a variety of applications in industry, science, and government. The goal of Metaheuristic Optimization via Memory and Evolution: Tabu Search and Scatter Search is to report original research on algorithms and applications of tabu search, scatter search or both, as well as variations and extensions having "adaptive memory programming" as a primary focus. Individual chapters identify useful new implementations or new ways to integrate and apply the principles of TS and SS, or that prove new theoretical results, or describe the successful application of these methods to real world problems.

Evolutionary scheduling is a vital research domain at the interface of artificial intelligence and operational research. This edited book gives an overview of many of the current developments in the large and growing field of evolutionary scheduling. It demonstrates the applicability of evolutionary computational techniques to solve scheduling problems, not only to small-scale test problems, but also fully-fledged real-world problems.

This book presents the application of some AI related optimization techniques in the operation and control of electric power systems. With practical applications and examples the use of functional analysis, simulated annealing, Tabu-search, Genetic algorithms and fuzzy systems for the optimization of power systems is discussed in detail. Preliminary mathematical concepts are presented before moving to more advanced material. Researchers and graduate students will benefit from this book. Engineers working in utility companies, operations and control, and resource management will also find this book useful. ?

Combining Genetic Algorithm and Tabu Search Methodology for Improving Winter's Method of Forecasting

Comparison of Tabu Search and Genetic Algorithm in Mobile Network Design

Computer Science and Operations Research: New Developments in their Interfaces

Global Optimization of Recurrent Neural Networks: a Comparison of the Genetic Algorithm and Tabu Search

Tabu Search and Genetic Algorithm for Phylogeny Inference

Proceedings of the International Conference in Alès, France, 1995

This book offers a basic introduction to genetic algorithms. It provides a detailed explanation of genetic algorithm concepts and examines numerous genetic algorithm optimization problems. In addition, the book presents implementation of optimization problems using C and C++ as well as simulated solutions for genetic algorithm problems using MATLAB 7.0. It also includes application case studies on genetic algorithms in emerging fields.

Genetic Algorithms in Java Basics is a brief introduction to solving problems using genetic algorithms, with working projects and solutions written in the Java programming language. This brief book will guide you step-by-step through various implementations of genetic algorithms and some of their common applications, with the aim to give you a practical understanding allowing you to solve your own unique, individual problems. After reading this book you will be comfortable with the language specific issues and concepts involved with genetic algorithms and you'll have everything you need to start building your own. Genetic algorithms are frequently used to solve highly complex real world problems and with this book you too can harness their problem solving capabilities. Understanding how to utilize and implement genetic algorithms is an essential tool in any respected software developers toolkit. So step into this intriguing topic and learn how you too can improve your software with genetic algorithms, and see real Java code at work which you can develop further for your own projects and research. Guides you through the theory behind genetic algorithms Explains how genetic algorithms can be used for software developers trying to solve a range of problems Provides a step-by-step guide to implementing genetic algorithms in Java

Blackbox optimization--optimization in presence of limited knowledge about the objective function--has recently enjoyed a large increase in interest because of the demand from the practitioners. This has triggered a race for new high performance algorithms for solving large, difficult problems. Simulated annealing, genetic algorithms, tabu search are some examples. Unfortuntely, each of these algorithms is creating a separate field in itself and their use in practice is often guided by personal discretion rather than scientific reasons. The primary reason behind this confusing situation is the lack of any comprehensive understanding about blackbox search. This dissertation takes a step toward clearing some of the confusion. The main objectives of this dissertation are: (1) present SEARCH (Search Envisioned As Relation & Class Hierarchizing)--an alternate perspective of blackbox optimization and its quantitative analysis that lays the foundation essential for transcending the limits of random enumerative search; (2) design and testing of the fast messy genetic algorithm. SEARCH is a general framework for understanding blackbox optimization in terms of relations, classes and ordering. The primary motivation comes from the observation that sampling in blackbox optimization is essentially an inductive process (Michalski, 1983) and in absence of any relation among the members of the search space, induction is no better than enumeration. The foundation of SEARCH is laid on a decomposition of BBO into relation, class, and sample spaces. An ordinal, probablistic, and approximate framework is developed on this foundation to identify the fundamental principles in-blackbox optimization, essential for transcending the limits of random enumerative search. Bounds on success probability and sample complexity ate derived. I explicitly consider specific blackbox algorithms like simulated annealing, genetic algorithms and demonstrate that the fundamental computations in all of them can be captured using SEARCH. SEARCH also offers an alternate perspective of natural evolution that establishes the computational role of gene expression (DNA to RNA to Protein) in evolution. This model of evolutionary computation hypothesizes a possible mapping of the decomposition is relation, class, and sample spaces of SEARCH into the transcriptional regulatory mechanisms, proteins, and DNA respectively. The second part of this dissertation starts by noting the limitations of simple GAs, which fail to properly search for relations and makes decision making very noisy by combining relation, class, and the sample spaces. Messy genetic algorithms (Goldberg, Korb, & Deb, 1989; Deb, 1991) are a rare class of algorithms that emphasize the search for relations. Despite this strength of messy GAs, they lacked complete benefits of implicit parallelism (Holland, 1975). The fast messy GA initiated by Goldberg, Deb, Kargupta, and Harik (1993) introduced some of the benefits of implicit parallelism in messy GA without sacrificing its other strengths very much. This dissertation investigates fast messy GAs and presents test results to demonstrate its performance for order-k delineable problems.

Tabu Search and Genetic Algorithm for Phylogeny Inference

Metaheuristics for Hard Optimization

Practical Handbook of Genetic Algorithms

Transportation Systems and Engineering: Concepts, Methodologies, Tools, and Applications

Third International Conference, EMO 2005, Guanajuato, Mexico, March 9-11, 2005, Proceedings

Theory and Applications

Tabu Search and Scatter Search

This book constitutes the refereed proceedings of the 8th European Conference on Evolutionary Computation in Combinatorial Optimization, EvoCOP 2008, held in Naples, Italy, in March 2008. The 24 revised full papers presented were carefully reviewed and selected from 69 submissions. The papers present the latest research and discuss current developments and applications in metaheuristics - a paradigm to effectively solve difficult co problems appearing in various industrial, economical, and scientific domains. Prominent examples of metaheuristics are evolutionary algorithms, simulated annealing, tabu search, scatter search, memetic algorithms, variable neighborhood search, iterated local search, greedy randomized adaptive search procedures, estimation of distribution algorithms and ant colony optimization.

Cellular Genetic Algorithms defines a new class of optimization algorithms based on the concepts of structured populations and Genetic Algorithms (GAs). The authors explain and demonstrate the validity of these cellular genetic algorithms throughout the book with equal and parallel emphasis on both theory and practice. This book is a key source for studying and designing cellular GAs, as well as a self-contained primary reference book f

Artificial neural networks and genetic algorithms both are areas of research which have their origins in mathematical models constructed in order to gain understanding of important natural processes. By focussing on the process models rather than the processes themselves, significant new computational techniques have evolved which have found application in a large number of diverse fields. This diversity is reflected in the topics which a to this volume. There are contributions reporting successful applications of the technology to the solution of industrial/commercial problems. This may well reflect the maturity of the technology, notably in the sense that 'real' users of modelling/prediction techniques are prepared to accept neural networks as a valid paradigm. Theoretical issues also receive attention, notably in connection with the radial basis function neural network. Contribu algorithms reflect the wide range of current applications, including, for example, portfolio selection, filter design, frequency assignment, tuning of nonlinear PID controllers. These techniques are also used extensively for combinatorial optimisation problems.

To present the methodology of applying Genetic Algorithm and Tabu Search in finding the global optima in Recurrent Neural Network. Then the result is compared with Backpropagation, the legacy method. The result depicts that Genetic Algorithm and Tabu Search can help Recurrent Neural Network performs better than Backpropagation. This is because the Genetic Algorithm has a cross-over operator to jump off of local optima whilst Ta prevent re-cycling search as well as using long term memory to make the searching broader. However, Genetic Algorithm and Tabu Search take more time to find out the solution. In a short time running, Backpropagation can find a solution in some dataset better than others.

Soft Computing in Engineering Design and Manufacturing

Essays and Surveys in Metaheuristics

A Tabu Search/genetic Algorithm Hybrid Heuristic for Solving a Master Production Scheduling Problem with Sequence Dependent Changeover Times

Third International Conference, PATAT 2000 Konstanz, Germany, August 16-18, 2000 Selected Papers

Theory, Algorithms, Techniques and Applications

Evolutionary Scheduling

The interface of Operation Research and Computer Science - although elusive to a precise definition - has been a fertile area of both methodological and applied research. The papers in this book, written by experts in their respective fields, convey the current state-of-the-art in this interface across a broad spectrum of research domains which include optimization techniques, linear programming, interior point algorithms, networks, computer graphics in operations research, parallel algorithms and implementations, planning and scheduling, genetic algorithms, heuristic search techniques and data retrieval.

Contains case studies from engineering and operations research Includes commented literature for each chapter

Meta-heuristics have developed dramatically since their inception in the early 1980s. They have had widespread success in attacking a variety of practical and difficult combinatorial optimization problems. These families of approaches include, but are not limited to greedy random adaptive search procedures, genetic algorithms, problem-space search, neural networks, simulated annealing, tabu search, threshold algorithms, and their hybrids. They incorporate concepts based on biological evolution, intelligent problem solving, mathematical and physical sciences, nervous systems, and statistical mechanics. Since the 1980s, a great deal of effort has been invested in the field of combinatorial optimization theory in which heuristic algorithms have become an important area of research and applications. This volume is drawn from the first conference on Meta-Heuristics and contains 41 papers on the state-of-the-art in heuristic theory and applications. The book treats the following meta-heuristics and applications: Genetic Algorithms, Simulated Annealing, Tabu Search, Networks & Graphs, Scheduling and Control, TSP, and Vehicle Routing Problems. It represents research from the fields of Operations Research, Management Science, Artificial Intelligence and Computer Science.

Researchers and practitioners alike are increasingly turning to search, op timization, and machine-learning procedures based on natural selection and natural genetics to solve problems across the spectrum of human endeavor. These genetic algorithms and techniques of evolutionary computation are solv ing problems and inventing new hardware and software that rival human designs. The Kluwer Series on Genetic Algorithms and Evolutionary Computation pub lishes research monographs, edited collections, and graduate-level texts in this rapidly growing field. Primary areas of coverage include the theory, implemen tation, and application of genetic algorithms (GAs), evolution strategies (ESs), evolutionary programming (EP), learning classifier systems (LCSs) and other variants of genetic and evolutionary computation (GEC). The series also pub lishes texts in related fields such as artificial life, adaptive behavior, artificial immune systems, agent-based systems, neural computing, fuzzy systems, and quantum computing as long as GEC techniques are part of or inspiration for the system being described. This encyclopedic volume on the use of the algorithms of genetic and evolu tionary computation for the solution of multi-objective problems is a landmark addition to the literature that comes just in the nick of time. Multi-objective evolutionary algorithms (MOEAs) are receiving increasing and unprecedented attention. Researchers and practitioners are finding an irresistible match be tween the popUlation available in most genetic and evolutionary algorithms and the need in multi-objective problems to approximate the Pareto trade-off curve or surface.

Complex Coding Systems, Volume III

Practice and Theory of Automated Timetabling III

Meta-heuristic and Evolutionary Algorithms for Engineering Optimization

Genetic Algorithm and Tabu Search Approaches to Quantization for DCT-based Image Compression

Solving Nonlinear Combinatorial Optimization Problems with a Cooperative Genetic Algorithm and Tabu Search Meta-heuristic

This work gives a concise introduction to four important optimization techniques, presenting a range of applications drawn from electrical, manufacturing, mechanical, and systems engineering-such as the design of microstrip antennas, digital FIR filters, and fuzzy logic controllers. The book also contains the C programs used to implement the main techniques for those wishing to experiment with them.

This is the third in a series of conferences devoted primarily to the theory and applications of artificial neural networks and genetic algorithms. The first such event was held in Innsbruck, Austria, in April 1993, the second in Ales, France, in April 1995. We are pleased to host the 1997 event in the mediaeval city of Norwich, England, and to carryon the fine tradition set by its predecessors of providing a relaxed and stimulating environment for both established and emerging researchers working in these and other, related fields. This series of conferences is unique in recognising the relation between the two main themes of artificial neural networks and genetic algorithms, each having its origin in a natural process fundamental to life on earth, and each now well established as a paradigm fundamental to continuing technological development through the solution of complex, industrial, commercial and financial problems. This is well illustrated in this volume by the numerous applications of both paradigms to new and challenging problems. The third key theme of the series, therefore, is the integration of both technologies, either through the use of the genetic algorithm to construct the most effective network architecture for the problem in hand, or, more recently, the use of neural networks as approximate fitness functions for a genetic algorithm searching for good solutions in an 'incomplete' solution space, i.e. one for which the fitness is not easily established for every possible solution instance.

Discusses current methods used for image compression. Also gives a detailed explanation of the discrete cosine transform (DCT), used by JPEG, and the efforts that have recently been made to optimize related algorithms.

Combinatorial optimization is the process of finding the best, or optimal, so lution for problems with a discrete set of feasible solutions. Applications arise in numerous settings involving operations management and logistics, such as routing, scheduling, packing, inventory and production management, lo cation, logic, and assignment of resources. The economic impact of combi natorial optimization is profound, affecting sectors as diverse as transporta tion (airlines, trucking, rail, and shipping), forestry, manufacturing, logistics, aerospace, energy (electrical power, petroleum, and natural gas), telecommu nications, biotechnology, financial services, and agriculture. While much progress has been made in finding exact (provably optimal) so lutions to some combinatorial optimization problems, using techniques such as dynamic programming, cutting planes, and branch and cut methods, many hard combinatorial problems are still not solved exactly and require good heuristic methods. Moreover, reaching "optimal solutions" is in many cases meaningless, as in practice we are often dealing with models that are rough simplifications of reality. The aim of heuristic methods for combinatorial op timization is to quickly produce good-quality solutions, without necessarily providing any guarantee of solution quality. Metaheuristics are high level procedures that coordinate simple heuristics, such as local search, to find solu tions that are of better quality than those found by the simple heuristics alone: Modem metaheuristics include simulated annealing, genetic algorithms, tabu search, GRASP, scatter search, ant colony optimization, variable neighborhood search, and their hybrids.

Advances and Trends in Local Search Paradigms for Optimization

Intelligent Optimisation Techniques

Artificial Neural Nets and Genetic Algorithms

A Tabu Search and a Genetic Algorithm for Solving a Bicriteria General Job Shop Scheduling Problem

A Textbook of Graph Theory

Evolutionary Multi-Criterion Optimization

Multiobjective Scheduling by Genetic Algorithms describes methods for developing multiobjective solutions to common production scheduling equations modeling in the literature as flowshops, job shops and open shops. The methodology is metaheuristic, one inspired by how nature has evolved a multitude of coexisting species of living beings on earth. Multiobjective flowshops, job shops and open shops are each highly relevant models in manufacturing, classroom scheduling or automotive assembly, yet for want of sound methods they have remained almost untouched to date. This text shows how methods such as Elitist Nondominated Sorting Genetic Algorithm (ENGA) can find a bevy of Pareto optimal solutions for them. Also it accents the value of hybridizing Gas with both solution-generating and solution-improvement methods. It envisions fundamental research into such methods, greatly strengthening the growing reach of metaheuristic methods. This book is therefore intended for students of industrial engineering, operations research, operations management and computer science, as well as practitioners. It may also assist in the development of efficient shop management software tools for schedulers and production planners who face multiple planning and operating objectives as a matter of course.

In its second edition, expanded with new chapters on domination in graphs and on the spectral properties of graphs, this book offers a solid background in the basics of graph theory. Introduces such topics as Dirac's theorem on k-connected graphs and more.

This thesis can be divided into two parts. In Part I we are dealing with the problem of finding optimal time intervals for carrying out routine maintenance works and large projects in such a way that the track possession costs and maintenance costs are minimized. In Part II of this thesis we focus on rescheduling of the rolling stock in the passenger railways due to changing circumstances and more precisely on the Rolling Stock Rebalancing Problem (RSRP). The main objectives of this thesis are formulated as follows: 1. Review the existing literature on maintenance planning in relation with production. 2. Identify some tactical and operational railway infrastructure maintenance planning problems and develop operations research models for providing decision support. Investigate the effect of planning railway infrastructure maintenance on the train operation and identify rolling stock planning problems that occur during planned infrastructure maintenance. 3. Analyze the considered models, investigate their computational complexity, propose solution methods and test the solutions of the models.

Keywords: parsimony, phylogeny, genetic algorithm, tabu search, topology search, maximum likelihood.

Modern Optimization Techniques with Applications in Electric Power Systems

Meta-Heuristics

Proceedings of the International Conference in Norwich, U.K., 1997

Supplement Volume B

Concepts, Methodologies, Tools, and Applications

Search, Polynomial Complexity, and the Fast Messy Genetic Algorithm

This thesis will explore two methods of designing a mobile wireless network. The approaches used in designing their wireless networks are tabu search and genetic algorithm. Both of these methods are widely used for global optimization problems. A detailed network optimization framework is developed for designing wireless network. This optimization problem is then solved using genetic algorithm and tabu search. The designs from the two methods are compared with each other to compare which optimization performs better. From the study of the results of this experiment, both of the methods can find a good framework of a mobile wireless network. They both converge at about the same rate. Therefore, they are equal in performance.

Phylogenetics is the study of evolutionary relations between different organisms. Phylogenetic trees are the representations of these relations. Researchers have been working on finding fast and systematic approaches to reconstruct phylogenetic trees from observed data for over 40 years. It has been shown that, given a certain criterion to evaluate each tree, finding the best fitted phylogenetic trees among all possible trees is an NP-hard problem. In this study, we focus on the topology searching techniques for the maximum-parsimony and maximum-likelihood phylogeny inference. We proposed two search methods based on tabu search and genetic algorithms. We first explore the feasibility of using tabu search for finding the maximum-parsimony trees. The performance of the proposed algorithm is evaluated based on its efficiency and accuracy. Then we proposed a hybrid method of the tabu search and genetic algorithm. The experimental results indicate that the hybrid method can provide maximum-parsimony trees with a ggood level of accuracy and efficiency. The hybrid method is also implemented for finding maximum-likelihood trees. The experimental results show that the proposed hybrid method produce better maximum-likelihood trees than the default-setting dnaml program in average on the tested data sets. On a much larger data set, the hybrid method outperforms the default-setting dnaml program and has equally good performance as the dnaml program with the selected jumble option.

From driverless cars to vehicular networks, recent technological advances are being employed to increase road safety and improve driver satisfaction. As with any newly developed technology, researchers must take care to address all concerns, limitations, and dangers before widespread public adoption. Transportation Systems and Engineering: Concepts, Methodologies, Tools, and Applications addresses current trends in transportation technologies, such as smart cars, green technologies, and infrastructure development. This multivolume book is a critical reference source for engineers, computer scientists, transportation authorities, students, and practitioners in the field of transportation systems management.

Genetic Algorithms in Java Basics

Evolutionary Computation in Combinatorial Optimization

Cellular Genetic Algorithms

Metaheuristic Optimization via Memory and Evolution

Introduction to Genetic Algorithms