An Introduction to Fuzzy Logic Applications

Soft Computing Techniques and Applications in Mechanical Engineering

Environmental Systems Analysis with MATLAB®
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**Soft Computing and Its Applications**

The evolution of soft computing applications has 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. In particular, these concepts have created significant developments in the engineering field. Soft Computing Techniques and Applications in Mechanical Engineering is a pivotal reference source for the latest research findings on a comprehensive range of soft computing techniques applied in various fields of mechanical engineering. Featuring extensive coverage on relevant areas such as thermodynamics, fuzzy computing, and computational intelligence, this publication is an ideal resource for students, engineers, research scientists, and academicians involved in soft computing techniques and applications in mechanical engineering areas.

**Software Engineering with Computational Intelligence**

This book is a guide for students, researchers, and practitioners to the latest developments in fuzzy hybrid computing in construction engineering and management. It discusses basic theory related to fuzzy logic and fuzzy hybrid computing, their application in a range of practical construction problems, and emerging and future research trends.

**Reliability and Optimization of Structural Systems**

"This reference is a broad, multi-volume collection of the best recent works published under the umbrella of computer engineering, including perspectives on the fundamental aspects, tools and technologies, methods and design, applications, managerial impact, social/behavioral perspectives, critical issues, and emerging trends in the field"--Provided by publisher.

**Evolutionary Algorithms in Engineering Applications**

"This book provides knowledge and insights on present and future AI applications in Operations Management presenting tools and decisions in terms of theoretical and empirical models, methods and proposed applications"--Provided by publisher.

**Fuzzy Logic and Hydrological Modeling**

Provides insight on both classical means and new trends in the application of power electronic and artificial intelligence techniques in power system operation and control. This book presents advanced solutions for power system controllability improvement, transmission capability enhancement and operation planning. The book is organized into three parts. The first part describes the CSC-HVDC and VSC-HVDC technologies, the second part presents the FACTS devices, and the third part refers to the artificial intelligence techniques. All technologies and tools approached in this book are essential for power system development to comply with the smart grid requirements. Discusses detailed operating principles and diagrams, theory of modeling, control strategies and physical installations around the world of HVDC and FACTS systems. Covers a wide range of Artificial Intelligence techniques that are successfully applied for many power system problems, from planning and monitoring to operation and control. Each chapter is carefully edited, with drawings and illustrations that help the reader to easily understand the principles of operation or application. Advanced Solutions in Power Systems: HVDC, FACTS, and Artificial Intelligence is written for graduate students, researchers in transmission and distribution networks, and power system operation. This book also serves as a reference for professional software developers and practicing engineers.

**Fuzzy Engineering Expert Systems with Neural Network Applications**

The latest update on this popular textbook. The importance of concepts and methods based on fuzzy logic and fuzzy set theory has been rapidly growing since the early 1990s and all the indications are that this trend will continue in the foreseeable future. Fuzzy Logic with Engineering Applications, Fourth Edition is a new edition of the popular textbook with 15% of new and updated material. Updates have been made to most of the chapters and each chapter now includes new end-of-chapter problems. Key features: New edition of the popular textbook with 15% of new and updated material. Includes new examples and end-
of-chapter problems. Has been made more concise with the removal of out of date material. Covers applications of fuzzy logic to engineering and science. Accompanied by a website hosting a solutions manual and software. The book is essential reading for graduates and senior undergraduate students in civil, chemical, mechanical and electrical engineering as well as researchers and practitioners working with fuzzy logic in industry.

**Handbook of Maintenance Management and Engineering**

Fuzzy logic models can be used to demonstrate human decision making in complex situations, and can therefore be an important tool in examining natural complexity. Moreover, fuzzy logic can be exploited to predict chaotic behaviors. But why is fuzzy logic so valuable? The idea of fuzzy logic has been around since 1965, and since its introduction thousands of applications of fuzzy logic have been implemented in industry, medicine, and even economic applications and patents. How did this invaluable theory achieve such great success? This book aims to compare well-known and well-used membership functions to demonstrate how to select the best membership functions and show when and why to utilize them. This book also demonstrates how different fields of studies utilize fuzzy logic showing its wide reach and relevance.

**Fuzzy Logic and Applications**

Provides an up-to-date integration of expert systems with fuzzy logic and neural networks. Includes coverage of simulation models not present in other books. Presents cases and examples taken from the authors' experience in research and applying the technology to real-world situations.

**International Conference of Computational Methods in Sciences and Engineering (ICCMSE 2004)**

To be able to compete successfully both at national and international levels, production systems and equipment must perform at levels not even thinkable a decade ago. Requirements for increased product quality, reduced throughput time and enhanced operating effectiveness within a rapidly changing customer demand environment continue to demand a high maintenance performance. In some cases, maintenance is required to increase operational effectiveness and revenues and customer satisfaction while reducing capital, operating and support costs. This may be the largest challenge facing production enterprises these days. For this, maintenance strategy is required to be aligned with the production logistics and also to keep updated with the current best practices. Maintenance has become a multidisciplinary activity and one may come across situations in which maintenance is the responsibility of people whose training is not engineering. This handbook aims to assist at different levels of understanding whether the manager is an engineer, a production manager, an experienced maintenance practitioner or a beginner. Topics selected to be included in this handbook cover a wide range of issues in the area of maintenance management and engineering to cater for all those interested in maintenance whether practitioners or researchers. This handbook is divided into 6 parts and contains 26 chapters covering a wide range of topics related to maintenance management and engineering.

**Computational Intelligence for Multimedia Big Data on the Cloud with Engineering Applications**

Differential equations play a vital role in the modeling of physical and engineering problems, such as those in solid and fluid mechanics, viscoelasticity, biology, physics, and many other areas. In general, the parameters, variables and initial conditions within a model are considered as being defined exactly. In reality there may be only vague, imprecise or incomplete information about the variables and parameters available. This can result from errors in measurement, observation, or experimental data; application of different operating conditions; or maintenance induced errors. To overcome uncertainties or lack of precision, one can use a fuzzy environment in parameters, variables and initial conditions in place of exact (fixed) ones, by turning general differential equations into Fuzzy Differential Equations ("FDEs"). In real applications it can be complicated to obtain exact solution of fuzzy differential equations due to complexities in fuzzy arithmetic, creating the need for use of reliable and efficient numerical techniques in the solution of fuzzy differential equations. These include fuzzy ordinary and partial, fuzzy linear and nonlinear, and fuzzy arbitrary order differential equations. This unique work provides a new direction for the reader in the use of basic concepts of fuzzy differential equations, solutions and its applications. It can serve as an essential reference work for students, scholars, practitioners, researchers and academicians in engineering and science who need to model uncertain physical problems.

**Intelligent Systems in Operations: Methods, Models and Applications in the Supply Chain**

The aim of this article is to study the concept of unique solvability of max-min fuzzy neutrosophic soft matrix equation and strong regularity of fuzzy neutrosophic soft matrices over Fuzzy Neutrosophic Soft Algebra (FNSA).
Fuzzy Logic Based in Optimization Methods and Control Systems and Its Applications

This book provides an overview of the state-of-the-art in both the theory and methods of intuitionistic fuzzy logic, partial differential equations and numerical methods in informatics. Covering topics such as fuzzy intuitionistic Hilbert spaces, intuitionistic fuzzy differential equations, fuzzy intuitionistic metric spaces, and numerical methods for differential equations, it discusses applications such as fuzzy real-time scheduling, intelligent control, diagnostics and time series prediction. The book features selected contributions presented at the 6th international congress of the Moroccan Applied Mathematics Society, which took place at Sultan Moulay Slimane University Beni Mellal, Morocco, from 7 to 9 November 2019.

Fuzzy Arbitrary Order System

Fuzzy logic provides a unique method of approximate reasoning in an imperfect world. This text is a bridge to the principles of fuzzy logic through an application-focused approach to selected topics in Engineering and Management. The many examples point to the richer solutions obtained through fuzzy logic and to the possibilities of much wider applications. There are relatively few texts available at present in fuzzy logic applications. The style and content of this text is complementary to those already available. New areas of application are presented in a graded approach in which the underlying concepts are first described. The text is broadly divided into two parts which treat Processes and Materials and also System Applications. The level enables a selection of the text to be made for the substance of a senior undergraduate level course. There is also sufficient volume and quality for the basis of a postgraduate course. A more restricted and judicious selection can provide the material for a professional short course.

Nature-Inspired Computing

Special Features: · New edition of a classic text is brought up-to-date with the latest advances in the area of fuzzy logic. Includes abundant new illustrations and examples using MATLAB code constituting an invaluable tool for students as well as for self-study by practicing engineers. · Introduces new material on expansions of the MLFE method using genetic algorithms, cognitive mapping, fuzzy agent-based models and total uncertainty. · Features completely revised end-of-chapter problems. Companion website with MATLAB code examples and instructors solutions set. · Introduces new material on expansions of the MLFE method using genetic algorithms, cognitive mapping, fuzzy agent-based models and total uncertainty. Redundant or obsolete topics have been removed, resulting in a more concise yet inclusive text that will ensure the book retains its broad appeal at the forefront of the literature. Fuzzy Logic with Engineering Applications, 3rd Edition is oriented mainly towards methods and techniques. Every chapter has been revised, featuring new illustrations and examples throughout. Supporting MATLAB code is downloadable at www.wileyeurope.com/go/fuzzylogic. This will benefit student learning in all basic operations, the generation of membership functions, and the specialized applications in the latter chapters of the book, providing an invaluable tool for students as well as for self-study by practicing engineers.

Computer Engineering: Concepts, Methodologies, Tools and Applications

The six volumes LNCS 11619-11624 constitute the refereed proceedings of the 19th International Conference on Computational Science and Its Applications, ICCSA 2019, held in Saint Petersburg, Russia, in July 2019. The 64 full papers, 10 short papers and 259 workshop papers presented were carefully reviewed and selected from numerous submissions. The 64 full papers are organized in the following five general tracks: computational methods, algorithms and scientific applications; high performance computing and networks; geometric modeling, graphics and visualization; advanced and emerging applications; and information systems and technologies. The 259 workshop papers were presented at 33 workshops in various areas of computational sciences, ranging from computational science technologies to specific areas of computational sciences, such as software engineering, security, artificial intelligence and blockchain technologies.

Recent Advances in Intuitionistic Fuzzy Logic Systems and Mathematics

The International Conference of Computational Methods in Sciences and Engineering (ICCMSE) is unique in its kind. It regroups original contributions from all fields of the traditional Sciences, Mathematics, Physics, Chemistry, Biology, Medicine and all branches of Engineering. The aim of the conference is to bring together computational scientists from several disciplines in order to share methods and ideas. More than 370 extended abstracts have been submitted for consideration for presentation in ICCMSE 2004. From these, 289 extended abstracts have been selected after international peer review by at least two independent reviewers.
Fuzzy Control of Queuing Systems

This edited book invites the reader to explore how the latest technologies developed in computational intelligence can be extended and applied to software engineering. Leading experts demonstrate how this recent confluence of software engineering and computational intelligence provides a powerful tool to address the increasing demand for complex applications in diversified areas, the ever-increasing complexity and size of software systems, and the inherently imperfect nature of the information. The presented treatments to software modeling and formal analysis permit the extension of computational intelligence to various phases in software life cycles, such as managing fuzziness resident in the requirements, coping with fuzzy objects and imprecise knowledge, and handling uncertainty encountered in quality prediction.

Fuzzy Logic with Engineering Applications

The hydrological sciences typically present grey or fuzzy information, making them quite messy and a choice challenge for fuzzy logic application. Providing readers with the first book to cover fuzzy logic modeling as it relates to water science, the author takes an approach that incorporates verbal expert views and other parameters that allow him to eschew the use of mathematics. The book’s first seven chapters expose the fuzzy logic principles, processes and design for a fruitful inference system with many hydrological examples. The last two chapters present the use of those principles in larger scale hydrological scales within the hydrological cycle.

Fuzzy Logic

"a much-needed handbook with contributions from well-chosen practitioners. A primary accomplishment is to provide guidance for those involved in modeling and simulation in support of Systems of Systems development, more particularly guidance that draws on well-conceived academic research to define concepts and terms, that identifies primary challenges for developers, and that suggests fruitful approaches grounded in theory and successful examples.” Paul Davis, The RAND Corporation Modeling and Simulation Support for System of Systems Engineering Applications provides a comprehensive overview of the underlying theory, methods, and solutions in modeling and simulation support for system of systems engineering. Highlighting plentiful multidisciplinary applications of modeling and simulation, the book uniquely addresses the criteria and challenges found within the field. Beginning with a foundation of concepts, terms, and categories, a theoretical and generalized approach to system of systems engineering is introduced, and real-world applications via case studies and examples are presented. A unified approach is maintained in an effort to understand the complexity of a single system as well as the context among other proximate systems. In addition, the book features: Cutting edge coverage of modeling and simulation within the field of system of systems, including transportation, system health management, space mission analysis, systems engineering methodology, and energy State-of-the-art advances within multiple domains to instantiate theoretic insights, applicable methods, and lessons learned from real-world applications of modeling and simulation. The challenges of system of systems engineering using a systematic and holistic approach. Key concepts, terms, and activities to provide a comprehensive, unified, and concise representation of the field. A collection of chapters written by over 40 recognized international experts from academia, government, and industry. A research agenda derived from the contribution of experts that guides scholars and researchers towards open questions. Modeling and Simulation Support for System of Systems Engineering Applications is an ideal reference and resource for academics and practitioners in operations research, engineering, statistics, mathematics, modeling and simulation, and computer science. The book is also an excellent course book for graduate and PhD-level courses in modeling and simulation, engineering, and computer science.

Computational Science and Its Applications – ICCSA 2019

This book is a collection of chapters, concerning the developments within the Fuzzy Logic field of study. The book includes scholarly contributions by various authors pertinent to Fuzzy Logic. Each contribution comes as a separate chapter complete in itself but directly related to the books topics and objectives. The target audience comprises scholars and specialists in the field.

Engineering Applications of Neural Networks

The first edition of Fuzzy Logic with Engineering Applications (1995) was the first classroom text for undergraduates in the field. Now updated for the second time, this new edition features the latest advances in the field including material on expansion of the MLFE method using genetic algorithms, cognitive mapping, fuzzy agent-based models and total uncertainty. Redundant or obsolete topics have been removed, resulting in a more concise yet inclusive text that will ensure the book retains its broad appeal at the forefront of the literature. Fuzzy Logic with Engineering Applications, 3rd Edition is...
oriented mainly towards methods and techniques. Every chapter has been revised, featuring new illustrations and examples throughout. Supporting MATLAB code is downloadable at www.wileyeurope.com/go/fuzzylogic. This will benefit student learning in all basic operations, the generation of membership functions, and the specialized applications in the latter chapters of the book, providing an invaluable tool for students as well as for self-study by practicing engineers.

Uncertainty Modeling

This book highlights the basic concepts of the CS algorithm and its variants, and their use in solving diverse optimization problems in medical and engineering applications. Evolutionary-based meta-heuristic approaches are increasingly being applied to solve complicated optimization problems in several real-world applications. One of the most successful optimization algorithms is the Cuckoo search (CS), which has become an active research area to solve N-dimensional and linear/nonlinear optimization problems using simple mathematical processes. CS has attracted the attention of various researchers, resulting in the emergence of numerous variants of the basic CS with enhanced performance since 2019.

Intelligent Production Machines and Systems – 2nd I*PROMS Virtual International Conference 3–14 July 2006

Explore the inner workings of environmental processes using a mathematical approach. Environmental Systems Analysis with MATLAB® combines environmental science concepts and system theory with numerical techniques to provide a better understanding of how our environment works. The book focuses on building mathematical models of environmental systems, and using these models to analyse their behaviors. Designed with the environmental professional in mind, it offers a practical introduction to developing the skills required for managing environmental modeling and data handling. The book follows a logical sequence from the basic steps of model building and data analysis to implementing these concepts into working computer codes, and then on to assessing their results. It describes data processing (rarely considered in environmental analysis); outlines the tools needed to successfully analyze data and develop models, and moves on to real-world problems. The author illustrates in the first four chapters the methodological aspects of environmental systems analysis, and in subsequent chapters applies them to specific environmental concerns. The accompanying software bundle is freely downloadable from the book website. It follows the chapters sequence and provides a hands-on experience, allowing the reader to reproduce the figures in the text and experiment by varying the problem setting. A basic MATLAB literacy is required to get the most out of the software. Ideal for coursework and self-study, this offering: Deals with the basic concepts of environmental modeling and identification, both from the mechanistic and the data-driven viewpoint Provides a unifying methodological approach to deal with specific aspects of environmental modeling: population dynamics, flow systems, and environmental microbiology Assesses the similarities and the differences of microbial processes in natural and man-made environments Analyzes several aquatic ecosystems’ case studies Presents an application of an extended Streeter & Phelps (S&P) model Describes an ecological method to estimate the bioavailable nutrients in natural waters Considers a lagoon ecosystem from several viewpoints, including modeling and management, and more

Minimal solution of fuzzy neutrosophic soft matrix

Annotation This volume constitutes the refereed proceedings of the 8th International Workshop on Fuzzy Logic and Applications held in Palermo, Italy in June 2009. The papers are organized in topical sections on fuzzy set theory, intuitionistic fuzzy sets, fuzzy classification and clustering, fuzzy image processing and analysis, and fuzzy systems.

Integrated Design and Manufacturing in Mechanical Engineering

Computational Intelligence for Multimedia Big Data on the Cloud with Engineering Applications covers timely topics, including the neural network (NN), particle swarm optimization (PSO), evolutionary algorithm (GA), fuzzy sets (FS) and rough sets (RS), etc. Furthermore, the book highlights recent research on representative techniques to elaborate how a data-centric system formed a powerful platform for the processing of cloud hosted multimedia big data and how it could be analyzed, processed and characterized by CI. The book also provides a view on how techniques in CI can offer solutions in modeling, relationship pattern recognition, clustering and other problems in bioengineering. It is written for domain experts and developers who want to understand and explore the application of computational intelligence aspects (opportunities and challenges) for design and development of a data-centric system in the context of multimedia cloud, big data era and its related applications, such as smarter healthcare, homeland security, traffic control trading analysis and telecom, etc. Researchers and PhD students exploring the significance of data centric systems in the next paradigm of computing will find this book extremely useful. Presents a brief overview of computational intelligence paradigms and its significant role in application domains illustrates the state-of-the-art and recent developments in the new theories and applications of CI approaches Familiarizes the reader with computational intelligence concepts and technologies that are successfully used in the implementation of cloud-based multimedia services in massive data processing Provides new advances in the
Nature-Inspired Computing: Physics and Chemistry-Based Algorithms provides a comprehensive introduction to the methodologies and algorithms in nature-inspired computing, with an emphasis on applications to real-life engineering problems. The research interest for Nature-inspired Computing has grown considerably exploring different phenomena observed in nature and basic principles of physics, chemistry, and biology. The discipline has reached a mature stage and the field has been well-established. This endeavour is another attempt at investigation into various computational schemes inspired from nature, which are presented in this book with the development of a suitable framework and industrial applications. Designed for senior undergraduates, postgraduates, research students, and professionals, the book is written at a comprehensible level for students who have some basic knowledge of calculus and differential equations, and some exposure to optimization theory. Due to the focus on search and optimization, the book is also appropriate for electrical, control, civil, industrial and manufacturing engineering, business, and economics students, as well as those in computer and information sciences. With the mathematical and programming references and applications in each chapter, the book is self-contained, and can also serve as a reference for researchers and scientists in the fields of system science, natural computing, and optimization.


This two-volume set explains the primary tools of soft computing as well as provides an abundance of working examples and detailed design studies. The books start with coverage of fuzzy sets and fuzzy logic and their various approaches to fuzzy reasoning and go on to discuss several advanced features of soft computing and hybrid methodologies. Toge

Applications of Cuckoo Search Algorithm and its Variants

Modeling and Simulation Support for System of Systems Engineering Applications

The 6th meeting sponsored by IFIP Working Group 7.5, on reliability and optimization of structural systems, took place in September 1994 in Assisi, Italy. This book contains the papers presented at the working conference including topics such as reliability of special structures, fatigue, failure modes and time-variant systems reliability.

Fuzzy Hybrid Computing in Construction Engineering and Management

This book commemorates the 65th birthday of Dr. Boris Kovalerchuk, and reflects many of the research areas covered by his work. It focuses on data processing under uncertainty, especially fuzzy data processing, when uncertainty comes from the imprecision of expert opinions. The book includes 17 authoritative contributions by leading experts.

Scientific and Technical Aerospace Reports

Evolutionary algorithms are general-purpose search procedures based on the mechanisms of natural selection and population genetics. They are appealing because they are simple, easy to interface, and easy to extend. This volume is concerned with applications of evolutionary algorithms and associated strategies in engineering. It will be useful for engineers, designers, developers, and researchers in any scientific discipline interested in the applications of evolutionary algorithms. The volume consists of five parts, each with four or five chapters. The topics are chosen to emphasize application areas in different fields of engineering. Each chapter can be used for self-study or as a reference by practitioners to help them apply evolutionary algorithms to problems in their engineering domains.

Fuzzy Differential Equations and Applications for Engineers and Scientists
Fuzzy Logic with Engineering Applications

This brand new research has only appeared to date in academic papers. This is the first book to specifically talk about the new approach fuzzy control of queuing systems. A must have monograph for graduate and postgraduate students and researchers working in a variety of fields.

Fuzzy Logic for Embedded Systems Applications

This volume includes most of the recent results obtained by Italian researchers in fuzzy logic. It collects selected papers from the 1997 Italian Workshop on Fuzzy Logic – WILF ’97 and some invited papers, covering the mathematical foundations of fuzzy logic, neuro-fuzzy systems, hardware implementation of fuzzy logic controllers, and gives an update on applications to control, physics, decision support systems and pattern analysis.

Soft-Computing-Based Nonlinear Control Systems Design

This volume constitutes the refereed proceedings of the 15th International Conference on Engineering Applications of Neural Networks, EANN 2014, held in Sofia, Bulgaria, in September 2014. The 18 revised full papers presented together with 5 short papers were carefully reviewed and selected from 37 submissions. The papers demonstrate a variety of applications of neural networks and other computational intelligence approaches to challenging problems relevant to society and the economy. These include areas such as: environmental engineering, facial expression recognition, classification with parallelization algorithms, control of autonomous unmanned aerial vehicles, intelligent transport, flood forecasting, classification of medical images, renewable energy systems, intrusion detection, fault classification and general engineering.

FUZZY LOGIC WITH ENGINEERING APPLICATIONS, 3RD ED

A critical part of ensuring that systems are advancing alongside technology without complications is problem solving. Practical applications of problem-solving theories can model conflict and cooperation and aid in creating solutions to real-world problems. Soft-Computing-Based Nonlinear Control Systems Design is a critical scholarly publication that examines the practical applications of control theory and its applications in problem solving to fields including economics, environmental management, and financial modelling. Featuring a wide range of topics, such as fuzzy logic, nature-inspired algorithms, and cloud computing, this book is geared toward academicians, researchers, and students seeking relevant research on control theory and its practical applications.

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