Investigation and Implementation of a New Heuristic Algorithm and a Relaxed Formulation of the Hamilton Tour Decision Problem

The knapsack problem has been used to model various decision making processes. Industrial applications find the need for satisfying additional constraints and these necessities lead to the variants and extensions of knapsack problems which are complex to solve. Heuristic algorithms have been developed by many researchers to solve the variants of knapsack problems. Empirical analysis has been done to compare the performance of these heuristics. Little research has been done to find out why certain algorithms perform well on certain test problems while not so well on other test problems. There has been little work done to gain knowledge of the test problem characteristics and their effects on algorithm performance. The research focuses on the Multiple-choice Multidimensional Knapsack Problem (MMKP), a complex variant of the knapsack problem. The objectives of the research are fourfold. The first objective is to show how empirical science can lead to theory. The research involves the empirical analysis of current heuristics with respect to problem structure especially constraint correlation and constraint slackness settings. The second objective is to consider the performance traits of heuristic procedures and develop a more diverse set of MMKP test problems considering problem characteristics like the number of variables, number of constraints, constraint correlation, and constraint right-hand side capacities. The third objective is the development of new heuristic approaches for solving the MMKP. This involves examining the existing heuristics against our new test set and using the analysis of the results to help in the development of new heuristic approaches. The fourth objective is to develop improved metaheuristic procedures for the MMKP using the improved heuristic approaches to initialize searches or to improve local search neighborhoods.

Application of Modern Heuristic Optimization Methods in Power and Energy Systems

One of the ultimate goals of robotics research is to create autonomous robots. Progress toward this goal requires advances in many domains, including automatic motion planning. The basic problem in motion planning is to construct a collision-free path for a moving object among fixed obstacles. Several approaches have been proposed, including cell decomposition, retraction, and potential field. Nevertheless, most existing planners still lack efficiency, or reliability, or both. In this paper, we consider one of the most popular approaches to path planning: hierarchical approximate cell decomposition. We propose a set of new algorithms for constructing more efficient and reliable path planners based on this general approach. These algorithms concern the hierarchical decomposition of the robot's configuration space into rectangloid cells, and the search of the connectivity graphs built at each level of
Get Free A New Heuristic Algorithm To Assign Priorities And decomposition. We have implemented these algorithms in a path planner and experimented with this planner on various examples. Some are described in the paper. These experiments show that our planner is significantly faster than previous planners based on the same general approach. (KR).

Service Oriented, Holonic and Multi-agent Manufacturing Systems for Industry of the Future

This edited book presents new results in the area of the development of exact and heuristic scheduling algorithms. It contains eight articles accepted for publication for a Special Issue in the journal Algorithms. The book presents new algorithms, e.g., for flow shop, job shop, and parallel machine scheduling problems. The particular articles address subjects such as a heuristic for the routing and scheduling problem with time windows, applied to the automotive industry in Mexico, a heuristic for the blocking job shop problem with tardiness minimization based on new neighborhood structures, fast heuristics for the Euclidean traveling salesman problem or a new mathematical model for the period-aggregated resource leveling problem with variable job duration, and several others.

Data Mining: A Heuristic Approach

This volume of Advances in Intelligent and Soft Computing contains accepted - pers presented at SOCO 2010 held in the beautiful and historic city of Guimarães, Portugal, June 2010. The global purpose of SOCO conferences has been to provide a broad and - terdisciplinary forum for soft computing and associated paradigms, which are playing increasingly important roles in an important number of industrial and - vironmental applications fields. Soft computing represents a collection or set of computational techniques in machine learning, computer science and some engineering disciplines, which - vestigate, simulate and analyze very complex issues and phenomena. This wo- shop is mainly focused on its industrial and environmental applications. th SOCO 2010 is the 5 International Workshop on Soft Computing Models in Industrial Applications and provides interesting opportunities to present and d- cuss the latest theoretical advances and real world applications in this multis- pinary research field. This volume presents the papers accepted for the 2010 edition, both for the main event and the Special Sessions. SOCO 2010 Special Sessions are a very u- ful tool in order to complement the regular program with new or emerging topics of particular interest to the participating community. Special Sessions that emp- size on multi-disciplinary and transversal aspects, as well as cutting-edge topics were especially encouraged and welcome. SOCO 2010 included a total of 3 Special Sessions: Ensemble Learning and - formation Fusion for Industrial Applications; Soft Computing for Service M- agement; Hybrid Intelligent Systems and Applications.

Metaheuristics in Water, Geotechnical and Transport Engineering

Computer Science and Operations Research continue to have a synergistic relationship and this book - as a part of the Operations Research and Computer Science Interface Series - sits squarely in the center of the confluence of these two technical research communities. The research presented in the volume is evidence of the expanding frontiers of these two intersecting disciplines and provides researchers and practitioners with new work in the areas of logic programming, stochastic optimization, heuristic search and post-solution analysis for integer programs. The chapter topics span the spectrum of application level. Some of the chapters are highly applied and others represent work in which the application potential is only beginning. In addition, each chapter contains expository material and reviews of the literature designed to enhance the participation of the reader in this expanding interface.

A New Heuristic for Job Scheduling in Multiple Processor Systems

Advanced Modeling and Optimization of Manufacturing Processes

The Harmony Search Algorithm (HSA) is one of the most well-known techniques in the field of soft computing, an important paradigm in the science and engineering community. This volume, the proceedings of the 2nd International Conference on Harmony Search Algorithm 2015 (ICHSA 2015), brings together contributions describing the latest developments in the
field of soft computing with a special focus on HSA techniques. It includes coverage of new methods that have potentially immense application in various fields. Contributed articles cover aspects of the following topics related to the Harmony Search Algorithm: analytical studies; improved, hybrid and multi-objective variants; parameter tuning; and large-scale applications. The book also contains papers discussing recent advances on the following topics: genetic algorithms; evolutionary strategies; the firefly algorithm and cuckoo search; particle swarm optimization and ant colony optimization; simulated annealing; and local search techniques. This book offers a valuable snapshot of the current status of the Harmony Search Algorithm and related techniques, and will be a useful reference for practising researchers and advanced students in computer science and engineering.

Heuristics and Hyper-Heuristics

Computational optimization is an important paradigm with a wide range of applications. In virtually all branches of engineering and industry, we almost always try to optimize something - whether to minimize the cost and energy consumption, or to maximize profits, outputs, performance and efficiency. In many cases, this search for optimality is challenging, either because of the high computational cost of evaluating objectives and constraints, or because of the nonlinearity, multimodality, discontinuity and uncertainty of the problem functions in the real-world systems. Another complication is that most problems are often NP-hard, that is, the solution time for finding the optimum increases exponentially with the problem size. The development of efficient algorithms and specialized techniques that address these difficulties is of primary importance for contemporary engineering, science and industry. This book consists of 12 self-contained chapters, contributed from worldwide experts who are working in these exciting areas. The book strives to review and discuss the latest developments concerning optimization and modelling with a focus on methods and algorithms for computational optimization. It also covers well-chosen, real-world applications in science, engineering and industry. Main topics include derivative-free optimization, multi-objective evolutionary algorithms, surrogate-based methods, maximum simulated likelihood estimation, support vector machines, and metaheuristic algorithms. Application case studies include aerodynamic shape optimization, microwave engineering, black-box optimization, classification, economics, inventory optimization and structural optimization. This graduate level book can serve as an excellent reference for lecturers, researchers and students in computational science, engineering and industry.

A New Heuristic Algorithm for the Traveling Salesman Problem

Music-Inspired Harmony Search Algorithm

As known, it is not possible to develop an algorithm that can compute the exact value of the minimum makespan on identical parallel machines in polynomial time. Therefore heuristic methods are convenient to find near optimal solutions. In this thesis, it is aimed to compose a new heuristic algorithm to minimize the makespan on identical parallel machines. This algorithm can present better solutions than LPT (Longest Processing Time) algorithm in general. The computer models of the proposed and LPT algorithms are developed. 1640 different problems are solved using the two models to compare the performances of the algorithms. Numbers of jobs, numbers of machines or the mean of processing times are changed one at a time, while keeping the rest constant and, the variation in the makespan is observed. Finally it is concluded that there is sufficient evidence that the proposed algorithm provides better solutions than LPT in the light of the data collected from the uniform distribution. The proposed algorithm is also modified to the probabilistic cases.

Integer Programming and Network Models

In recent years researchers have spent much effort in developing efficient heuristic algorithms for solving the class of NP-complete problems which are widely believed to be inherently intractable from the computational point of view. Although algorithms have been designed and are notorious among researchers, computer programs are either not implemented on computers or very difficult to obtain. The purpose of this book is to provide a source of FORTRAN coded algorithms for a selected number of well-known combinatorial optimization problems. The book is intended to be used as a supplementary text in combinatorial algorithms, network optimization, operations research and management science. In addition, a short description on each algorithm will allow the book to be used as a convenient reference. This work would not have been possible without the excellent facilities of Bell-Northern Research, Canada. H. T. Lau Ile des Soeurs Quebec, Canada August 1986 CONTENTS Page Introduction Part I. INTEGER PROGRAMMING Chapter 1. Integer Linear Programming Chapter 2.
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Zero-one Linear Programming 30 Chapter 3. Zero-one Knapsack Problem 38 Part II. NETWORK DESIGN Chapter 4. Traveling Salesman Problem 52 Chapter 5. Steiner Tree Problem 81 Chapter 6. Graph Partitioning 98 Chapter 7. K-Median Location 106 Chapter 8. K-Center Location 114 List of Subroutines 123 Bibliographic Notes 124 INTRODUCTION Following the elegant theory of NP-completeness, the idea of developing efficient heuristic algorithms has been gaining its popularity and significance.

Machine Learning and Big Data Analytics Paradigms: Analysis, Applications and Challenges

Most textbooks on modern heuristics provide the reader with detailed descriptions of the functionality of single examples like genetic algorithms, genetic programming, tabu search, simulated annealing, and others, but fail to teach the underlying concepts behind these different approaches. The author takes a different approach in this textbook by focusing on the users' needs and answering three fundamental questions: First, he tells us which problems modern heuristics are expected to perform well on, and which should be left to traditional optimization methods. Second, he teaches us to systematically design the "right" modern heuristic for a particular problem by providing a coherent view on design elements and working principles. Third, he shows how we can make use of problem-specific knowledge for the design of efficient and effective modern heuristics that solve not only small toy problems but also perform well on large real-world problems. This book is written in an easy-to-read style and it is aimed at students and practitioners in computer science, operations research and information systems who want to understand modern heuristics and are interested in a guide to their systematic design and use. This book is written in an easy-to-read style and it is aimed at students and practitioners in computer science, operations research and information systems who want to understand modern heuristics and are interested in a guide to their systematic design and use. This book is written in an easy-to-read style and it is aimed at students and practitioners in computer science, operations research and information systems who want to understand modern heuristics and are interested in a guide to their systematic design and use.

A New Heuristic Algorithm for Resource-constrained Project Scheduling

Harmony Search Algorithm

The purpose of this book is to provide readers with an introduction to the very active field of integer programming and network models. The idea is to cover the main parts of the field without being too detailed or too technical. As a matter of fact, we found it somewhat surprising that most--especially newer--books are strongly algorithmically oriented. In contrast, the main emphasis of this book is on models rather than methods. This focus expresses our view that methods are tools to solve actual problems and not ends in themselves. As such, graduate (and with some omissions, undergraduate) students may find this book helpful in their studies as will practitioners who would like to get acquainted with a field or use this text as a refresher. This premise has resulted in a coverage that omits material that is standard fare in other books, whereas it covers topics that are only infrequently found elsewhere. There are some, yet relatively few, prerequisites for the reader. Most material that is required for the understanding of more than one chapter is presented in one of the four chapters of the introductory part, which reviews the main results in linear programming, the analysis of algorithms, graphs and networks, and dynamic programming, respectively. Readers who are familiar with the issues involved can safely skip that part. The three main parts of the book rely on intuitive reasoning and examples, whenever practical, instead of theorems and proofs.

A New Meta-heuristic Optimization Algorithm Based on the String Theory Paradigm from Physics

In the last few years, the society is witnessing ever-growing levels of complexity in the optimization paradigms lying at the core of different applications and processes. This augmented complexity has motivated the adoption of heuristic methods as a means to balance the Pareto trade-off between computational efficiency and the quality of the produced solutions to the problem at hand. The momentum gained by heuristics in practical applications spans further towards hyper-heuristics, which allow constructing ensembles of simple heuristics to handle efficiently several problems of a single class. In this context, this short book compiles selected applications of heuristics and hyper-heuristics for combinatorial optimization problems, including scheduling and other assorted application scenarios.
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AI 2011: Advances in Artificial Intelligence

Calculus has been used in solving many scientific and engineering problems. For optimization problems, however, the differential calculus technique sometimes has a drawback when the objective function is step-wise, discontinuous, or multi-modal, or when decision variables are discrete rather than continuous. Thus, researchers have recently turned their interests into metaheuristic algorithms that have been inspired by natural phenomena such as evolution, animal behavior, or metallic annealing. This book especially focuses on a music-inspired metaheuristic algorithm, harmony search. Interestingly, there exists an analogy between music and optimization: each musical instrument corresponds to each decision variable; musical note corresponds to variable value; and harmony corresponds to solution vector. Just like musicians in Jazz improvisation play notes randomly or based on experiences in order to find fantastic harmony, variables in the harmony search algorithm have random values or previously-memorized good values in order to find optimal solution.

Meta-heuristic and Evolutionary Algorithms for Engineering Optimization

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.

Soft Computing Models in Industrial and Environmental Applications, 5th International Workshop (SOCO 2010)

This comprehensive handbook brings together experts who use optimization to solve problems that arise in telecommunications. It is the first book to cover in detail the field of optimization in telecommunications. Recent optimization developments that are frequently applied to telecommunications are covered. The spectrum of topics covered includes planning and design of telecommunication networks, routing, network protection, grooming, restoration, wireless communications, network location and assignment problems, Internet protocol, World Wide Web, and stochastic issues in telecommunications. The book's objective is to provide a reference tool for the increasing number of scientists and engineers in telecommunications who depend upon optimization.

Advanced Data Mining and Applications

Due to an ever-decreasing supply in raw materials and stringent constraints on conventional energy sources, demand for lightweight, efficient and low cost structures has become crucially important in modern engineering design. This requires engineers to search for optimal and robust design options to address design problems that are often large in scale and highly nonlinear, making finding solutions challenging. In the past two decades, metaheuristic algorithms have shown promising power, efficiency and versatility in solving these difficult optimization problems. This book examines the latest developments of metaheuristics and their applications in water, geotechnical and transport engineering offering practical case studies as examples to demonstrate real world applications. Topics cover a range of areas within engineering, including reviews of optimization algorithms, artificial intelligence, cuckoo search, genetic programming, neural networks, multivariate adaptive regression, swarm intelligence, genetic algorithms, ant colony optimization, evolutionary multiobjective optimization with diverse applications in engineering such as behavior of materials, geotechnical design, flood control, water distribution and signal networks. This book can serve as a supplementary text for design courses and computation in engineering as well as a reference for researchers and engineers in metaheuristics, optimization in civil engineering and computational intelligence. Provides detailed descriptions of all major metaheuristic algorithms with a focus on practical implementation Develops new hybrid and advanced methods suitable for civil engineering problems at all levels Appropriate for researchers and advanced students to help to develop their work

Handbook of Optimization in Telecommunications
An $O(n^3)$ heuristic algorithm is described for solving $n$-city travelling salesman problems (TSP) whose cost matrix satisfies the triangularity condition. The algorithm involves as substeps the computation of a shortest spanning tree of the graph $G$ defining the TSP, and the finding of a minimum cost perfect matching of a certain induced subgraph of $G$. A worst-case analysis of this heuristic shows that the ratio of the answer obtained to the optimum TSP solution is strictly less than $3/2$. This represents a 50% reduction over the value 2 which was the previously best known such ratio for the performance of other polynomial-growth algorithms for the TSP.

Advances in Internet, Data and Web Technologies

Real life problems are known to be messy, dynamic and multi-objective, and involve high levels of uncertainty and constraints. Because traditional problem-solving methods are no longer capable of handling this level of complexity, heuristic search methods have attracted increasing attention in recent years for solving such problems. Inspired by nature, biology, statistical mechanics, physics and neuroscience, heuristics techniques are used to solve many problems where traditional methods have failed. Data Mining: A Heuristic Approach will be a repository for the applications of these techniques in the area of data mining.

Computers and Games

This book constitutes the refereed proceedings of the 24th Australasian Joint Conference on Artificial Intelligence, AI 2011, held in Perth, Australia, in December 2011. The 82 revised full papers presented were carefully reviewed and selected from 193 submissions. The papers are organized in topical sections on data mining and knowledge discovery, machine learning, evolutionary computation and optimization, intelligent agent systems, logic and reasoning, vision and graphics, image processing, natural language processing, cognitive modeling and simulation technology, and AI applications.

Meta-heuristic Algorithms for Optimal Design of Real-Size Structures

The present book outlines a new approach to possibilistic clustering in which the sought clustering structure of the set of objects is based directly on the formal definition of fuzzy cluster and the possibilistic memberships are determined directly from the values of the pairwise similarity of objects. The proposed approach can be used for solving different classification problems. Here, some techniques that might be useful at this purpose are outlined, including a methodology for constructing a set of labeled objects for a semi-supervised clustering algorithm, a methodology for reducing analyzed attribute space dimensionality and a methods for asymmetric data processing. Moreover, a technique for constructing a subset of the most appropriate alternatives for a set of weak fuzzy preference relations, which are defined on a universe of alternatives, is described in detail, and a method for rapidly prototyping the Mamdani’s fuzzy inference systems is introduced. This book addresses engineers, scientists, professors, students and post-graduate students, who are interested in and work with fuzzy clustering and its applications.

The Traveling Salesman Problem

Advanced Modeling and Optimization of Manufacturing Processes presents a comprehensive review of the latest international research and development trends in the modeling and optimization of manufacturing processes, with a focus on machining. It uses examples of various manufacturing processes to demonstrate advanced modeling and optimization techniques. Both basic and advanced concepts are presented for various manufacturing processes, mathematical models, traditional and non-traditional optimization techniques, and real case studies. The results of the application of the proposed methods are also covered and the book highlights the most useful modeling and optimization strategies for achieving best process performance. In addition to covering the advanced modeling, optimization and environmental aspects of machining processes, Advanced Modeling and Optimization of Manufacturing Processes also covers the latest technological advances, including rapid prototyping and tooling, micromachining, and nano-finishing. Advanced Modeling and Optimization of Manufacturing Processes is written for designers and manufacturing engineers who are responsible for the technical aspects of product realization, as it presents new models and optimization techniques to make their work easier, more efficient, and more effective. It is also a useful text for practitioners, researchers, and advanced students in mechanical, industrial, and manufacturing engineering.
Worst-Case Analysis of a New Heuristic for the Travelling Salesman Problem

This book focuses on the fields of nature-inspired algorithms, optimization problems and fuzzy logic. In this book, a new metaheuristic based on String Theory from Physics is proposed. It is important to mention that we have proposed the new algorithm to generate new potential solutions in optimization problems in order to find new ways that could improve the results in solving these problems. We are presenting the results for the proposed method in different cases of study. The first case, is optimization of traditional benchmark mathematical functions. The second case, is the optimization of benchmark functions of the CEC 2015 Competition and we are also presenting results of the CEC 2017 Competition on Constrained Real-Parameter Optimization that are problems that contain the presence of constraints that alter the shape of the search space making them more difficult to solve. Finally, in the third case, we are presenting the optimization of a fuzzy inference system, specifically for finding the optimal design of a fuzzy controller for an autonomous mobile robot. It is important to mention that in all study cases we are presenting statistical tests in order to validate the performance of proposed method. In summary, we believe that this book will be of great interest to a wide audience, ranging from engineering and science graduate students, to researchers and professors in computational intelligence, metaheuristics, optimization, robotics and control.

Hyper-Heuristics and Metaheuristics for Selected Bio-Inspired Combinatorial Optimization Problems

This book approaches its subject matter by promoting concepts, methods and solutions for the digital transformation of manufacturing through service orientation in holonic and agent-based control with distributed intelligence. The scientific theme of the book concerns “Manufacturing as a Service”, developed by virtualizing and encapsulating manufacturing resources, activities and controls into cloud networked services in an open perspective that spans models from shop floor resource allocation to enterprise infrastructure sharing. The papers included in the application space have a profound human dedication and aim at solving societal needs serving the partnership of the future--people and industry in the era of Society 5.0. The book's readership includes researchers and engineers working in manufacturing, supply chains and logistics areas who innovate, develop and use digital control solutions and students enrolled in Engineering and Service Science programs.

Intelligence and Security Informatics

This book constitutes the thoroughly refereed post-proceedings of the 5th International Conference on Computers and Games, CG 2006, co-located with the 14th World Computer-Chess Championship and the 11th Computer Olympiad. The 24 revised papers cover all aspects of artificial intelligence in computer-game playing. Topics addressed are evaluation and learning, search, combinatorial games and theory opening and endgame databases, single-agent search and planning, and computer Go.

New Heuristic Algorithms for Efficient Hierarchical Path Planning

This book presents the latest findings on one of the most intensely investigated subjects in computational mathematics—the traveling salesman problem. It sounds simple enough: given a set of cities and the cost of travel between each pair of them, the problem challenges you to find the cheapest route by which to visit all the cities and return home to where you began. Though seemingly modest, this exercise has inspired studies by mathematicians, chemists, and physicists. Teachers use it in the classroom. It has practical applications in genetics, telecommunications, and neuroscience. The authors of this book are the same pioneers who for nearly two decades have led the investigation into the traveling salesman problem. They have derived solutions to almost eighty-six thousand cities, yet a general solution to the problem has yet to be discovered. Here they describe the method and computer code they used to solve a broad range of large-scale problems, and along the way they demonstrate the interplay of applied mathematics with increasingly powerful computing platforms. They also give the fascinating history of the problem—how it developed, and why it continues to intrigue us.

A New Heuristic Algorithm For Minimizing The Makespan On Identical Parallel Machines

Examines the job scheduling problem by proposing a recursive heuristic algorithm to solve the problem of scheduling n independent, atomic and nonpreemptive tasks among m identical
Get Free A New Heuristic Algorithm To Assign Priorities And Processors.

**Design of Modern Heuristics**

This book constitutes the refereed proceedings of the IEEE International Conference on Intelligence and Security Informatics, ISI 2006. Gathers 39 revised full papers, 30 revised short papers, and 56 extended poster abstracts, organized in topical sections including intelligence analysis and knowledge discovery; access control, privacy, and cyber trust; surveillance and emergency response; infrastructure protection and cyber security; terrorism informatics and countermeasures; surveillance, bioterrorism, and emergency response.

**Combinatorial Heuristic Algorithms with FORTRAN**

With the ever-growing power to generate, transmit and collect huge amounts of data, information overload is now an imminent problem to mankind. The overwhelming demand for information processing is not just about a better understanding of data, but also a better usage of data in a timely fashion. Data mining, or knowledge discovery from databases, is proposed to gain insight into aspects of data and to help people make informed, sensible, and better decisions. At present, growing attention has been paid to the study, development and application of data mining. As a result, there is an urgent need for sophisticated techniques and tools that can handle new fields of data mining, e.g., spatial data mining, biomedical data mining, and mining on high-speed and time-variant data streams. The knowledge of data mining should also be expanded to new applications.

The 1st International Conference on Advanced Data Mining and Applications (ADMA 2005) aimed to bring together the experts on data mining throughout the world. It provided a leading international forum for the dissemination of original research results in advanced data mining techniques, applications, algorithms, software and systems, and different applied disciplines. The conference attracted 539 online submissions and 63 mailing submissions from 25 different countries and areas. All full papers were peer reviewed by at least three members of the Program Committee composed of international experts in data mining fields. All full papers were reviewed by at least three members of the Program Committee.

Amongst them, 25 papers were selected as regular papers and 75 papers were selected as short papers, yielding a combined acceptance rate of 17%.

**Arc Routing**

This book is intended to present the state of the art in research on machine learning and big data analytics. The accepted chapters covered many themes including artificial intelligence and data mining applications, machine learning and applications, deep learning technology for big data analytics, and modeling, simulation, and security with big data. It is a valuable resource for researchers in the area of big data analytics and its applications.

**A New Heuristic Algorithm**

Many decision and optimization problems arising in bioinformatics field are time demanding, and several algorithms are designed to solve these problems or to improve their current best solution approach. Modeling and implementing a new heuristic algorithm may be time-consuming but has strong motivations: on the one hand, even a small improvement of the new solution may be worth the long time spent on the construction of a new method; on the other hand, there are problems for which good-enough solutions are acceptable which could be achieved at a much lower computational cost. In the first case, specially designed heuristics or metaheuristics are needed, while the latter hyper-heuristics can be proposed. The paper will describe both approaches in different domain problems.

**New Heuristic and Metaheuristic Approaches Applied to the Multiple-choice Multidimensional Knapsack Problem**

The contributions in this book discuss large-scale problems like the optimal design of domes, antennas, transmission line towers, barrel vaults and steel frames with different types of limitations such as strength, buckling, displacement and natural frequencies. The authors use a set of definite algorithms for the optimization of all types of structures. They also add a
new enhanced version of VPS and information about configuration processes to all chapters. Domes are of special interest to engineers as they enclose a maximum amount of space with a minimum surface and have proven to be very economical in terms of consumption of constructional materials. Antennas and transmission line towers are the one of the most popular structure since these steel lattice towers are inexpensive, strong, light and wind resistant. Architects and engineers choose barrel vaults as viable and often highly suitable forms for covering not only low-cost industrial buildings, warehouses, large-span hangars, indoor sports stadiums, but also large cultural and leisure centers. Steel buildings are preferred in residential as well as commercial buildings due to their high strength and ductility particularly in regions which are prone to earthquakes.

A Heuristic Approach to Possibilistic Clustering: Algorithms and Applications

Overview of optimization -- Introduction to meta-heuristic and evolutionary algorithms -- Pattern search (PS) -- Genetic algorithm (GA) -- Simulated annealing (SA) -- Tabu search (TS) -- Ant colony optimization (ACO) -- Particle swarm optimization (PSO) -- Differential evolution (DE) -- Harmony search (HS) -- Shuffled frog-leaping algorithm (SFLA) -- Honey-bee mating optimization (HBMO) -- Invasive weed optimization (IWO) -- Central force optimization (CFO) -- Biogeography-based optimization (BBO) -- Firefly algorithm (FA) -- Gravity search algorithm (GSA) -- Bat algorithm (BA) -- Plant propagation algorithm (PPA) -- Water cycle algorithm (WCA) -- Symbiotic organisms search (SOS) -- Comprehensive evolutionary algorithm (CEA)

Advances in Computational and Stochastic Optimization, Logic Programming, and Heuristic Search

This book presents original contributions on the theories and practices of emerging Internet, Data and Web technologies and their applications in businesses, engineering and academia. As a key feature, it addresses advances in the life-cycle exploitation of data generated by digital ecosystem technologies. The Internet has become the most proliferative platform for emerging large-scale computing paradigms. Among these, Data and Web technologies are two of the most prominent paradigms, manifesting in a variety of forms such as Data Centers, Cloud Computing, Mobile Cloud, Mobile Web Services, and so on. These technologies altogether create a digital ecosystem whose cornerstone is the data cycle, from capturing to processing, analysis and visualization. The need to investigate various research and development issues in this digital ecosystem has been made even more pressing by the ever-increasing demands of real-life applications, which are based on storing and processing large amounts of data. Given its scope, the book offers a valuable asset for all researchers, software developers, practitioners and students interested in the field of Data and Web technologies.

Computational Optimization, Methods and Algorithms

A New Heuristic Algorithm to Assign Priorities and Resources to Tasks with End-to-end Deadlines

Reinforced concrete structures are one of the major structural types and must adhere to design regulation codes. It is ideal to find the best design (section dimension, material type, and amount of reinforcement) with the minimum cost providing the design constraints (design formulation considering loading of structure). Metaheuristic methods inspired by natural phenomena can consider design constraints by combining the analyses of formulation of reinforced concrete structures with an iterative numerical algorithm using several convergence options of random generation of candidate design solutions. Metaheuristic Approaches for Optimum Design of Reinforced Concrete Structures: Emerging Research and Opportunities is a pivotal reference source that focuses on several metaheuristic algorithms and the design of several types of structural members. Additionally, retrofit applications and seismic design issues are considered for readers in earthquake zones. Highlighting a wide range of topics including algorithms, design variables, and retrofit design, this book is ideally designed for architects, engineers, urban designers, government officials, policymakers, researchers, academicians, and students.

Exact and Heuristic Scheduling Algorithms
Reviews state-of-the-art technologies in modern heuristic optimization techniques and presents case studies showing how they have been applied in complex power and energy systems problems. Written by a team of international experts, this book describes the use of metaheuristic applications in the analysis and design of electric power systems. This includes a discussion of optimum energy and commitment of generation (nonrenewable & renewable) and load resources during day-to-day operations and control activities in regulated and competitive market structures, along with transmission and distribution systems. Applications of Modern Heuristic Optimization Methods in Power and Energy Systems begins with an introduction and overview of applications in power and energy systems before moving on to planning and operation, control, and distribution. Further chapters cover the integration of renewable energy and the smart grid and electricity markets. The book finishes with final conclusions drawn by the editors. Applications of Modern Heuristic Optimization Methods in Power and Energy Systems: Explains the application of differential evolution in electric power systems' active power multi-objective optimal dispatch Includes studies of optimization and stability in load frequency control in modern power systems Describes optimal compliance of reactive power requirements in near-shore wind power plants Features contributions from noted experts in the field Ideal for power and energy systems designers, planners, operators, and consultants, Applications of Modern Heuristic Optimization Methods in Power and Energy Systems will also benefit engineers, software developers, researchers, academics, and students.

Metaheuristic Approaches for Optimum Design of Reinforced Concrete Structures: Emerging Research and Opportunities

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