Fuzzy Optimization Recent Advances And Applications Studies In Fuzziness And Soft Computing

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A First Course in Fuzzy Logic, Fuzzy Dynamical Systems, and Biomathematics - Laécio Carvalho de Barros 2016-09-13
This book provides an essential introduction to the field of dynamical models. Starting from classical theories such as set theory and probability, it allows readers to draw near to the fuzzy case. On one hand, the book equips readers with a fundamental understanding of the theoretical underpinnings of fuzzy sets and fuzzy dynamical systems. On the other, it demonstrates how these theories are used to solve modeling problems in biomathematics, and presents existing derivatives and integrals applied to the context of fuzzy functions. Each of the major topics is accompanied by examples, worked-out exercises, and exercises to be completed. Moreover, many applications to real problems are presented. The book has been developed on the basis of the authors' lectures to university students and is accordingly primarily intended as a textbook for both upper-level undergraduates and graduates in applied mathematics, statistics, and engineering. It also offers a valuable resource for practitioners such as mathematical consultants and modelers, and for researchers alike, as it may provide both groups with new ideas and inspirations for projects in the fields of fuzzy logic and biomathematics.
Fuzzy Relational Calculus - Ketty Peeva 2005-01-06
This book examines fuzzy relational calculus theory with applications in various engineering subjects. The scope of the text covers unified and exact methods with algorithms for direct and inverse problem resolution in fuzzy relational calculus. Extensive engineering applications of fuzzy relation compositions and fuzzy linear systems (linear, relational and intuitionistic) are discussed. Some examples of such applications include solutions of equivalence, reduction and minimization problems in fuzzy machines, pattern recognition in fuzzy languages, optimization and inference engines in textile and chemical engineering, etc. A comprehensive overview of the authors' original work in fuzzy relational calculus is also provided in each chapter. The attached CD-Rom contains a toolbox with many functions for fuzzy calculations, together with an original algorithm for inverse problem resolution in MATLAB. This book is also suitable for use as a textbook in related courses at advanced undergraduate and graduate levels. Contents:Fuzzy Relations. Direct Problem ResolutionFuzzy Relation EquationsFuzzy Relational InclusionsFuzzy Linear Systems — Dual ApproachDirect and Inverse

Problems in Intuitionistic Fuzzy Relational CalculusΛ-Fuzzy Finite MachinesFuzzy Languages in Syntactic Pattern RecognitionApplications as Inference EngineSoftware Description Readership: Academics and researchers in theoretical and applied mathematics; programmers and engineers. Keywords:Fuzzy Relational Equations;Fuzzy Linear Systems;Direct and Inverse Problem Resolution;Fuzzy Machines;Fuzzy Languages;Inference Engine;MATLABKey Features:Includes comprehensive bibliographical notes at the end of each chapterFree toolbox for fuzzy relational calculations with MATLABProvides many solved examples of fuzzy compositions, intuitionistic compositions, fuzzy linear systems of equations, fuzzy relational equations, intuitionistic fuzzy systems, problems in fuzzy machines

Recent Advances of Hybrid Intelligent Systems Based on Soft Computing - Patricia Melin 2021-11-07

This book describes recent advances on fuzzy logic, neural networks and optimization algorithms, as well as their hybrid combinations, and their application in areas such as intelligent control and robotics, pattern recognition, medical diagnosis, time series prediction and optimization of complex problems. The book contains a collection of papers focused on hybrid intelligent systems based on soft computing. There are some papers with the main theme of type-1 and type-2 fuzzy logic, which basically consists of papers that propose new concepts and algorithms based on type-1 and type-2 fuzzy logic and their applications. There are also some papers that present theory and practice of meta-heuristics in different areas of application. Another group of papers describes diverse applications of fuzzy logic, neural networks and hybrid intelligent systems in medical applications. There are also some papers that present theory and practice of neural networks in different areas of application. In addition, there are papers that present theory and practice of optimization and evolutionary algorithms in different areas of application. Finally, there are some papers describing applications of fuzzy logic, neural networks and meta-heuristics in pattern recognition problems.

Recent Advances in Intelligent Paradigms and Applications - Ajith Abraham 2002-11-26

Digital systems that bring together the computing capacity for processing large bodies of information with the human cognitive capability are called intelligent systems. Building these systems has become one of the great goals of modem technology. This goal has both intellectual and economic incentives. The need for such intelligent systems has become more intense in the face of the global connectivity of the internet. There has become an almost insatiable requirement for instantaneous information and decision brought about by this confluence of computing and communication. This requirement can only be satisfied by the construction of innovative intelligent systems. A second and perhaps an even more significant development is the great advances being made in genetics and related areas of biotechnology. Future developments in biotechnology may open the possibility for the development of a true human-silicon interaction at the micro level, neural and cellular, bringing about a need for "intelligent" systems. What is needed to further the development of intelligent systems are tools to enable the representation of human cognition in a manner that allows formal manipulation. The idea of developing such an algebra goes back to Leibniz in the 17th century with his dream of a calculus ratiocinator. It wasn't until two hundred years later beginning with the work of Boole, Cantor and Frege that a formal mathematical logic for modeling human reasoning was developed. The introduction of the modem digital computer during the Second World War by von Neumann and others was a culmination of this intellectual trend.

Genetic Algorithms and Fuzzy Multiobjective Optimization - Masatoshi Sakawa 2002

Since the introduction of genetic algorithms in the 1970s, an enormous number of articles together with several significant monographs and books have been published on this methodology. As a result, genetic algorithms have made a major contribution to optimization, adaptation, and learning in a wide variety of unexpected fields. Over the years, many excellent books in genetic algorithm optimization have been published; however, they focus mainly on single-objective discrete or other hard

optimization problems under certainty. There appears to be no book that is designed to present genetic algorithms for solving not only single-objective but also fuzzy and multiobjective optimization problems in a unified way. Genetic Algorithms And Fuzzy Multiobjective Optimization introduces the latest advances in the field of genetic algorithm optimization for 0-1 programming, integer programming, nonconvex programming, and job-shop scheduling problems under multiobjectiveness and fuzziness. In addition, the book treats a wide range of actual real world applications. The theoretical material and applications place special stress on interactive decision-making aspects of fuzzy multiobjective optimization for human-centered systems in most realistic situations when dealing with fuzziness. The intended readers of this book are senior undergraduate students, graduate students, researchers, and practitioners in the fields of operations research, computer science, industrial engineering, management science, systems engineering, and other engineering disciplines that deal with the subjects of multiobjective programming for discrete or other hard optimization problems under fuzziness. Real world research applications are used throughout the book to illustrate the presentation. These applications are drawn from complex problems. Examples include flexible scheduling in a machine center, operation planning of district heating and cooling plants, and coal purchase planning in an actual electric power plant.

Fuzzy Sets Based Heuristics for Optimization - José-Luis Verdegay 2012-11-03

The aim of this volume is to show how Fuzzy Sets and Systems can help to provide robust and adaptive heuristic optimization algorithms in a variety of situations. The book presents the state of the art and gives a broad overview on the real practical applications that Fuzzy Sets, based on heuristic algorithms, have.

Handbook of Research on Emergent Applications of Optimization Algorithms - Vasant, Pandian 2017-10-31

Modern optimization approaches have attracted an increasing number of scientists, decision makers, and researchers. As new issues in this field emerge, different optimization methodologies must be developed and implemented. The Handbook of Research on Emergent Applications of Optimization Algorithms is an authoritative reference source for the latest scholarly research on modern optimization techniques for solving complex problems of global optimization and their applications in economics and engineering. Featuring coverage on a broad range of topics and perspectives such as hybrid systems, non-cooperative games, and cryptography, this publication is ideally designed for students, researchers, and engineers interested in emerging developments in optimization algorithms.

Advanced Control Techniques in Complex Engineering Systems: Theory and Applications - Yuriy P. Kondratenko 2019-05-24

This book presents an authoritative collection of contributions by researchers from 16 different countries (Austria, Chile, Georgia, Germany, Mexico, Norway, P.R. of China, Poland, North Macedonia, Romania, Russia, Spain, Turkey, Ukraine, the United Kingdom and United States) that report on recent developments and new directions in advanced control systems, together with new theoretical findings, industrial applications and case studies on complex engineering systems. This book is dedicated to Professor Vsevolod Mykhailovych Kuntsevich, an Academician of the National Academy of Sciences of Ukraine, and President of the National Committee of the Ukrainian Association on Automatic Control, in recognition of his pioneering works, his great scientific and scholarly achievements, and his years of service to many scientific and professional communities, notably those involved in automation, cybernetics, control, management and, more specifically, the fundamentals and applications of tools and techniques for dealing with uncertain information, robustness, non-linearity, extremal systems, discrete control systems, adaptive control systems and others. Covering essential theories, methods and new challenges in control systems design, the book is not only a timely reference guide but also a source of new ideas and inspirations for graduate students and researchers alike. Its 15 chapters are grouped into four sections: (a) fundamental theoretical issues in complex engineering systems, (b) artificial

intelligence and soft computing for control and decision-making systems, (c) advanced control techniques for industrial and collaborative automation, and (d) modern applications for management and information processing in complex systems. All chapters are intended to provide an easy-to-follow introduction to the topics addressed, including the most relevant references. At the same time, they reflect various aspects of the latest research work being conducted around the world and, therefore, provide information on the state of the art.

Fuzzy Probabilities - James J. Buckley 2012-12-06

In probability and statistics we often have to estimate probabilities and parameters in probability distributions using a random sample. Instead of using a point estimate calculated from the data we propose using fuzzy numbers which are constructed from a set of confidence intervals. In probability calculations we apply constrained fuzzy arithmetic because probabilities must add to one. Fuzzy random variables have fuzzy distributions. A fuzzy normal random variable has the normal distribution with fuzzy number mean and variance. Applications are to queuing theory, Markov chains, inventory control, decision theory and reliability theory.

Fuzzy Reasoning in Decision Making and Optimization - Christer Carlsson 2012-08-27

Many decision-making tasks are too complex to be understood quantitatively, however, humans succeed by using knowledge that is imprecise rather than precise. Fuzzy logic resembles human reasoning in its use of imprecise informa tion to generate decisions. Unlike classical logic which requires a deep under standing of a system, exact equations, and precise numeric values, fuzzy logic incorporates an alternative way of thinking, which allows modeling complex systems using a higher level of abstraction originating from our knowledge and experience. Fuzzy logic allows expressing this knowledge with subjective concepts such as very big and a long time which are mapped into exact numeric ranges. Since knowledge can be expressed in a more natural by using fuzzy sets, many decision (and engineering) problems can be greatly simplified. Fuzzy logic provides an inference morphology that enables approximate human reasoning capabilities to be applied to knowledge-based systems. The theory of fuzzy logic provides a mathematical strength to capture the un certainties associated with human cognitive processes, such as thinking and reasoning. The conventional approaches to knowledge representation lack the means for representating the meaning of fuzzy concepts. As a consequence, the approaches based on first order logic do not provide an appropriate con ceptual framework for dealing with the representation of commonsense knowl edge, since such knowledge is by its nature both lexically imprecise and non categorical.

Applications of Fuzzy Optimization and Fuzzy Decision Making - Vassilis C Gerogiannis 2021-10-26

The aim of the Special Issue "Applications of Fuzzy Optimization and Fuzzy Decision Making" is to expand the applicability of fuzzy optimization and decision making for solving various types of problems in the areas of economics, business, engineering, management, operations research, etc. Any experimental research or empirical study of theoretical developments in fuzzy optimization and decision making is highly welcome. Additionally, research papers presenting solution methods and/or studying their computational complexity, and proposing new algorithms to solve fuzzy optimization and decision making problems, in an effective and efficient manner, are also welcome. We are looking forward to receive innovative approaches that apply, in practical settings, state-of-the art mathematical/algorithmic techniques from fuzzy technology, computational intelligence and soft-computing methodologies, with the aim to offer robust solutions for complex optimization and decision making problems characterized by non-probabilistic uncertainty, vagueness, ambiguity, and hesitation. Such type of papers will address the suitability, validity, and advantages of using fuzzy technologies and the enhancement of them using intelligent methods to treat real-life problems from various disciplines.

Fuzzy Sets in Decision Analysis, Operations Research and Statistics - Roman Slowiński 2012-12-06

Fuzzy Sets in Decision Analysis, Operations Research and Statistics includes chapters on fuzzy preference modeling, multiple criteria

analysis, ranking and sorting methods, group decision-making and fuzzy game theory. It also presents optimization techniques such as fuzzy linear and non-linear programming, applications to graph problems and fuzzy combinatorial methods such as fuzzy dynamic programming. In addition, the book also accounts for advances in fuzzy data analysis, fuzzy statistics, and applications to reliability analysis. These topics are covered within four parts: Decision Making, Mathematical Programming, Statistics and Data Analysis, and Reliability, Maintenance and Replacement. The scope and content of the book has resulted from multiple interactions between the editor of the volume, the series editors, the series advisory board, and experts in each chapter area. Each chapter was written by a well-known researcher on the topic and reviewed by other experts in the area. These expert reviewers sometimes became co-authors because of the extent of their contribution to the chapter. As a result, twenty-five authors from twelve countries and four continents were involved in the creation of the 13 chapters, which enhances the international character of the project and gives an idea of how carefully the Handbook has been developed.

Evolving Fuzzy Systems - Methodologies, Advanced Concepts and Applications - Edwin Lughofer 2011-01-19

In today’s real-world applications, there is an increasing demand of integrating new information and knowledge on-demand into model building processes to account for changing system dynamics, new operating conditions, varying human behaviors or environmental influences. Evolving fuzzy systems (EFS) are a powerful tool to cope with this requirement, as they are able to automatically adapt parameters, expand their structure and extend their memory on-the-fly, allowing on-line/real-time modeling. This book comprises several evolving fuzzy systems approaches which have emerged during the last decade and highlights the most important incremental learning methods used. The second part is dedicated to advanced concepts for increasing performance, robustness, process-safety and reliability, for enhancing user-friendliness and enlarging the field of applicability of EFS and for improving the interpretability and understandability of the evolved models. The third part underlines the usefulness and necessity of evolving fuzzy systems in several online real-world application scenarios, provides an outline of potential future applications and raises open problems and new challenges for the next generation evolving systems, including human-inspired evolving machines. The book includes basic principles, concepts, algorithms and theoretic results underlined by illustrations. It is dedicated to researchers from the field of fuzzy systems, machine learning, data mining and system identification as well as engineers and technicians who apply data-driven modeling techniques in real-world systems.

Linear and Multiobjective Programming with Fuzzy Stochastic Extensions - Masatoshi Sakawa 2013-11-29

Although several books or monographs on multiobjective optimization under uncertainty have been published, there seems to be no book which starts with an introductory chapter of linear programming and is designed to incorporate both fuzziness and randomness into multiobjective programming in a unified way. In this book, five major topics, linear programming, multiobjective programming, fuzzy programming, stochastic programming, and fuzzy stochastic programming, are presented in a comprehensive manner. Especially, the last four topics together comprise the main characteristics of this book, and special stress is placed on interactive decision making aspects of multiobjective programming for human-centered systems in most realistic situations under fuzziness and/or randomness. Organization of each chapter is briefly summarized as follows: Chapter 2 is a concise and condensed description of the theory of linear programming and its algorithms. Chapter 3 discusses fundamental notions and methods of multiobjective linear programming and concludes with interactive multiobjective linear programming. In Chapter 4, starting with clear explanations of fuzzy linear programming and fuzzy multiobjective linear programming, interactive fuzzy multiobjective linear programming is presented. Chapter 5 gives detailed explanations of fundamental notions and methods of stochastic programming including two-stage programming and chance constrained programming. Chapter 6 develops

several interactive fuzzy programming approaches to multiobjective stochastic programming problems. Applications to purchase and transportation planning for food retailing are considered in Chapter 7. The book is self-contained because of the three appendices and answers to problems. Appendix A contains a brief summary of the topics from linear algebra. Pertinent results from nonlinear programming are summarized in Appendix B. Appendix C is a clear explanation of the Excel Solver, one of the easiest ways to solve optimization problems, through the use of simple examples of linear and nonlinear programming.

Optimization Techniques for Problem Solving in Uncertainty - Tilahun, Surafel Luleseged 2018-06-22

When it comes to optimization techniques, in some cases, the available information from real models may not be enough to construct either a probability distribution or a membership function for problem solving. In such cases, there are various theories that can be used to quantify the uncertain aspects. Optimization Techniques for Problem Solving in Uncertainty is a scholarly reference resource that looks at uncertain aspects involved in different disciplines and applications. Featuring coverage on a wide range of topics including uncertain preference, fuzzy multilevel programming, and metaheuristic applications, this book is geared towards engineers, managers, researchers, and post-graduate students seeking emerging research in the field of optimization.

Recent Advances in Nonlinear Analysis and Optimization with Applications - Savin Treanţă 2020-09-30

This book focuses on recent advances in nonlinear analysis and optimization with important applications drawn from various fields, such as artificial intelligence, genetic algorithms, optimization problems under uncertainty, and fuzzy logic. Specifically, it is devoted to nonlinear problems associated with optimization which have some connection with applications. The ideas and techniques developed here will serve to stimulate further research in this dynamic field, and, in this way, the book will become a valuable reference for researchers, engineers and students in the field of mathematics, management science, operations research, optimal control science and economics.

The Theory of Info-Dynamics: Rational Foundations of Information-Knowledge Dynamics - Kofi K. Dompere 2017-12-06

This book focuses on the development of a theory of info-dynamics to support the theory of info-statics in the general theory of information. It establishes the rational foundations of information dynamics and how these foundations relate to the general socio-natural dynamics from the primary to the derived categories in the universal existence and from the potential to the actual in the ontological space. It also shows how these foundations relate to the general socio-natural dynamics from the potential to the possible to give rise to the possibility space with possibilistic thinking; from the possible to the probable to give rise to possibility space with probabilistic thinking; and from the probable to the actual to give rise to the space of knowledge with paradigms of thought in the epistemological space. The theory is developed to explain the general dynamics through various transformations in quality-quantity space in relation to the nature of information flows at each variety transformation. The theory explains the past-present-future connectivity of the evolving information structure in a manner that illuminates the transformation problem and its solution in the never-ending information production within matter-energy space under socio-natural technologies to connect the theory of info-statics, which in turn presents explanations to the transformation problem and its solution. The theoretical framework is developed with analytical tools based on the principle of opposites, systems of actual-potential polarities, negative-positive dualities under different time-structures with the use of category theory, fuzzy paradigm of thought and game theory in the fuzzy-stochastic cost-benefit space. The rational foundations are enhanced with categorial analytics. The value of the theory of info-dynamics is demonstrated in the explanatory and prescriptive structures of the transformations of varieties and categorial varieties at each point of time and over time from parent–offspring sequences. It constitutes a general explanation of dynamics of information-knowledge production through info-processes and info-processors induced by a socio-natural infinite set of technologies

in the construction–destruction space.

Recent Advances in Electrical Engineering and Control Applications - Mohammed Chadli 2016-12-01

This book of proceedings includes papers presenting the state of art in electrical engineering and control theory as well as their applications. The topics focus on classical as well as modern methods for modeling, control, identification and simulation of complex systems with applications in science and engineering. The papers were selected from the hottest topic areas, such as control and systems engineering, renewable energy, faults diagnosis—faults tolerant control, large-scale systems, fractional order systems, unconventional algorithms in control engineering, signals and communications. The control and design of complex systems dynamics, analysis and modeling of its behavior and structure is vitally important in engineering, economics and in science generally science today. Examples of such systems can be seen in the world around us and are a part of our everyday life. Application of modern methods for control, electronics, signal processing and more can be found in our mobile phones, car engines, home devices like washing machines is as well as in such advanced devices as space probes and systems for communicating with them. All these technologies are part of technological backbone of our civilization, making further research and hi-tech applications essential. The rich variety of contributions appeals to a wide audience, including researchers, students and academics.

Recent Developments in Fuzzy Logic and Fuzzy Sets - Shahnaz N. Shahbazova 2020-03-05

This book provides a timely and comprehensive overview of current theories and methods in fuzzy logic, as well as relevant applications in a variety of fields of science and technology. Dedicated to Lotfi A. Zadeh on his one year death anniversary, the book goes beyond a pure commemorative text. Yet, it offers a fresh perspective on a number of relevant topics, such as computing with words, theory of perceptions, possibility theory, and decision-making in a fuzzy environment. Written by Zadeh’s closest colleagues and friends, the different chapters are intended both as a timely reference guide and a source of inspiration for scientists, developers and researchers who have been dealing with fuzzy sets or would like to learn more about their potential for their future research.

Advanced Fuzzy Systems Design and Applications - Yaochu Jin 2003

This book presents a variety of recently developed methods for generating fuzzy rules from data with the help of neural networks and evolutionary algorithms. Special efforts have been put on dealing with knowledge incorporation into neural and evolutionary systems and knowledge extraction from data with the help of fuzzy logic. On the one hand, knowledge that is understandable to human beings can be extracted from data using evolutionary and learning methods by maintaining the interpretability of the generated fuzzy rules. On the other hand, a priori knowledge like expert knowledge and human preferences can be incorporated into evolution and learning, taking advantage of the knowledge representation capability of fuzzy rule systems and fuzzy preference models. Several engineering application examples in the fields of intelligent vehicle systems, process modeling and control and robotics are presented.

Advances and Applications of Fuzzy Sets and Logic - Said Broumi 2021-07

Fuzzy Optimization - Weldon A. Lodwick 2010-07-12

This potent area of technology allows us to formulate and solve a multitude of problems. Written by leading experts, this overview covers a number of aspects of fuzzy optimization, some related general issues, and various applications of this powerful tool.

Handbook of Research on Natural Computing for Optimization Problems - Mandal, Jyotsna Kumar 2016-05-25

Nature-inspired computation is an interdisciplinary topic area that connects the natural sciences to computer science. Since natural computing is utilized in a variety of disciplines, it is imperative to research its capabilities in solving optimization issues. The Handbook of Research on Natural Computing for Optimization Problems discusses nascent optimization procedures in nature-inspired computation and the

innovative tools and techniques being utilized in the field. Highlighting empirical research and best practices concerning various optimization issues, this publication is a comprehensive reference for researchers, academicians, students, scientists, and technology developers interested in a multidisciplinary perspective on natural computational systems.

Fuzzy Multi-Criteria Decision Making - Cengiz Kahraman 2008-08-09

This work examines all the fuzzy multicriteria methods recently developed, such as fuzzy AHP, fuzzy TOPSIS, interactive fuzzy multiobjective stochastic linear programming, fuzzy multiobjective dynamic programming, grey fuzzy multiobjective optimization, fuzzy multiobjective geometric programming, and more. Each of the 22 chapters includes practical applications along with new developments/results. This book may be used as a textbook in graduate operations research, industrial engineering, and economics courses. It will also be an excellent resource, providing new suggestions and directions for further research, for computer programmers, mathematicians, and scientists in a variety of disciplines where multicriteria decision making is needed.

Scientific and Technical Aerospace Reports - 1992-10

Recent Developments in Mechatronics and Intelligent Robotics - Kevin Deng 2018-10-04

This book is a collection of proceedings of the International Conference on Mechatronics and Intelligent Robotics (ICMIR2018), held in Kunming, China during May 19–20, 2018. It consists of 155 papers, which have been categorized into 6 different sections: Intelligent Systems, Robotics, Intelligent Sensors & Actuators, Mechatronics, Computational Vision and Machine Learning, and Soft Computing. The volume covers the latest ideas and innovations both from the industrial and academic worlds, as well as shares the best practices in the fields of mechanical engineering, mechatronics, automatic control, IOT and its applications in industry, electrical engineering, finite element analysis and computational engineering. The volume covers key research outputs, which delivers a wealth of new ideas and food for thought to the readers.

Fuzzy Optimization and Multi-Criteria Decision Making in Digital Marketing - Kumar, Anil 2015-10-27

Abstract: "This book applies fuzzy theory and multi-criteria decision making principles for better practice in the digital business environment through the use of timely research and case studies on practical implementation of such theories in the digital marketplace"--Provided by publisher

Exploring Innovative and Successful Applications of Soft Computing - Masegosa, Antonio D. 2013-11-30

The evolution of soft computing applications have offered a multitude of methodologies and techniques that are useful in facilitating new ways to address practical and real scenarios in a variety of fields. Exploring Innovative and Successful Applications of Soft Computing highlights the applications and conclusions associated with soft computing in different technological environments. Providing potential results based on new trends in the development of these services, this book aims to be a reference source for researchers, practitioners, and students interested in the most successful soft computing methods applied to recent problems.

Advanced Fuzzy Logic Approaches in Engineering Science - Ram, Mangey 2018-09-14

Fuzzy logic techniques have had extraordinary growth in various engineering systems. The developments in engineering sciences have caused apprehension in modern years due to high-tech industrial processes with ever-increasing levels of complexity. Advanced Fuzzy Logic Approaches in Engineering Science provides innovative insights into a comprehensive range of soft fuzzy logic techniques applied in various fields of engineering problems like fuzzy sets theory, adaptive neuro fuzzy inference system, and hybrid fuzzy logic genetic algorithms belief networks in industrial and engineering settings. The content within this publication represents the work of particle swarms, fuzzy computing, and rough sets. It is a vital reference source for engineers, research scientists, academicians, and graduate-level students seeking coverage on topics centered on the applications of fuzzy logic in high-tech

industrial processes.

Fuzzy Engineering and Operations Research - Bing-Yuan Cao 2012-07-01

"Fuzzy Engineering and Operations Research" is the edited outcome of the 5th International Conference on Fuzzy Information and Engineering (ICFIE2011) held during Oct. 15-17, 2011 in Chengdu, China and by the 1st academic conference in establishment of Guangdong Province Operations Research Society (GDORSC) held on Oct. 20, 2011 in Guangzhou, China. The 5th ICFIE2011, built on the success of previous conferences, and the GDORC, first held, are major Symposiums, respectively, for scientists, engineers practitioners and Operation Research (OR) researchers presenting their updated results, developments and applications in all areas of fuzzy information and engineering and OR. It aims to strengthen relations between industry research laboratories and universities, and to create a primary symposium for world scientists in Fuzziology and OR fields. The book contains 62 papers and is divided into five main parts: "Fuzzy Optimization, Logic and Information", "The mathematical Theory of Fuzzy Systems", "Fuzzy Engineering Applications and Soft Computing Methods", "OR and Fuzziology" and "Guess and Review".

Monte Carlo Methods in Fuzzy Optimization - James J. Buckley 2008-02-20

Monte Carlo Methods in Fuzzy Optimization is a clear and didactic book about Monte Carlo methods using random fuzzy numbers to obtain approximate solutions to fuzzy optimization problems. The book includes various solved problems such as fuzzy linear programming, fuzzy regression, fuzzy inventory control, fuzzy game theory, and fuzzy queuing theory. The book will appeal to engineers, researchers, and students in Fuzziness and applied mathematics.

Fuzzy Logic and Soft Computing - Guoqing Chen 2012-12-06

Fuzzy Logic and Soft Computing contains contributions from world-leading experts from both the academic and industrial communities. The first part of the volume consists of invited papers by international authors describing possibilistic logic in decision analysis, fuzzy dynamic programming in optimization, linguistic modifiers for word computation, and theoretical treatments and applications of fuzzy reasoning. The second part is composed of eleven contributions from Chinese authors focusing on some of the key issues in the fields: stable adaptive fuzzy control systems, partial evaluations and fuzzy reasoning, fuzzy wavelet neural networks, analysis and applications of genetic algorithms, partial repeatability, rough set reduction for data enriching, limits of agents in process calculus, medium logic and its evolution, and factor spaces canes. These contributions are not only theoretically sound and well-formulated, but are also coupled with applicability implications and/or implementation treatments. The domains of applications realized or implied are: decision analysis, word computation, databases and knowledge discovery, power systems, control systems, and multi-destinational routing. Furthermore, the articles contain materials that are an outgrowth of recently conducted research, addressing fundamental and important issues of fuzzy logic and soft computing.

Flexible and Generalized Uncertainty Optimization - Weldon A. Lodwick 2017-01-17

This book presents the theory and methods of flexible and generalized uncertainty optimization. Particularly, it describes the theory of generalized uncertainty in the context of optimization modeling. The book starts with an overview of flexible and generalized uncertainty optimization. It covers uncertainties that are both associated with lack of information and that more general than stochastic theory, where well-defined distributions are assumed. Starting from families of distributions that are enclosed by upper and lower functions, the book presents construction methods for obtaining flexible and generalized uncertainty input data that can be used in a flexible and generalized uncertainty optimization model. It then describes the development of such a model in detail. All in all, the book provides the readers with the necessary background to understand flexible and generalized uncertainty optimization and develop their own optimization model.

Intuitionistic and Type-2 Fuzzy Logic Enhancements in Neural and Optimization Algorithms: Theory and Applications - Oscar Castillo

2020-02-27

This book describes the latest advances in fuzzy logic, neural networks, and optimization algorithms, as well as their hybrid intelligent combinations, and their applications in the areas such as intelligent control, robotics, pattern recognition, medical diagnosis, time series prediction, and optimization. The topic is highly relevant as most current intelligent systems and devices use some form of intelligent feature to enhance their performance. The book also presents new and advanced models and algorithms of type-2 fuzzy logic and intuitionistic fuzzy systems, which are of great interest to researchers in these areas. Further, it proposes novel, nature-inspired optimization algorithms and innovative neural models. Featuring contributions on theoretical aspects as well as applications, the book appeals to a wide audience.

Aggregation Functions: A Guide for Practitioners - Gleb Beliakov 2007-09-09

A broad introduction to the topic of aggregation functions is to be found in this book. It also provides a concise account of the properties and the main classes of such functions. Some state-of-the-art techniques are presented, along with many graphical illustrations and new interpolatory aggregation functions. Particular attention is paid to identification and construction of aggregation functions from application specific requirements and empirical data.

Recent Advances in Applications of Computational and Fuzzy Mathematics - Snehashish Chakraverty 2018-07-17

This book addresses the basics of interval/fuzzy set theory, artificial neural networks (ANN) and computational methods. It presents step-by-step modeling for application problems along with simulation and numerical solutions. In general, every science and engineering problem is inherently biased by uncertainty, and there is often a need to model, solve and interpret problems in the world of uncertainty. At the same time, exact information about models and parameters of practical applications is usually not known and precise values do not exist. This book discusses uncertainty in both data and models. It consists of seven chapters covering various aspects of fuzzy uncertainty in application problems, such as shallow water wave equations, static structural problems, robotics, radon diffusion in soil, risk of invasive alien species and air quality quantification. These problems are handled by means of advanced computational and fuzzy theory along with machine intelligence when the uncertainties involved are fuzzy. The proposed computational methods offer new fuzzy computing methods that help other areas of knowledge construction where inexact information is present.

Soft Computing for Problem Solving - Jagdish Chand Bansal 2018-12-14

This two-volume book presents outcomes of the 7th International Conference on Soft Computing for Problem Solving, SocProS 2017. This conference is a joint technical collaboration between the Soft Computing Research Society, Liverpool Hope University (UK), the Indian Institute of Technology Roorkee, the South Asian University New Delhi and the National Institute of Technology Silchar, and brings together researchers, engineers and practitioners to discuss thought-provoking developments and challenges in order to select potential future directions The book presents the latest advances and innovations in the interdisciplinary areas of soft computing, including original research papers in the areas including, but not limited to, algorithms (artificial immune systems, artificial neural networks, genetic algorithms, genetic programming, and particle swarm optimization) and applications (control systems, data mining and clustering, finance, weather forecasting, game theory, business and forecasting applications). It is a valuable resource for both young and experienced researchers dealing with complex and intricate real-world problems for which finding a solution by traditional methods is a difficult task.

Recent Advances in Intelligent Information Systems and Applied Mathematics - Oscar Castillo 2020-01-31

This book describes the latest advances in intelligent techniques such as fuzzy logic, neural networks, and optimization algorithms, and their relevance in building intelligent information systems in combination with applied mathematics. The authors also outline the applications of these systems in areas like intelligent control and robotics, pattern recognition,

medical diagnosis, time series prediction, and optimization of complex problems. By sharing fresh ideas and identifying new targets/problems it offers young researchers and students new directions for their future research. The book is intended for readers from mathematics and computer science, in particular professors and students working on theory and applications of intelligent systems for real-world applications.

Uncertainty Management with Fuzzy and Rough Sets - Rafael Bello 2019-01-22

This book offers a timely overview of fuzzy and rough set theories and methods. Based on selected contributions presented at the International Symposium on Fuzzy and Rough Sets, ISFUROS 2017, held in Varadero, Cuba, on October 24-26, 2017, the book also covers related approaches, such as hybrid rough-fuzzy sets and hybrid fuzzy-rough sets and granular computing, as well as a number of applications, from big data analytics, to business intelligence, security, robotics, logistics, wireless sensor networks and many more. It is intended as a source of inspiration for PhD students and researchers in the field, fostering not only new ideas but also collaboration between young researchers and institutions and established ones.

Handbook of AI-based Metaheuristics - Anand J. Kulkarni 2021-09-02

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