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In recent years, rapid changes and improvements have been witnessed in the field of transformer condition monitoring and assessment, especially with the advances in computational intelligence techniques. Condition Monitoring and Assessment of Power Transformers Using Computational Intelligence applies a broad range of computational intelligence techniques to deal with practical transformer operation problems. The approaches introduced are presented in a concise and flowing manner, tackling complex transformer modelling problems and uncertainties occurring in transformer fault diagnosis. Condition Monitoring and Assessment of Power Transformers Using Computational Intelligence covers both the fundamental theories and the most up-to-date research in this rapidly changing field. Many examples have been included that use real-world measurements and realistic operating scenarios of power transformers to fully illustrate the use of computational intelligence techniques for a variety of transformer modelling and fault diagnosis problems. Condition Monitoring and Assessment of Power Transformers Using Computational Intelligence is a useful book for professional engineers and postgraduate students. It also provides a firm foundation for advanced undergraduate students in power engineering.
This book explains the theory and application of evolutionary com-

puter vision, a new paradigm where challenging vision problems can be approached using the techniques of evolutionary computing. This methodology achieves excellent results for defining fitness functions and representations for problems by merging evolutionary computation with mathematical optimization to produce automatic creation of emerging visual behaviors. In the first part of the book the author surveys the literature in concise form, defines the relevant terminology, and offers historical and philosophical motivations for the key research problems in the field. For researchers from the computer vision community, he offers a simple introduction to the evolutionary computing paradigm. The second part of the book focuses on implementing evolutionary algorithms that solve given problems using working programs in the major fields of low-, intermediate- and high-level computer vision. This book will be of value to researchers, engineers, and students in the fields of computer vision, evolutionary computing, robotics, biologically inspired mechatronics, electronics engineering, control, and artificial intelligence.

Metaheuristics exhibit desirable properties like simplicity, easy parallelizability and ready applicability to different types of optimization problems such as real parameter optimization, combinatorial optimization and mixed integer optimization. They are thus beginning to play a key role in different industrially important process engineering applications, among them the synthesis of heat and mass exchange equipment, synthesis of distillation columns and static and dynamic optimization of chemical and bioreactors. This book explains cutting-edge research techniques in related computational intelligence domains and their applications in real--world process engineering. It will be of interest to industrial practitioners and research academics.

"Bioinformatics: Concepts, Methodologies, Tools, and Applications highlights the area of bioinformatics and its impact over the medical community with its innovations that change how we recognize and care for illnesses"--Provided by publisher.

Evolutionary computation algorithms are employed to minimize functions with large number of variables. Biogeography-based optimization (BBO) is an optimization algorithm that is based on the science of biogeography, which researches the migration patterns of species. These migration paradigms provide the main logic behind BBO. Due to the cross-disciplinary nature of the optimization problems, there is a need to develop multiple approaches to tackle them and to study the theoretical reasoning behind their performance. This book explains the mathematical model of BBO algorithm and its variants created to cope with continuous domain problems (with and without constraints) and combinatorial problems.

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, reopti-

mization, 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.

This monograph presents examples of best practices when combining bioinspired algorithms with parallel architectures. The book includes recent work by leading researchers in the field and offers a map with the main paths already explored and new ways towards the future. Parallel Architectures and Bioinspired Algorithms will be of value to both specialists in Bioinspired Algorithms, Parallel and Distributed Computing, as well as computer science students trying to understand the present and the future of Parallel Architectures and Bioinspired Algorithms.

This book constitutes the joint refereed proceedings of six workshops, EvoWorkshops 2003, held together with EuroGP 2003 in Essex, UK in April 2003. The 63 revised full papers presented were carefully reviewed and selected from a total of 109 submissions. In accordance with the six workshops covered , the papers are organized in topical sections on bioinformatics, combinatorial optimization, image analysis and signal processing, evolutionary music and art, evolutionary robotics, and scheduling and timetabling.

This volume will be a collection of chapters from authors with wide experience in their research field. The purpose is to produce a coherent book that reflects the common theme of theory in medical thinking and multidisciplinary research practice. In this context "theory" relates to frameworks of concepts, facts, models etc that help to inform practitioners (clinicians, scientists and engineers) both within their own fields and as they seek to share dialogue with colleagues from other fields. The book will therefore be integrative across a broad spectrum of fields within medicine. To achieve this the chapters will be associated with others in a number of meaningful ways. Each chapter will share a number of points of contact that will include at least two of the following: *similar biomedical area (e.g., immunity, neuroscience, endocrinology, pathology, oncology, haematology, â€¦) *similar multidis-

ciplinary theoretical contexts (e.g., modelling, analysis, description, visualization, complex systems, â€¦) *similar multidisciplinary medical issues and questions (e.g., clinical practice, decision making, informatics, â€¦) â€¢Uniquely explores role of interdisciplinary exchange in the development and expansion of medical theory â€¢Timely and insightful essays on the growth and development of medical theories from some of the world's top clinicians and medical researchers, including Werner Arber, Frank Vertosick, and David Weatherall â€¢Assembles diverse perspectives on medicine and physiology from biology, statistics, ethics, computer science, philosophy, history â€¢Uniquely illuminates the social and historical processes through which theoretical research translates into clinical practice â€¢Reveals the growing role of technology, especially computational modelling, in changing the nature of Western medicine

The8thWorkshopontheFoundationsofGeneticAlgorithms,FOGA-8,washeld at the University of Aizu in Aizu-Wakamatsu City, Japan, January 5–9, 2005. This series of workshops was initiated in 1990 to encourage further research on the theoretical aspects of genetic algorithms, and the workshops have been held biennially ever since. The papers presented at these workshops are revised, edited and published as volumes during the year following each workshop. This series of (now eight) volumes provides an outstanding source of reference for the theoretical work in this ?eld. At the same time this series of volumes provides a clear picture of how the theoretical research has grown and matured along with the ?eld to encompass many evolutionary computation paradigms including evolution strategies (ES), evolutionary programming (EP), and genetic programming (GP), as well as the

continuing growthininteractionswith other ?elds suchas mathematics,physics, and biology. Atraditionoftheseworkshopsisorganizetheminsuchawayastoencourage lots of interaction and discussion by restricting the number of papers presented and the number of attendees, and by holding the workshop in a relaxed and informal setting. This year's workshop was no exception. Thirty-two researchers met for 3 days to present and discuss 16 papers. The local organizer was Lothar Schmitt who, together with help and support from his university, provided the workshop facilities. Aftertheworkshopwasover,theauthorsweregiventheopportunitytorevise their papers based on the feedback they received from the other participants.

The papers in this volume are the refereed technical papers presented at AI-2008, the Twenty-eighth SGAI International Conference on Innovative Techniques and Applications of Artificial Intelligence, held in Cambridge in December 2008. They present new and innovative developments in the field, divided into sections on CBR and Classification, AI Techniques, Argumentation and Negotiation, Intelligent Systems, From Machine Learning To E-Learning and Decision Making. The volume also includes the text of short papers presented as posters at the conference. This is the twenty-fifth volume in the Research and Development series. The series is essential reading for those who wish to keep up to date with developments in this important field. The Application Stream papers are published as a companion volume under the title Applications and Innovations in Intelligent Systems XVI.

"This book is a comprehensive and in-depth reference to the most recent developments in the field covering theoretical developments, techniques, technologies, among others"--Provided by

publisher.

Genetic Algorithms: Principles and Perspectives: A Guide to GA Theory is a survey of some important theoretical contributions, many of which have been proposed and developed in the Foundations of Genetic Algorithms series of workshops. However, this theoretical work is still rather fragmented, and the authors believe that it is the right time to provide the field with a systematic presentation of the current state of theory in the form of a set of theoretical perspectives. The authors do this in the interest of providing students and researchers with a balanced foundational survey of some recent research on GAs. The scope of the book includes chapter-length discussions of Basic Principles, Schema Theory, "No Free Lunch", GAs and Markov Processes, Dynamical Systems Model, Statistical Mechanics Approximations, Predicting GA Performance, Landscapes and Test Problems.

This book constitutes the refereed proceedings of the 10th International Conference on Parallel Problem Solving from Nature, PPSN 2008, held in Dortmund, Germany, in September 2008. The 114 revised full papers presented were carefully reviewed and selected from 206 submissions. The conference covers a wide range of topics, such as evolutionary computation, quantum computation, molecular computation, neural computation, artificial life, swarm intelligence, artificial ant systems, artificial immune systems, self-organizing systems, emergent behaviors, and applications to real-world problems. The paper are organized in topical sections on formal theory, new techniques, experimental analysis, multiobjective optimization, hybrid methods, and applications.

This textbook is a second edition of Evolutionary Algorithms for Solving Multi-Objective Problems, significantly expanded and adapted for the classroom. The various features of multi-objective evolutionary algorithms are presented here in an innovative and student-friendly fashion, incorporating state-of-the-art research. The book disseminates the application of evolutionary algorithm techniques to a variety of practical problems. It contains exhaustive appendices, index and bibliography and links to a complete set of teaching tutorials, exercises and solutions.

Mostindustrialbiotechnologicalprocessesareoperatedempirically.Oneofthe major di?culties of applying advanced control theories is the highly nonlinear nature of the processes. This book examines approaches based on arti?cial intelligencemethods,inparticular,geneticalgorithmsandneuralnetworks,for monitoring, modelling and optimization of fed-batch fermentation processes. The main aim of a process control is to maximize the ?nal product with minimum development and production costs. This book is interdisciplinary in nature, combining topics from biotechn- ogy, arti?cial intelligence, system identi?cation, process monitoring, process modelling and optimal control. Both simulation and experimental validation are performed in this study to demonstrate the suitability and feasibility of proposed methodologies. An online biomass sensor is constructed using a - current neural network for predicting the biomass concentration online with only three measurements (dissolved oxygen, volume and feed rate). Results show that the proposed sensor is comparable or even superior to other sensors proposed in the literature that use more than three measurements. Biote- nological processes are modelled by cascading two recurrent neural networks. It is found that neural models are able

to describe the processes with high accuracy. Optimization of the ?nal product is achieved using modi?ed genetic algorithms to determine optimal feed rate pro?les. Experimental results of the corresponding production yields demonstrate that genetic algorithms are powerful tools for optimization of highly nonlinear systems. Moreover, a c- bination of recurrentneural networks and genetic algorithms provides a useful and cost-e?ective methodology for optimizing biotechnological processes.

This book focuses on the implementation, evaluation and application of DNA/RNA-based genetic algorithms in connection with neural network modeling, fuzzy control, the Q-learning algorithm and CNN deep learning classifier. It presents several DNA/RNA-based genetic algorithms and their modifications, which are tested using benchmarks, as well as detailed information on the implementation steps and program code. In addition to single-objective optimization, here genetic algorithms are also used to solve multi-objective optimization for neural network modeling, fuzzy control, model predictive control and PID control. In closing, new topics such as Q-learning and CNN are introduced. The book offers a valuable reference guide for researchers and designers in system modeling and control, and for senior undergraduate and graduate students at colleges and universities.

This book makes available a self-contained collection of modern research addressing the general constrained optimization problems using evolutionary algorithms. Broadly the topics covered include constraint handling for single and multi-objective optimizations; penalty function based methodology; multi-objective based methodology; new constraint handling mechanism; hybrid methodology; scaling issues in constrained optimization; design of scalable test problems; parameter adaptation in constrained optimization; handling of integer, discrete and mix variables in addition to continuous variables; application of constraint handling techniques to real-world problems; and constrained optimization in dynamic environment. There is also a separate chapter on hybrid optimization, which is gaining lots of popularity nowadays due to its capability of bridging the gap between evolutionary and classical optimization. The material in the book is useful to researchers, novice, and experts alike. The book will also be useful for classroom teaching and future research.

The first complete overview of evolutionary computing, the collective name for a range of problem-solving techniques based on principles of biological evolution, such as natural selection and genetic inheritance. The text is aimed directly at lecturers and graduate and undergraduate students. It is also meant for those who wish to apply evolutionary computing to a particular problem or within a given application area. The book contains quick-reference information on the current state-of-the-art in a wide range of related topics, so it is of interest not just to evolutionary computing specialists but to researchers working in other fields.

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.

"This book explores emerging technologies and best practices designed to effectively address concerns inherent in properly optimizing advanced systems, demonstrating applications in areas such as bio-engineering, space exploration, industrial informatics, information security, and nuclear and renewable energies"--Provided by publisher.

This book provides a compilation on the state-of-the-art and recent advances of evolutionary computation for dynamic optimization problems. The motivation for this book arises from the fact that many real-world optimization problems and engineering systems are subject to dynamic environments, where changes occur over time. Key issues for addressing dynamic optimization problems in evolutionary computation, including fundamentals, algorithm design, theoretical analysis, and real-world applications, are presented. "Evolutionary Computation for Dynamic Optimization Problems" is a valuable reference to scientists, researchers, professionals and students in the field of engineering and science, particularly in the areas of computational intelligence, nature- and bio-inspired computing, and evolutionary computation.

This book constitutes the refereed proceedings of the 18th International Conference on Information and Software Technologies, ICIST 2012, held in Kaunas, Lithuania, in September 2012. The 40 revised full papers presented were carefully reviewed and selected from 81 submissions. The papers are organized in topical sections on artificial intelligence and knowledge engineering, business process modelling, analysis and design, formal analysis and design methods, information and software systems engineering, information technology applications and computer networks, information technology in teaching and learning, ontology, conceptual modelling and databases, requirements engineering and business rules.

As technology continues to become more sophisticated, mimicking natural processes and phenomena also becomes more of a reality. Continued research in the field of natural computing enables an understanding of the world around us, in addition to opportunities for man-made computing to mirror the natural processes and systems that have existed for centuries. Nature-Inspired Computing: Concepts, Methodologies, Tools, and Applications takes an interdisciplinary approach to the topic of natural computing, including emerging technologies being developed for the purpose of simulating natural phenomena, applications across industries, and the future outlook of biologically and nature-inspired technologies. Emphasizing critical research in a comprehensive multi-volume set, this publication is designed for use by IT professionals, researchers, and graduate students studying intelligent computing.

This book gathers together a set of chapters covering recent development in optimization methods that are inspired by nature. The first group of chapters describes in detail different meta-heuristic algorithms, and shows their applicability using some test or real-world problems. The second part of the book is especially focused on advanced applications and case studies. They span different engineering fields, including mechanical, electrical and civil engineering, and earth/environmental science, and covers topics such as robotics, water management, process optimization, among others. The book covers both basic concepts and advanced issues, offering a timely introduction to nature-inspired op-

timization method for newcomers and students, and a source of inspiration as well as important practical insights to engineers and researchers.

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

modern heuristics and are interested in a guide to their systematic design and use.

State of the Art on Grammatical Inference Using Evolutionary Method presents an approach for grammatical inference (GI) using evolutionary algorithms. Grammatical inference deals with the standard learning procedure to acquire grammars based on evidence about the language. It has been extensively studied due to its high importance in various fields of engineering and science. The book's prime purpose is to enhance the current state-of-the-art of grammatical inference methods and present new evolutionary algorithms-based approaches for context free grammar induction. The book's focus lies in the development of robust genetic algorithms for context free grammar induction. The new algorithms discussed in this book incorporate Boolean-based operators during offspring generation within the execution of the genetic algorithm. Hence, the user has no limitation on utilizing the evolutionary methods for grammatical inference. Discusses and summarizes the latest developments in Grammatical Inference, with a focus on Evolutionary Methods Provides an understanding of premature convergence as well as genetic algorithms Presents a performance analysis of genetic algorithms as well as a complete look into the wide range of applications of Grammatical Inference methods Demonstrates how to develop a robust experimental environment to conduct experiments using evolutionary methods and algorithms

This volume brings together recent theoretical work in Learning Classifier Systems (LCS), which is a Machine Learning technique combining Genetic Algorithms and Reinforcement Learning. It includes self-contained background chapters on related fields (rein-

forcement learning and evolutionary computation) tailored for a classifier systems audience and written by acknowledged authorities in their area - as well as a relevant historical original work by John Holland.

A clear and lucid bottom-up approach to the basic principlesof evolutionary algorithms Evolutionary algorithms (EAs) are a type of artificialintelligence. EAs are motivated by optimization processes that weobserve in nature, such as natural selection, species migration,bird swarms, human culture, and ant colonies. This book discusses the theory, history, mathematics, andprogramming of evolutionary optimization algorithms. Featuredalgorithms include genetic algorithms, genetic programming, antcolony optimization, particle swarm optimization, differentialevolution, biogeography-based optimization, and many others. Evolutionary Optimization Algorithms: Provides a straightforward, bottom-up approach that assists thereader in obtaining a clear—but theoreticallyrigorous—understanding of evolutionary algorithms, with anemphasis on implementation Gives a careful treatment of recently developedEAs—including opposition-based learning, artificial fishswarms, bacterial foraging, and many others— and discussestheir similarities and differences from more well-establishedEAs Includes chapter-end problems plus a solutions manual availableonline for instructors Offers simple examples that provide the reader with anintuitive understanding of the theory Features source code for the examples available on the author'swebsite Provides advanced mathematical techniques for analyzing EAs,including Markov modeling and dynamic system modeling Evolutionary Optimization Algorithms: Biologically Inspiredand Population-Based

Approaches to Computer Intelligence is anideal text for advanced undergraduate students, graduate students,and professionals involved in engineering and computer science.

The Handbook of Computational Statistics: Concepts and Methodology is divided into four parts. It begins with an overview over the field of Computational Statistics. The second part presents several topics in the supporting field of statistical computing. Emphasis is placed on the need of fast and accurate numerical algorithms and it discusses some of the basic methodologies for transformation, data base handling and graphics treatment. The third part focuses on statistical methodology. Special attention is given to smoothing, iterative procedures, simulation and visualization of multivariate data. Finally a set of selected applications like Bioinformatics, Medical Imaging, Finance and Network Intrusion Detection highlight the usefulness of computational statistics.

Cellular Genetic Algorithms defines a new class of optimization algorithms based on the concepts of structured populations and Genetic Algorithms (GAs). The authors explain and demonstrate the validity of these cellular genetic algorithms throughout the book with equal and parallel emphasis on both theory and practice. This book is a key source for studying and designing cellular GAs, as well as a self-contained primary reference book for these algorithms.

Readers will find here a fascinating text that is the thoroughly refereed post-proceedings of the 9th Workshop on the Foundations of Genetic Algorithms, FOGA 2007, held in Mexico City in January 2007. The 11 revised full papers presented were carefully reviewed and selected during two rounds of reviewing and improvement from 22 submissions. The papers address all current topics

in the field of theoretical evolutionary computation and also depict the continuing growth in interactions with other fields such as mathematics, physics, and biology

Optimization has played a key role in the design, planning and operation of chemical and related processes, for several decades. Global optimization has been receiving considerable attention in the past two decades. Of the two types of techniques for global optimization, stochastic global optimization is applicable to any type of problems having non-differentiable functions, discrete variables and/or continuous variables. It, thus, shows significant promise and potential for process optimization. So far, there are no books focusing on stochastic global optimization and its applications in chemical engineering. Stochastic Global Optimization ? a monograph with contributions by leading researchers in the area ? bridges the gap in this subject, with the aim of highlighting and popularizing stochastic global optimization techniques for chemical engineering applications. The book, with 19 chapters in all, is broadly categorized into two sections that extensively cover the techniques and the chemical engineering applications.

Cluster analysis means the organization of an unlabeled collection of objects or patterns into separate groups based on their similarity. The task of computerized data clustering has been approached from diverse domains of knowledge like graph theory, multivariate analysis, neural networks, fuzzy set theory, and so on. Clustering is often described as an unsupervised learning method but most of the traditional algorithms require a prior specification of the number of clusters in the data for guiding the partitioning process, thus making it not completely unsupervised.

Modern data mining tools that predict future trends and behaviors for allowing businesses to make proactive and knowledge-driven decisions, demand fast and fully automatic clustering of very large datasets with minimal or no user intervention. In this volume, we formulate clustering as an optimization problem, where the best partitioning of a given dataset is achieved by minimizing/maximizing one (single-objective clustering) or more (multi-objective clustering) objective functions. Using several real world applications, we illustrate the performance of several meta-heuristics, particularly the Differential Evolution algorithm when applied to both single and multi-objective clustering problems, where the number of clusters is not known beforehand and must be determined on the run. This volume comprises of 7 chapters including an introductory chapter giving the fundamental definitions and the last Chapter provides some important research challenges. Academics, scientists as well as engineers engaged in research, development and application of optimization techniques and data mining will find the comprehensive coverage of this book invaluable.

This book constitutes the refereed joint proceedings of seven workshops on evolutionary computing, EvoWorkshops 2007, held in Valencia, Spain in April 2007. It examines evolutionary computation in communications, networks, and connected systems; finance and economics; image analysis and signal processing; and transportation and logistics. Coverage also details evolutionary algorithms in stochastic and dynamic environments.

In the field of genetic and evolutionary algorithms (GEAs), a large amount of theory and empirical study has been focused on operators and test problems, while problem representation has often

been taken as given. This book breaks with this tradition and provides a comprehensive overview on the influence of problem representations on GEA performance. The book summarizes existing knowledge regarding problem representations and describes how basic properties of representations, such as redundancy, scaling, or locality, influence the performance of GEAs and other heuristic optimization methods. Using the developed theory, representations can be analyzed and designed in a theory-guided matter. The theoretical concepts are used for solving integer optimization problems and network design problems more efficiently. The book is written in an easy-readable style and is intended for researchers, practitioners, and students who want to learn about representations. This second edition extends the analysis of the basic properties of representations and introduces a new chapter on the analysis of direct representations.

The Handbook of Computational Statistics - Concepts and Methods (second edition) is a revision of the first edition published in 2004, and contains additional comments and updated information on the existing chapters, as well as three new chapters addressing recent work in the field of computational statistics. This new edition is divided into 4 parts in the same way as the first edition. It begins with "How Computational Statistics became the backbone of modern data science" (Ch.1): an overview of the field of Computational Statistics, how it emerged as a separate discipline, and how its own development mirrored that of hardware and software, including a discussion of current active research. The second part (Chs. 2 - 15) presents several topics in the supporting field of statistical computing. Emphasis is placed on the need for fast and accurate numerical algorithms, and some of the basic methodologies for transformation, database handling, high-dimensional data and graphics treatment are discussed. The third part (Chs. 16 - 33) focuses on statistical methodology. Special attention is given to smoothing, iterative procedures, simulation and visualization of multivariate data. Lastly, a set of selected applications (Chs. 34 - 38) like Bioinformatics, Medical Imaging, Finance, Econometrics and Network Intrusion Detection highlight the usefulness of computational statistics in real-world applications.

The overall structure of this new edition is three-tier: Part I presents the basics, Part II is concerned with methodological issues, and Part III discusses advanced topics. In the second edition the authors have reorganized the material to focus on problems, how to represent them, and then how to choose and design algorithms for different representations. They also added a chapter on problems, reflecting the overall book focus on problem-solvers, a chapter on parameter tuning, which they combined with the parameter control and "how-to" chapters into a methodological part, and finally a chapter on evolutionary robotics with an outlook on possible exciting developments in this field. The book is suitable for undergraduate and graduate courses in artificial intelligence and computational intelligence, and for self-study by practitioners and researchers engaged with all aspects of bioinspired design and optimization.

The first edition of Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques was originally put together to offer a basic introduction to the various search and optimization techniques that students might need to use dur-

ing their research, and this new edition continues this tradition. Search Methodologies has been expanded and brought completely up to date, including new chapters covering scatter search, GRASP, and very large neighborhood search. The chapter authors are drawn from across Computer Science and Operations Research and include some of the world's leading authorities in their field. The book provides useful guidelines for implementing the methods and frameworks described and offers valuable tutorials to students and researchers in the field. "As I embarked on the pleasant journey of reading through the chapters of this book, I became convinced that this is one of the best sources of introductory material on the search methodologies topic to be found. The book's subtitle, "Introductory Tutorials in Optimization and Decision Support Techniques", aptly describes its aim, and the editors and contributors to this volume have achieved this aim with remarkable success. The chapters in this book are exemplary in giving useful guidelines for implementing the methods and frameworks described." Fred Glover, Leeds School of Business, University of Colorado Boulder, USA "[The book] aims to present a series of well written tutorials by the leading experts in their fields. Moreover, it does this by covering practically the whole possible range of topics in the discipline. It enables students and practitioners to study and appreciate the beauty and the power of some of the computational search techniques that are able to effectively navigate through search spaces that are sometimes inconceivably large. I am convinced that this second edition will build on the success of the first edition and that it will prove to be just as popular." Jacek Blazewicz, Institute of Computing Science, Poznan University of Technology and Institute of Bioorganic Chemistry, Polish Academy of Sciences