

Swarm Intelligence And Bio Inspired Computation 14 Modeling To Generate Alternatives Using Biologically Inspired Algorithms

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O'CONNELL JOSIE

4. Memetic Self-Adaptive Firefly Algorithm CRC Press
The "firefly algorithm" (FFA) is a modern metaheuristic algorithm, inspired by the behavior of fireflies. This algorithm and its variants have been successfully applied to many continuous optimization problems. This work analyzes the performance of the FFA when solving combinatorial optimization problems. In order to improve the results, the original FFA is extended and improved for self-adaptation of control parameters, and thus more directly balancing between exploration and exploitation in the search process of fireflies. We use a new population model to increase the selection pressure, and the next generation selects only the fittest between a parent and an offspring population. As a result, the proposed memetic self-adaptive FFA (MSA-FFA) is compared with other well-known graph coloring algorithms such as Tabucol, the hybrid evolutionary algorithm, and an evolutionary algorithm with stepwise adaptation of weights. Various experiments have been conducted on a huge set of randomly generated graphs. The results of these experiments show that the results of the MSA-FFA are comparable with other tested algorithms.

15. Structural Optimization Using Krill Herd Algorithm CRC Press
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

Swarm Intelligence and Bio-Inspired Computation Elsevier Inc. Chapters
This timely review volume summarizes the state-of-the-art developments in nature-inspired algorithms and applications with the emphasis on swarm intelligence and bio-inspired computation. Topics include the analysis and overview of swarm intelligence and evolutionary computation, hybrid metaheuristic algorithms, bat algorithm, discrete cuckoo search, firefly algorithm, particle swarm optimization, and harmony search as well as convergent hybridization. Application case studies have focused on the dehydration of fruits and vegetables by the firefly algorithm and goal programming, feature selection by the binary flower pollination algorithm, job shop scheduling, single row facility layout optimization, training of feed-forward neural networks, damage and stiffness identification, synthesis of cross-ambiguity functions by the bat algorithm, web document clustering, truss analysis, water distribution networks, sustainable building designs and others. As a timely review, this book can serve as an ideal reference for graduates, lecturers, engineers and researchers in computer science, evolutionary computing, artificial intelligence, machine learning, computational intelligence, data mining, engineering optimization and designs.

12. Bio-Inspired Models for Semantic Web Elsevier Inc. Chapters
Data mining has evolved from methods of simple statistical analysis to complex pattern recognition in the past decades. During the progression, the data mining algorithms are modified or extended in order to overcome some specific problems. This chapter discusses about the prospects of improving data mining algorithms by integrating bio-inspired optimization, which has lately captivated much of researchers' attention. In particular, high dimensionality and the unavailability of the whole data set (as in stream mining) in the training data have known to be two major challenges. We demonstrated that these two challenges, through two small examples such as K-means clustering and time-series classification, can be overcome by integrating data mining and bio-inspired algorithms.

8. Test Functions for Global Optimization: A Comprehensive Survey Springer
In this chapter, we present the convergence analysis and applications of particle swarm optimization algorithm. Although it is difficult to analyze the convergence of this algorithm, we discuss its convergence based on its iterated function system and probabilistic theory. The dynamic trajectory of the particle is described based on single individual. We also attempt to theoretically prove that the swarm algorithm converges with a probability of 1 toward the global optimal. We apply the

algorithms to solve the scheduling problem and peer-to-peer neighbor selection problem. This chapter is also concerned to employ the nature-inspired optimization methods in machine learning. We introduce the swarm algorithm to reoptimize hidden Markov models.

Principles, Advances, and Applications Elsevier Inc. Chapters
Swarm intelligence (SI) and bio-inspired computing in general have attracted great interest in almost every area of science, engineering, and industry over the last two decades. In this chapter, we provide an overview of some of the most widely used bio-inspired algorithms, especially those based on SI such as cuckoo search, firefly algorithm, and particle swarm optimization. We also analyze the essence of algorithms and their connections to self-organization. Furthermore, we highlight the main challenging issues associated with these metaheuristic algorithms with in-depth discussions. Finally, we provide some key, open problems that need to be addressed in the next decade.

Bio-Inspired Networking Elsevier Inc. Chapters
This book and its companion volume, LNCS vol. 8794 and 8795 constitute the proceedings of the 5th International Conference on Swarm Intelligence, ICSI 2014, held in Hefei, China in October 2014. The 107 revised full papers presented were carefully reviewed and selected from 198 submissions. The papers are organized in 18 cohesive sections, 3 special sessions and one competitive session covering all major topics of swarm intelligence research and development such as novel swarm-based search methods; novel optimization algorithm; particle swarm optimization; ant colony optimization for travelling salesman problem; artificial bee colony algorithms; artificial immune system; evolutionary algorithms; neural networks and fuzzy methods; hybrid methods; multi-objective optimization; multi-agent systems; evolutionary clustering algorithms; classification methods; GPU-based methods; scheduling and path planning; wireless sensor networks; power system optimization; swarm intelligence in image and video processing; applications of swarm intelligence to management problems; swarm intelligence for real-world application.

Swarm Intelligence and Bio-Inspired Computation Elsevier Inc. Chapters
Bio-Inspired Computation and Applications in Image Processing summarizes the latest developments in bio-inspired computation in image processing, focusing on nature-inspired algorithms that are linked with deep learning, such as ant colony optimization, particle swarm optimization, and bat and firefly algorithms that have recently emerged in the field. In addition to documenting state-of-the-art developments, this book also discusses future research trends in bio-inspired computation, helping researchers establish new research avenues to pursue. Reviews the latest developments in bio-inspired computation in image processing
Focuses on the introduction and analysis of the key bio-inspired methods and techniques Combines theory with real-world applications in image processing Helps solve complex problems in image and signal processing Contains a diverse range of self-contained case studies in real-world applications
Swarm Intelligence and Bio-Inspired Computation BoD - Books on Demand

In solving many practical mathematical programming applications, it is generally preferable to formulate several quantifiably good alternatives that provide very different approaches to the particular problem. This is because decision-making typically involves complex problems that are riddled with incompatible performance objectives and possess competing design requirements which are very difficult—if not impossible—to quantify and capture at the time that the supporting decision models are constructed. There are invariably unmodeled design issues, not apparent at the time of model construction, which can greatly impact the acceptability of the model's solutions. Consequently, it is preferable to generate several alternatives that provide multiple, disparate perspectives to the problem. These alternatives should possess near-optimal objective measures with respect to all known modeled objective(s) but be fundamentally different from each other in terms of the system structures characterized by their decision variables. This solution approach is referred to as modeling-to-generate-alternatives (MGA). This chapter provides a synopsis of various MGA techniques and demonstrates how biologically inspired MGA algorithms are particularly efficient at creating multiple solution alternatives that both satisfy required system performance

criteria and yet are maximally different in their decision spaces. The efficacy and efficiency of these MGA methods are demonstrated using a number of case studies.
Swarm Intelligence and Bio-Inspired Computation Academic Press
A comprehensive introduction to new approaches in artificial intelligence and robotics that are inspired by self-organizing biological processes and structures. New approaches to artificial intelligence spring from the idea that intelligence emerges as much from cells, bodies, and societies as it does from evolution, development, and learning. Traditionally, artificial intelligence has been concerned with reproducing the abilities of human brains; newer approaches take inspiration from a wider range of biological structures that are capable of autonomous self-organization. Examples of these new approaches include evolutionary computation and evolutionary electronics, artificial neural networks, immune systems, biorobotics, and swarm intelligence—to mention only a few. This book offers a comprehensive introduction to the emerging field of biologically inspired artificial intelligence that can be used as an upper-level text or as a reference for researchers. Each chapter presents computational approaches inspired by a different biological system; each begins with background information about the biological system and then proceeds to develop computational models that make use of biological concepts. The chapters cover evolutionary computation and electronics; cellular systems; neural systems, including neuromorphic engineering; developmental systems; immune systems; behavioral systems—including several approaches to robotics, including behavior-based, bio-mimetic, epigenetic, and evolutionary robots; and collective systems, including swarm robotics as well as cooperative and competitive co-evolving systems. Chapters end with a concluding overview and suggested reading.

2. Analysis of Swarm Intelligence-Based Algorithms for Constrained Optimization CRC Press
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.

3. Lévy Flights and Global Optimization Elsevier Inc. Chapters
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.

Swarm Intelligence and Bio-Inspired Computation Elsevier Inc. Chapters
Swarm Intelligence and bio-inspired computation have become increasingly popular in the last two decades. Bio-inspired algorithms such as ant colony algorithms, bat algorithms, bee algorithms, firefly algorithms, cuckoo search and particle swarm optimization have been applied in almost every area of science and engineering with a dramatic increase of number of relevant publications. This book reviews the latest developments in swarm intelligence and bio-inspired computation from both the theory and application side, providing a complete resource that analyzes and discusses the latest and future trends in research directions. It can help new researchers to carry out timely research and inspire readers to develop new algorithms. With its impressive breadth and depth, this book will be useful for advanced undergraduate students, PhD students and lecturers in computer

science, engineering and science as well as researchers and engineers. Focuses on the introduction and analysis of key algorithms Includes case studies for real-world applications Contains a balance of theory and applications, so readers who are interested in either algorithm or applications will all benefit from this timely book.

Swarm Intelligence and Bio-Inspired Computation Academic Press Bio-inspired computation, especially those based on swarm intelligence, has become increasingly popular in the last decade. Bio-Inspired Computation in Telecommunications reviews the latest developments in bio-inspired computation from both theory and application as they relate to telecommunications and image processing, providing a complete resource that analyzes and discusses the latest and future trends in research directions. Written by recognized experts, this is a must-have guide for researchers, telecommunication engineers, computer scientists and PhD students.

Computational Linguistics, Speech And Image Processing For Arabic Language Elsevier

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 *Handbook of Bioinspired Algorithms and Applications* Elsevier Inc. Chapters

Swarm Intelligence: Principles, Advances, and Applications delivers in-depth coverage of bat, artificial fish swarm, firefly, cuckoo search, flower pollination, artificial bee colony, wolf search, and gray wolf optimization algorithms. The book begins with a brief introduction to mathematical optimization, addressing basic concepts related to swarm intelligence, such as randomness, random walks, and chaos theory. The text then: Describes the various swarm intelligence optimization methods, standardizing the variants, hybridizations, and algorithms whenever possible Discusses variants that focus more on binary,

discrete, constrained, adaptive, and chaotic versions of the swarm optimizers Depicts real-world applications of the individual optimizers, emphasizing variable selection and fitness function design Details the similarities, differences, weaknesses, and strengths of each swarm optimization method Draws parallels between the operators and searching manners of the different algorithms Swarm Intelligence: Principles, Advances, and Applications presents a comprehensive treatment of modern swarm intelligence optimization methods, complete with illustrative examples and an extendable MATLAB® package for feature selection in wrapper mode applied on different data sets with benchmarking using different evaluation criteria. The book provides beginners with a solid foundation of swarm intelligence fundamentals, and offers experts valuable insight into new directions and hybridizations.

Swarm Intelligence Elsevier Inc. Chapters

Advanced inventory management in complex supply chains requires effective and robust nonlinear optimization due to the stochastic nature of supply and demand variations. Application of estimated gradients can boost up the convergence of Particle Swarm Optimization (PSO) algorithm but classical gradient calculation cannot be applied to stochastic and uncertain systems. In these situations Monte-Carlo (MC) simulation can be applied to determine the gradient. We developed a memory-based algorithm where instead of generating and evaluating new simulated samples the stored and shared former function evaluations of the particles are sampled to estimate the gradients by local weighted least squares regression. The performance of the resulted regional gradient-based PSO is verified by several benchmark problems and in a complex application example where optimal reorder points of a supply chain are determined. *Swarm Intelligence and Bio-Inspired Computation* John Wiley & Sons

Swarm Intelligence in Cloud Computing is an invaluable treatise for researchers involved in delivering intelligent optimized solutions for reliable deployment, infrastructural stability, and security issues of cloud-based resources. Starting with a bird's eye view on the prevalent state-of-the-art techniques, this book enriches the readers with the knowledge of evolving swarm intelligent optimized techniques for addressing different cloud computing issues including task scheduling, virtual machine allocation, load balancing and optimization, deadline handling, power-aware profiling, fault resilience, cost-effective design, and energy efficiency. The book offers comprehensive coverage of the most essential topics, including: Role of swarm intelligence on cloud computing services Cloud resource sharing strategies Cloud service provider selection Dynamic task and resource scheduling Data center resource management. Indrajit Pan is an Associate Professor in Information Technology of RCC Institute of Information Technology, India. He received his PhD from Indian

Institute of Engineering Science and Technology, Shibpur, India. With an academic experience of 14 years, he has published around 40 research publications in different international journals, edited books, and conference proceedings. Mohamed Abd Elaziz is a Lecturer in the Mathematical Department of Zagazig University, Egypt. He received his PhD from the same university. He is the author of more than 100 articles. His research interests include machine learning, signal processing, image processing, cloud computing, and evolutionary algorithms. Siddhartha Bhattacharyya is a Professor in Computer Science and Engineering of Christ University, Bangalore. He received his PhD from Jadavpur University, India. He has published more than 230 research publications in international journals and conference proceedings in his 20 years of academic experience. *Handbook of Research on Advancements of Swarm Intelligence Algorithms for Solving Real-World Problems* Elsevier Inc. Chapters The "firefly algorithm" (FA) is a nature-inspired technique originally designed for solving continuous optimization problems. There are several existing approaches that apply FA also as a basis for solving discrete optimization problems, in particular the "traveling salesman problem" (TSP). In this chapter, we present a new movement scheme called edge-based movement, an operation which guarantees that a candidate solution more closely resembles another one. This leads to a more FA-like behavior of the algorithm. We investigate the performance of the 'evolutionary discrete firefly algorithm' when using this new edge-based movement and compare it against previous methods. Computer simulations show that the new movement scheme produces slightly better accuracy with much faster average time. The average speedup factor is 14.06 times.

17. Genetic Algorithm for the Dynamic Berth Allocation Problem in Real Time Elsevier Inc. Chapters

Bio-inspired models have taken inspiration from the nature to solve challenging problems in an intelligent manner. Major aims of such bio-inspired models of computation are to propose new unconventional computing architectures and novel problem solving paradigms. Computing models such as artificial neural network (ANN), genetic algorithm (GA), and swarm intelligence (SI) are major constituent models of the bio-inspired approach. Applications of these models are ubiquitous and hence proposed to be applied for Semantic Web. The chapter discusses fundamentals of these bio-inspired constituents along with some heuristic that can be used to design and implement these constituents and briefly surveys recent applications of these models for the Semantic Web. The study shows that the objective of the Semantic Web is better met with such approach and the Web can be accessed in more human-oriented way. At the end, a generic framework for web content filtering based on neuro-fuzzy approach is presented. By considering online webpages and fuzzy user profile, the proposed system classifies the webpages into vague categories using a neural network.