

Economic Model For Fuzzy Weibull Distribution

Fuzzy Modeling and Fuzzy Control **Modeling Uncertainty with Fuzzy Logic Fuzzy Model Identification** *Fuzzy Modeling for Control* **Model Based Fuzzy Control Fuzzy Modeling and Genetic Algorithms for Data Mining and Exploration** *Policy Decision Modeling with Fuzzy Logic* **Fuzzy Logic-Based Modeling in Collaborative and Blended Learning** *Insight into Fuzzy Modeling* **Analysis and Synthesis of Fuzzy Control Systems** *Fuzzy Databases Fuzzy Control and Modeling* **Fuzzy Logic Control Fuzzy Models and Algorithms for Pattern Recognition and Image Processing** **Fuzzy Systems** *Methods for Decision Making in an Uncertain Environment* **Analytical Methods in Fuzzy Modeling and Control** *Fuzzy Modeling and Control* *Interpretability Issues in Fuzzy Modeling* **Mathematical Modeling using Fuzzy Logic** **Fuzzy Neural Networks for Real Time Control Applications** **Fuzzy Models in Economics** *Biological Models via Interval Type-2 Fuzzy Sets* *Fuzzy Lattice Neural Model and Fuzzy Equivalence Relation Model* **Fuzzy Sets and Their Extensions: Representation, Aggregation and Models** *Fuzzy Model Identification for Control* **Fuzzy Modelling Fuzzy Modelling** *Fuzzy Decision Making in Modeling and Control* **New Approaches to Fuzzy Modeling and Control** **Model Based Fuzzy Control Type-2 Fuzzy Logic** *Fuzzy Control Systems Design and Analysis* *Optimization Based Model Using Fuzzy and Other Statistical Techniques Towards Environmental Sustainability* **Emerging Trends and Applications in Cognitive Computing** *Information Intelligence, Systems, Technology and Management* **Fuzzy Model Identification** **Essentials of Fuzzy Modeling and Control** **Fuzzy Chaotic Systems** **Intelligent Control, Filtering and Model Reduction** **Analysis for Fuzzy-Model-Based Systems**

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Fuzzy Model Identification Nov 03 2022 During the past few years two principally different approaches to the design of fuzzy controllers have emerged: heuristics-based design and model-based design. The main motivation for the heuristics-based design is given by the fact that many industrial processes are still controlled in one of the following two ways: - The process is controlled manually by an experienced operator. - The process is controlled by an automatic control system which needs manual, on-line 'trimming' of its parameters by an experienced operator. In both cases it is enough to translate in terms of a set of fuzzy if-then rules the operator's manual control algorithm or manual on-line 'trimming' strategy in order to obtain an equally good, or even better, wholly automatic fuzzy control system. This implies that the design of a fuzzy controller can only be done after a manual control algorithm or trimming strategy exists. It is admitted in the literature on fuzzy control that the heuristics-based approach to the design of fuzzy controllers is very difficult to apply to multiple-input/multiple-output control problems which represent the largest part of challenging industrial process control applications. Furthermore, the heuristics-based design lacks systematic and formally verifiable tuning techniques. Also, studies of the stability, performance, and robustness of a closed loop system incorporating a heuristics-based fuzzy controller can only be done via extensive simulations.

Policy Decision Modeling with Fuzzy Logic Jun 29 2022 This book introduces the concept of policy decision emergence and its dynamics at the sub systemic level of the decision process. This level constitutes the breeding ground of the emergence of policy decisions but remains unexplored due to the absence of adequate tools. It is a nonlinear complex system made of several entities that interact dynamically. The behavior of such a system cannot be understood with linear and deterministic methods. The book presents an innovative multidisciplinary approach that results in the development of a Policy Decision Emergence Simulation Model (PODESIM). This computational model is a multi-level fuzzy inference system that allows the identification of the decision emergence levers. This development represents a major advancement in the field of public policy decision studies. It paves the way for decision emergence modeling and simulation by bridging complex systems theory, multiple streams theory, and fuzzy logic theory.

Interpretability Issues in Fuzzy Modeling Jun 17 2021 Fuzzy modeling has become one of the most productive and successful results of fuzzy logic. Among others, it has been applied to knowledge discovery, automatic classification, long-term prediction, or medical and engineering analysis. The research developed in the topic during the last two decades has been mainly focused on exploiting the fuzzy model flexibility to obtain the highest accuracy. This approach usually sets aside the interpretability of the obtained models. However, we should remember the initial philosophy of fuzzy sets theory directed to serve the bridge between the human understanding and the machine processing. In this challenge, the ability of fuzzy models to express the behavior of the real system in a comprehensible manner acquires a great importance. This book collects the works of a group of experts in the field that advocate the interpretability improvements as a mechanism to obtain well balanced fuzzy models.

Fuzzy Control and Modeling Jan 25 2022 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 Lattice Neural Model and Fuzzy Equivalence Relation Model Jan 13 2021 Computer vision, unlike humans, still has not fully acquired the ability to categorise a person's age group from an image of the person's face. Successful gender and age classification could be used to boost the performance of face recognition system. Fuzzy models have been used and analysed in this work to achieve the desired results. The concept of fuzzy lattice neural model is introduced and is applied to classify the age group of a person from the gray scale facial image. Next, the fuzzy equivalence relation model is constructed and is used to classify the age group of a person. Then, the fuzzy lattice neural model is applied to segment an aerial gray scale image. Finally, fuzzy lattice neural model is compared with other models like fuzzy equivalence relation model, Kohonen's clustering neural model that are used for classification. The hybridization of the technologies is demonstrated on architectures such as Neuro-fuzzy systems. This book should be of interest to researchers and technologists desirous of applying FLN technology to their respective fields of work.

Essentials of Fuzzy Modeling and Control Oct 29 2019 This book offers a thorough introduction to the field of fuzzy logic with complete coverage of both relevant theory and applications. With its comprehensive presentation of fuzzy logic as well as coverage of both fuzzy control and modeling, this text is destined to become the classic primer in this quickly developing field.

Fuzzy Logic-Based Modeling in Collaborative and Blended Learning May 29 2022 Technology has dramatically changed the way in which knowledge is shared within and outside of traditional classroom settings. The application of fuzzy logic to new forms of technology-centered education has presented new opportunities for analyzing and modeling learner behavior. Fuzzy Logic-Based Modeling in Collaborative and Blended Learning explores the application of the fuzzy set theory to educational settings in order to analyze the learning process, gauge student feedback, and enable quality learning outcomes. Focusing on educational data analysis and modeling in collaborative and blended learning environments, this publication is an essential reference source for educators, researchers, educational administrators and designers, and IT specialists. This premier reference monograph presents key research on educational data analysis and modeling through the integration of research on advanced modeling techniques, educational technologies, fuzzy concept maps, hybrid modeling, neuro-fuzzy learning management systems, and quality of interaction.

Optimization Based Model Using Fuzzy and Other Statistical Techniques Towards Environmental Sustainability Mar 03 2020 This book explores key examples concerning the implementation of information technology and mathematical modeling to solve issues concerning environmental sustainability. The examples include using fuzzy weighted multivariate regression to predict the water quality index at Perak River in Malaysia; using wireless sensor networks (WSNs) for a remote river water pollution monitoring system; deriving biomass activated carbon from oil palm shell; and assessing the performance of a PV/T air solar collector. The book offers a valuable resource for all graduate students and researchers who are working in this rapidly growing area.

Insight into Fuzzy Modeling Apr 27 2022 Provides a unique and methodologically consistent treatment of various areas of fuzzy modeling and includes the results of mathematical fuzzy logic and linguistics This book is the result of almost thirty years of research on fuzzy modeling. It provides a unique view of both the theory and various types of applications. The book is divided into two parts. The first part contains an extensive presentation of the theory of fuzzy modeling. The second part presents selected applications in three important areas: control and decision-making, image processing, and time series analysis and forecasting. The authors address the consistent and appropriate treatment of the notions of fuzzy sets and fuzzy logic and their applications. They provide two complementary views of the methodology, which is based on fuzzy IF-THEN rules. The first, more traditional method involves fuzzy approximation and the theory of fuzzy relations. The second method is based on a combination of formal fuzzy logic and linguistics. A very important topic covered for the first time in book form is the fuzzy transform (F-transform). Applications of this theory are described in separate chapters and include image processing and time series analysis and forecasting. All of the mentioned components make this book of interest to students and researchers of fuzzy modeling as well as to practitioners in industry. Features: Provides a foundation of fuzzy modeling and proposes a thorough description of fuzzy modeling methodology Emphasizes fuzzy modeling based on results in linguistics and formal logic Includes chapters on natural language and approximate reasoning, fuzzy control and fuzzy decision-making, and image processing using the F-transform Discusses fuzzy IF-THEN rules for approximating functions, fuzzy cluster analysis, and time series forecasting Insight into Fuzzy Modeling is a reference for researchers in the fields of soft computing and fuzzy logic as well as undergraduate, master and Ph.D. students. Vilém Novák, D.Sc. is Full Professor and Director of the Institute for Research and Applications of Fuzzy Modeling, University of Ostrava, Czech Republic. Irina Perfilieva, Ph.D. is Full Professor, Senior Scientist, and Head of the Department of Theoretical Research at the Institute for Research and Applications of Fuzzy Modeling, University of Ostrava, Czech Republic. Antonín Dvůrák, Ph.D. is Associate Professor, and Senior Scientist at the Institute for Research and Applications of Fuzzy Modeling, University of Ostrava, Czech Republic.

Fuzzy Model Identification for Control Nov 10 2020 This book presents new approaches to constructing fuzzy models for model-based control. Simulated examples and real-world applications from chemical and process engineering illustrate the main methods and techniques. Supporting MATLAB and Simulink files create a computational platform for exploration of the concepts and algorithms.

Model Based Fuzzy Control Sep 01 2022 Model Based Fuzzy Control uses a given conventional or fuzzy open loop model of the plant under control to derive the set of fuzzy rules for the fuzzy controller. Of central interest are the stability, performance, and robustness of the resulting closed loop system. The major objective of model based fuzzy control is to use the full range of linear and nonlinear design and analysis methods to design such fuzzy controllers with better stability, performance, and robustness properties than non-fuzzy controllers designed using the same techniques. This objective has already been achieved for fuzzy sliding mode controllers and fuzzy gain schedulers - the main topics of this book. The primary aim of the book is to serve as a guide for the practitioner and to provide introductory material for courses in control theory.

Analytical Methods in Fuzzy Modeling and Control Aug 20 2021 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.

Information Intelligence, Systems, Technology and Management Jan 01 2020 This book constitutes the refereed proceedings of the 5th International Conference on Information Systems, Technology and Management, ICISTM 2011, held in Gurgaon, India, in March 2011. The 35 revised full papers presented together with 4 short papers were carefully reviewed and selected from 106 submissions. The papers

are organized in topical sections on information management, information systems, information technology, healthcare information management and technology, business intelligence, applications, as well as management science and education.

Emerging Trends and Applications in Cognitive Computing Jan 31 2020 Though an individual can process a limitless amount of information, the human brain can only comprehend a small amount of data at a time. Using technology can improve the process and comprehension of information, but the technology must learn to behave more like a human brain to employ concepts like memory, learning, visualization ability, and decision making. Emerging Trends and Applications in Cognitive Computing is a fundamental scholarly source that provides empirical studies and theoretical analysis to show how learning methods can solve important application problems throughout various industries and explain how machine learning research is conducted. Including innovative research on topics such as deep neural networks, cyber-physical systems, and pattern recognition, this collection of research will benefit individuals such as IT professionals, academicians, students, researchers, and managers.

Type-2 Fuzzy Logic May 05 2020 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 a valuable reference guide for all engineers and researchers in the field of computer science who are interested in intelligent systems, rule-based systems and modeling uncertainty.

Fuzzy Neural Networks for Real Time Control Applications Apr 15 2021 AN INDISPENSABLE RESOURCE FOR ALL THOSE WHO DESIGN AND IMPLEMENT TYPE-1 AND TYPE-2 FUZZY NEURAL NETWORKS IN REAL TIME SYSTEMS Delve into the type-2 fuzzy logic systems and become engrossed in the parameter update algorithms for type-1 and type-2 fuzzy neural networks and their stability analysis with this book! Not only does this book stand apart from others in its focus but also in its application-based presentation style. Prepared in a way that can be easily understood by those who are experienced and inexperienced in this field. Readers can benefit from the computer source codes for both identification and control purposes which are given at the end of the book. A clear and an in-depth examination has been made of all the necessary mathematical foundations, type-1 and type-2 fuzzy neural network structures and their learning algorithms as well as their stability analysis. You will find that each chapter is devoted to a different learning algorithm for the tuning of type-1 and type-2 fuzzy neural networks; some of which are: • Gradient descent • Levenberg-Marquardt • Extended Kalman filter In addition to the aforementioned conventional learning methods above, number of novel sliding mode control theory-based learning algorithms, which are simpler and have closed forms, and their stability analysis have been proposed. Furthermore, hybrid methods consisting of particle swarm optimization and sliding mode control theory-based algorithms have also been introduced. The potential readers of this book are expected to be the undergraduate and graduate students, engineers, mathematicians and computer scientists. Not only can this book be used as a reference source for a scientist who is interested in fuzzy neural networks and their real-time implementations but also as a course book of fuzzy neural networks or artificial intelligence in master or doctorate university studies. We hope that this book will serve its main purpose successfully. Parameter update algorithms for type-1 and type-2 fuzzy neural networks and their stability analysis Contains algorithms that are applicable to real time systems Introduces fast and simple adaptation rules for type-1 and type-2 fuzzy neural networks Number of case studies both in identification and control Provides MATLAB® codes for some algorithms in the book

Modeling Uncertainty with Fuzzy Logic Dec 04 2022 The world we live in is pervaded with uncertainty and imprecision. Is it likely to rain this afternoon? Should I take an umbrella with me? Will I be able to find parking near the campus? Should I go by bus? Such simple questions are a common occurrence in our daily lives. Less simple examples: What is the probability that the price of oil will rise sharply in the near future? Should I buy Chevron stock? What are the chances that a bailout of GM, Ford and Chrysler will not succeed? What will be the consequences? Note that the examples in question involve both uncertainty and imprecision. In the real world, this is the norm rather than exception. There is a deep-seated tradition in science of employing probability theory, and only probability theory, to deal with uncertainty and imprecision. The monopoly of probability theory came to an end when fuzzy logic made its debut. However, this is by no means a widely accepted view. The belief persists, especially within the probability community, that probability theory is all that is needed to deal with uncertainty. To quote a prominent Bayesian, Professor Dennis Lindley, "The only satisfactory description of uncertainty is probability."

Fuzzy Modelling Sep 08 2020 Provides recent information on fuzzy models, identification algorithms, and applications. Section I on relational models includes theory and case studies in areas such as speech recognition, prediction, and ecological systems. Section II on fuzzy neural networks covers fundamentals such as neurocomputing, explains the relationship between fuzzy systems and neural networks, and details architectures. Section III addresses design principles governing the development of rule-based models. Of interest to researchers and practitioners developing models of complex systems. Annotation copyright by Book News, Inc., Portland, OR

Fuzzy Databases Feb 23 2022 "This book includes an introduction to fuzzy logic, fuzzy databases and an overview of the state of the art in fuzzy modeling in databases"--Provided by publisher.

Mathematical Modeling using Fuzzy Logic May 17 2021 Mathematical Modeling using Fuzzy Logic has been a dream project for the author. Fuzzy logic provides a unique method of approximate reasoning in an imperfect world. This text is a bridge to the principles of fuzzy logic through an application-focused approach to selected topics in engineering and management. The many examples point to the richer solutions obtained through fuzzy logic and to the possibilities of much wider applications. There are relatively very few texts available at present in fuzzy logic applications. The style and content of this text is complementary to those already available. New areas of application, like application of fuzzy logic in modeling of sustainability, are presented in a graded approach in which the underlying concepts are first described. The text is broadly divided into two parts: the first treats processes, materials, and system applications related to fuzzy logic, and the second delves into the modeling of sustainability with the help of fuzzy logic. This book offers comprehensive coverage of the most essential topics, including: Treating processes, materials, system applications related to fuzzy logic Highlighting new areas of application of fuzzy logic Identifying possibilities of much wider applications of fuzzy logic Modeling of sustainability with the help of fuzzy logic The level enables a selection of the text to be made for the substance of undergraduate-, graduate-, and postgraduate-level courses. There is also sufficient volume and quality for the basis of a postgraduate course. A more restricted and judicious selection can provide the material for a professional short course and various university-level courses.

Fuzzy Modeling for Control Oct 02 2022 Rule-based fuzzy modeling has been recognised as a powerful technique for the modeling of partly-known nonlinear systems. Fuzzy models can effectively integrate

information from different sources, such as physical laws, empirical models, measurements and heuristics. Application areas of fuzzy models include prediction, decision support, system analysis, control design, etc. *Fuzzy Modeling for Control* addresses fuzzy modeling from the systems and control engineering points of view. It focuses on the selection of appropriate model structures, on the acquisition of dynamic fuzzy models from process measurements (fuzzy identification), and on the design of nonlinear controllers based on fuzzy models. To automatically generate fuzzy models from measurements, a comprehensive methodology is developed which employs fuzzy clustering techniques to partition the available data into subsets characterized by locally linear behaviour. The relationships between the presented identification method and linear regression are exploited, allowing for the combination of fuzzy logic techniques with standard system identification tools. Attention is paid to the trade-off between the accuracy and transparency of the obtained fuzzy models. Control design based on a fuzzy model of a nonlinear dynamic process is addressed, using the concepts of model-based predictive control and internal model control with an inverted fuzzy model. To this end, methods to exactly invert specific types of fuzzy models are presented. In the context of predictive control, branch-and-bound optimization is applied. The main features of the presented techniques are illustrated by means of simple examples. In addition, three real-world applications are described. Finally, software tools for building fuzzy models from measurements are available from the author.

Fuzzy Modeling and Control Jul 19 2021 In the last ten years, a true explosion of investigations into fuzzy modeling and its applications in control, diagnostics, decision making, optimization, pattern recognition, robotics, etc. has been observed. The attraction of fuzzy modeling results from its intelligibility and the high effectiveness of the models obtained. Owing to this the modeling can be applied for the solution of problems which could not be solved till now with any known conventional methods. The book provides the reader with an advanced introduction to the problems of fuzzy modeling and to one of its most important applications: fuzzy control. It is based on the latest and most significant knowledge of the subject and can be used not only by control specialists but also by specialists working in any field requiring plant modeling, process modeling, and systems modeling, e.g. economics, business, medicine, agriculture, and meteorology.

Fuzzy Models in Economics Mar 15 2021 This book offers a timely guide to fuzzy methods applied to the analysis of socioeconomic systems. It provides readers with a comprehensive and up-to-date overview of the algorithms, including the theory behind them, as well as practical considerations, current limitations and solutions. Each chapter focuses on a different economic problem, explaining step by step the process to approach it, using the corresponding fuzzy tools. The book covers elements of intuitionistic fuzzy logics, fuzzy entropy and the fuzzy DEMATEL method, a fuzzy approach to calculate the financial stability index. It also reports on some new models of social, financial and ecological security, and on a novel fuzzy method for evaluating the quality of development of information economy.

Model Based Fuzzy Control Jun 05 2020 Introduction to model based fuzzy control; The FLC as a nonlinear transfer element; model based design of sliding mode FLC; Model based design of Takagi-Sugeno FLCs; References; Index.

Fuzzy Model Identification Nov 30 2019 This carefully edited collection of recent works in fuzzy model identification opens the field to conventional control theorists as a complement to existing approaches, provides practicing engineers with new techniques, and emphasizes opportunities for new theory by bringing together different methods to identify the same types of fuzzy models. In control engineering, mathematical models are often constructed without using system data (white-box models) or using data but no insight (black-box models). The authors in this volume combine white- and black-box models chosen from types of structures known to be flexible and successful in applications. They use the same notation and terminology, and each describes a model with an identification technique and gives a practical example to show how the method works.

Fuzzy Control Systems Design and Analysis Apr 03 2020 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.

Intelligent Control, Filtering and Model Reduction Analysis for Fuzzy-Model-Based Systems Aug 27 2019 This book aims to introduce the state-of-the-art research of stability/performance analysis and optimal synthesis methods for fuzzy-model-based systems. A series of problems are solved with new approaches of design, analysis and synthesis of fuzzy systems, including stabilization control and stability analysis, dynamic output feedback control, fault detection filter design, and reduced-order model approximation. Some efficient techniques, such as Lyapunov stability theory, linear matrix inequality, reciprocally convex approach, and cone complementary linearization method, are utilized in the approaches. This book is a comprehensive reference for researchers and practitioners working on intelligent control, model reduction, and fault detection of fuzzy systems, and is also a useful source of information for senior undergraduates and graduates in these areas. The readers will benefit from some new concepts and methodologies with theoretical and practical significance in system analysis and control synthesis.

Fuzzy Modeling and Genetic Algorithms for Data Mining and Exploration Jul 31 2022 Foundations and ideas -- Principal model types -- Approaches to model building -- Fundamental concepts of fuzzy logic -- Fundamental concepts of fuzzy systems -- Fuzzy SQL and intelligent queries -- Fuzzy clustering -- Fuzzy rule induction -- Fundamental concepts of genetic algorithms -- Genetic resource scheduling optimization -- Genetic tuning of fuzzy models.

Fuzzy Sets and Their Extensions: Representation, Aggregation and Models Dec 12 2020 This carefully edited book presents an up-to-date state of current research in the use of fuzzy sets and their extensions. It pays particular attention to foundation issues and to their application to four important areas where fuzzy sets are seen to be an important tool for modeling and solving problems. The book's 34 chapters deal with the subject with clarity and effectiveness. They include four review papers introducing some non-standard representations

Fuzzy Modeling and Fuzzy Control Jan 05 2023 Fuzzy logic methodology has proven effective in dealing with complex nonlinear systems containing uncertainties that are otherwise difficult to model. Technology based on this methodology is applicable to many real-world problems, especially in the area of consumer products. This book presents the first comprehensive, unified treatment of fuzzy

modeling and fuzzy control, providing tools for the control of complex nonlinear systems. Coverage includes model complexity, model precision, and computing time. This is an excellent reference for electrical, computer, chemical, industrial, civil, manufacturing, mechanical and aeronautical engineers, and also useful for graduate courses in electrical engineering, computer engineering, and computer science.

Fuzzy Chaotic Systems Sep 28 2019 This book presents the fundamental concepts of fuzzy logic and fuzzy control, chaos theory and chaos control. It also provides a definition of chaos on the metric space of fuzzy sets. The book raises many questions and generates a great potential to attract more attention to combine fuzzy systems with chaos theory. In this way it contains important seeds for future scientific research and engineering applications.

Fuzzy Decision Making in Modeling and Control Aug 08 2020 Decision making and control are two fields with distinct methods for solving problems, and yet they are closely related. This book bridges the gap between decision making and control in the field of fuzzy decisions and fuzzy control, and discusses various ways in which fuzzy decision making methods can be applied to systems modeling and control. Fuzzy decision making is a powerful paradigm for dealing with human expert knowledge when one is designing fuzzy model-based controllers. The combination of fuzzy decision making and fuzzy control in this book can lead to novel control schemes that improve the existing controllers in various ways. The following applications of fuzzy decision making methods for designing control systems are considered: OCo Fuzzy decision making for enhancing fuzzy modeling. The values of important parameters in fuzzy modeling algorithms are selected by using fuzzy decision making. OCo Fuzzy decision making for designing signal-based fuzzy controllers. The controller mappings and the defuzzification steps can be obtained by decision making methods. OCo Fuzzy design and performance specifications in model-based control. Fuzzy constraints and fuzzy goals are used. OCo Design of model-based controllers combined with fuzzy decision modules. Human operator experience is incorporated for the performance specification in model-based control. The advantages of bringing together fuzzy control and fuzzy decision making are shown with multiple examples from real and simulated control systems."

Methods for Decision Making in an Uncertain Environment Sep 20 2021 This book contains a selection of the papers presented at the XVII SIGEF Congress. It presents fuzzy logic, neural networks and other intelligent techniques applied to economic and business problems. This book is very useful for researchers and graduate students aiming to introduce themselves to the field of quantitative techniques for overcoming uncertain environments. The contributors are experienced scholars of different countries who offer real world applications of these mathematical techniques.

Fuzzy Systems Oct 22 2021 The analysis and control of complex systems have been the main motivation for the emergence of fuzzy set theory since its inception. It is also a major research field where many applications, especially industrial ones, have made fuzzy logic famous. This unique handbook is devoted to an extensive, organized, and up-to-date presentation of fuzzy systems engineering methods. The book includes detailed material and extensive bibliographies, written by leading experts in the field, on topics such as: Use of fuzzy logic in various control systems. Fuzzy rule-based modeling and its universal approximation properties. Learning and tuning techniques for fuzzy models, using neural networks and genetic algorithms. Fuzzy control methods, including issues such as stability analysis and design techniques, as well as the relationship with traditional linear control. Fuzzy sets relation to the study of chaotic systems, and the fuzzy extension of set-valued approaches to systems modeling through the use of differential inclusions. Fuzzy Systems: Modeling and Control is part of The Handbooks of Fuzzy Sets Series. The series provides a complete picture of contemporary fuzzy set theory and its applications. This volume is a key reference for systems engineers and scientists seeking a guide to the vast amount of literature in fuzzy logic modeling and control.

Fuzzy Modelling Oct 10 2020 Fuzzy Modelling: Paradigms and Practice provides an up-to-date and authoritative compendium of fuzzy models, identification algorithms and applications. Chapters in this book have been written by the leading scholars and researchers in their respective subject areas. Several of these chapters include both theoretical material and applications. The editor of this volume has organized and edited the chapters into a coherent and uniform framework. The objective of this book is to provide researchers and practitioners involved in the development of models for complex systems with an understanding of fuzzy modelling, and an appreciation of what makes these models unique. The chapters are organized into three major parts covering relational models, fuzzy neural networks and rule-based models. The material on relational models includes theory along with a large number of implemented case studies, including some on speech recognition, prediction, and ecological systems. The part on fuzzy neural networks covers some fundamentals, such as neurocomputing, fuzzy neurocomputing, etc., identifies the nature of the relationship that exists between fuzzy systems and neural networks, and includes extensive coverage of their architectures. The last part addresses the main design principles governing the development of rule-based models. Fuzzy Modelling: Paradigms and Practice provides a wealth of specific fuzzy modelling paradigms, algorithms and tools used in systems modelling. Also included is a panoply of case studies from various computer, engineering and science disciplines. This should be a primary reference work for researchers and practitioners developing models of complex systems.

Biological Models via Interval Type-2 Fuzzy Sets Feb 11 2021 This book offers a gentle introduction to type-2 fuzzy sets and, in particular, interval type-2 fuzzy sets and their application in biological modeling. Interval type-2 fuzzy modeling is a comparatively recent direction of research in fuzzy modeling. As the modeling of biological problems is inherently uncertain, the use of fuzzy sets in this field is a natural choice. The coverage begins with a succinct review of type-1 fuzzy basic theory, before providing a comprehensive and didactic explanation of type-2 fuzzy set components. In turn, Fuzzy Rule-Based Systems, or FRBS, are shown for both types, interval type-2 and type-1 fuzzy sets. Applications include the pharmacological models, prediction of prostate cancer stages, a model for HIV population transfer (asymptomatic to symptomatic), an epidemiological disease caused by HIV, some models in population growth, included the Malthus Model, and an epidemic model refers to COVID-19. The book is ideally suited to graduate students in mathematics and related fields, professionals, researchers, or the public interested in interval type-2 fuzzy modeling. Largely self-contained, it can also be used as a supplementary text in specialized graduate courses.

New Approaches to Fuzzy Modeling and Control Jul 07 2020 Fuzzy logic has found applications in an incredibly wide range of areas in the relatively short time since its conception. It was invented by Lotfi Zadeh, a leading systems expert, so it is perhaps not surprising that system theory is one of the areas in which fuzzy logic has made a profound impact. Fuzzy logic combined with the paradigm of computing with words allows the use and manipulation of human knowledge and reasoning in the modeling and control of dynamical systems. This monograph presents new approaches to the construction of fuzzy models and to the design of fuzzy controllers. The emphasis is on developing methods that allow systematic design on the one hand and mathematical analysis of the resulting system on the other. In particular, the methods described allow rigorous analysis of the stability and robustness of the systems, which are crucial issues in control theory. The first theme of the book is a new approach to the system design and analysis of fuzzy controllers, given linguistic information concerning the plant and the control objective. The new approach, fuzzy Lyapunov synthesis, is a computing-with-words version of the well-known (classical) Lyapunov synthesis method. The second theme of the book is to show that fuzzy controllers are in fact solutions to a nonlinear optimal control

problem. The authors formulate a novel nonlinear optimal control problem, consisting of a new state-space model -- referred to as the hyperbolic state-space model -- and a new cost functional and show that its solution is a fuzzy controller. This leads to a new framework for fuzzy modeling and control that combines the advantages of the fuzzyworld, such as linguistic interpretability, and of classical optimal control theory, such as guaranteed stability and robustness.

Analysis and Synthesis of Fuzzy Control Systems Mar 27 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®.

Fuzzy Logic Control Dec 24 2021 Fuzzy logic control has become an important methodology in control engineering. This volume deals with applications of fuzzy logic control in various domains. The contributions are divided into three parts. The first part consists of two state-of-the-art tutorials on fuzzy control and fuzzy modeling. Surveys of advanced methodologies are included in the second part. These surveys address fuzzy decision making and control, fault detection, isolation and diagnosis, complexity reduction in fuzzy systems and neuro-fuzzy methods. The third part contains application-oriented contributions from various fields, such as process industry, cement and ceramics, vehicle control and traffic management, electromechanical and production systems, avionics, biotechnology and medical applications. The book is intended for researchers both from the academic world and from industry.

Fuzzy Models and Algorithms for Pattern Recognition and Image Processing Nov 22 2021 *Fuzzy Models and Algorithms for Pattern Recognition and Image Processing* presents a comprehensive introduction of the use of fuzzy models in pattern recognition and selected topics in image processing and computer vision. Unique to this volume in the Kluwer Handbooks of Fuzzy Sets Series is the fact that this book was written in its entirety by its four authors. A single notation, presentation style, and purpose are used throughout. The result is an extensive unified treatment of many fuzzy models for pattern recognition. The main topics are clustering and classifier design, with extensive material on feature analysis relational clustering, image processing and computer vision. Also included are numerous figures, images and numerical examples that illustrate the use of various models involving applications in medicine, character and word recognition, remote sensing, military image analysis, and industrial engineering.