

Particle Swarm Optimization Code In Matlab Samsan

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Swarm Intelligence Optimization - Abhishek Kumar 2021-01-07

Resource optimization has always been a thrust area of research, and as the Internet of Things (IoT) is the most talked about topic of the current era of technology, it has become the need of the hour. Therefore, the idea behind this book was to simplify the journey of those who aspire to understand resource optimization in the IoT. To this end, included in this book are various real-time/offline applications and algorithms/case studies in the fields of engineering, computer science, information security, and cloud computing, along with the modern tools and various technologies used in systems, leaving the reader with a high level of understanding of various techniques and algorithms used in resource optimization.

Voltage Control Based on Fuzzy Adaptive Particle Swarm Optimization - Husam Shaheen 2011-03

Keeping an acceptable voltage profile at the system buses is a challenging and a system-wide task. Voltage-control is rooted in rescheduling of the reactive power flow in the lines of power system. Despite the fact that many voltage-control techniques are available to electric power system operators, these systems around the world have been subjected to voltage instability problems and voltage collapses that cause in many occasions complete system

breakdowns. In this Book, a new voltage control methodology is presented, which is originated on the use of multi- objective function based on fuzzy set theory and adaptive particle swarm optimization. This methodology is applied to get a solution to the mathematical model that represents the voltage- control problem of a power system. The purpose is to ensure acceptable voltage profile and to minimize both the voltage deviation and the real power loss. The IEEE 30-Bus system model is used to employ the suggested technique to the mathematical model built for the new voltage-control methodology using Matlab code. The findings will be documented and compared with other voltage-control strategies.

Ant Colony Optimization and Swarm Intelligence - Directeur de Recherches Du Fnrs Marco Dorigo 2004-08-19

This book constitutes the refereed proceedings of the 4th International Workshop on Ant Colony Optimization and Swarm Intelligence, ANTS 2004, held in Brussels, Belgium in September 2004. The 22 revised full papers, 19 revised short papers, and 9 poster abstracts presented were carefully reviewed and selected from 79 papers submitted. The papers are devoted to theoretical and foundational aspects of ant algorithms, ant colony optimization and swarm intelligence and deal with a broad variety of optimization applications in networking and

operations research.

Swarm Intelligence - 2019-12-04

Swarm Intelligence has emerged as one of the most studied artificial intelligence branches during the last decade, constituting the fastest growing stream in the bio-inspired computation community. A clear trend can be deduced analyzing some of the most renowned scientific databases available, showing that the interest aroused by this branch has increased at a notable pace in the last years. This book describes the prominent theories and recent developments of Swarm Intelligence methods, and their application in all fields covered by engineering. This book unleashes a great opportunity for researchers, lecturers, and practitioners interested in Swarm Intelligence, optimization problems, and artificial intelligence.

Nature-Inspired Optimization Algorithms - Xin-She Yang 2014-02-17

Nature-Inspired Optimization Algorithms provides a systematic introduction to all major nature-inspired algorithms for optimization. The book's unified approach, balancing algorithm introduction, theoretical background and practical implementation, complements extensive literature with well-chosen case studies to illustrate how these algorithms work. Topics include particle swarm optimization, ant and bee algorithms, simulated annealing, cuckoo search, firefly algorithm, bat algorithm, flower algorithm, harmony search, algorithm analysis, constraint handling, hybrid methods, parameter tuning and control, as well as multi-objective optimization. This book can serve as an introductory book for graduates, doctoral students and lecturers in computer science, engineering and natural sciences. It can also serve a source of inspiration for new applications. Researchers and engineers as well as experienced experts will also find it a handy reference. Discusses and summarizes the latest developments in nature-inspired algorithms with comprehensive, timely literature Provides a theoretical understanding as well as practical implementation hints Provides a step-by-step introduction to each algorithm

Applying Particle Swarm Optimization -

Burcu Adıgüzel Mercangöz 2021-05-13

This book explains the theoretical structure of

particle swarm optimization (PSO) and focuses on the application of PSO to portfolio optimization problems. The general goal of portfolio optimization is to find a solution that provides the highest expected return at each level of portfolio risk. According to H. Markowitz's portfolio selection theory, as new assets are added to an investment portfolio, the total risk of the portfolio's decreases depending on the correlations of asset returns, while the expected return on the portfolio represents the weighted average of the expected returns for each asset. The book explains PSO in detail and demonstrates how to implement Markowitz's portfolio optimization approach using PSO. In addition, it expands on the Markowitz model and seeks to improve the solution-finding process with the aid of various algorithms. In short, the book provides researchers, teachers, engineers, managers and practitioners with many tools they need to apply the PSO technique to portfolio optimization.

Particle Swarm Optimization with

Applications - Pakize Erdogmus 2018-05-30

This book is intended to gather recent studies on particle swarm optimization (PSO). In this book, readers can find the recent theoretical developments and applications on PSO algorithm. From the theoretical aspect, PSO has preserved its popularity because of the fast convergence rate, and a lot of hybrid algorithms have recently been developed in order to increase the performance of the algorithm. At the same time, PSO has also been used to solve different kinds of engineering optimization problems. In this book, a reader can find engineering applications of PSO, such as environmental economic dispatch and grid computing.

Bioinspired Optimization Methods and Their Applications - Bogdan Filipič 2020-11-16

This book constitutes the refereed proceedings of the 9th International Conference on Bioinspired Optimization Methods and Their Applications, BIOMA 2020, held in Brussels, Belgium, in November 2020. The 24 full papers presented in this book were carefully reviewed and selected from 68 submissions. The papers in this BIOMA proceedings specialized in bioinspired algorithms as a means for solving the optimization problems and came in two

categories: theoretical studies and methodology advancements on the one hand, and algorithm adjustments and their applications on the other. Due to the Corona pandemic BIOMA 2020 was held as a virtual event.

Recent Advances in Simulated Evolution and Learning - K. C. Tan 2004

This book covers the latest advances in the theories, algorithms, and applications of simulated evolution and learning techniques. It provides insights into different evolutionary computation techniques and their applications in domains such as scheduling, control and power, robotics, signal processing, and bioinformatics. The book will be of significant value to all postgraduates, research scientists and practitioners dealing with evolutionary computation or complex real-world problems.

Ant Colony Optimization and Swarm Intelligence - Marco Dorigo 2006-08-29

This book constitutes the refereed proceedings of the 5th International Workshop on Ant Colony Optimization and Swarm Intelligence, ANTS 2006, held in Brussels, Belgium, in September 2006. The 27 revised full papers, 23 revised short papers, and 12 extended abstracts presented were carefully reviewed and selected from 115 submissions.

Genetic and Evolutionary Computation - GECCO 2003 - Erick Cantú-Paz 2003-08-03

The set LNCS 2723 and LNCS 2724 constitutes the refereed proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2003, held in Chicago, IL, USA in July 2003. The 193 revised full papers and 93 poster papers presented were carefully reviewed and selected from a total of 417 submissions. The papers are organized in topical sections on a-life adaptive behavior, agents, and ant colony optimization; artificial immune systems; coevolution; DNA, molecular, and quantum computing; evolvable hardware; evolutionary robotics; evolution strategies and evolutionary programming; evolutionary scheduling routing; genetic algorithms; genetic programming; learning classifier systems; real-world applications; and search based software engineering.

New Optimization Techniques in Engineering - Godfrey C. Onwubolu 2013-03-14

Presently, general-purpose optimization techniques such as Simulated Annealing, and

Genetic Algorithms, have become standard optimization techniques. Concerted research efforts have been made recently in order to invent novel optimization techniques for solving real life problems, which have the attributes of memory update and population-based search solutions. The book describes a variety of these novel optimization techniques which in most cases outperform the standard optimization techniques in many application areas. New Optimization Techniques in Engineering reports applications and results of the novel optimization techniques considering a multitude of practical problems in the different engineering disciplines - presenting both the background of the subject area and the techniques for solving the problems.

Grokking Artificial Intelligence Algorithms - Rishal Hurbans 2020-09-01

Grokking Artificial Intelligence Algorithms is a fully-illustrated and interactive tutorial guide to the different approaches and algorithms that underpin AI. Written in simple language and with lots of visual references and hands-on examples, you'll learn the concepts, terminology, and theory you need to effectively incorporate AI algorithms into your applications. Summary Grokking Artificial Intelligence Algorithms is a fully-illustrated and interactive tutorial guide to the different approaches and algorithms that underpin AI. Written in simple language and with lots of visual references and hands-on examples, you'll learn the concepts, terminology, and theory you need to effectively incorporate AI algorithms into your applications. And to make sure you truly grok as you go, you'll use each algorithm in practice with creative coding exercises—including building a maze puzzle game, performing diamond data analysis, and even exploring drone material optimization. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology Artificial intelligence touches every part of our lives. It powers our shopping and TV recommendations; it informs our medical diagnoses. Embracing this new world means mastering the core algorithms at the heart of AI. About the book Grokking Artificial Intelligence Algorithms uses illustrations, exercises, and jargon-free explanations to teach fundamental AI concepts.

All you need is the algebra you remember from high school math class. Explore coding challenges like detecting bank fraud, creating artistic masterpieces, and setting a self-driving car in motion. What's inside Use cases for different AI algorithms Intelligent search for decision making Biologically inspired algorithms Machine learning and neural networks Reinforcement learning to build a better robot About the reader For software developers with high school-level algebra and calculus skills. About the author Rishal Hurbans is a technologist, startup and AI group founder, and international speaker. Table of Contents 1 Intuition of artificial intelligence 2 Search fundamentals 3 Intelligent search 4 Evolutionary algorithms 5 Advanced evolutionary approaches 6 Swarm intelligence: Ants 7 Swarm intelligence: Particles 8 Machine learning 9 Artificial neural networks 10 Reinforcement learning with Q-learning

APTİKOM Journal on Computer Science and Information Technologies (CSIT) Vol. 6 No. 1 March 2021 - APTİKOM Journal on Computer Science and Information Technologies (CSIT) 2021-05-31

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[Meta-heuristic and Evolutionary Algorithms for Engineering Optimization](#) - Omid Bozorg-Haddad 2017-09-05

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. OMID BOZORG-HADDAD, PhD, is Professor in the Department of Irrigation and Reclamation Engineering at the University of Tehran, Iran. MOHAMMAD SOLGI, M.Sc., is Teacher Assistant for M.Sc. courses at the University of Tehran, Iran. HUGO A. LOÁICIGA, PhD, is Professor in the Department of Geography at the University of California, Santa Barbara, United States of America.

Modern Optimization with R - Paulo Cortez 2021-07-30

The goal of this book is to gather in a single

work the most relevant concepts related in optimization methods, showing how such theories and methods can be addressed using the open source, multi-platform R tool. Modern optimization methods, also known as metaheuristics, are particularly useful for solving complex problems for which no specialized optimization algorithm has been developed. These methods often yield high quality solutions with a more reasonable use of computational resources (e.g. memory and processing effort). Examples of popular modern methods discussed in this book are: simulated annealing; tabu search; genetic algorithms; differential evolution; and particle swarm optimization. This book is suitable for undergraduate and graduate students in computer science, information technology, and related areas, as well as data analysts interested in exploring modern optimization methods using R. This new edition integrates the latest R packages through text and code examples. It also discusses new topics, such as: the impact of artificial intelligence and business analytics in modern optimization tasks; the creation of interactive Web applications; usage of parallel computing; and more modern optimization algorithms (e.g., iterated racing, ant colony optimization, grammatical evolution).

Hybrid of Differential Evolution and Particle Swarm Optimization for Vector Evaluated Multi-population Optimization of Dna Code Words Designing - Krishna Veni Selvan 2012

The performances of a multi-population optimizer, VEDEPSO as well as the proposed M-VEDEPSO are evaluated using ZDT test functions. As a result, both algorithms perform better than VEPSO. Furthermore, the modified version produces improved fitness distributions among its particles/individuals. Since the two VEDEPSO approaches are still new and yet to be applied in any application areas, they are applied into DNA code words designing.

Recent Advances in Computational Optimization

- Stefka Fidanova 2018-09-18

Our everyday lives are practically unthinkable without optimization. We constantly try to minimize our effort and to maximize the reward or progress achieved. Many real-world and industrial problems arising in engineering, economics, medicine and other domains can be

formulated as optimization tasks. This volume presents a comprehensive collection of extended contributions from the 2017 Workshop on Computational Optimization. Presenting recent advances in computational optimization, it addresses important concrete applications, e.g. the modeling of physical processes, wildfire modeling, modeling processes in chemical engineering, workforce planning, wireless access network topology, parameter settings for controlling various processes, berth allocation, identification of homogeneous domains, and quantum computing. The book shows how to develop algorithms for them based on new intelligent methods like evolutionary computations, ant colony optimization, constrain programming and others.

Swarm Intelligence - Felix Chan 2007-12-01

In the era globalisation the emerging technologies are governing engineering industries to a multifaceted state. The escalating complexity has demanded researchers to find the possible ways of easing the solution of the problems. This has motivated the researchers to grasp ideas from the nature and implant it in the engineering sciences. This way of thinking led to emergence of many biologically inspired algorithms that have proven to be efficient in handling the computationally complex problems with competence such as Genetic Algorithm (GA), Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO), etc. Motivated by the capability of the biologically inspired algorithms the present book on "Swarm Intelligence: Focus on Ant and Particle Swarm Optimization" aims to present recent developments and applications concerning optimization with swarm intelligence techniques. The papers selected for this book comprise a cross-section of topics that reflect a variety of perspectives and disciplinary backgrounds. In addition to the introduction of new concepts of swarm intelligence, this book also presented some selected representative case studies covering power plant maintenance scheduling; geotechnical engineering; design and machining tolerances; layout problems; manufacturing process plan; job-shop scheduling; structural design; environmental dispatching problems; wireless communication; water distribution systems; multi-plant supply chain; fault

diagnosis of airplane engines; and process scheduling. I believe these 27 chapters presented in this book adequately reflect these topics.

Engineering Optimization - Xin-She Yang
2010-07-20

An accessible introduction to metaheuristics and optimization, featuring powerful and modern algorithms for application across engineering and the sciences. From engineering and computer science to economics and management science, optimization is a core component for problem solving. Highlighting the latest developments that have evolved in recent years, *Engineering Optimization: An Introduction with Metaheuristic Applications* outlines popular metaheuristic algorithms and equips readers with the skills needed to apply these techniques to their own optimization problems. With insightful examples from various fields of study, the author highlights key concepts and techniques for the successful application of commonly-used metaheuristic algorithms, including simulated annealing, particle swarm optimization, harmony search, and genetic algorithms. The author introduces all major metaheuristic algorithms and their applications in optimization through a presentation that is organized into three succinct parts: *Foundations of Optimization and Algorithms* provides a brief introduction to the underlying nature of optimization and the common approaches to optimization problems, random number generation, the Monte Carlo method, and the Markov chain Monte Carlo method. *Metaheuristic Algorithms* presents common metaheuristic algorithms in detail, including genetic algorithms, simulated annealing, ant algorithms, bee algorithms, particle swarm optimization, firefly algorithms, and harmony search. *Applications* outlines a wide range of applications that use metaheuristic algorithms to solve challenging optimization problems with detailed implementation while also introducing various modifications used for multi-objective optimization. Throughout the book, the author presents worked-out examples and real-world applications that illustrate the modern relevance of the topic. A detailed appendix features important and popular algorithms using MATLAB® and Octave

software packages, and a related FTP site houses MATLAB code and programs for easy implementation of the discussed techniques. In addition, references to the current literature enable readers to investigate individual algorithms and methods in greater detail.

Engineering Optimization: An Introduction with Metaheuristic Applications is an excellent book for courses on optimization and computer simulation at the upper-undergraduate and graduate levels. It is also a valuable reference for researchers and practitioners working in the fields of mathematics, engineering, computer science, operations research, and management science who use metaheuristic algorithms to solve problems in their everyday work.

Swarm Intelligence - Abhishek Sharma
2022-02-08

Swarm intelligence is one of the fastest growing subfields of artificial intelligence and soft computing. This field includes multiple optimization algorithms to solve NP-hard problems for which conventional methods are not effective. It inspires researchers in engineering sciences to learn theories from nature and incorporate them. *Swarm Intelligence: Foundation, Principles, and Engineering Applications* provides a comprehensive review of new swarm intelligence techniques and offers practical implementation of Particle Swarm Optimization (PSO) with MATLAB code. The book discusses the statistical analysis of swarm optimization techniques so that researchers can analyse their experiment design. It also includes algorithms in social sectors, oil and gas industries, and recent research findings of new optimization algorithms in the field of engineering describing the implementation in machine learning. This book is written for students of engineering, research scientists, and academicians involved in the engineering sciences.

Particle Swarm Optimisation - Jun Sun
2016-04-19

Although the particle swarm optimisation (PSO) algorithm requires relatively few parameters and is computationally simple and easy to implement, it is not a globally convergent algorithm. In *Particle Swarm Optimisation: Classical and Quantum Perspectives*, the authors introduce their concept of quantum-behaved

particles inspired by quantum mechanics

Particle Swarm Optimization - Alex Lazinica

2009-01-01

Particle swarm optimization (PSO) is a population based stochastic optimization technique influenced by the social behavior of bird flocking or fish schooling. PSO shares many similarities with evolutionary computation techniques such as Genetic Algorithms (GA). The system is initialized with a population of random solutions and searches for optima by updating generations. However, unlike GA, PSO has no evolution operators such as crossover and mutation. In PSO, the potential solutions, called particles, fly through the problem space by following the current optimum particles. This book represents the contributions of the top researchers in this field and will serve as a valuable tool for professionals in this interdisciplinary field.

Particle Swarm Optimisation - Jun Sun

2019-09-19

Helping readers numerically solve optimization problems, this book focuses on the fundamental principles and applications of PSO and QPSO algorithms. The authors develop their novel QPSO algorithm, a PSO variant motivated from quantum mechanics, and show how to implement it in real-world applications, including inverse problems, digital filter d

Computational Intelligence - Andries P.

Engelbrecht 2007-10-22

Computational Intelligence: An Introduction, Second Edition offers an in-depth exploration into the adaptive mechanisms that enable intelligent behaviour in complex and changing environments. The main focus of this text is centred on the computational modelling of biological and natural intelligent systems, encompassing swarm intelligence, fuzzy systems, artificial neural networks, artificial immune systems and evolutionary computation. Engelbrecht provides readers with a wide knowledge of Computational Intelligence (CI) paradigms and algorithms; inviting readers to implement and problem solve real-world, complex problems within the CI development framework. This implementation framework will enable readers to tackle new problems without any difficulty through a single Java class as part of the CI library. Key features of this second

edition include: A tutorial, hands-on based presentation of the material. State-of-the-art coverage of the most recent developments in computational intelligence with more elaborate discussions on intelligence and artificial intelligence (AI). New discussion of Darwinian evolution versus Lamarckian evolution, also including swarm robotics, hybrid systems and artificial immune systems. A section on how to perform empirical studies; topics including statistical analysis of stochastic algorithms, and an open source library of CI algorithms. Tables, illustrations, graphs, examples, assignments, Java code implementing the algorithms, and a complete CI implementation and experimental framework. Computational Intelligence: An Introduction, Second Edition is essential reading for third and fourth year undergraduate and postgraduate students studying CI. The first edition has been prescribed by a number of overseas universities and is thus a valuable teaching tool. In addition, it will also be a useful resource for researchers in Computational Intelligence and Artificial Intelligence, as well as engineers, statisticians, operational researchers, and bioinformaticians with an interest in applying AI or CI to solve problems in their domains. Check out <http://www.ci.cs.up.ac.za> for examples, assignments and Java code implementing the algorithms.

Proceedings of the International Conference on Frontiers of Intelligent Computing: Theory and Applications (FICTA) 2013 - Suresh Chandra

Satapathy 2013-10-05

This volume contains the papers presented at the Second International Conference on Frontiers in Intelligent Computing: Theory and Applications (FICTA-2013) held during 14-16 November 2013 organized by Bhubaneswar Engineering College (BEC), Bhubaneswar, Odisha, India. It contains 63 papers focusing on application of intelligent techniques which includes evolutionary computation techniques like genetic algorithm, particle swarm optimization techniques, teaching-learning based optimization etc for various engineering applications such as data mining, Fuzzy systems, Machine Intelligence and ANN, Web technologies and Multimedia applications and Intelligent computing and Networking etc.

Bionic Optimization in Structural Design -

Rolf Steinbuch 2015-11-04

The book provides suggestions on how to start using bionic optimization methods, including pseudo-code examples of each of the important approaches and outlines of how to improve them. The most efficient methods for accelerating the studies are discussed. These include the selection of size and generations of a study's parameters, modification of these driving parameters, switching to gradient methods when approaching local maxima, and the use of parallel working hardware. Bionic Optimization means finding the best solution to a problem using methods found in nature. As Evolutionary Strategies and Particle Swarm Optimization seem to be the most important methods for structural optimization, we primarily focus on them. Other methods such as neural nets or ant colonies are more suited to control or process studies, so their basic ideas are outlined in order to motivate readers to start using them. A set of sample applications shows how Bionic Optimization works in practice. From academic studies on simple frames made of rods to earthquake-resistant buildings, readers follow the lessons learned, difficulties encountered and effective strategies for overcoming them. For the problem of tuned mass dampers, which play an important role in dynamic control, changing the goal and restrictions paves the way for Multi-Objective-Optimization. As most structural designers today use commercial software such as FE-Codes or CAE systems with integrated simulation modules, ways of integrating Bionic Optimization into these software packages are outlined and examples of typical systems and typical optimization approaches are presented. The closing section focuses on an overview and outlook on reliable and robust as well as on Multi-Objective-Optimization, including discussions of current and upcoming research topics in the field concerning a unified theory for handling stochastic design processes.

Optimization - Rajesh Kumar Arora 2015-05-06

Choose the Correct Solution Method for Your Optimization Problem Optimization: Algorithms and Applications presents a variety of solution techniques for optimization problems, emphasizing concepts rather than rigorous mathematical details and proofs. The book covers both gradient and stochastic methods as

solution techniques for unconstrained and constrained optimization. **Particle Swarm Optimization** - Maurice Clerc 2013-03-04

This is the first book devoted entirely to Particle Swarm Optimization (PSO), which is a non-specific algorithm, similar to evolutionary algorithms, such as taboo search and ant colonies. Since its original development in 1995, PSO has mainly been applied to continuous-discrete heterogeneous strongly non-linear numerical optimization and it is thus used almost everywhere in the world. Its convergence rate also makes it a preferred tool in dynamic optimization.

Swarm Intelligence Algorithms (Two Volume Set) - Adam Slowik 2021-01-26

Swarm intelligence algorithms are a form of nature-based optimization algorithms. Their main inspiration is the cooperative behavior of animals within specific communities. This can be described as simple behaviors of individuals along with the mechanisms for sharing knowledge between them, resulting in the complex behavior of the entire community. Examples of such behavior can be found in ant colonies, bee swarms, schools of fish or bird flocks. Swarm intelligence algorithms are used to solve difficult optimization problems for which there are no exact solving methods or the use of such methods is impossible, e.g. due to unacceptable computational time. This set comprises two volumes: *Swarm Intelligence Algorithms: A Tutorial* and *Swarm Intelligence Algorithms: Modifications and Applications*. The first volume thoroughly presents the basics of 24 algorithms selected from the entire family of swarm intelligence algorithms. It contains a detailed explanation of how each algorithm works, along with relevant program codes in Matlab and the C++ programming language, as well as numerical examples illustrating step-by-step how individual algorithms work. The second volume describes selected modifications of these algorithms and presents their practical applications. This book presents 24 swarm algorithms together with their modifications and practical applications. Each chapter is devoted to one algorithm. It contains a short description along with a pseudo-code showing the various stages of its operation. In addition, each chapter contains a description of selected modifications

of the algorithm and shows how it can be used to solve a selected practical problem.

Swarm Intelligence - Marco Dorigo 2010-09-02

These proceedings contain the papers presented at ANTS 2010, the 7th International Conference on Swarm Intelligence, organized by IRIDIA, CoDE, Université Libre de Bruxelles, Brussels, Belgium, during September 8-10, 2010. The ANTS series started in 1998 with the First International Workshop on Ant Colony Optimization (ANTS 1998), which attracted more than 50 participants. Since then ANTS, which is held bi-annually, has gradually become an international forum for researchers in the wider field of swarm intelligence. In the past (since 2004), this development has been acknowledged by the inclusion of the term "Swarm Intelligence" (next to "Ant Colony Optimization") in the conference title. This year's ANTS conference was officially devoted to the field of swarm intelligence as a whole, without any bias towards specific research directions. As a result, the title of the conference was changed to "The International Conference on Swarm Intelligence." This name change is already in place this year, and future ANTS conferences will continue to use the new title.

This volume contains the best papers selected out of 99 submissions. Of these, 28 were accepted as full-length papers, while 27 were accepted as short papers. This corresponds to an overall acceptance rate of 56%. Also included in this volume are 14 extended abstracts. Of the full-length papers, 15 were selected for oral presentation at the conference. All other contributions, including short papers and extended abstracts, were presented in the form of poster presentations. Following the conference, the journal *Swarm Intelligence* will publish extended versions of some of the best papers presented at the conference.

Optimization for Machine Learning - Jason Brownlee 2021-09-22

Optimization happens everywhere. Machine learning is one example of such and gradient descent is probably the most famous algorithm for performing optimization. Optimization means to find the best value of some function or model. That can be the maximum or the minimum according to some metric. Using clear explanations, standard Python libraries, and

step-by-step tutorial lessons, you will learn how to find the optimum point to numerical functions confidently using modern optimization algorithms.

Swarm Intelligence and Bio-Inspired Computation - Zhihua Cui 2013-05-16

Artificial plant optimization algorithm (APOA) is a novel evolutionary strategy inspired by tree's growing process. In this chapter, the methodologies of prototypal APOA and its updated version are illustrated. First, the primary framework is introduced by accounting for photosynthesis and phototropism phenomena. Since some important factors are ignored during mimicking branch's growing, the optimization is sometimes misleading and time-consuming. Therefore, the standard version is developed by adding geotropism mechanism and apical dominance operator. The quality of the proposed technique is verified by two applications on artificial neural network training and toy model of protein folding. Simulation results are consistent with reported numerical data, indicating that the new optimization approach is valid and shows broad application in other fields.

A Particle Swarm Optimization Based Multi-agent Stochastic Evacuation Simulation Model - Zhendan Xue 2009

How do we evaluate the evacuation efficiency of a building floor plan or an aircraft cabin? The most direct approach is to arrange evacuation drills for the evaluation purpose. However, several disadvantages have been associated with these drills. Firstly, these drills are usually considered dangerous, especially when a large number of participants are involved. Secondly, these drills usually require relatively long time and a large amount of money to prepare. Furthermore, the cost increases dramatically when the number of participants increases or when the drill fails and a new one needs to be re-designed. Lastly but not least, it is typically the case that only limited number of trials can be performed in each evacuation drill due to the time-consuming planning and enormous cost. Therefore, the trial results could easily be biased if the number of trials is not sufficient. The other approach to guarantee the evacuation efficiency is to keep floor plan designs in compliance with relevant prescriptive

Building Code or Aircraft Safety Code. However, these codes are typically conservative in nature therefore hinder the innovation of floor plan designs. Performance-Based Code, on the other hand, allows engineers to design fire protection individually for each new building or aircraft using alternative methods other than prescriptive ones, with a maximum design freedom. ^To evaluate the evacuation efficiency conveniently and efficiently in performance-based design, computer simulation models, besides being cost efficient and eliminating the need of involving real participants, can perform repeated tests fairly easily with a built-in stochastic feature that enables a reasonable representation of appropriate behaviors across a spectrum of situations. This dissertation research introduces a Particle Swarm Optimization (PSO) based multi-agent stochastic evacuation simulation model incorporating fire hazards and critical human behaviors. The model has two sub-models: Vacate and VacateAir. The former one is for building evacuation simulation and the latter one is for aircraft evacuation simulation. The model utilizes a modified PSO Algorithm as a path finding algorithm that directs evacuees to the final exit as well as dynamically adjusts evacuees' direction according to fire hazards and crowd movements. ^The fire data are pre-calculated in Fire Dynamics Simulator (FDS) and imported in the model for the use of conducting Human Tenability Analysis (HTA). Critical human behaviors that identified in building and aircraft evacuation are simulated and their impact on the evacuation efficiency is evaluated. There are numerous advantages in applying modified PSO as the path finding algorithm. Application of this strategy overcomes several limitations of existing evacuation models, e.g. eliminating the need to divide the entire floor plan layout into grids and nodes therefore saving substantial computational expense and enabling a simulation of the continuous movement of evacuees, which outperforms the jagged and often unrealistic movement generated by traditional grid-based path finding algorithms. ^With these improved features and validations against published evacuation experimental data, Vacate (for building evacuation) and VacateAir (for aircraft

evacuation) can help designers and fire protection engineers conduct the performance-based design of buildings and aircraft more conveniently. The parametric study of the effects of physical factors such as exit width, aisle width, seat pitch and evacuation motivation (competitive or cooperative), on evacuation efficiency not only provides valuable information to building and aircraft designers, but also opens a potentially new avenue in the future research work on the System-of-Systems (SoS) design approach by coupling the evacuation system with aerodynamic system, weight system, and airline resource allocation system. /italic
Handbook of Heuristics - Rafael Martí
2017-01-16

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.

Multidimensional Particle Swarm Optimization for Machine Learning and Pattern Recognition

- Serkan Kiranyaz

2013-07-16

For many engineering problems we require optimization processes with dynamic adaptation as we aim to establish the dimension of the search space where the optimum solution resides and develop robust techniques to avoid the local optima usually associated with multimodal problems. This book explores multidimensional particle swarm optimization, a technique developed by the authors that addresses these requirements in a well-defined algorithmic approach. After an introduction to the key optimization techniques, the authors introduce their unified framework and demonstrate its advantages in challenging application domains, focusing on the state of the art of multidimensional extensions such as global convergence in particle swarm optimization, dynamic data clustering, evolutionary neural networks, biomedical applications and personalized ECG classification, content-based image classification and retrieval, and evolutionary feature synthesis. The content is characterized by strong practical considerations, and the book is supported with fully documented source code for all applications presented, as well as many sample datasets. The book will be of benefit to researchers and practitioners working in the areas of machine intelligence, signal processing, pattern recognition, and data mining, or using principles from these areas in their application domains. It may also be used as a reference text for graduate courses on swarm optimization, data clustering and classification, content-based multimedia search, and biomedical signal processing applications.

Fractional Order Darwinian Particle Swarm Optimization

- Micael Couceiro 2015-06-16

This book examines the bottom-up applicability of swarm intelligence to solving multiple problems, such as curve fitting, image segmentation, and swarm robotics. It compares the capabilities of some of the better-known bio-inspired optimization approaches, especially

Particle Swarm Optimization (PSO), Darwinian Particle Swarm Optimization (DPSO) and the recently proposed Fractional Order Darwinian Particle Swarm Optimization (FODPSO), and comprehensively discusses their advantages and disadvantages. Further, it demonstrates the superiority and key advantages of using the FODPSO algorithm, such as its ability to provide an improved convergence towards a solution, while avoiding sub-optimality. This book offers a valuable resource for researchers in the fields of robotics, sports science, pattern recognition and machine learning, as well as for students of electrical engineering and computer science.

Transactions on Computational Science VIII

- C. J. Kenneth Tan 2010-10-19

The 8th issue of the Transactions on Computational Science has been divided into two parts. Part I, prepared by Guest Editors Nadia Nedjah, Abdelhamid Bouchachia, and Luiza de Macedo Mourelle, consists of 5 detailed papers, presenting state-of-the-art research results on adaptive models for evolutionary computation and their application in various dynamic environments. The 6 papers in Part II take an in-depth look at selected computational science research in the areas of geometric computing, Euclidean distance transform, distributed systems, segmentation, visualization of monotone data, and data interpolation.

Particle Swarm Optimization and Intelligence: Advances and Applications

- Parsopoulos, Konstantinos E. 2010-01-31

"This book presents the most recent and established developments of Particle swarm optimization (PSO) within a unified framework by noted researchers in the field"--Provided by publisher.

Innovations in Hybrid Intelligent Systems

- Emilio Corchado 2007-12-22

This carefully edited book combines symbolic and sub-symbolic techniques to construct more robust and reliable problem solving models. This volume focused on "Hybrid Artificial Intelligence Systems" contains a collection of papers that were presented at the 2nd International Workshop on Hybrid Artificial Intelligence Systems, held in 12 - 13 November, 2007, Salamanca, Spain.