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Intro

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Object-Oriented Design Question

Dynamic Programming Algorithm Question

Feedback Chat

Closing Thoughts

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Introduction

1948

Partition

October 7

Gaza

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 Is remote/hybrid work a good thing?
 Cal’s tip to avoid burnout
 A better way to work
 Working at a “natural pace”
 Obsess over quality
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 Introduction
 Definition
 Bisection Method | Lecture 13 | Numerical Methods for Engineers - Bisection Method | Lecture 13 | Numerical Methods for Engineers by Jeffrey Chasnov 120,500 views 3 years ago 9 minutes, 20 seconds - Explanation of the bisection **method**, for finding the roots of a function. Join me on Coursera: ...
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Handbook of Metaheuristics

The third edition of this handbook is designed to provide a broad coverage of the concepts, implementations, and applications in metaheuristics. The book’s chapters serve as stand-alone presentations giving both the necessary underpinnings as well as practical guides for implementation. The nature of metaheuristics invites an analyst to modify basic methods in response to problem characteristics, past experiences, and personal preferences, and the chapters in this handbook are designed to facilitate this process as well. This new edition has been fully revised and features new chapters on swarm intelligence and automated design of metaheuristics from flexible algorithm frameworks. The authors who have contributed to this volume represent leading figures from the

metaheuristic community and are responsible for pioneering contributions to the fields they write about. Their collective work has significantly enriched the field of optimization in general and combinatorial optimization in particular. Metaheuristics are solution methods that orchestrate an interaction between local improvement procedures and higher level strategies to create a process capable of escaping from local optima and performing a robust search of a solution space. In addition, many new and exciting developments and extensions have been observed in the last few years. Hybrids of metaheuristics with other optimization techniques, like branch-and-bound, mathematical programming or constraint programming are also increasingly popular. On the front of applications, metaheuristics are now used to find high-quality solutions to an ever-growing number of complex, ill-defined real-world problems, in particular combinatorial ones. This handbook should continue to be a great reference for researchers, graduate students, as well as practitioners interested in metaheuristics.

Handbook of Metaheuristics

This book provides both the research and practitioner communities with a comprehensive coverage of the metaheuristic methodologies that have proven to be successful in a wide variety of real-world problem settings. Moreover, it is these metaheuristic strategies that hold particular promise for success in the future. The various chapters serve as stand alone presentations giving both the necessary background underpinnings as well as practical guides for implementation.

Handbook of Metaheuristic Algorithms

Handbook of Metaheuristic Algorithms: From Fundamental Theories to Advanced Applications provides a brief introduction to metaheuristic algorithms from the ground up, including basic ideas and advanced solutions. Although readers may be able to find source code for some metaheuristic algorithms on the Internet, the coding styles and explanations are generally quite different, and thus requiring expanded knowledge between theory and implementation. This book can also help students and researchers construct an integrated perspective of metaheuristic and unsupervised algorithms for artificial intelligence research in computer science and applied engineering domains. Metaheuristic algorithms can be considered the epitome of unsupervised learning algorithms for the optimization of engineering and artificial intelligence problems, including simulated annealing (SA), tabu search (TS), genetic algorithm (GA), ant colony optimization (ACO), particle swarm optimization (PSO), differential evolution (DE), and others. Distinct from most supervised learning algorithms that need labeled data to learn and construct determination models, metaheuristic algorithms inherit characteristics of unsupervised learning algorithms used for solving complex engineering optimization problems without labeled data, just like self-learning, to find solutions to complex problems. Presents a unified framework for metaheuristics and describes well-known algorithms and their variants Introduces fundamentals and advanced topics for solving engineering optimization problems, e.g., scheduling problems, sensors deployment problems, and clustering problems Includes source code based on the unified framework for metaheuristics used as examples to show how TS, SA, GA, ACO, PSO, DE, parallel metaheuristic algorithm, hybrid metaheuristic, local search, and other advanced technologies are realized in programming languages such as C++ and Python

Handbook of Heuristics

Heuristics are strategies using readily accessible, loosely applicable information to control problem solving. Algorithms, for example, are a type of heuristic. By contrast, Metaheuristics are methods used to design Heuristics and may coordinate the usage of several Heuristics toward the formulation of a single method. GRASP (Greedy Randomized Adaptive Search Procedures) is an example of a Metaheuristic. To the layman, heuristics may be thought of as 'rules of thumb' but despite its imprecision, heuristics is a very rich field that refers to experience-based techniques for problem-solving, learning, and discovery. Any given solution/heuristic is not guaranteed to be optimal but heuristic methodologies are used to speed up the process of finding satisfactory solutions where optimal solutions are impractical. The introduction to this Handbook provides an overview of the history of Heuristics along with main issues regarding the methodologies covered. This is followed by Chapters containing various examples of local searches, search strategies and Metaheuristics, leading to an analyses of Heuristics and search algorithms. The reference concludes with numerous illustrations of the highly applicable nature and implementation of Heuristics in our daily life. Each chapter of this work includes an abstract/introduction with a short description of the methodology. Key words are also necessary as part of top-matter to each chapter to enable maximum search engine optimization. Next, chapters will include discussion of the

adaptation of this methodology to solve a difficult optimization problem, and experiments on a set of representative problems.

Handbook of AI-based Metaheuristics

At the heart of the optimization domain are mathematical modeling of the problem and the solution methodologies. The problems are becoming larger and with growing complexity. Such problems are becoming cumbersome when handled by traditional optimization methods. This has motivated researchers to resort to artificial intelligence (AI)-based, nature-inspired solution methodologies or algorithms. The Handbook of AI-based Metaheuristics provides a wide-ranging reference to the theoretical and mathematical formulations of metaheuristics, including bio-inspired, swarm-based, socio-cultural, and physics-based methods or algorithms; their testing and validation, along with detailed illustrative solutions and applications; and newly devised metaheuristic algorithms. This will be a valuable reference for researchers in industry and academia, as well as for all Master's and PhD students working in the metaheuristics and applications domains.

Handbook of Approximation Algorithms and Metaheuristics

Handbook of Approximation Algorithms and Metaheuristics, Second Edition reflects the tremendous growth in the field, over the past two decades. Through contributions from leading experts, this handbook provides a comprehensive introduction to the underlying theory and methodologies, as well as the various applications of approximation algorithms and metaheuristics. Volume 1 of this two-volume set deals primarily with methodologies and traditional applications. It includes restriction, relaxation, local ratio, approximation schemes, randomization, tabu search, evolutionary computation, local search, neural networks, and other metaheuristics. It also explores multi-objective optimization, reoptimization, sensitivity analysis, and stability. Traditional applications covered include: bin packing, multi-dimensional packing, Steiner trees, traveling salesperson, scheduling, and related problems. Volume 2 focuses on the contemporary and emerging applications of methodologies to problems in combinatorial optimization, computational geometry and graphs problems, as well as in large-scale and emerging application areas. It includes approximation algorithms and heuristics for clustering, networks (sensor and wireless), communication, bioinformatics search, streams, virtual communities, and more. About the Editor Teofilo F. Gonzalez is a professor emeritus of computer science at the University of California, Santa Barbara. He completed his Ph.D. in 1975 from the University of Minnesota. He taught at the University of Oklahoma, the Pennsylvania State University, and the University of Texas at Dallas, before joining the UCSB computer science faculty in 1984. He spent sabbatical leaves at the Monterrey Institute of Technology and Higher Education and Utrecht University. He is known for his highly cited pioneering research in the hardness of approximation; for his sublinear and best possible approximation algorithm for k-tMM clustering; for introducing the open-shop scheduling problem as well as algorithms for its solution that have found applications in numerous research areas; as well as for his research on problems in the areas of job scheduling, graph algorithms, computational geometry, message communication, wire routing, etc.

Handbook of Approximation Algorithms and Metaheuristics

Delineating the tremendous growth in this area, the Handbook of Approximation Algorithms and Metaheuristics covers fundamental, theoretical topics as well as advanced, practical applications. It is the first book to comprehensively study both approximation algorithms and metaheuristics. Starting with basic approaches, the handbook presents the methodologies to design and analyze efficient approximation algorithms for a large class of problems, and to establish inapproximability results for another class of problems. It also discusses local search, neural networks, and metaheuristics, as well as multiobjective problems, sensitivity analysis, and stability. After laying this foundation, the book applies the methodologies to classical problems in combinatorial optimization, computational geometry, and graph problems. In addition, it explores large-scale and emerging applications in networks, bioinformatics, VLSI, game theory, and data analysis. Undoubtedly sparking further developments in the field, this handbook provides the essential techniques to apply approximation algorithms and metaheuristics to a wide range of problems in computer science, operations research, computer engineering, and economics. Armed with this information, researchers can design and analyze efficient algorithms to generate near-optimal solutions for a wide range of computational intractable problems.

Handbook of Approximation Algorithms and Metaheuristics, Second Edition

This handbook reflects the tremendous growth in the field, over the past two decades. Through contributions from leading experts, this handbook provides a comprehensive introduction to the underlying theory and methodologies, as well as the various applications of approximation algorithms and metaheuristics.

Meta-Heuristics Optimization Algorithms in Engineering, Business, Economics, and Finance

Optimization techniques have developed into a significant area concerning industrial, economics, business, and financial systems. With the development of engineering and financial systems, modern optimization has played an important role in service-centered operations and as such has attracted more attention to this field. Meta-heuristic hybrid optimization is a newly development mathematical framework based optimization technique. Designed by logicians, engineers, analysts, and many more, this technique aims to study the complexity of algorithms and problems. Meta-Heuristics Optimization Algorithms in Engineering, Business, Economics, and Finance explores the emerging study of meta-heuristics optimization algorithms and methods and their role in innovated real world practical applications. This book is a collection of research on the areas of meta-heuristics optimization algorithms in engineering, business, economics, and finance and aims to be a comprehensive reference for decision makers, managers, engineers, researchers, scientists, financiers, and economists as well as industrialists.

Handbook of Approximation Algorithms and Metaheuristics, Second Edition

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Advancements in Applied Metaheuristic Computing

Metaheuristic algorithms are present in various applications for different domains. Recently, researchers have conducted studies on the effectiveness of these algorithms in providing optimal solutions to complicated problems. Advancements in Applied Metaheuristic Computing is a crucial reference source for the latest empirical research on methods and approaches that include metaheuristics for further system improvements, and it offers outcomes of employing optimization algorithms. Featuring coverage on a broad range of topics such as manufacturing, genetic programming, and medical imaging, this publication is ideal for researchers, academicians, advanced-level students, and technology developers seeking current research on the use of optimization algorithms in several applications.

Trends in Developing Metaheuristics, Algorithms, and Optimization Approaches

Developments in metaheuristics continue to advance computation beyond its traditional methods. With groundwork built on multidisciplinary research findings; metaheuristics, algorithms, and optimization approaches uses memory manipulations in order to take full advantage of strategic level problem solving. Trends in Developing Metaheuristics, Algorithms, and Optimization Approaches provides insight on the latest advances and analysis of technologies in metaheuristics computing. Offering widespread coverage on topics such as genetic algorithms, differential evolution, and ant colony optimization, this book aims to be a forum researchers, practitioners, and students who wish to learn and apply metaheuristic computing.

Clever Algorithms

This book provides a handbook of algorithmic recipes from the fields of Metaheuristics, Biologically Inspired Computation and Computational Intelligence that have been described in a complete, consistent, and centralized manner. These standardized descriptions were carefully designed to be accessible, usable, and understandable. Most of the algorithms described in this book were originally inspired by biological and natural systems, such as the adaptive capabilities of genetic evolution and the acquired immune system, and the foraging behaviors of birds, bees, ants and bacteria. An encyclopedic algorithm reference, this book is intended for research scientists, engineers, students, and interested amateurs. Each algorithm description provides a working code example in the Ruby Programming Language.

Essentials of Metaheuristics (Second Edition)

Interested in the Genetic Algorithm? Simulated Annealing? Ant Colony Optimization? Essentials of Metaheuristics covers these and other metaheuristics algorithms, and is intended for undergraduate students, programmers, and non-experts. The book covers a wide range of algorithms, representations, selection and modification operators, and related topics, and includes 71 figures and 135 algorithms great and small. Algorithms include: Gradient Ascent techniques, Hill-Climbing variants, Simulated Annealing, Tabu Search variants, Iterated Local Search, Evolution Strategies, the Genetic Algorithm, the Steady-State Genetic Algorithm, Differential Evolution, Particle Swarm Optimization, Genetic Programming variants, One- and Two-Population Competitive Coevolution, N-Population Cooperative Coevolution, Implicit Fitness Sharing, Deterministic Crowding, NSGA-II, SPEA2, GRASP, Ant Colony Optimization variants, Guided Local Search, LEM, PBIL, UMDA, cGA, BOA, SAMUEL, ZCS, XCS, and XCSE.

Handbook of Metaheuristics

This book provides both the research and practitioner communities with a comprehensive coverage of the metaheuristic methodologies that have proven to be successful in a wide variety of real-world problem settings. Moreover, it is these metaheuristic strategies that hold particular promise for success in the future. The various chapters serve as stand alone presentations giving both the necessary background underpinnings as well as practical guides for implementation.

Metaheuristic Approaches to Portfolio Optimization

Control of an impartial balance between risks and returns has become important for investors, and having a combination of financial instruments within a portfolio is an advantage. Portfolio management has thus become very important for reaching a resolution in high-risk investment opportunities and addressing the risk-reward tradeoff by maximizing returns and minimizing risks within a given investment period for a variety of assets. Metaheuristic Approaches to Portfolio Optimization is an essential reference source that examines the proper selection of financial instruments in a financial portfolio management scenario in terms of metaheuristic approaches. It also explores common measures used for the evaluation of risks/returns of portfolios in real-life situations. Featuring research on topics such as closed-end funds, asset allocation, and risk-return paradigm, this book is ideally designed for investors, financial professionals, money managers, accountants, students, professionals, and researchers.

Multi-Objective Optimization in Theory and Practice II: Metaheuristic Algorithms

Multi-Objective Optimization in Theory and Practice is a simplified two-part approach to multi-objective optimization (MOO) problems. This second part focuses on the use of metaheuristic algorithms in more challenging practical cases. The book includes ten chapters that cover several advanced MOO techniques. These include the determination of Pareto-optimal sets of solutions, metaheuristic algorithms, genetic search algorithms and evolution strategies, decomposition algorithms, hybridization of different metaheuristics, and many-objective (more than three objectives) optimization and parallel computation. The final section of the book presents information about the design and types of fifty test problems for which the Pareto-optimal front is approximated. For each of them, the package NSGA-II is used to approximate the Pareto-optimal front. It is an essential handbook for students and teachers involved in advanced optimization courses in engineering, information science and mathematics degree programs.

Handbook of Research on Metaheuristics for Order Picking Optimization in Warehouses to Smart Cities

Building accurate algorithms for the optimization of picking orders is a difficult task, especially when one considers the delays of real-world situations. In warehouse environments, diverse algorithms must be developed to enhance the global performance relating to combining customer orders into picking orders to reduce wait times. The Handbook of Research on Metaheuristics for Order Picking Optimization in Warehouses to Smart Cities is a pivotal reference source that addresses strategies for developing able algorithms in order to build better picking orders and the impact of these strategies on the picking systems in which diverse algorithms are implemented. While highlighting topics such ABC optimization, environmental intelligence, and order batching, this publication examines common picking aspects in warehouse environments ranging from manual order picking systems to automated retrieval systems. This book is intended for researchers, teachers, engineers, managers, and practitioners seeking research on algorithms to enhance the order picking performance.

Ant Colony Optimization

An overview of the rapidly growing field of ant colony optimization that describes theoretical findings, the major algorithms, and current applications. The complex social behaviors of ants have been much studied by science, and computer scientists are now finding that these behavior patterns can provide models for solving difficult combinatorial optimization problems. The attempt to develop algorithms inspired by one aspect of ant behavior, the ability to find what computer scientists would call shortest paths, has become the field of ant colony optimization (ACO), the most successful and widely recognized algorithmic technique based on ant behavior. This book presents an overview of this rapidly growing field, from its theoretical inception to practical applications, including descriptions of many available ACO algorithms and their uses. The book first describes the translation of observed ant behavior into working optimization algorithms. The ant colony metaheuristic is then introduced and

viewed in the general context of combinatorial optimization. This is followed by a detailed description and guide to all major ACO algorithms and a report on current theoretical findings. The book surveys ACO applications now in use, including routing, assignment, scheduling, subset, machine learning, and bioinformatics problems. AntNet, an ACO algorithm designed for the network routing problem, is described in detail. The authors conclude by summarizing the progress in the field and outlining future research directions. Each chapter ends with bibliographic material, bullet points setting out important ideas covered in the chapter, and exercises. Ant Colony Optimization will be of interest to academic and industry researchers, graduate students, and practitioners who wish to learn how to implement ACO algorithms.

Metaheuristics for Bi-level Optimization

This book provides a complete background on metaheuristics to solve complex bi-level optimization problems (continuous/discrete, mono-objective/multi-objective) in a diverse range of application domains. Readers learn to solve large scale bi-level optimization problems by efficiently combining metaheuristics with complementary metaheuristics and mathematical programming approaches. Numerous real-world examples of problems demonstrate how metaheuristics are applied in such fields as networks, logistics and transportation, engineering design, finance and security.

Handbook of Approximation Algorithms and Metaheuristics, Second Edition

Through contributions from leading experts, this book provides a comprehensive introduction to the underlying theory and methodologies, as well as the various applications of approximation algorithms and metaheuristics. --

Optimization by GRASP

This is the first book to cover GRASP (Greedy Randomized Adaptive Search Procedures), a metaheuristic that has enjoyed wide success in practice with a broad range of applications to real-world combinatorial optimization problems. The state-of-the-art coverage and carefully crafted pedagogical style lends this book highly accessible as an introductory text not only to GRASP, but also to combinatorial optimization, greedy algorithms, local search, and path-relinking, as well as to heuristics and metaheuristics, in general. The focus is on algorithmic and computational aspects of applied optimization with GRASP with emphasis given to the end-user, providing sufficient information on the broad spectrum of advances in applied optimization with GRASP. For the more advanced reader, chapters on hybridization with path-relinking and parallel and continuous GRASP present these topics in a clear and concise fashion. Additionally, the book offers a very complete annotated bibliography of GRASP and combinatorial optimization. For the practitioner who needs to solve combinatorial optimization problems, the book provides a chapter with four case studies and implementable templates for all algorithms covered in the text. This book, with its excellent overview of GRASP, will appeal to researchers and practitioners of combinatorial optimization who have a need to find optimal or near optimal solutions to hard combinatorial optimization problems.

Handbook of Global Optimization

In 1995 the Handbook of Global Optimization (first volume), edited by R. Horst, and P.M. Pardalos, was published. This second volume of the Handbook of Global Optimization is comprised of chapters dealing with modern approaches to global optimization, including different types of heuristics. Topics covered in the handbook include various metaheuristics, such as simulated annealing, genetic algorithms, neural networks, taboo search, shake-and-bake methods, and deformation methods. In addition, the book contains chapters on new exact stochastic and deterministic approaches to continuous and mixed-integer global optimization, such as stochastic adaptive search, two-phase methods, branch-and-bound methods with new relaxation and branching strategies, algorithms based on local optimization, and dynamical search. Finally, the book contains chapters on experimental analysis of algorithms and software, test problems, and applications.

Combinatorial Optimization

This well-written textbook on combinatorial optimization puts special emphasis on theoretical results and algorithms with provably good performance, in contrast to heuristics. The book contains complete

(but concise) proofs, as well as many deep results, some of which have not appeared in any previous books.

Scatter Search

The book *Scatter Search* by Manuel Laguna and Rafael Martí represents a long-awaited "missing link" in the literature of evolutionary methods. Scatter Search (SS)-together with its generalized form called Path Relinking-constitutes the only evolutionary approach that embraces a collection of principles from Tabu Search (TS), an approach popularly regarded to be divorced from evolutionary procedures. The TS perspective, which is responsible for introducing adaptive memory strategies into the metaheuristic literature (at purposeful level beyond simple inheritance mechanisms), may at first seem to be at odds with population-based approaches. Yet this perspective equips SS with a remarkably effective foundation for solving a wide range of practical problems. The successes documented by Scatter Search come not so much from the adoption of adaptive memory in the range of ways proposed in Tabu Search (except where, as often happens, SS is advantageously coupled with TS), but from the use of strategic ideas initially proposed for exploiting adaptive memory, which blend harmoniously with the structure of Scatter Search. From a historical perspective, the dedicated use of heuristic strategies both to guide the process of combining solutions and to enhance the quality of offspring has been heralded as a key innovation in evolutionary methods, giving rise to what are sometimes called "hybrid" (or "memetic") evolutionary procedures. The underlying processes have been introduced into the mainstream of evolutionary methods (such as genetic algorithms, for example) by a series of gradual steps beginning in the late 1980s.

Recent Advances in Hybrid Metaheuristics for Data Clustering

An authoritative guide to an in-depth analysis of various state-of-the-art data clustering approaches using a range of computational intelligence techniques *Recent Advances in Hybrid Metaheuristics for Data Clustering* offers a guide to the fundamentals of various metaheuristics and their application to data clustering. Metaheuristics are designed to tackle complex clustering problems where classical clustering algorithms have failed to be either effective or efficient. The authors—noted experts on the topic—provide a text that can aid in the design and development of hybrid metaheuristics to be applied to data clustering. The book includes performance analysis of the hybrid metaheuristics in relationship to their conventional counterparts. In addition to providing a review of data clustering, the authors include in-depth analysis of different optimization algorithms. The text offers a step-by-step guide in the build-up of hybrid metaheuristics and to enhance comprehension. In addition, the book contains a range of real-life case studies and their applications. This important text: Includes performance analysis of the hybrid metaheuristics as related to their conventional counterparts Offers an in-depth analysis of a range of optimization algorithms Highlights a review of data clustering Contains a detailed overview of different standard metaheuristics in current use Presents a step-by-step guide to the build-up of hybrid metaheuristics Offers real-life case studies and applications Written for researchers, students and academics in computer science, mathematics, and engineering, *Recent Advances in Hybrid Metaheuristics for Data Clustering* provides a text that explores the current data clustering approaches using a range of computational intelligence techniques.

Nature-inspired Metaheuristic Algorithms

Modern metaheuristic algorithms such as bee algorithms and harmony search start to demonstrate their power in dealing with tough optimization problems and even NP-hard problems. This book reviews and introduces the state-of-the-art nature-inspired metaheuristic algorithms in optimization, including genetic algorithms, bee algorithms, particle swarm optimization, simulated annealing, ant colony optimization, harmony search, and firefly algorithms. We also briefly introduce the photosynthetic algorithm, the enzyme algorithm, and Tabu search. Worked examples with implementation have been used to show how each algorithm works. This book is thus an ideal textbook for an undergraduate and/or graduate course. As some of the algorithms such as the harmony search and firefly algorithms are at the forefront of current research, this book can also serve as a reference book for researchers.

Handbook of Intelligent Computing and Optimization for Sustainable Development

HANDBOOK OF INTELLIGENT COMPUTING AND OPTIMIZATION FOR SUSTAINABLE DEVELOPMENT This book provides a comprehensive overview of the latest breakthroughs and recent progress in sustainable intelligent computing technologies, applications, and optimization techniques across

various industries. Optimization has received enormous attention along with the rapidly increasing use of communication technology and the development of user-friendly software and artificial intelligence. In almost all human activities, there is a desire to deliver the highest possible results with the least amount of effort. Moreover, optimization is a very well-known area with a vast number of applications, from route finding problems to medical treatment, construction, finance, accounting, engineering, and maintenance schedules in plants. As far as optimization of real-world problems is concerned, understanding the nature of the problem and grouping it in a proper class may help the designer employ proper techniques which can solve the problem efficiently. Many intelligent optimization techniques can find optimal solutions without the use of objective function and are less prone to local conditions. The 41 chapters comprising the Handbook of Intelligent Computing and Optimization for Sustainable Development by subject specialists, represent diverse disciplines such as mathematics and computer science, electrical and electronics engineering, neuroscience and cognitive sciences, medicine, and social sciences, and provide the reader with an integrated understanding of the importance that intelligent computing has in the sustainable development of current societies. It discusses the emerging research exploring the theoretical and practical aspects of successfully implementing new and innovative intelligent techniques in a variety of sectors, including IoT, manufacturing, optimization, and healthcare. Audience It is a pivotal reference source for IT specialists, industry professionals, managers, executives, researchers, scientists, and engineers seeking current research in emerging perspectives in the field of artificial intelligence in the areas of Internet of Things, renewable energy, optimization, and smart cities.

Modeling, Analysis, and Applications in Metaheuristic Computing

"This book is a collection of the latest developments, models, and applications within the transdisciplinary fields related to metaheuristic computing, providing readers with insight into a wide range of topics such as genetic algorithms, differential evolution, and ant colony optimization"--Provided by publisher.

Algorithms and Theory of Computation Handbook, Volume 2

Algorithms and Theory of Computation Handbook, Second Edition: Special Topics and Techniques provides an up-to-date compendium of fundamental computer science topics and techniques. It also illustrates how the topics and techniques come together to deliver efficient solutions to important practical problems. Along with updating and revising many of

Advanced Methodologies and Technologies in Network Architecture, Mobile Computing, and Data Analytics

From cloud computing to data analytics, society stores vast supplies of information through wireless networks and mobile computing. As organizations are becoming increasingly more wireless, ensuring the security and seamless function of electronic gadgets while creating a strong network is imperative. Advanced Methodologies and Technologies in Network Architecture, Mobile Computing, and Data Analytics highlights the challenges associated with creating a strong network architecture in a perpetually online society. Readers will learn various methods in building a seamless mobile computing option and the most effective means of analyzing big data. This book is an important resource for information technology professionals, software developers, data analysts, graduate-level students, researchers, computer engineers, and IT specialists seeking modern information on emerging methods in data mining, information technology, and wireless networks.

Handbook of Bioinspired Algorithms and Applications

The mystique of biologically inspired (or bioinspired) paradigms is their ability to describe and solve complex relationships from intrinsically very simple initial conditions and with little or no knowledge of the search space. Edited by two prominent, well-respected researchers, the Handbook of Bioinspired Algorithms and Applications reveals the

Handbook of Memetic Algorithms

Memetic Algorithms (MAs) are computational intelligence structures combining multiple and various operators in order to address optimization problems. The combination and interaction amongst operators evolves and promotes the diffusion of the most successful units and generates an algorithmic behavior which can handle complex objective functions and hard fitness landscapes. "Handbook of

Memetic Algorithms” organizes, in a structured way, all the the most important results in the field of MAs since their earliest definition until now. A broad review including various algorithmic solutions as well as successful applications is included in this book. Each class of optimization problems, such as constrained optimization, multi-objective optimization, continuous vs combinatorial problems, uncertainties, are analysed separately and, for each problem, memetic recipes for tackling the difficulties are given with some successful examples. Although this book contains chapters written by multiple authors, a great attention has been given by the editors to make it a compact and smooth work which covers all the main areas of computational intelligence optimization. It is not only a necessary read for researchers working in the research area, but also a useful handbook for practitioners and engineers who need to address real-world optimization problems. In addition, the book structure makes it an interesting work also for graduate students and researchers in related fields of mathematics and computer science.

Handbook of Research on Modern Optimization Algorithms and Applications in Engineering and Economics

Modern optimization approaches have attracted many research scientists, decision makers and practicing researchers in recent years as powerful intelligent computational techniques for solving several complex real-world problems. The Handbook of Research on Modern Optimization Algorithms and Applications in Engineering and Economics highlights the latest research innovations and applications of algorithms designed for optimization applications within the fields of engineering, IT, and economics. Focusing on a variety of methods and systems as well as practical examples, this book is a significant resource for graduate-level students, decision makers, and researchers in both public and private sectors who are seeking research-based methods for modeling uncertain real-world problems. .

Handbook of Research on Artificial Intelligence Techniques and Algorithms

For decades, optimization methods such as Fuzzy Logic, Artificial Neural Networks, Firefly, Simulated annealing, and Tabu search, have been capable of handling and tackling a wide range of real-world application problems in society and nature. Analysts have turned to these problem-solving techniques in the event during natural disasters and chaotic systems research. The Handbook of Research on Artificial Intelligence Techniques and Algorithms highlights the cutting edge developments in this promising research area. This premier reference work applies Meta-heuristics Optimization (MO) Techniques to real world problems in a variety of fields including business, logistics, computer science, engineering, and government. This work is particularly relevant to researchers, scientists, decision-makers, managers, and practitioners.

The Practical Handbook of Genetic Algorithms

The mathematics employed by genetic algorithms (GAs) are among the most exciting discoveries of the last few decades. But what exactly is a genetic algorithm? A genetic algorithm is a problem-solving method that uses genetics as its model of problem solving. It applies the rules of reproduction, gene crossover, and mutation to pseudo-organisms.

Handbook of Neural Computation

Handbook of Neural Computation explores neural computation applications, ranging from conventional fields of mechanical and civil engineering, to electronics, electrical engineering and computer science. This book covers the numerous applications of artificial and deep neural networks and their uses in learning machines, including image and speech recognition, natural language processing and risk analysis. Edited by renowned authorities in this field, this work is comprised of articles from reputable industry and academic scholars and experts from around the world. Each contributor presents a specific research issue with its recent and future trends. As the demand rises in the engineering and medical industries for neural networks and other machine learning methods to solve different types of operations, such as data prediction, classification of images, analysis of big data, and intelligent decision-making, this book provides readers with the latest, cutting-edge research in one comprehensive text. Features high-quality research articles on multivariate adaptive regression splines, the minimax probability machine, and more. Discusses machine learning techniques, including classification, clustering, regression, web mining, information retrieval and natural language processing. Covers supervised, unsupervised, reinforced, ensemble, and nature-inspired learning methods.

Handbook of Research on Modeling, Analysis, and Application of Nature-Inspired Metaheuristic Algorithms

The digital age is ripe with emerging advances and applications in technological innovations. Mimicking the structure of complex systems in nature can provide new ideas on how to organize mechanical and personal systems. The Handbook of Research on Modeling, Analysis, and Application of Nature-Inspired Metaheuristic Algorithms is an essential scholarly resource on current algorithms that have been inspired by the natural world. Featuring coverage on diverse topics such as cellular automata, simulated annealing, genetic programming, and differential evolution, this reference publication is ideal for scientists, biological engineers, academics, students, and researchers that are interested in discovering what models from nature influence the current technology-centric world.

Handbook of Research on Advancements of Swarm Intelligence Algorithms for Solving Real-World Problems

The use of optimization algorithms has seen an emergence in various professional fields due to its ability to process data and information in an efficient and productive manner. Combining computational intelligence with these algorithms has created a trending subject of research on how much more beneficial intelligent-inspired algorithms can be within companies and organizations. As modern theories and applications are continually being developed in this area, professionals are in need of current research on how intelligent algorithms are advancing in the real world. The Handbook of Research on Advancements of Swarm Intelligence Algorithms for Solving Real-World Problems is a pivotal reference source that provides vital research on the development of swarm intelligence algorithms and their implementation into current issues. While highlighting topics such as multi-agent systems, bio-inspired computing, and evolutionary programming, this publication explores various concepts and theories of swarm intelligence and outlines future directions of development. This book is ideally designed for IT specialists, researchers, academicians, engineers, developers, practitioners, and students seeking current research on the real-world applications of intelligent algorithms.