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Analytical Methods in Fuzzy Modeling and Control Fuzzy Analytic Hierarchy Process Performance Measurement with Fuzzy Data Envelopment Analysis Comparative Analysis of Metallogenetic Models Based on Analytical and Fuzzy Analytical Hierarchy Process Fuzzy Surfaces in GIS and Geographical Analysis Fuzzy Sets-Based Methods and Techniques for Modern Analytics Analysis and Synthesis of Fuzzy Control Systems Computational Intelligence Techniques for New Product Design Fuzzy Sets in Decision Analysis, Operations Research and Statistics Applications of Fuzzy Sets to Systems Analysis Fuzzy Multi-Criteria Decision Making Fuzzy Logic in Financial Analysis Cost-Benefit Analysis and the Theory of Fuzzy Decisions Fuzzy Control and Modeling Performance Prediction and Analytics of Fuzzy, Reliability and Queuing Models Intelligent and Fuzzy Techniques in Big Data Analytics and Decision Making Fuzzy Control Systems Design and Analysis Stability Analysis of Fuzzy-Model-Based Control Systems An Introduction to Analytical Fuzzy Plane Geometry Cost-Benefit Analysis and the Theory of Fuzzy Decisions The Theory of the Knowledge Square: The Fuzzy Rational Foundations of the Knowledge-Production Systems Fuzzy Techniques: Theory and Applications The SAGE Handbook of Spatial Analysis Fuzzy Cluster Analysis Fuzzy Information and Engineering Intelligent Communication, Control and Devices Fuzzy Sets in Information Retrieval and Cluster Analysis Applications of Fuzzy Sets to Systems Analysis Fuzzy Systems & Operations Research and Management The Multi-Criteria Approach for Decision Support Fuzzy Classification of Online Customers Minimization of Climatic Vulnerabilities on Mini-hydro Power Plants Fuzzy Logic for the Applications to Complex Systems Vedic Mathematics, 'Vedic' or 'Mathematics': A Fuzzy & Neutrosophic Analysis Handbook of Research on Fuzzy and Rough Set Theory in Organizational Decision Making Intelligent and Fuzzy Techniques for Emerging Conditions and Digital Transformation Analysis of Socio-Economic Conditions Analysis of Socio-Economic Conditions Fuzzy Logic in Its 50th Year Fundamentals of Logistics Management

Fuzzy Classification of Online Customers Mar 28 2020 This book introduces a fuzzy classification approach, which combines relational databases with fuzzy logic for more effective and powerful customer relationship management (CRM). It shows the benefits of a fuzzy classification in contrast to the traditional sharp evaluation of customers for the acquisition, retention and recovery of customers in online shops. The book starts with a presentation of the basic concepts, fuzzy set theory and the combination of relational databases and fuzzy classification. In its second part, it focuses on the customer perspective, detailing the central concepts of CRM, its theoretical constructs and aspects of analytical, operational and collaborative CRM. It juxtaposes fuzzy and sharp customer classes and shows the implications for customer positioning, mass customization, personalization, customer assessment and controlling. Finally, the book presents the application and implementation of the concepts in online shops. A detailed case study presents the application and a separate chapter introduces the fuzzy Classification Query Language (fCQL) toolkit for implementing these concepts. In its appendix the book lists the fuzzy set operators and the query language's grammar.

Computational Intelligence Techniques for New Product Design Mar 20 2022 Applying computational intelligence for product design is a fast-

growing and promising research area in computer sciences and industrial engineering. However, there is currently a lack of books, which discuss this research area. This book discusses a wide range of computational intelligence techniques for implementation on product design. It covers common issues on product design from identification of customer requirements in product design, determination of importance of customer requirements, determination of optimal design attributes, relating design attributes and customer satisfaction, integration of marketing aspects into product design, affective product design, to quality control of new products. Approaches for refinement of computational intelligence are discussed, in order to address different issues on product design. Cases studies of product design in terms of development of real-world new products are included, in order to illustrate the design procedures, as well as the effectiveness of the computational intelligence based approaches to product design. This book covers the state-of-art of computational intelligence methods for product design, which provides a clear picture to post-graduate students in industrial engineering and computer science. It is particularly suitable for researchers and professionals working on computational intelligence for product design. It provides concepts, techniques and methodologies, for product designers in applying computational intelligence to deal with product design.

The Multi-Criteria Approach for Decision Support Apr 28 2020 This book presents the multi-criteria approach to decision support, as well as the various multi-criteria tools to help avoid multi-objective optimization. The book is intended as a tool for understanding the multi-criteria tools for decision support and modeling in mathematical programming. It helps to structure models, to easily model complex constraints, to have a basic modeling guide for any multi-criteria system and to better understand models already existing in the literature. The book is structured in the same order as components of the methodology, established in a multi-criteria optimization problem. It introduces the elements of the actors, the decision-making activity under criteria, calculations, specifications and objective criterion.

Intelligent and Fuzzy Techniques in Big Data Analytics and Decision Making Jul 12 2021 This book includes the proceedings of the Intelligent and Fuzzy Techniques INFUS 2019 Conference, held in Istanbul, Turkey, on July 23–25, 2019. Big data analytics refers to the strategy of analyzing large volumes of data, or big data, gathered from a wide variety of sources, including social networks, videos, digital images, sensors, and sales transaction records. Big data analytics allows data scientists and various other users to evaluate large volumes of transaction data and other data sources that traditional business systems would be unable to tackle. Data-driven and knowledge-driven approaches and techniques have been widely used in intelligent decision-making, and they are increasingly attracting attention due to their importance and effectiveness in addressing uncertainty and incompleteness. INFUS 2019 focused on intelligent and fuzzy systems with applications in big data analytics and decision-making, providing an international forum that brought together those actively involved in areas of interest to data science and knowledge engineering. These proceeding feature about 150 peer-reviewed papers from countries such as China, Iran, Turkey, Malaysia, India, USA, Spain, France, Poland, Mexico, Bulgaria, Algeria, Pakistan, Australia, Lebanon, and Czech Republic.

Fuzzy Information and Engineering Oct 03 2020 The Second International Conference on Fuzzy Information and Engineering (ICFIE2007) is a major symposium for scientists, engineers and practitioners in China as well as the world to present their latest results, ideas, developments and applications in all areas of fuzzy information and knowledge engineering. It aims to strengthen relations between industry research laboratories and universities, and to create a primary symposium for world scientists.

Vedic Mathematics, 'Vedic' or 'Mathematics': A Fuzzy & Neutrosophic Analysis Dec 25 2019 The 'Vedas' are considered 'divine' in origin and are assumed to be revelations from God. In traditional Hinduism, the Vedas were to be learnt only by the 'upper' caste Hindus. The 'lower castes' (Sudras) and so-called 'untouchables' (who were outside the Hindu social order) were forbidden from even hearing to its recitation. In recent years,

there have been claims that the Vedas contain the cure to AIDS and the production of electricity. Here the authors probe into Vedic Mathematics (that gained renown during the revivalist Hindutva rule in India and was introduced into school syllabus in several states); and explore if it is really 'Vedic' in origin or 'Mathematics' in content. To gain a better understanding of its imposition, we interviewed students, teachers, parents, educationists and activists. We analyze this problem using models like Fuzzy Cognitive Maps (FCM), Fuzzy Relational Maps (FRM) and newly constructed Fuzzy Dynamical System (and their Neutrosophic Analogues). The issue of imposition of Vedic Mathematics into the school curriculum involves religious politics, caste supremacy, apart from elementary arithmetic ? so we use fuzzy and neutrosophic techniques to gain acute insight into how students have been affected because of this politically motivated syllabus revision.

[Analysis of Socio-Economic Conditions](#) Aug 21 2019 Showcasing fuzzy set theory, this book highlights the enormous potential of fuzzy logic in helping to analyse the complexity of a wide range of socio-economic patterns and behaviour. The contributions to this volume explore the most up-to-date fuzzy-set methods for the measurement of socio-economic phenomena in a multidimensional and/or dynamic perspective. Thus far, fuzzy-set theory has primarily been utilised in the social sciences in the field of poverty measurement. These chapters examine the latest work in this area, while also exploring further applications including social exclusion, the labour market, educational mismatch, sustainability, quality of life and violence against women. The authors demonstrate that real-world situations are often characterised by imprecision, uncertainty and vagueness, which cannot be properly described by the classical set theory which uses a simple true-false binary logic. By contrast, fuzzy-set theory has been shown to be a powerful tool for describing the multidimensionality and complexity of social phenomena. This book will be of significant interest to economists, statisticians and sociologists utilising quantitative methods to explore socio-economic phenomena.

Fuzzy Surfaces in GIS and Geographical Analysis Jun 23 2022 Surfaces are a central to geographical analysis. Their generation and manipulation are a key component of geographical information systems (GISs). However, geographical surface data is often not precise. When surfaces are used to model geographical entities, the data inherently contains uncertainty in terms of both position and attribute. Fuzzy

An Introduction to Analytical Fuzzy Plane Geometry Apr 09 2021 This book offers a rigorous mathematical analysis of fuzzy geometrical ideas. It demonstrates the use of fuzzy points for interpreting an imprecise location and for representing an imprecise line by a fuzzy line. Further, it shows that a fuzzy circle can be used to represent a circle when its description is not known precisely, and that fuzzy conic sections can be used to describe imprecise conic sections. Moreover, it discusses fundamental notions on fuzzy geometry, including the concepts of fuzzy line segment and fuzzy distance, as well as key fuzzy operations, and includes several diagrams and numerical illustrations to make the topic more understandable. The book fills an important gap in the literature, providing the first comprehensive reference guide on the fuzzy mathematics of imprecise image subsets and imprecise geometrical objects. Mainly intended for researchers active in fuzzy optimization, it also includes chapters relevant for those working on fuzzy image processing and pattern recognition. Furthermore, it is a valuable resource for beginners interested in basic operations on fuzzy numbers, and can be used in university courses on fuzzy geometry, dealing with imprecise locations, imprecise lines, imprecise circles, and imprecise conic sections.

Fuzzy Logic in Financial Analysis Nov 16 2021 In today's increasingly complex and uncertain business environment, financial analysis is yet more critical to business managers who tackle problems of an economic or business nature. Knowledge based on formal logic and even experience becomes less sufficient. This volume systematically sets out the basic elements on which to base financial analysis for business in the new century. It incorporates a previous work that can serve as the basis and foundation for the new contributions that are now being made in the field of financial economy and intend to provide business with instruments and models suitable for dealing with the new economic context. In dealing with rapid and

unpredictable changes in technological and business conditions, it postulates a growing reliance on the opinions of experts instead of past data or probabilistic forecasts, which is a radical change but may yield fruitful results. For this reason, much emphasis is devoted to the problem of aggregation of the opinion of experts in the financial field, with the object of limiting, wherever possible, the subjective component of the opinions and making sure that the decisions have the best guarantee of reaching the desired objectives.

Cost-Benefit Analysis and the Theory of Fuzzy Decisions Oct 15 2021 The genus of definitions for the theoretical sciences is (the province of) the habitus of the intellectual intention, for the practical sciences, however, that of the effective intention; the objects and ends constitute the specific difference There is nothing in the intellect that has not already been in the senses, that is, in the sensory organs, that has not already been in sensible things from which are distinguished things not perceptible to the senses. Nothing can be of the mind, sensation and the thing inferred therefrom except the operation itself. Real learning is cognition of things in themselves. It thus has the basis of its certainty in the known thing. This is established in two ways: by demonstration in the case of contemplative things, and by induction in the case of things perceptible to the senses. In contrast with real learning there is possible, probable and fictive learning. Antonius Gvilielmus Amo Afer (1827) This research has been long in the making. Its conception began in my last years in the doctoral program at Temple University, Philadelphia, Pa. It was simultaneously conceived with my two books on the Neo Keynesian Theory of Optimal aggregate investment and output dynamics [201] [202] as well as reflections on the methodology of decision-choice rationality and development economics [440] [441]. Economic theories and social policies were viewed to have, among other things, one important thing in common in that they relate to decision making under different.

The SAGE Handbook of Spatial Analysis Dec 05 2020 The widespread use of Geographical Information Systems (GIS) has significantly increased the demand for knowledge about spatial analytical techniques across a range of disciplines. As growing numbers of researchers realise they are dealing with spatial data, the demand for specialised statistical and mathematical methods designed to deal with spatial data is undergoing a rapid increase. Responding to this demand, The Handbook of Spatial Analysis is a comprehensive and authoritative discussion of issues and techniques in the field of Spatial Data Analysis. Its principal focus is on: • why the analysis of spatial data needs separate treatment • the main areas of spatial analysis • the key debates within spatial analysis • examples of the application of various spatial analytical techniques • problems in spatial analysis • areas for future research Aimed at an international audience of academics, The Handbook of Spatial Analysis will also prove essential to graduate level students and researchers in government agencies and the private sector.

Comparative Analysis of Metallogenetic Models Based on Analytical and Fuzzy Analytical Hierarchy Process Jul 24 2022

Fuzzy Logic for the Applications to Complex Systems Jan 26 2020 This volume presents an interesting mix of topics on complex systems such as information systems, engineering systems, fuzzy neural systems, image processing, robotics, fuzzy control, genetic algorithms, and fuzzy decision making. The contributions come from 12 countries, and provide a clear picture of fuzzy logic applications worldwide. Contents: LIFE Project in Japan (T Terano & K Nakamura) Fuzzy Models and Explicit Functions (L T Koczy & P Varlaki) A Precedent-Based Legal Judgement System Using Fuzzy Relationship Database (K Hirota et al.) The Design of an Adaptive Multiple Agent Constraint-Based Controller for a Complex Hydraulic System (P P Wang et al.) Automatic Labeling of Human Brain Structures in 3D MRI Using Fuzzy Logic (J Yen et al.) Auto-Generation of Fuzzy Production Rules Using Hyper-Cone Membership Function by Genetic Algorithm (H Inoue et al.) Weighted Fuzzy Expected Values and Their Applications (A Kandel & M Friedman) Combining Fuzzy Quantifiers (A L Ralescu et al.) Combining Fuzzy Quantifiers (A L Ralescu et al.) Principal Components, B-Splines, and Fuzzy System Reduction (J Yen et al.) Conditioning in Possibility Theory (A Ramer) User Equilibrium in Traffic Assignment — An Application of Variational Inequality with Fuzzy Functions (H-F Wang & H-S Liao) Applicable Conditions on the Linear Interpolative Reasoning Method in Sparse

Fuzzy Rule Bases (M Mizumoto & Y Shi) and other papers Readership: Computer scientists and control engineers. keywords:

Stability Analysis of Fuzzy-Model-Based Control Systems May 10 2021 In this book, the state-of-the-art fuzzy-model-based (FMB) based control approaches are covered. A comprehensive review about the stability analysis of type-1 and type-2 FMB control systems using the Lyapunov-based approach is given, presenting a clear picture to researchers who would like to work on this field. A wide variety of continuous-time nonlinear control systems such as state-feedback, switching, time-delay and sampled-data FMB control systems, are covered. In short, this book summarizes the recent contributions of the authors on the stability analysis of the FMB control systems. It discusses advanced stability analysis techniques for various FMB control systems, and finds a concrete theoretical basis to support the investigation of FMB control systems at the research level. The analysis results of this book offer various mathematical approaches to designing stable and well-performed FMB control systems. Furthermore, the results widen the applicability of the FMB control approach and help put the fuzzy controller in practice. A wide range of advanced analytical and mathematical analysis techniques will be employed to investigate the system stability and performance of FMB-based control systems in a rigorous manner. Detailed analysis and derivation steps are given to enhance the readability, enabling the readers who are unfamiliar with the FMB control systems to follow the materials easily. Simulation examples, with figures and plots of system responses, are given to demonstrate the effectiveness of the proposed FMB control approaches.

Fuzzy Systems & Operations Research and Management May 30 2020 This book includes results of the seventh International Conference on Fuzzy Information and Engineering (ICFIE'2014) and the 1st International Conference of Operations Research and Management (ICORM'2014) on November 7-11, 2014 in ZhuHai, China. The book, contains 35 selected high-quality papers, and is divided into five main parts: Part I focuses on "Fuzzy Systems and Its Applications", Part II on "Fuzzy Mathematics and Its Applications", Part III discusses "Fuzzy Information and Computer", Part IV is devoted to "Operations Research and Management and Its Applications" and Part V includes various other topics.

Fuzzy Sets in Information Retrieval and Cluster Analysis Aug 01 2020 The present monograph intends to establish a solid link among three fields: fuzzy set theory, information retrieval, and cluster analysis. Fuzzy set theory supplies new concepts and methods for the other two fields, and provides a common frame work within which they can be reorganized. Four principal groups of readers are assumed: researchers or students who are interested in (a) application of fuzzy sets, (b) theory of information retrieval or bibliographic databases, (c) hierarchical clustering, and (d) application of methods in systems science. Readers in group (a) may notice that the fuzzy set theory used here is very simple, since only finite sets are dealt with. This simplification enables the max min algebra to deal with fuzzy relations and matrices as equivalent entities. Fuzzy graphs are also used for describing theoretical properties of fuzzy relations. This assumption of finite sets is sufficient for applying fuzzy sets to information retrieval and cluster analysis. This means that little theory, beyond the basic theory of fuzzy sets, is required. Although readers in group (b) with little background in the theory of fuzzy sets may have difficulty with a few sections, they will also find enough in this monograph to support an intuitive grasp of this new concept of fuzzy information retrieval. Chapter 4 provides fuzzy retrieval without the use of mathematical symbols. Also, fuzzy graphs will serve as an aid to the intuitive understanding of fuzzy relations.

Minimization of Climatic Vulnerabilities on Mini-hydro Power Plants Feb 25 2020 This Brief presents the multi criteria decision making (MCDM) techniques like Fuzzy Analytical Hierarchy Process (AHP) and Fuzzy Analytical Network Process (ANP) to find out the importance of the influencing factors to develop the Climatic Vulnerability Index (CVI) that will represent the vulnerability of the Hydro-Power Plant (HPP) to climatic abnormalities. The cognitive ability of neuro-genetic modeling is applied to minimize CVI so that the conditions required to reduce the effect of climate change on HPP can be identified. The results from the study are found to be encouraging. The scarcity and pollution potential of conventional

sources of energy has enforced scientists worldwide to look for efficient, flexible, cost effective but reliable alternative energy resources. Among many available options the energy extracted from water was found to be the least expensive, most flexible and moderately reliable renewable energy source which has the potential to replace the dependency on conventional fuels.

Analysis of Socio-Economic Conditions Sep 21 2019 Showcasing fuzzy set theory, this book highlights the enormous potential of fuzzy logic in helping to analyse the complexity of a wide range of socio-economic patterns and behaviour. The contributions to this volume explore the most up-to-date fuzzy-set methods for the measurement of socio-economic phenomena in a multidimensional and/or dynamic perspective. Thus far, fuzzy-set theory has primarily been utilised in the social sciences in the field of poverty measurement. These chapters examine the latest work in this area, while also exploring further applications including social exclusion, the labour market, educational mismatch, sustainability, quality of life and violence against women. The authors demonstrate that real-world situations are often characterised by imprecision, uncertainty and vagueness, which cannot be properly described by the classical set theory which uses a simple true-false binary logic. By contrast, fuzzy-set theory has been shown to be a powerful tool for describing the multidimensionality and complexity of social phenomena. This book will be of significant interest to economists, statisticians and sociologists utilising quantitative methods to explore socio-economic phenomena.

Fuzzy Multi-Criteria Decision Making Dec 17 2021 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.

Analytical Methods in Fuzzy Modeling and Control Oct 27 2022 This book is focused on mathematical analysis and rigorous design methods for fuzzy control systems based on Takagi-Sugeno fuzzy models, sometimes called Takagi-Sugeno-Kang models. The author presents a rather general analytical theory of exact fuzzy modeling and control of continuous and discrete-time dynamical systems. Main attention is paid to usability of the results for the control and computer engineering community and therefore simple and easy knowledge-bases for linguistic interpretation have been used. The approach is based on the author's theorems concerning equivalence between widely used Takagi-Sugeno systems and some class of multivariate polynomials. It combines the advantages of fuzzy system theory and classical control theory. Classical control theory can be applied to modeling of dynamical plants and the controllers. They are all equivalent to the set of Takagi-Sugeno type fuzzy rules. The approach combines the best of fuzzy and conventional control theory. It enables linguistic interpretability (also called transparency) of both the plant model and the controller. In the case of linear systems and some class of nonlinear systems, engineers can in many cases directly apply well-known classical tools from the control theory both for analysis, and the design of closed-loop fuzzy control systems. Therefore the main objective of the book is to establish comprehensive and unified analytical foundations for fuzzy modeling using the Takagi-Sugeno rule scheme and their applications for fuzzy control, identification of some class of nonlinear dynamical processes and classification problem solver design.

Fuzzy Cluster Analysis Nov 04 2020 Provides a timely and important introduction to fuzzy cluster analysis, its methods and areas of application, systematically describing different fuzzy clustering techniques so the user may choose methods appropriate for his problem. It provides a very thorough overview of the subject and covers classification, image recognition, data analysis and rule generation. The application examples are highly relevant and illustrative, and the use of the techniques are justified and well thought-out. Features include: * Sections on inducing fuzzy if-then rules

by fuzzy clustering and non-alternating optimization fuzzy clustering algorithms * Discussion of solid fuzzy clustering techniques like the fuzzy c-means, the Gustafson-Kessel and the Gath-and-Geva algorithm for classification problems * Focus on linear and shell clustering techniques used for detecting contours in image analysis * Accompanying software and data sets pertaining to the examples presented, enabling the reader to learn through experimentation * Examination of the difficulties involved in evaluating the results of fuzzy cluster analysis and of determining the number of clusters with analysis of global and local validity measures This is one of the most comprehensive books on fuzzy clustering and will be welcomed by computer scientists, engineers and mathematicians in industry and research who are concerned with different methods, data analysis, pattern recognition or image processing. It will also give graduate students in computer science, mathematics or statistics a valuable overview.

Intelligent and Fuzzy Techniques for Emerging Conditions and Digital Transformation Oct 23 2019 This book presents recent research in intelligent and fuzzy techniques. Emerging conditions such as pandemic, wars, natural disasters and various high technologies force people for significant changes in business and social life. The adoption of digital technologies to transform services or businesses, through replacing non-digital or manual processes with digital processes or replacing older digital technology with newer digital technologies through intelligent systems is the main scope of this book. It focuses on revealing the reflection of digital transformation in our business and social life under emerging conditions through intelligent and fuzzy systems. The latest intelligent and fuzzy methods and techniques on digital transformation are introduced by theory and applications. The intended readers are intelligent and fuzzy systems researchers, lecturers, M.Sc. and Ph.D. students studying digital transformation. Usage of ordinary fuzzy sets and their extensions, heuristics and metaheuristics from optimization to machine learning, from quality management to risk management makes the book an excellent source for researchers.

Fuzzy Sets-Based Methods and Techniques for Modern Analytics May 22 2022 The book offers a comprehensive, practice-oriented introduction to the field of fuzzy mathematical programming (FMP) as key topic of modern analytics. FMP plays a fundamental role in dealing with a varied range of problems, such as those concerning smart cities, sustainability, and renewable energies. This book includes an introduction to the basic concepts, together with extensive information on the computational-intelligence-based optimization models and techniques that have been used to date. Special emphasis is given to fuzzy transportation problems. The book is a valuable resource for researchers, data scientists and practitioners dealing with computational-intelligence-based optimization models for analytics.

Fuzzy Logic in Its 50th Year Jul 20 2019 This book offers a multifaceted perspective on fuzzy set theory, discussing its developments over the last 50 years. It reports on all types of fuzzy sets, from ordinary to hesitant fuzzy sets, with each one explained by its own developers, authoritative scientists well known for their previous works. Highlighting recent theorems and proofs, the book also explores how fuzzy set theory has come to be extensively used in almost all branches of science, including the health sciences, decision science, earth science and the social sciences alike. It presents a wealth of real-world sample applications, from routing problem to robotics, and from agriculture to engineering. By offering a comprehensive, timely and detailed portrait of the field, the book represents an excellent reference guide for researchers, lecturers and postgraduate students pursuing research on new fuzzy set extensions.

Fundamentals of Logistics Management Jun 18 2019 Fundamentals of Logistics Management provides a unique opportunity to leverage high profile, quality authorship into a market segment that has had little prior access to it. This text approaches logistics from a marketing perspective which is unique to its competitors. It also integrates the area of marketing, accounting, finance, and manufacturing within the text.

Fuzzy Control and Modeling Sep 14 2021 The emerging, powerful fuzzy control paradigm has led to the worldwide success of countless commercial products and real-world applications. Fuzzy control is exceptionally practical and cost-effective due to its unique ability to accomplish tasks without

knowing the mathematical model of the system, even if it is nonlinear, time varying and complex. Nevertheless, compared with the conventional control technology, most fuzzy control applications are developed in an ad hoc manner with little analytical understanding and without rigorous system analysis and design. Fuzzy Control and Modeling is the only book that establishes the analytical foundations for fuzzy control and modeling in relation to the conventional linear and nonlinear theories of control and systems. The coverage is up-to-date, comprehensive, in-depth and rigorous. Numeric examples and applications illustrate the utility of the theoretical development. Important topics discussed include: Structures of fuzzy controllers/models with respect to conventional fuzzy controllers/models Analysis of fuzzy control and modeling in relation to their classical counterparts Stability analysis of fuzzy systems and design of fuzzy control systems Sufficient and necessary conditions on fuzzy systems as universal approximators Real-time fuzzy control systems for treatment of life-critical problems in biomedicine Fuzzy Control and Modeling is a self-contained, invaluable resource for professionals and students in diverse technical fields who aspire to analytically study fuzzy control and modeling.

Fuzzy Sets in Decision Analysis, Operations Research and Statistics Feb 19 2022 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.

Performance Measurement with Fuzzy Data Envelopment Analysis Aug 25 2022 The intensity of global competition and ever-increasing economic uncertainties has led organizations to search for more efficient and effective ways to manage their business operations. Data envelopment analysis (DEA) has been widely used as a conceptually simple yet powerful tool for evaluating organizational productivity and performance. Fuzzy DEA (FDEA) is a promising extension of the conventional DEA proposed for dealing with imprecise and ambiguous data in performance measurement problems. This book is the first volume in the literature to present the state-of-the-art developments and applications of FDEA. It is designed for students, educators, researchers, consultants and practicing managers in business, industry, and government with a basic understanding of the DEA and fuzzy logic concepts.

Applications of Fuzzy Sets to Systems Analysis Jun 30 2020 Ten years ago, Zadeh has brought into vogue the use of a name. Scientists no is an increasing less than poets strike off words that fit a situation. Today there recognition that for understanding vagueness, a fuzzy approach is required. We are just going through ~ transient period. From discussions of general philosophy to practical methods for system analysis. Unfortunately, much of the existing research is scattered. The practitioner interested in these methods face the challenge of sorting through a vast amount of literature to find a core on which to build. One of the objects of this book was to facilitate communication by bringing toge ther different viewpoints and coloring them from a common viewpoint. Since the romanian version appeared, at the very beginning of 1974, there has been a rapid growth in the literature of fuzzy modelling. A minor revision would have left the book quite out-of-date. The opportunity has been taken to correct, clarify, and update. Inexactness is implicit in human behaviour and erare humanum est. It is a pleasure to acknowledge the help we have received in

preparing this version. The opportunity to see an english edition was a powerful stimulus, and we are grateful to Salomon Klaczko for making this possible. Another debt is to all fuzzy authors we have quoted. Their fascinating papers kindled our interest in the subject.

Analysis and Synthesis of Fuzzy Control Systems Apr 21 2022 Fuzzy logic control (FLC) has proven to be a popular control methodology for many complex systems in industry, and is often used with great success as an alternative to conventional control techniques. However, because it is fundamentally model free, conventional FLC suffers from a lack of tools for systematic stability analysis and controller design. To address this problem, many model-based fuzzy control approaches have been developed, with the fuzzy dynamic model or the Takagi and Sugeno (T-S) fuzzy model-based approaches receiving the greatest attention. *Analysis and Synthesis of Fuzzy Control Systems: A Model-Based Approach* offers a unique reference devoted to the systematic analysis and synthesis of model-based fuzzy control systems. After giving a brief review of the varieties of FLC, including the T-S fuzzy model-based control, it fully explains the fundamental concepts of fuzzy sets, fuzzy logic, and fuzzy systems. This enables the book to be self-contained and provides a basis for later chapters, which cover: T-S fuzzy modeling and identification via nonlinear models or data Stability analysis of T-S fuzzy systems Stabilization controller synthesis as well as robust H_∞ and observer and output feedback controller synthesis Robust controller synthesis of uncertain T-S fuzzy systems Time-delay T-S fuzzy systems Fuzzy model predictive control Robust fuzzy filtering Adaptive control of T-S fuzzy systems A reference for scientists and engineers in systems and control, the book also serves the needs of graduate students exploring fuzzy logic control. It readily demonstrates that conventional control technology and fuzzy logic control can be elegantly combined and further developed so that disadvantages of conventional FLC can be avoided and the horizon of conventional control technology greatly extended. Many chapters feature application simulation examples and practical numerical examples based on MATLAB®.

The Theory of the Knowledge Square: The Fuzzy Rational Foundations of the Knowledge-Production Systems Feb 07 2021 The monograph is about a meta-theory of knowledge-production process and the logical pathway that connects the epistemic possibility to the epistemic reality. It examines the general conditions of paradigms for information processing and isolates the classical and fuzzy paradigms for comparative analysis. The sets of conditions that give rise to them are defined, stated and analyzed to abstract the corresponding sets of laws of thought. The fuzzy paradigm with its corresponding logic and mathematics is related to inexact symbolism for the defective information structure where the results of the knowledge production must satisfy the epistemic conditionality, composed of fuzzy conditionality and fuzzy-stochastic conditionality under the principle of logical duality with continuum. The classical paradigm with its corresponding logic and mathematics is related to exact symbolism for exact information structure where the vagueness component of the defectiveness is assumed away, and where the results of the knowledge production must satisfy no epistemic conditionality or at the maximum only the stochastic conditionality under the principle of logical dualism with excluded middle. It is argued that the epistemic path that links ontological space to the epistemological space is information. The ontological space is taken as the primary category of reality while the epistemological space is shone to be a derivative. Such information is universally defective and together with assumptions imposed guides the development of paradigms with their laws of thought, logic of reasoning, mathematics and computational techniques. The relational structure is seen in terms of logical trinity with a given example as matter-information-energy transformational trinity which is supported by the time trinity of past-present-future relationality. The book is written for professionals, researchers and students working in philosophy of science, decision-choice theories, economies, sciences, computer science, engineering, cognitive psychology and researchers working on, or interested in fuzzy paradigm, fuzzy logic, fuzzy decisions, and phenomena of vagueness and ambiguities, fuzzy mathematics, fuzzy-stochastic processes and theory of knowledge. It is further aimed at research institutions and libraries. The subject matter belongs to extensive research and development taking place on fuzzy phenomena and the debate between the fuzzy paradigm and the classical paradigm relative to informatics,

synergetic science and complexity theory. The book will have a global appeal and across disciplines. Its strength, besides the contents, is the special effort that is undertaken to make it relevant and accessible to different areas of sciences and knowledge production.

Fuzzy Analytic Hierarchy Process Sep 26 2022 This book is the first in the literature and presents the state of the art in new developments and some interesting and relevant applications of the Fuzzy Analytical Hierarchy Process (FAHP). The AHP were introduced in the 1970s as a conceptually and mathematically simple, easily implementable, yet extremely powerful tool for group decision making and is used around the world in a wide variety of decision situations, such as government, business, industry, healthcare, and education. The aim of this book is to study various fuzzy methods for dealing with the imprecise and ambiguous data in AHP.

Cost-Benefit Analysis and the Theory of Fuzzy Decisions Mar 08 2021 This monograph is devoted to the identification and measurement theory of costs and benefits in a fuzzy information environment. The process of cost-benefit analysis is presented, requiring the development of real cost-benefit databases and the construction of cost-benefit criterion. These steps are accomplished with various theoretical constructs that provide sets of self-contained algorithms for application. This book integrates cost-benefit analysis, theory of fuzzy decisions and social decisions into unified decision algorithms accessible to practitioners, researchers, and graduate students. It features the essentials of fuzzy mathematics and algorithms in a comprehensive way, exposing a multi-disciplinary approach for the development of cost-benefit decision making in the framework of fuzziness and soft computing.

Fuzzy Control Systems Design and Analysis Jun 11 2021 A comprehensive treatment of model-based fuzzy control systems This volume offers full coverage of the systematic framework for the stability and design of nonlinear fuzzy control systems. Building on the Takagi-Sugeno fuzzy model, authors Tanaka and Wang address a number of important issues in fuzzy control systems, including stability analysis, systematic design procedures, incorporation of performance specifications, numerical implementations, and practical applications. Issues that have not been fully treated in existing texts, such as stability analysis, systematic design, and performance analysis, are crucial to the validity and applicability of fuzzy control methodology. Fuzzy Control Systems Design and Analysis addresses these issues in the framework of parallel distributed compensation, a controller structure devised in accordance with the fuzzy model. This balanced treatment features an overview of fuzzy control, modeling, and stability analysis, as well as a section on the use of linear matrix inequalities (LMI) as an approach to fuzzy design and control. It also covers advanced topics in model-based fuzzy control systems, including modeling and control of chaotic systems. Later sections offer practical examples in the form of detailed theoretical and experimental studies of fuzzy control in robotics systems and a discussion of future directions in the field. Fuzzy Control Systems Design and Analysis offers an advanced treatment of fuzzy control that makes a useful reference for researchers and a reliable text for advanced graduate students in the field.

Handbook of Research on Fuzzy and Rough Set Theory in Organizational Decision Making Nov 23 2019 Soft computing techniques are innovative tools that use nature-inspired algorithms to run predictive analysis of industries from business to software measurement. These tools have gained momentum in recent years for their practicality and flexibility. The Handbook of Research on Fuzzy and Rough Set Theory in Organizational Decision Making collects both empirical and applied research in the field of fuzzy set theory, and bridges the gap between the application of soft computational approaches and the organizational decision making process. This publication is a pivotal reference for business professionals, IT specialists, software engineers, and advanced students of business and information technology.

Performance Prediction and Analytics of Fuzzy, Reliability and Queuing Models Aug 13 2021 This book presents the latest developments and breakthroughs in fuzzy theory and performance prediction of queuing and reliability models by using the stochastic modeling and optimization

theory. The main focus is on analytics that use fuzzy logic, queuing and reliability theory for the performance prediction and optimal design of real-time engineering systems including call centers, telecommunication, manufacturing, service organizations, etc. For the day-to-day as well as industrial queuing situations and reliability prediction of machining parts embedded in computer, communication and manufacturing systems, the book assesses various measures of performance and effectiveness that can provide valuable insights and help arrive at the best decisions with regard to service and engineering systems. In twenty chapters, the book presents both theoretical developments and applications of the fuzzy logic, reliability and queuing models in a diverse range of scenarios. The topics discussed will be of interest to researchers, educators and undergraduate students in the fields of Engineering, Business Management, and the Mathematical Sciences.

Fuzzy Techniques: Theory and Applications Jan 06 2021 This book describes the latest findings related to fuzzy techniques, discussing applications in control, economics, education, humor studies, industrial engineering, linguistics, management, marketing, medicine and public health, military engineering, robotics, ship design, sports, transportation, and many other areas. It also presents recent fuzzy-related algorithms and theoretical results that can be used in other application areas. Featuring selected papers from the Joint World Congress of the International Fuzzy Systems Association (IFSA) and the Annual Conference of the North American Fuzzy Information Processing Society (NAFIPS) IFSA-NAFIPS'2019, held in Lafayette, Louisiana, USA, on June 18-21, 2019, the book is of interest to practitioners wanting to use fuzzy techniques to process imprecise expert knowledge. It is also a valuable resource for researchers wishing to extend the ideas from these papers to new application areas, for graduate students and for anyone else interested in problems involving fuzziness and uncertainty.

Applications of Fuzzy Sets to Systems Analysis Jan 18 2022 Ten years ago, Zadeh has brought into vogue the use of a name. Scientists no is an increasing less than poets strike off words that fit a situation. Today there recognition that for understanding vagueness, a fuzzy approach is required. We are just going through ~ transient period. From discussions of general philosophy to practical methods for system analysis. Unfortunately, much of the existing research is scattered. The practitioner interested in these methods face the challenge of sorting through a vast amount of literature to find a core on which to build. One of the objects of this book was to facilitate communication by bringing together different viewpoints and coloring them from a common viewpoint. Since the romanian version appeared, at the very beginning of 1974, there has been a rapid growth in the literature of fuzzy modelling. A minor revision would have left the book quite out-of-date. The opportunity has been taken to correct, clarify, and update. Inexactness is implicit in human behaviour and erare humanum est. It is a pleasure to acknowledge the help we have received in preparing this version. The opportunity to see an english edition was a powerful stimulus, and we are grateful to Salomon Klaczko for making this possible. Another debt is to all fuzzy authors we have quoted. Their fascinating papers kindled our interest in the subject.

Intelligent Communication, Control and Devices Sep 02 2020 This book focuses on the integration of intelligent communication systems, control systems and devices related to all aspects of engineering and sciences. It includes high-quality research papers from the 4th International Conference on Intelligent Communication, Control and Devices (ICICCD 2020), organized by the Department of Electronics, Instrumentation and Control Engineering at the University of Petroleum and Energy Studies, Dehradun, India during 27-28 November 2020. The topics covered are a range of recent advances in intelligent communication, intelligent control, and intelligent devices.