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ISAIAH TIANA

Concepts, Principles and Applications
Springer

A core task in statistical analysis, especially in the era of Big Data, is the fitting of flexible, high-dimensional, and non-linear models to noisy data in order to capture meaningful patterns. This can often result in challenging non-linear and non-convex global optimization problems. The large data volume that must be handled in Big Data applications further increases the difficulty of these problems. Swarm Intelligence Methods for Statistical Regression describes

methods from the field of computational swarm intelligence (SI), and how they can be used to overcome the optimization bottleneck encountered in statistical analysis. Features Provides a short, self-contained overview of statistical data analysis and key results in stochastic optimization theory Focuses on methodology and results rather than formal proofs Reviews SI methods with a deeper focus on Particle Swarm Optimization (PSO) Uses concrete and realistic data analysis examples to guide the reader Includes practical tips and tricks for tuning PSO to extract good performance in real world data analysis challenges

Applied Optimization and Swarm Intelligence Springer Nature
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.

Multidimensional Particle Swarm Optimization for Machine Learning

and Pattern Recognition IntechOpen Fundamentals of Computational Swarm Intelligence provides a comprehensive introduction to the new computational paradigm of Swarm Intelligence (SI), a field that emerged from biological research, and is now picking up momentum within the computational research community. Bio-inspired systems are becoming increasingly important research areas for computer scientists, engineers, economists, bioinformaticians, operational researchers, and many other disciplines. This book introduces the reader to the mathematical models of social insects collective behaviour, and shows how they can be used in solving optimization problems. Focusing on the algorithmic implementation of models of swarm behavior, this book: Examines how social network structures are used to exchange information among individuals, and how the aggregate behaviour of these individuals forms a powerful organism. Introduces a compact summary of the formal theory of optimisation. Outlines paradigms with relations to SI, including genetic algorithms, evolutionary programming, evolutionary strategies, cultural algorithms and co-evolution. Looks at the choreographic movements of birds in a flock as a basis for the Particle Swarm Optimization (PSO) models, and provides an extensive treatment of different classes of PSO models. Shows how the behaviour of ants can be used to implement Ant Colony Optimization (ACO) algorithms to solve real-world problems including routing optimization, structure optimization, data mining and data clustering. Considers different classes of optimization problems, including multi-objective optimization, dynamic environments, discrete and continuous

search spaces, constrained optimization, and niching. Includes an accompanying website containing Java classes and implementations of the different algorithms that can be used to test PSO and ACO algorithms: <http://si.cs.up.ac.za>

The interdisciplinary nature of this field will make *Fundamentals of Computational Swarm Intelligence* an essential resource for readers with diverse backgrounds. In addition, it will be an excellent reference for computer scientists, practitioners in business or industry and researchers involved in the analysis, design and simulation of multibody systems. Advanced undergraduates and graduate students in artificial intelligence, collective intelligence and engineering will also find this book an invaluable tool.

Swarm Intelligence and Bio-Inspired Computation Elsevier Inc. Chapters

The natural social behavior of large groups of animals, such as flocks of birds, schools of fish, or colonies of ants has fascinated scientists for hundreds of years, if not longer, due to the intricate nature of their interactions and their ability to move and work together seemingly effortlessly. *Innovations and Developments of Swarm Intelligence Applications* explores the emerging realm of swarm intelligence, which finds its basis in the natural social behavior of animals. The study and application of this swarm behavior has led scientists to a new world of research as ways are found to apply this behavior to independent intelligent agents, creating complex solutions for real world applications. Worldwide contributions have been seamlessly combined in this comprehensive reference, providing a wealth of new information for researchers, academicians, students, and engineers.

6. Particle Swarm Algorithm: Convergence and Applications John Wiley & Sons

This volume examines the application of swarm intelligence in data mining, addressing the issues of swarm intelligence and data mining using novel intelligent approaches. The book comprises 11 chapters including an introduction reviewing fundamental definitions and important research challenges. Important features include a detailed overview of swarm intelligence and data mining paradigms, focused coverage of timely, advanced data mining topics, state-of-the-art theoretical research and application developments and contributions by pioneers in the field.

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

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.

New Solutions and Cases for Optimized Portfolios Springer Nature

The two-volume set (LNCS 6728 and 6729) constitutes the refereed proceedings of the International Conference on Swarm Intelligence, ICSI 2011, held in Chongqing, China, in June 2011. The 143 revised full papers presented were carefully reviewed and selected from 298 submissions. The papers are organized in topical sections on theoretical analysis of swarm intelligence algorithms, particle swarm optimization, applications of pso algorithms, ant colony optimization algorithms, bee colony algorithms, novel swarm-based optimization algorithms, artificial immune system, differential evolution, neural networks, genetic algorithms, evolutionary computation, fuzzy methods, and hybrid algorithms - for part I. Topics addressed in part II are such as multi-objective optimization algorithms, multi-robot, swarm-robot, and multi-agent systems, data mining methods, machine learning methods, feature selection algorithms, pattern recognition methods, intelligent control, other optimization algorithms and applications, data fusion and swarm intelligence, as well as fish school search - foundations and applications.

Swarm Intelligence Control, Robotics and Sensors

The aim of this book is to understand the state-of-the-art theoretical and practical advances of swarm intelligence. It comprises seven contemporary relevant chapters. In chapter 1, a review of Bacteria Foraging Optimization (BFO) techniques for both single and multiple criteria problem is presented. A survey

on swarm intelligence for multiple and many objectives optimization is presented in chapter 2 along with a topical study on EEG signal analysis. Without compromising the extensive simulation study, a comparative study of variants of MOPSO is provided in chapter 3. Intractable problems like subset and job scheduling problems are discussed in chapters 4 and 7 by different hybrid swarm intelligence techniques. An attempt to study image enhancement by ant colony optimization is made in chapter 5. Finally, chapter 7 covers the aspect of uncertainty in data by hybrid PSO.

Focus on Ant and Particle Swarm Optimization IGI Global

This book gravitates on the prominent theories and recent developments of swarm intelligence methods, and their application in both synthetic and real-world optimization problems. The special interest will be placed in those algorithmic variants where biological processes observed in nature have underpinned the core operators underlying their search mechanisms. In other words, the book centers its attention on swarm intelligence and nature-inspired methods for efficient optimization and problem solving. The content of this book unleashes a great opportunity for researchers, lecturers and practitioners interested in swarm intelligence, optimization problems and artificial intelligence.

Swarm Intelligence Nova Science Pub Incorporated

The field of research that studies the emergent collective intelligence of self-organized and decentralized simple agents is referred to as Swarm Intelligence. It is based on social behavior that can be observed in nature, such as flocks of birds, fish schools and

bee hives, where a number of individuals with limited capabilities are able to come to intelligent solutions for complex problems. The computer science community have already learned about the importance of emergent behaviors for complex problem solving. Hence, this book presents some recent advances on Swarm Intelligence, specially on new swarm-based optimization methods and hybrid algorithms for several applications. The content of this book allows the reader to know more both theoretical and technical aspects and applications of Swarm Intelligence. [Swarm Intelligence for Electric and Electronic Engineering](#) Elsevier Inc.

Chapters

Over the past two decades, swarm intelligence has emerged as a powerful approach to solving optimization as well as other complex problems. Swarm intelligence models are inspired by social behaviours of simple agents interacting among themselves as well as with the environment, e.g., flocking of birds, schooling of fish, foraging of bees and ants. The collective behaviours that emerge out of the interactions at the colony level are useful in achieving complex goals. The main aim of this research book is to present a sample of recent innovations and advances in techniques and applications of swarm intelligence. Among the topics covered in this book include: particle swarm optimization and hybrid methods, ant colony optimization and hybrid methods, bee colony optimization, glowworm swarm optimization, and complex social swarms, application of various swarm intelligence models to operational planning of energy plants, modeling and control of nanorobots, classification of documents, identification of disease biomarkers, and prediction of gene

signals. The book is directed to researchers, practicing professionals, and undergraduate as well as graduate students of all disciplines who are interested in enhancing their knowledge in techniques and applications of swarm intelligence.

[Emerging Research on Swarm Intelligence and Algorithm Optimization](#)
CRC Press

The purpose of this book is to collect contributions that are at the intersection of multi-objective optimization, swarm intelligence (specifically, particle swarm optimization and ant colony optimization) and data mining.

Swarm Intelligence and Bio-Inspired Computation BoD – Books on Demand

Swarm intelligence refers to collective intelligence. Biologists and natural scientist have been studying the behavior of social insects due to their efficiency of solving complex problems such as finding the shortest path between their nest and food source or organizing their nests. In spite of the fact that these insects are unsophisticated individually, they make wonders as a swarm by interaction with each other and their environment. In last two decades, the behaviors of various swarms that are used in finding preys or mating are simulated into a numerical optimization technique. In this chapter, eight different swarm intelligence-based algorithms are summarized and their working steps are listed. These techniques are ant colony optimizer, particle swarm optimizer, artificial bee colony algorithm, glowworm algorithm, firefly algorithm, cuckoo search algorithm, bat algorithm, and hunting search algorithm. Two optimization problems taken from the literature are solved by all these eight algorithms and their performance are compared. It is

noticed that most of the swarm intelligence-based algorithms are simple and robust techniques that determine the optimum solution of optimization problems efficiently without requiring much of a mathematical struggling.

Multi-objective Swarm Intelligence

Elsevier Inc. Chapters

This book is a delight for academics, researchers and professionals working in evolutionary and swarm computing, computational intelligence, machine learning and engineering design, as well as search and optimization in general. It provides an introduction to the design and development of a number of popular and recent swarm and evolutionary algorithms with a focus on their applications in engineering problems in diverse domains. The topics discussed include particle swarm optimization, the artificial bee colony algorithm, Spider Monkey optimization algorithm, genetic algorithms, constrained multi-objective evolutionary algorithms, genetic programming, and evolutionary fuzzy systems. A friendly and informative treatment of the topics makes this book an ideal reference for beginners and those with experience alike.

Swarm Intelligence Methods for Statistical Regression Springer

Science & Business Media

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.

Evolutionary and Swarm Intelligence Algorithms Wiley

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. Theoretical Advances and Applications Springer Science & Business Media 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.

Fundamentals of Computational Swarm Intelligence Springer Science & Business Media

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.

Swarm Intelligence IGI Global

This book presents the basic principles and current algorithms and methods of well-known swarm intelligence algorithms and efficient improvements from typical particle swarm optimisation (PSO), ant colony optimisation (ACO) and fireworks algorithm (FWA) as well as other swarm intelligence algorithms for swarm robotics.

BoD – Books on Demand

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.