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KEY=FUZZINESS - LEON NOELLE

The Fuzzification of Systems

The Genesis of Fuzzy Set Theory and its Initial

Applications - Developments up to the 1970s

Springer **Today, Fuzzy Set Theory is the core discipline of so-called ‘soft’ computing, and provides new impetus for research in the field of artificial intelligence. In this fascinating book, the history of Fuzzy Set Theory and the ways it was first used are incorporated into the history of 20th century science and technology. Influences from philosophy, system theory and cybernetics stemming from the earliest part of the 20th century are considered alongside those of communication and control theory from mid-century.**

Views on Fuzzy Sets and Systems from Different Perspectives

Philosophy and Logic, Criticisms and Applications

Springer **In our new century, the theory of fuzzy sets and systems is in the core of "Soft Computing" and "Computational Intelligence" and has become a normal scientific theory in the fields of exact sciences and engineering and it is well on its way to becoming normal in the soft sciences as well. This book is a collection of the views of numerous scholars in different parts of the world who are involved in various research projects concerning fuzziness in science, technology, economic systems, social sciences, logics and philosophy. This volume demonstrates that there are many different views of the theory of fuzzy sets and systems and of their interpretation and applications in diverse areas of our cultural and social life.**

Fifty Years of Fuzzy Logic and its Applications

Springer **This book presents a comprehensive report on the evolution of Fuzzy Logic since its formulation in Lotfi Zadeh’s seminal paper on “fuzzy sets,” published in 1965. In addition, it features a stimulating sampling from the broad field of research and development inspired by Zadeh’s paper. The chapters, written by pioneers and prominent**

scholars in the field, show how fuzzy sets have been successfully applied to artificial intelligence, control theory, inference, and reasoning. The book also reports on theoretical issues; features recent applications of Fuzzy Logic in the fields of neural networks, clustering, data mining and software testing; and highlights an important paradigm shift caused by Fuzzy Logic in the area of uncertainty management. Conceived by the editors as an academic celebration of the fifty years' anniversary of the 1965 paper, this work is a must-have for students and researchers willing to get an inspiring picture of the potentialities, limitations, achievements and accomplishments of Fuzzy Logic-based systems.

Computer Aided Systems Theory – EUROCAST 2019

17th International Conference, Las Palmas de Gran Canaria, Spain, February 17–22, 2019, Revised Selected Papers, Part I

Springer Nature **The two-volume set LNCS 12013 and 12014 constitutes the thoroughly refereed proceedings of the 17th International Conference on Computer Aided Systems Theory, EUROCAST 2019, held in Las Palmas de Gran Canaria, Spain, in February 2019. The 123 full papers presented were carefully reviewed and selected from 172 submissions. The papers are organized in the following topical sections: Part I: systems theory and applications; pioneers and landmarks in the development of information and communication technologies; stochastic models and applications to natural, social and technical systems; theory and applications of metaheuristic algorithms; model-based system design, verification and simulation. Part II: applications of signal processing technology; artificial intelligence and data mining for intelligent transportation systems and smart mobility; computer vision, machine learning for image analysis and applications; computer and systems based methods and electronic technologies in medicine; advances in biomedical signal and image processing; systems concepts and methods in touristic flows; systems in industrial robotics, automation and IoT.**

Information Processing and Management of Uncertainty in Knowledge-Based Systems

18th International Conference, IPMU 2020, Lisbon, Portugal, June 15–19, 2020, Proceedings, Part I

Springer Nature **This three volume set (CCIS 1237-1239) constitutes the proceedings of the 18th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU 2020, in June 2020. The conference was scheduled to take place in Lisbon, Portugal, at University of Lisbon, but due to COVID-19 pandemic it was held virtually. The 173 papers were carefully reviewed and selected from 213 submissions. The papers are organized in topical sections: homage to Enrique Ruspini; invited talks; foundations and mathematics; decision making, preferences and votes; optimization and uncertainty; games; real world applications; knowledge processing and creation; machine learning I; machine learning II; XAI; image processing; temporal data processing; text analysis and processing; fuzzy interval analysis; theoretical and applied aspects of imprecise probabilities; similarities in artificial intelligence; belief function theory and its applications; aggregation: theory and practice; aggregation: pre-aggregation functions and other generalizations of monotonicity; aggregation: aggregation of different data structures; fuzzy methods in data mining and knowledge discovery; computational intelligence for logistics and transportation problems; fuzzy implication functions; soft methods in statistics and data analysis; image understanding and explainable AI; fuzzy and generalized quantifier theory; mathematical methods towards dealing with uncertainty in applied sciences; statistical image processing and analysis, with applications in neuroimaging; interval uncertainty; discrete models and computational intelligence; current techniques to model, process and describe time series; mathematical fuzzy logic and graded reasoning models; formal concept analysis, rough sets, general operators and related topics; computational intelligence methods in information modelling, representation and processing.**

Theoretical Advances and Applications of Fuzzy Logic and Soft Computing

Springer Science & Business Media **This book comprises a selection of papers on theoretical advances and applications of fuzzy logic and soft computing from the IFSA 2007 World Congress, held in Cancun, Mexico, June 2007. These papers constitute an important contribution to the theory and applications of fuzzy logic and soft computing methodologies.**

Towards the Future of Fuzzy Logic

Springer **This book provides readers with a snapshot of the state-of-the art in fuzzy logic. Throughout the chapters, key theories developed in the last fifty years as well as important applications to practical problems are presented and discussed from different perspectives, as the authors hail from different disciplines and therefore use fuzzy logic for different purposes. The book aims at showing how fuzzy logic has evolved since the first theory formulation by Lotfi A. Zadeh in his seminal paper on Fuzzy Sets in 1965. Fuzzy theories and implementation grew at an impressive speed and achieved significant results, especially on the applicative side. The study of fuzzy logic and its practice spread all over the world, from Europe to Asia, America and Oceania. The editors believe that, thanks to the drive of young researchers, fuzzy logic will be able to face the challenging goals posed by computing with words. New frontiers of knowledge are waiting to be explored. In order to motivate young people to engage in the future development of fuzzy logic, fuzzy methodologies, fuzzy applications, etc., the editors invited a team of internationally respected experts to write the present collection of papers, which shows the present and future potentials of fuzzy logic from different disciplinary perspectives and personal standpoints.**

Fuzziness and Medicine: Philosophical Reflections and

Application Systems in Health Care

A Companion Volume to Sadegh-Zadeh’s Handbook of Analytical Philosophy of Medicine

Springer **This book is a collection of contributions written by philosophers and scientists active in different fields, such as mathematics, logics, social sciences, computer sciences and linguistics. They comment on and discuss various parts of and subjects and propositions introduced in the Handbook of Analytical Philosophy of Medicine from Kadem Sadegh-Zadeh, published by Springer in 2012. This volume reports on the fruitful exchange and debate that arose in the fuzzy community upon the publication of the Handbook. This was not only very much appreciated by the community but also seen as a critical starting point for beginning a new discussion. The results of this discussion, which involved many different perspectives from science and the humanities and was warmly encouraged by Kadem Sadegh-Zadeh himself, are accurately reported in this volume, which is intended to be a critical companion to Kadem Sadegh-Zadeh´s handbook. Rudolf Seising is currently an adjunct researcher at the European Centre for Soft Computing in Mieres, Asturias (Spain) and a college lecturer at the Faculty of History and Arts, at the Ludwig Maximilians University of Munich (Germany). Marco Elio Tabacchi is currently the Scientific Director of the Italian National Research & Survey Organization Demopolis, and a research assistant in the Soft Computing Group at University of Palermo (Italy).**

Leadership in Science and Technology: A Reference Handbook

SAGE

Information Processing and Management of Uncertainty in Knowledge-Based Systems

13th International Conference, IPMU 2010, Dortmund, Germany, June 28–July 2, 2010. Proceedings, Part II

Springer **This book constitutes the proceedings of the 13th conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, held in Dortmund, Germany, in June 2010.**

Combining Experimentation and Theory

A Hommage to Abe Mamdani

Springer **The unexpected and premature passing away of Professor Ebrahim H. "Abe" Mamdani on January, 22, 2010, was a big shock to the scientific community, to all his friends and colleagues around the world, and to his close relatives. Professor Mamdani was a remarkable figure in the academic world, as he contributed to so many areas of science and technology. Of great relevance are his latest thoughts and ideas on the study of language and its handling by computers. The fuzzy logic community is particularly indebted to Abe Mamdani (1941-2010) who, in 1975, in his famous paper An Experiment in Linguistic Synthesis with a Fuzzy Logic Controller, jointly written with his student Sedrak Assilian, introduced the novel idea of fuzzy control. This was an elegant engineering approach to the modeling and control of complex processes for which mathematical models were unknown or too difficult to build, yet they could effectively and efficiently be controlled by human operators. This ground-breaking idea has found innumerable applications and can be considered as one of the main factors for the proliferation and adoption of fuzzy logic technology. Professor Mamdani's own life and vital experience are illustrative of his “never surrendering” attitude**

while facing adversaries, which is normal for a person proposing any novel solution, and represent a great example for everybody. His subtle sense of humor, his joy for life, and his will to critically help people, especially young people, were characteristics deeply appreciated by all the people who enjoyed and benefited from his friendship and advice. This book constitutes a posthumous homage to Abe Mamdani. It is a collection of original papers related in some way to his works, ideas and vision, and especially written by researchers directly acquainted with him or with his work. The underlying goal of this book will be fulfilled if, in the very spirit of Mamdani's legacy, the papers will trigger a scientific or philosophical debate on the issues covered, or contribute to a cross-fertilization of ideas in the various fields.

Applying Computational Intelligence

How to Create Value

Springer Science & Business Media **In theory, there is no difference between theory and practice. But, in practice, there is. Jan L. A. van de Snepscheut The ?ow of academic ideas in the area of computational intelligence has penetrated industry with tremendous speed and persistence. Thousands of applications have proved the practical potential of fuzzy logic, neural networks, evolutionary com- tation, swarm intelligence, and intelligent agents even before their theoretical foundation is completely understood. And the popularity is rising. Some software vendors have pronounced the new machine learning gold rush to “Transfer Data into Gold”. New buzzwords like “data mining”, “genetic algorithms”, and “swarm optimization” have enriched the top executives’ vocabulary to make them look more “visionary” for the 21st century. The phrase “fuzzy math” became political jargon after being used by US President George W. Bush in one of the election debates in the campaign in 2000. Even process operators are discussing the perf- mance of neural networks with the same passion as the performance of the Dallas Cowboys. However, for most of the engineers and scientists introducing computational intelligence technologies into practice, looking at the growing number of new approaches, and understanding their theoretical principles and potential for value creation becomes a more and more dif?cult task.**

Fuzzy Geometric Programming Techniques and Applications

Springer **This book develops the concepts of various unique optimization techniques in the crisp and fuzzy environment. It provides an extensive overview of geometric programming methods within a unifying framework, and presents an in-depth discussion of the modified geometric programming problem, fuzzy geometric programming, as well as new insights into goal geometric programming. With numerous examples and exercises together with detailed solutions for several problems, the book also addresses fuzzy multi-objective geometric programming techniques. Geometric programming, which falls into the general class of signomial problems, has applications across disciplines, from engineering to economics, and is extremely useful in applications of a variety of optimization problems. Organized into thirteen chapters, this book is a valuable resource for graduate and advanced undergraduate students and researchers in applied mathematics and engineering.**

Music and Fuzzy Logic

The Dialectics of Idea and Realizations in the Artwork Process

Springer Nature **This book unfolds the manifold, complex and intertwined relations between Fuzzy Logic and music in a first comprehensive overview on this topic: systematically as an outline, as completely as possible, in the aspects of Fuzzy Logic in this relation, and especially in music as a process with three main phases, five anthropological layers, and thirteen forms of existence of the art work (Classics, Jazz, Pop, Folklore). Being concerned with the ontological, gnoseological, psychological, and (music-) aesthetical status and the relative importance of different phenomena of relationship between music and Fuzzy Logic, the explication follows the four main principles (with five phenotypes) of Fuzzy Logic with respect to music: similarity, sharpening 1 as filtering, sharpening 2 as crystallization, blurring, and**

variation. The book reports on years of author’s research on topics that have been only little explored so far in the area of Music and Fuzzy Logic. It merges concepts of music analysis with fuzzy logical modes of thinking, in a unique way that is expected to attract both specialists of music and specialists of Fuzzy Logic, and also non-specialists in both fields. The book introduces the concept of dialectic between sharpening and – conscious – “blurring”. In turn, some important aspects of this dialectic are discussed, placing them in an historical dimension, and ending in the postulation of a 'musical turn' in the sciences, with some important reflections concerning a “Philosophy of Fuzzy Logic”. Moreover, a production-oriented thinking is borrowed from fuzzy logic to musicology in this book, opening new perspectives in music, and possibly also in other artistic fields.

Soft Computing in Humanities and Social Sciences

Springer **The field of Soft Computing in Humanities and Social Sciences is at a turning point. The strong distinction between “science” and “humanities” has been criticized from many fronts and, at the same time, an increasing cooperation between the so-called “hard sciences” and “soft sciences” is taking place in a wide range of scientific projects dealing with very complex and interdisciplinary topics. In the last fifteen years the area of Soft Computing has also experienced a gradual rapprochement to disciplines in the Humanities and Social Sciences, and also in the field of Medicine, Biology and even the Arts, a phenomenon that did not occur much in the previous years. The collection of this book presents a generous sampling of the new and burgeoning field of Soft Computing in Humanities and Social Sciences, bringing together a wide array of authors and subject matters from different disciplines. Some of the contributors of the book belong to the scientific and technical areas of Soft Computing while others come from various fields in the humanities and social sciences such as Philosophy, History, Sociology or Economics. Rudolf Seising received a Ph.D. degree in philosophy of science and a postdoctoral lecture qualification (PD) in history of science from the Ludwig Maximilians University of Munich. He is an Adjoint Researcher at the European Centre for Soft Computing in Mieres (Asturias), Spain. Veronica Sanz earned a Ph.D. in Philosophy at the University Complutense of Madrid (Spain). At the moment she is a Postdoctoral Researcher at the Science, Technology and Society Center in the University of California at Berkeley. Veronica Sanz earned a Ph.D. in Philosophy at the University Complutense of Madrid (Spain). At the moment she is a Postdoctoral Researcher at the Science, Technology and Society Center in the University of California at Berkeley.**

Accuracy and Fuzziness. A Life in Science and Politics

A Festschrift book to Enric Trillas Ruiz

Springer **This book, which goes far beyond a traditional collection of technical articles, is dedicated to Enric Trillas, a fuzzy systems pioneer but also an internationally renowned researcher in other areas of science, such as mathematics and aerospace, and an outstanding manager of scientific affairs in Spain. Some of the contributions in this book develop technical, state-of-the-art themes obviously related to fuzzy logic, while others resemble popular-science articles that shed light on complex mathematical concepts. There are also chapters that highlight the authors' personal relationships and experiences working with Enric Trillas. While planning this book project, the editors decided to give contributors absolute freedom of thought and expression in preparing their chapters. The result is a colorful and inspiring mixture of styles and topics, which perfectly reflects Enric Trillas's multifaceted contributions to research and his outstanding role in promoting education and technological transfer in the field of soft computing. This Festschrift to Enric Trillas, published on the occasion of his 75th birthday, is not only intended as an exemplary source of information for young scientists dealing with uncertainty, imprecision and accuracy of models, but also as an inspiring guide to the role of scientists in education, politics and communication.**

On Fuzziness

A Homage to Lotfi A. Zadeh – Volume 2

Springer **The notion of Fuzziness stands as one of the really new concepts that have recently enriched the world of Science. Science grows not only through technical and formal advances on one side and useful applications on the other side, but also as consequence of the introduction and assimilation of new concepts in its corpus. These, in turn, produce new developments and applications. And this is what Fuzziness, one of the few new concepts arisen in the XX Century, has been doing so far. This book aims at paying homage to Professor Lotfi A. Zadeh, the "father of fuzzy logic" and also at giving credit to his exceptional work and personality. In a way, this is reflected in the variety of**

contributions collected in the book. In some of them the authors chose to speak of personal meetings with Lotfi; in others, they discussed how certain papers of Zadeh were able to open for them a new research horizon. Some contributions documented results obtained from the author/s after taking inspiration from a particular idea of Zadeh, thus implicitly acknowledging him. Finally, there are contributions of several “third generation fuzzysists or softies” who were firstly led into the world of Fuzziness by a disciple of Lotfi Zadeh, who, following his example, took care of opening for them a new road in science. Rudolf Seising is Adjoint Researcher at the European Centre for Soft Computing in Mieres, Asturias (Spain). Enric Trillas and Claudio Moraga are Emeritus Researchers at the European Centre for Soft Computing, Mieres, Asturias (Spain). Settimo Termini is Professor of Theoretical Computer Science at the University of Palermo, Italy and Affiliated Researcher at the European Centre for Soft Computing, Mieres, Asturias (Spain)

Fuzzy Sets, Fuzzy Logic, and Fuzzy Systems

Selected Papers by Lotfi A Zadeh

World Scientific **This book consists of selected papers written by the founder of fuzzy set theory, Lotfi A Zadeh. Since Zadeh is not only the founder of this field, but has also been the principal contributor to its development over the last 30 years, the papers contain virtually all the major ideas in fuzzy set theory, fuzzy logic, and fuzzy systems in their historical context. Many of the ideas presented in the papers are still open to further development. The book is thus an important resource for anyone interested in the areas of fuzzy set theory, fuzzy logic, and fuzzy systems, as well as their applications. Moreover, the book is also intended to play a useful role in higher education, as a rich source of supplementary reading in relevant courses and seminars. The book contains a bibliography of all papers published by Zadeh in the period 1949-1995. It also contains an introduction that traces the development of Zadeh's ideas pertaining to fuzzy sets, fuzzy logic, and fuzzy systems via his papers. The ideas range from his 1965 seminal idea of the concept of a fuzzy set to ideas reflecting his current interest in computing with words — a computing in which linguistic expressions are used in place of numbers. Places in the papers, where each idea is presented can easily be found by the reader via the Subject Index. Contents:Fuzzy SetsFuzzy Sets and SystemsAbstraction and Pattern ClassificationShadows of Fuzzy SetsFuzzy AlgorithmsNote on Fuzzy LanguagesTowards a Theory of Fuzzy**

SystemsQuantitative Fuzzy SemanticsA Rationale for Fuzzy ControlOn Fuzzy Algorithmsand other papers Readership: Scientists, mathematicians, engineers and graduate students in various areas. keywords:Fuzzy Set Theory;Fuzzy Logic;Fuzzy Systems;Soft Computing;Information Granularity;Approximate Reasoning;Possibility Theory “Also, I recommend highly this volume to everyone — from the beginner to the most experienced researcher and practitioner — who wishes to learn the philosophy or contribute to this advancing field of fuzzy logic and intelligent systems in the decades to come.” Int'l Journal of Uncertainty, Fuzziness and Knowledged-Based Systems “Very nice additions are a bibliography of Zadeh's papers and books, an introduction which puts the selected papers into a broader perspective, and a subject index.” Mathematical Reviews

Fuzzy Sets, Fuzzy Logic, and Fuzzy Systems

Selected Papers

World Scientific **This book consists of selected papers written by the founder of fuzzy set theory, Lotfi A Zadeh. Since Zadeh is not only the founder of this field, but has also been the principal contributor to its development over the last 30 years, the papers contain virtually all the major ideas in fuzzy set theory, fuzzy logic, and fuzzy systems in their historical context. Many of the ideas presented in the papers are still open to further development. The book is thus an important resource for anyone interested in the areas of fuzzy set theory, fuzzy logic, and fuzzy systems, as well as their applications. Moreover, the book is also intended to play a useful role in higher education, as a rich source of supplementary reading in relevant courses and seminars.The book contains a bibliography of all papers published by Zadeh in the period 1949-1995. It also contains an introduction that traces the development of Zadeh's ideas pertaining to fuzzy sets, fuzzy logic, and fuzzy systems via his papers. The ideas range from his 1965 seminal idea of the concept of a fuzzy set to ideas reflecting his current interest in computing with words ? a computing in which linguistic expressions are used in place of numbers.Places in the papers, where each idea is presented can easily be found by the reader via the Subject Index.**

Digital Human Modeling

Second International Conference, ICDHM 2009, Held as Part of HCI International 2009 San Diego, CA, USA, July 19-24, 2009 Proceedings

Springer Science & Business Media **The 13th International Conference on Human–Computer Interaction, HCI Inter- tional 2009, was held in San Diego, California, USA, July 19–24, 2009, jointly with the Symposium on Human Interface (Japan) 2009, the 8th International Conference on Engineering Psychology and Cognitive Ergonomics, the 5th International Conference on Universal Access in Human–Computer Interaction, the Third International Conf- ence on Virtual and Mixed Reality, the Third International Conference on Internati- alization, Design and Global Development, the Third International Conference on Online Communities and Social Computing, the 5th International Conference on Augmented Cognition, the Second International Conference on Digital Human Mod- ing, and the First International Conference on Human Centered Design. A total of 4,348 individuals from academia, research institutes, industry and gove- mental agencies from 73 countries submitted contributions, and 1,397 papers that were judged to be of high scientific quality were included in the program. These papers - dress the latest research and development efforts and highlight the human aspects of the design and use of computing systems. The papers accepted for presentation thoroughly cover the entire field of human–computer interaction, addressing major advances in knowledge and effective use of computers in a variety of application areas.**

Handbook of Analytic Philosophy of Medicine

Springer Science & Business Media **Medical practice is practiced morality, and clinical research belongs to normative ethics. The present book elucidates and advances this thesis by: 1. analyzing the structure of medical language, knowledge, and theories; 2. inquiring into the foundations of the clinical encounter; 3. introducing the logic and**

methodology of clinical decision-making; 4. suggesting comprehensive theories of organism, life, and psyche; of health, illness, and disease; of etiology, diagnosis, prognosis, prevention, and therapy; and 5. investigating the moral and metaphysical issues central to medical practice and research.

Designing Cognitive Cities

Springer **This book illustrates various aspects and dimensions of cognitive cities. Following a comprehensive introduction, the first part of the book explores conceptual considerations for the design of cognitive cities, while the second part focuses on concrete applications. The contributions provide an overview of the wide diversity of cognitive city conceptualizations and help readers to better understand why it is important to think about the design of our cities. The book adopts a transdisciplinary approach since the cognitive city concept can only be achieved through cooperation across different academic disciplines (e.g., economics, computer science, mathematics) and between research and practice. More and more people live in a growing number of ever-larger cities. As such, it is important to reflect on how cities need to be designed to provide their inhabitants with the means and resources for a good life. The cognitive city is an emerging, innovative approach to address this need.**

Futuristic Trends in Network and Communication Technologies

Third International Conference, FTNCT 2020, Taganrog, Russia, October 14–16, 2020, Revised Selected Papers,

Part I

Springer Nature **This two-wolume set (CCIS 1395-1396) constitutes the refereed proceedings of the Third International Conference on Futuristic Trends in Network and Communication Technologies, FTNCT 2020, held in Taganrog, Russia, in October 2020. The 80 revised full papers presented were carefully reviewed and selected from 291 submissions. The prime aim of the conference is to invite researchers from different domains of network and communication technologies to a single platform to showcase their research ideas. The selected papers are organized in topical sections on communication technologies; security and privacy; futuristic computing technologies; network and computing technologies; wireless networks and Internet of Things (IoT).**

Facets of Systems Science

Springer Science & Business Media **This book has a rather strange history. It began in spring 1989, thirteen years after our Systems Science Department at SUNY-Binghamton was established, when I was asked by a group of students in our doctoral program to have a meeting with them. The spokesman of the group, Cliff Joslyn, opened our meeting by stating its purpose. I can closely paraphrase what he said: "We called this meeting to discuss with you, as Chairman of the Department, a fundamental problem with our systems science curriculum. In general, we consider it a good curriculum: we learn a lot of concepts, principles, and methodological tools, mathematical, computational, heu ristic, which are fundamental to understanding and dealing with systems. And, yet, we learn virtually nothing about systems science itself. What is systems science? What are its historical roots? What are its aims? Where does it stand and where is it likely to go? These are pressing questions to us. After all, aren't we supposed to carry the systems science flag after we graduate from this program? We feel that a broad introductory course to systems science is urgently needed in the curriculum. Do you agree with this assessment?" The answer was obvious and, yet, not easy to give: "I agree, of course, but I do not see how the situation could be alleviated in the foreseeable future.**

Fuzzy Systems in Bioinformatics and Computational Biology

Springer Science & Business Media **Biological systems are inherently stochastic and uncertain. Thus, research in bioinformatics, biomedical engineering and computational biology has to deal with a large amount of uncertainties. Fuzzy logic has shown to be a powerful tool in capturing different uncertainties in engineering systems. In recent years, fuzzy logic based modeling and analysis approaches are also becoming popular in analyzing biological data and modeling biological systems. Numerous research and application results have been reported that demonstrated the effectiveness of fuzzy logic in solving a wide range of biological problems found in bioinformatics, biomedical engineering, and computational biology. Contributed by leading experts world-wide, this edited book contains 16 chapters presenting representative research results on the application of fuzzy systems to genome sequence assembly, gene expression analysis, promoter analysis, cis-regulation logic analysis and synthesis, reconstruction of genetic and cellular networks, as well as biomedical problems, such as medical image processing, electrocardiogram data classification and anesthesia monitoring and control. This volume is a valuable reference for researchers, practitioners, as well as graduate students working in the field of bioinformatics, biomedical engineering and computational biology.**

Forging New Frontiers: Fuzzy Pioneers I

Springer **The chapters of the book are evolved from presentations made by selected participants at the 2005 BISC International Special Event, held at the University of California at Berkely. The papers include reports from the different front of soft computing in various industries and address the problems of different fields of research in fuzzy logic, fuzzy set and soft computing. The book provides a collection of forty-four articles in two volumes.**

Backward Fuzzy Rule Interpolation

Springer **This book chiefly presents a novel approach referred to as backward fuzzy rule interpolation and extrapolation (BFRI). BFRI allows observations that directly relate to the conclusion to be inferred or interpolated from other antecedents and conclusions. Based on the scale and move transformation interpolation, this approach supports both interpolation and extrapolation, which involve multiple hierarchical intertwined fuzzy rules, each with multiple antecedents. As such, it offers a means of broadening the applications of fuzzy rule interpolation and fuzzy inference. The book deals with the general situation, in which there may be more than one antecedent value missing for a given problem. Two techniques, termed the parametric approach and feedback approach, are proposed in an attempt to perform backward interpolation with multiple missing antecedent values. In addition, to further enhance the versatility and potential of BFRI, the backward fuzzy interpolation method is extended to support α-cut based interpolation by employing a fuzzy interpolation mechanism for multi-dimensional input spaces (IMUL). Finally, from an integrated application analysis perspective, experimental studies based upon a real-world scenario of terrorism risk assessment are provided in order to demonstrate the potential and efficacy of the hierarchical fuzzy rule interpolation methodology.**

Fuzzy Systems and Soft Computing in Nuclear Engineering

Physica **Fuzzy systems and soft computing are new computing techniques that are tolerant to imprecision, uncertainty and partial truths. Applications of these techniques in nuclear engineering present a tremendous challenge due to its strict nuclear safety regulation. The fields of nuclear engineering, fuzzy systems and soft computing have nevertheless matured considerably during the last decade. This book presents new application potentials for Fuzzy Systems and Soft Computing in Nuclear Engineering. The root of this book can be traced back to the series of the first, second and third international workshops on Fuzzy Logic and Intelligent Technologies in Nuclear Science (FUNS), which were successfully held in Mol, September 14-16, 1994 (FLINS'94), in Mol, September 25-27, 1996 (FLINS'96), and in Antwerp, September 14-16, 1998 (FLINS'98). The conferences were organised by the Belgian Nuclear Research Centre (SCKeCEN)**

and aimed at bringing together scientists, researchers, and engineers from academia and industry, at introducing the principles of fuzzy logic, neural networks, genetic algorithms and other soft computing methodologies, to the field of nuclear engineering, and at applying these techniques to complex problem solving within nuclear industry and related research fields. This book, as its title suggests, consists of nuclear engineering applications of fuzzy systems (Chapters 1-10) and soft computing (Chapters 11-21). Nine pertinent chapters are based on the extended version of papers at FLINS'98 and the other 12 chapters are original contributions with up-to-date coverage of fuzzy and soft computing applications by leading researchers written exclusively for this book.

XXVII Brazilian Congress on Biomedical Engineering

Proceedings of CBEB 2020, October 26–30, 2020, Vitória, Brazil

Springer Nature

Applications of Fuzzy Logic in Bioinformatics

Imperial College Press **Many biological systems and objects are intrinsically fuzzy as their properties and behaviors contain randomness or uncertainty. In addition, it has been shown that exact or optimal methods have significant limitation in many bioinformatics problems. Fuzzy set theory and fuzzy logic are ideal to describe some biological systems/objects and provide good tools for some bioinformatics problems. This book comprehensively addresses several important bioinformatics topics using fuzzy concepts and approaches, including measurement of ontological similarity, protein structure prediction/analysis, and microarray data analysis. It also reviews other bioinformatics applications using fuzzy techniques.**

Knowledge-Based Intelligent Information and Engineering Systems

10th International Conference, KES 2006, Bournemouth, UK, October 9-11, 2006 Proceedings

Springer Science & Business Media **The three volume set LNAI 4251, LNAI 4252, and LNAI 4253 constitutes the refereed proceedings of the 10th International Conference on Knowledge-Based Intelligent Information and Engineering Systems, KES 2006, held in Bournemouth, UK, in October 2006. The 480 revised papers presented were carefully reviewed and selected from about 1400 submissions. The papers present a wealth of original research results from the field of intelligent information processing.**

Fuzzy Logic and Mathematics

A Historical Perspective

Oxford University Press **The term "fuzzy logic," as it is understood in this book, stands for all aspects of representing and manipulating knowledge based on the rejection of the most fundamental principle of classical logic---the principle of bivalence. According to this principle, each declarative sentence is required to be either true or false. In fuzzy logic, these classical truth values are not abandoned. However, additional, intermediate truth values between true and false are allowed, which are interpreted as degrees of truth. This opens a new way of thinking---thinking in terms of degrees rather than absolutes. For example, it leads to the definition of a new kind of sets, referred to as fuzzy sets, in which membership is a matter of degree. The book examines the genesis and development of fuzzy logic. It surveys the prehistory of fuzzy logic and inspects circumstances that eventually lead to the emergence of fuzzy logic. The book**

explores in detail the development of propositional, predicate, and other calculi that admit degrees of truth, which are known as fuzzy logic in the narrow sense. Fuzzy logic in the broad sense, whose primary aim is to utilize degrees of truth for emulating common-sense human reasoning in natural language, is scrutinized as well. The book also examines principles for developing mathematics based on fuzzy logic and provides overviews of areas in which this has been done most effectively. It also presents a detailed survey of established and prospective applications of fuzzy logic in various areas of human affairs, and provides an assessment of the significance of fuzzy logic as a new paradigm.

Computational Intelligence: Soft Computing and Fuzzy-Neuro Integration with Applications

Springer Science & Business Media **Soft computing is a consortium of computing methodologies that provide a foundation for the conception, design, and deployment of intelligent systems and aims to formalize the human ability to make rational decisions in an environment of uncertainty and imprecision. This book is based on a NATO Advanced Study Institute held in 1996 on soft computing and its applications. The distinguished contributors consider the principal constituents of soft computing, namely fuzzy logic, neurocomputing, genetic computing, and probabilistic reasoning, the relations between them, and their fusion in industrial applications. Two areas emphasized in the book are how to achieve a synergistic combination of the main constituents of soft computing and how the combination can be used to achieve a high Machine Intelligence Quotient.**

Computational Intelligence in Intelligent Data Analysis

Springer **Complex systems and their phenomena are ubiquitous as they can be found in biology, finance, the humanities, management sciences, medicine, physics and similar fields. For many problems in these fields, there are no conventional ways to mathematically or analytically solve them completely at low cost. On the other hand, nature already solved many optimization problems efficiently. Computational intelligence attempts to mimic nature-inspired problem-solving strategies and methods. These strategies can be used to study, model and analyze complex systems such that it becomes feasible to handle them. Key areas of computational intelligence are artificial neural networks, evolutionary computation and fuzzy systems. As only a few researchers in that field, Rudolf Kruse has contributed in**

many important ways to the understanding, modeling and application of computational intelligence methods. On occasion of his 60th birthday, a collection of original papers of leading researchers in the field of computational intelligence has been collected in this volume.

Distributed Computing and Artificial Intelligence, Special Sessions, 17th International Conference

Springer Nature **This book brings together past insights, current research and promising future trends associated with distributed computing, artificial intelligence and their application in order to provide efficient solutions to real-world problems. The book is based on the International Conference on Distributed Computing and Artificial Intelligence 2020 (DCAI 2020), which provided a forum to present applications of innovative techniques for studying and solving complex problems in artificial intelligence and computing areas. It includes contributions on well-established and evolving areas of research, by authors from 26 countries, representing a truly “wide area network” of research activity**

Some Asymptotic Properties of Fuzzy Set Systems

In previous work, a number of close connections was established between fuzzy set theory and probability theory. This basically involved the (many-to-one) correspondences of random sets to fuzzy sets through the former's one-point coverage functions. Other parallels between the two disciplines were established where multivalued logic theory was used as a basis for generating entire classes of fuzzy set systems. In this paper, the genesis of a fuzzy set sampling technique is presented, paralleling to a certain extent the ordinary Bayesian approach to random sampling and parameter estimation. As a consequence, an analysis is carried out concerning the structure of posterior possibilities and related functions for both finite and infinite sample size cases for various fuzzy set systems. Although some fuzzy set systems are shown not to admit nontrivial asymptotic forms, others indeed admit well-defined computable results that also differ significantly from the finite sampling size case.

Type-2 Fuzzy Logic

Uncertain Systems' Modeling and Control

Springer **This book focuses on a particular domain of Type-2 Fuzzy Logic, related to process modeling and control applications. It deepens readers'understanding of Type-2 Fuzzy Logic with regard to the following three topics: using simpler methods to train a Type-2 Takagi-Sugeno Fuzzy Model; using the principles of Type-2 Fuzzy Logic to reduce the influence of modeling uncertainties on a locally linear n-step ahead predictor; and developing model-based control algorithms according to the Generalized Predictive Control principles using Type-2 Fuzzy Sets. Throughout the book, theory is always complemented with practical applications and readers are invited to take their learning process one step farther and implement their own applications using the algorithms' source codes (provided). As such, the book offers avaluable referenceguide for allengineers and researchers in the field ofcomputer science who are interested in intelligent systems, rule-based systems and modeling uncertainty.**

Fuzzy Logic, Soft Computing and Computational Intelligence

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Fuzzy Semirings with Applications to Automata Theory

Springer **The purpose of this book is to present an up to date account of fuzzy ideals of a semiring. The book concentrates on theoretical aspects and consists of eleven chapters including three invited chapters. Among the invited chapters, two are devoted to applications of Semirings to automata theory, and one deals with some generalizations of Semirings. This volume may serve as a useful hand book for graduate students and researchers in the areas of Mathematics and Theoretical Computer Science.**

Fuzzy Logic

A Spectrum of Theoretical & Practical Issues

Springer **How far can you take fuzzy logic, the brilliant conceptual framework made famous by George Klir? With this book, you can find out. The authors of this updated edition have extended Klir's work by taking fuzzy logic into even more areas of application. It serves a number of functions, from an introductory text on the concept of fuzzy logic to a treatment of cutting-edge research problems suitable for a fully paid-up member of the fuzzy logic community.**