Modern Fuzzy Control Systems and Its Applications

Fuzzy Logic Control

Fuzzy Logic

Fuzzy Expert Systems

Classical and Modern Controls with Microcontrollers

Fuzzy Logic Applications in Engineering Science

Fuzzy Algorithms for Control

Fuzzy Control and Identification

A Learner's Guide to Fuzzy Logic Systems,

Second Edition

Fuzzy Logic Control Systems

Advanced Fuzzy Logic Technologies in Industrial Applications

Type-2 Fuzzy Logic and Systems

Introduction To Type-2 Fuzzy Logic Control

Intelligent Control Systems, Robotics and Automation

– Volume XVIII

Introduction to Fuzzy Systems

Control Systems with an Introduction to System of Systems Engineering

Analysis and Synthesis of Fuzzy Control Systems

Fuzzy Logic Control in Energy Systems with Design Applications in MATLAB®/Simulink®

Computational Intelligence in Systems and Control Design

Networked Control Systems

Fuzzy Logic Control

Fuzzy Control Systems

Fuzzy Logic and Control

Systems Design and Analysis

Environmental Control for Plants Using Intelligent Control Systems

Fuzzy Logic in Control Systems

Polynomial Fuzzy Model-Based Control Systems

Fuzzy Control of Industrial Systems

Neural Fuzzy Control Systems

with Structure and Parameter Learning

Fuzzy Reasoning in Information, Decision and Control Systems

Intelligent Control Systems with LabVIEW™

Introduction to Fuzzy Sets, Fuzzy Logic, and Fuzzy Control Systems

Neuro-Fuzzy Control of Industrial Systems with Actuator Nonlinearities

Neural and Fuzzy Logic Control of Drives and Power Systems

An Introduction to Fuzzy Logic Applications in Intelligent Systems

Industrial Fuzzy Logic Control Systems

Modern Fuzzy Control Systems and its Applications

Control systems play an important role in engineering. Fuzzy logic is the natural choice for designing control applications and is the most popular and appropriate for the control of home and industrial appliances. Academic and industrial experts are constantly researching and proposing innovative and effective fuzzy control systems.

This book is an edited volume and has 21 innovative chapters arranged into five sections covering applications of fuzzy control systems in energy and power systems, navigation systems, imaging, and industrial engineering. Overall, this book provides a rich set of modern fuzzy control systems and their applications and will be a useful resource for the graduate students, researchers, and practicing engineers in the field of electrical engineering.

Fuzzy Logic Control

This book explores recent perspectives on type-2 fuzzy sets. Written as a tribute to Professor Jerry Mendel for his pioneering works on type-2 fuzzy sets and systems, it covers a wide range of topics, including applications to the Go game, machine learning and pattern recognition, as well as type-2 fuzzy control and intelligent systems. The book is intended as a reference guide for the type-2 fuzzy logic community, yet it aims also at other communities dealing with similar methods and applications.

Fuzzy Logic

Fuzzy logic is a relatively new concept in science applications. Hitherto, fuzzy logic has been a conceptual process applied in the field of risk management. Its potential applicability is much wider than that, however, and its particular suitability for expanding our understanding of processes and information in science and engineering in our post-modern world is only just beginning to be appreciated. Written as a companion text to the author's earlier volume "An Introduction to Fuzzy Logic Applications", the book is aimed at professional engineers and students and those with an interest in exploring the potential of fuzzy logic as an information processing kit with a wide variety of practical applications in the field of engineering science and develops themes and topics introduced in the author's earlier text.

Fuzzy Expert Systems

Great progresses have been made in the application of fuzzy set theory and fuzzy logic. Most remarkable area of application is 'fuzzy control', where fuzzy logic was first applied to plant control systems and its use is expanding to consumer products. Most of fuzzy control systems uses fuzzy inference with max-min or max-product composition, similar to the algorithm that first used by Mamdani in 1970s. Some algorithms are developed to refine fuzzy controls systems but the main part of algorithm stays the same. Triggered by the success of fuzzy control systems, other ways of applying fuzzy set theory are also investigated. They are usually referred to
as 'fuzzy expert systems', and their purpose are to combine the idea of fuzzy theory with AI based approach toward knowledge processing. These approaches can be more generally viewed as 'fuzzy information processing', that is to bring fuzzy idea into information processing systems.

Classical and Modern Controls with Microcontrollers This Encyclopedia of Control Systems, Robotics, and Automation is a component of the global Encyclopedia of Life Support Systems EOLSS, which is an integrated compendium of twenty one Encyclopedias. This 22-volume set contains 240 chapters, each of size 5000-30000 words, with perspectives, applications and extensive illustrations. It is the only publication of its kind carrying state-of-the-art knowledge in the fields of Control Systems, Robotics, and Automation and is aimed, by virtue of the several applications, at the following five major target audiences: University and College Students, Educators, Professional Practitioners, Research Personnel and Policy Analysts, Managers, and Decision Makers and NGOs.

Fuzzy Logic Applications in Engineering Science The emergence of fuzzy logic and its applications has dramatically changed the face of industrial control engineering. Over the last two decades, fuzzy logic has allowed control engineers to meet and overcome the challenges of developing effective controllers for increasingly complex systems with poorly defined dynamics. Today's engineers need a working knowledge of the principles and techniques of fuzzy logic- Intelligent Control provides it. The author first introduces the traditional control techniques and contrasts them with intelligent control. He then presents several methods of representing and processing knowledge and introduces fuzzy logic as one such method. He highlights the advantages of fuzzy logic over other techniques, indicates its limitations, and describes in detail a hierarchical control structure appropriate for use in intelligent control systems. He introduces a variety of applications, most in the areas of robotics and mechatronics but with others including air conditioning and process/production control. One appendix provides discussion of some advanced analytical concepts of fuzzy logic, another describes a commercially available software system for developing fuzzy logic application. Intelligent Control is filled with worked examples, exercises, problems, and references. No prior knowledge of the subject nor advanced mathematics are needed to comprehend much of the book, making it well-suited as a senior undergraduate or first-year graduate text and a convenient reference tool for practicing professionals.

Fuzzy Algorithms for Control This book presents an introductory coverage of fuzzy logic, including basic principles from an interdisciplinary perspective. It includes concept of evolving a fuzzy set and fuzzy set operations, fuzzification rule base design and defuzzification and simple guidelines for fuzzy sets design and selected applications. Preliminary concepts of Neural Networks and Genetic Algorithm are added features with relevant examples and exercises. It is primarily intended for undergraduate and postgraduate students and researchers to facilitate education in the ever-increasing field of fuzzy logic as medium between human intelligence and machine.

Fuzzy Control and Identification Master's Thesis from the year 2005 in the subject Engineering - Artificial Intelligence, grade: MSc, course: Intelligent Control, language: English, abstract: [] In practice, conventional controllers were used to control the system however their parameters are empirically adjusted. Besides, the operation of these controllers relies on the measurements provided by sensors located inside and near the greenhouse. If the information provided by one or several of these sensors is erroneous, the controllers will not operate properly. Similarly, failure of one or several of the actuators to function properly will impair the greenhouse operation. Therefore, an automatic diagnosis system of failures in greenhouses is proposed. The diagnosis system is based on deviations observed between measurements performed in the system and the predictions of a model of the failure-free system. This comparison is done through a bank of fuzzy observers, where each observer becomes active to a specific failure signature and inactive to the other failures. Neural networks are used to develop a model for the failure-free greenhouse. The main objective of this thesis is to explore and develop intelligent control schemes for adjusting the climate inside a greenhouse. The thesis employs the conventional Pseudo- Derivative Feedback (PDF) Controller. It develops the fuzzy PDF controller (FPDF). The thesis also, develops two genetic algorithm (GA) based climatic control schemes, one is genetic PDF (GPDF) and the other is genetic FPDF (GFPDF). The former uses GA to adjust the gains of the Pseudo-Derivative Feedback Controller (GPDF) and the later uses genetic algorithm to optimize the FPDF controller parameters (i.e., scale factors and/or parameters of the membership functions). Finally, the thesis develops a fuzzy neural fault detection and isolation system (FNFDIS), in which a bank of fuzzy observers are designed to detect faults that m
A Learner’s Guide to Fuzzy Logic Systems, Second Edition From aeronautics and manufacturing to healthcare and disaster management, systems engineering (SE) now focuses on designing applications that ensure performance optimization, robustness, and reliability while combining an emerging group of heterogeneous systems to realize a common goal. Use SoS to Revolutionize Management of Large Organizations, Factories, and Systems Intelligent Control Systems with an Introduction to System of Systems Engineering integrates the fundamentals of artificial intelligence and systems control in a framework applicable to both simple dynamic systems and large-scale system of systems (SoS). For decades, NASA has used SoS methods, and major manufacturers—including Boeing, Lockheed-Martin, Northrop-Grumman, Raytheon, BAE Systems—now make large-scale systems integration and SoS a key part of their business strategies, dedicating entire business units to this remarkably efficient approach. Simulate Novel Robotic Systems and Applications Transcending theory, this book offers a complete and practical review of SoS and some of its fascinating applications, including: Manipulation of robots through neural-based network control Use of robotic swarms, based on ant colonies, to detect mines Other novel systems in which intelligent robots, trained animals, and humans cooperate to achieve humanitarian objectives Training engineers to integrate traditional systems control theory with soft computing techniques further nourishes emerging SoS technology. With this in mind, the authors address the fundamental precepts at the core of SoS, which uses human heuristics to model complex systems, providing a scientific rationale for integrating independent, complex systems into a single coordinated, stabilized, and optimized one. They provide readers with MATLAB® code, which can be downloaded from the publisher's website to simulate presented results and projects that offer practical, hands-on experience using concepts discussed throughout the book.

Fuzzy Logic Control Systems This book reviews fuzzy control systems. Chapter One presents a new class of fuzzy logic systems named type-2 fuzzy logic systems (T2FLS). Chapter Two discusses DSP based hardware and software implementation of a sliding mode control for high performance IM drive. Chapter Three examines fuzzy logic based encoder-less speed controls of permanent-magnet synchronous motors (PMSM) for hub motor drives. Chapter Four presents the development and research of fuzzy control system of floating dock docking operations. Chapter Five examines the problem of a robust H∞ fuzzy control design for a class of nonlinear Markovin jump systems via a LMI-based approach.

Advanced Fuzzy Logic Technologies in Industrial Applications On fuzzy logic

Type-2 Fuzzy Logic and Systems

Introduction To Type-2 Fuzzy Logic Control

Intelligent Control 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®.
Control Systems, Robotics and AutomatioN - Volume XVII An introductory book that provides theoretical, practical, and application coverage of the emerging field of type-2 fuzzy logic control. Until recently, little was known about type-2 fuzzy controllers due to the lack of basic calculation methods available for type-2 fuzzy sets and logic—and many different aspects of type-2 fuzzy control still needed to be investigated in order to advance this new and powerful technology. This self-contained reference covers everything readers need to know about the growing field. Written with an educational focus in mind, Introduction to Type-2 Fuzzy Logic Control: Theory and Applications uses a coherent structure and uniform mathematical notations to link chapters that are closely related, reflecting the book’s central themes: analysis and design of type-2 fuzzy control systems. The book includes worked examples, experiment and simulation results, and comprehensive reference materials. The book also offers downloadable computer programs from an associated website. Presented by world-class leaders in type-2 fuzzy logic control, Introduction to Type-2 Fuzzy Logic Control: Is useful for any technical person interested in learning type-2 fuzzy control theory and its applications Offers experiment and simulation results via downloadable computer programs Features type-2 fuzzy logic background chapters to make the book self-contained Provides an extensive literature survey on both fuzzy logic and related type-2 fuzzy control Introduction to Type-2 Fuzzy Logic Control is an easy-to-read reference book suitable for engineers, researchers, and graduate students who want to gain deep insight into type-2 fuzzy logic control.

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

Intelligent Control Systems with an Introduction to System of Systems Engineering Fuzzy logic is enjoying an unprecedented popularity—and for excellent reasons. It has moved successfully beyond the technological and engineering fields into areas as diverse as consumer and electronic products and systems, the stock market, and medical diagnostics.

Analysis and Synthesis of Fuzzy Control Systems Great progresses have been made in the application of fuzzy set theory and fuzzy logic. Most remarkable area of application is 'fuzzy control', where fuzzy logic was first applied to plant control systems and its use is expanding to consumer products. Most of fuzzy control systems uses fuzzy inference with max-min or max-product composition, similar to the algorithm that first used by Mamdani in 1970s. Some algorithms are developed to refine fuzzy controls systems but the main part of algorithm stays the same. Triggered by the success of fuzzy control systems, other ways of applying fuzzy set theory are also investigated. They are usually referred to as 'fuzzy expert systems', and their purpose are to combine the idea of fuzzy theory with AI based approach toward knowledge processing. These approaches can be more generally viewed as 'fuzzy information processing', that is to bring fuzzy idea into informa tion processing systems.

Fuzzy Logic Control in Energy Systems with Design Applications in MATLAB®/Simulink® Fuzzy Control Systems explores one of the most active areas of research involving fuzzy set theory. The contributors address basic issues concerning the analysis, design, and application of fuzzy control systems. Divided into three parts, the book first devotes itself to the general theory of fuzzy control systems. The second part deals with a variety of methodologies and algorithms used in the analysis and design of fuzzy controllers. The various paradigms include fuzzy reasoning models, fuzzy neural networks, fuzzy expert systems, and genetic algorithms. The final part considers current applications of fuzzy control systems. This book should be required reading for researchers, practitioners, and students interested in fuzzy control systems, artificial intelligence, and fuzzy sets and systems.

Computational Intelligence in Systems and Control Design and Applications This book focuses on
the design, implementation and applications of embedded systems and advanced industrial controls with microcontrollers. It combines classical and modern control theories as well as practical control programming codes to help readers learn control techniques easily and effectively. The book covers both linear and nonlinear control techniques to help readers understand modern control strategies. The author provides a detailed description of the practical considerations and applications in linear and nonlinear control systems. They concentrate on the ARM® Cortex®-M4 MCU system built by Texas Instruments™ called TM4C123GXL, in which two ARM® Cortex®-M4 MCUs, TM4C123GH6PM, are utilized. In order to help the reader develop and build application control software for a specified microcontroller unit. Readers can quickly develop and build their applications by using sample project codes provided in the book to access specified peripherals. The book enables readers to transfer from one interfacing protocol to another, even if they only have basic and fundamental understanding and basic knowledge of one interfacing function. Classical and Modern Controls with Microcontrollers is a powerful source of information for control and systems engineers looking to expand their programming knowledge of C, and of applications of embedded systems with microcontrollers. The book is a textbook for college students majored in CE, EE and ISE to learn and study classical and modern control technologies. The book can also be adopted as a reference book for professional programmers working in modern control fields or related to intelligent controls and embedded computing and applications. Advances in Industrial Control reports and encourages the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.

Networked Control Systems Intelligent Control with LabVIEW™ is a fresh and pragmatic approach to the understanding of a subject often clouded by too much mathematical theory. It exploits the full suite of tools provided by LabVIEW™, showing the student how to design, develop, analyze, and visualize intelligent control algorithms quickly and simply. Block diagrams are used to follow the progress of an algorithm through the design process and allow seamless integration with hardware systems for rapid deployment in laboratory experiments. This text delivers a thorough grounding in the main tools of intelligent control: fuzzy logic systems; artificial neural networks; neuro-fuzzy systems; evolutionary methods; and predictive methods. Learning and teaching are facilitated by: extensive use of worked examples; end of chapter problems with separate solutions; and provision of intelligent control tools for LabVIEW™.

Fuzzy Logic Control Rigorous stability proofs are further verified by computer simulations, and appendices contain the computer code needed to build intelligent controllers for real-time applications. Neural networks capture the parallel processing and learning capabilities of biological nervous systems, and fuzzy logic captures the decision-making capabilities of human linguistics and cognitive systems.

Fuzzy Control Systems

Fuzzy Logic and Control In the early 1970s, fuzzy systems and fuzzy control theories added a new dimension to control systems engineering. From its beginnings as mostly heuristic and somewhat ad hoc, more recent and rigorous approaches to fuzzy control theory have helped make it an integral part of modern control theory and produced many exciting results. Yesterday's "art

Fuzzy Control Systems Design and Analysis This book gives an introduction to basic fuzzy logic and Mamdaniand Takagi-Sugeno fuzzy systems. The text shows how these can be used to control complex nonlinear engineering systems, while also suggesting several approaches to modeling of complex engineering systems with unknown models. Finally, fuzzy modeling and control methods are combined in the book, to create adaptive fuzzy controllers, ending with an example of an obstacle-avoidance controller for an autonomous vehicle using modus ponendo tollens logic.

Environmental Control for Plants Using Intelligent Control Systems Introduction to Fuzzy Systems provides students with a self-contained introduction that requires no preliminary knowledge of fuzzy mathematics and fuzzy control systems theory. Simplified and readily accessible, it encourages both classroom and self-directed learners to build a solid foundation in fuzzy systems. After introducing the subject, the authors move directly into presenting real-world applications of fuzzy logic, revealing its practical flavor. This practicality is then followed by basic fuzzy systems
theory. The book also offers a tutorial on fuzzy control theory, based mainly on the well-known classical Proportional-Integral-Derivative (PID) controllers theory and design methods. In particular, the text discusses fuzzy PID controllers in detail, including a description of the new notion of generalized verb-based fuzzy-logic control theory. Introduction to Fuzzy Systems is primarily designed to provide training for systems and control majors, both senior undergraduate and first year graduate students, to acquaint them with the fundamental mathematical theory and design methodology required to understand and utilize fuzzy control systems.

Fuzzy Logic in Control Systems *Introduces cutting-edge control systems to a wide readership of engineers and students *The first book on neuro-fuzzy control systems to take a practical, applications-based approach, backed up with worked examples and case studies *Learn to use VHDL in real-world applications Introducing cutting edge control systems through real-world applications Neural networks and fuzzy logic based systems offer a modern control solution to AC machines used in variable speed drives, enabling industry to save costs and increase efficiency by replacing expensive and high-maintenance DC motor systems. The use of fast micros has revolutionised the field with sensorless vector control and direct torque control. This book reflects recent research findings and acts as a useful guide to the new generation of control systems for a wide readership of advanced undergraduate and graduate students, as well as practising engineers. The authors guide readers quickly and concisely through the complex topics of neural networks, fuzzy logic, mathematical modelling of electrical machines, power systems control and VHDL design. Unlike the academic monographs that have previously been published on each of these subjects, this book combines them and is based round case studies of systems analysis, control strategies, design, simulation and implementation. The result is a guide to applied control systems design that will appeal equally to students and professional design engineers. The book can also be used as a unique VHDL design aid, based on real-world power engineering applications.

Polynomial Fuzzy Model-Based Control Systems This book contains thirty timely contributions in the emerging field of Computational Intelligence (CI) with reference to system control design and applications. The three basic constituents of CI are neural networks (NNs), fuzzy logic (FL) I fuzzy reasoning (FR). and genetic algorithms (GAs). NNs mimic the distributed functioning of the human brain and consist of many, rather simple, building elements (called artificial neurons) which are controlled by adaptive parameters and are able to incorporate via learning the knowledge provided by the environment, and thus respond intelligently to new stimuli. Fuzzy logic (FL) provides the means to build systems that can reason linguistically under uncertainty like the human experts (common sense reasoning). Both NNs and FL I FR are among the most widely used tools for modeling unknown systems with nonlinear behavior. FL suits better when there is some kind of knowledge about the system. such as, for example, the linguistic information of a human expert. On the other hand. NNs possess unique learning and generalization capabilities that allow the user to construct very accurate models of nonlinear systems simply using input-output data. GAs offer an interesting set of generic tools for systematic random search optimization following the mechanisms of natural genetics. In hybrid Computational Intelligence - based systems these three tools (NNs, FL, GAs) are combined in several synergetic ways producing integrated tools with enhanced learning, generalization. universal approximation. reasoning and optimization abilities.

Fuzzy Control of Industrial Systems Until recently, fuzzy logic was the intellectual plaything of a handful of researchers. Now it is being used to enhance the power of intelligent systems, as well as improve the performance and reduce the cost of intelligent and "smart" products appearing in the commercial market. Fuzzy Expert Systems focuses primarily on the theory of fuzzy expert systems and their applications in science and engineering. In doing so, it provides the first comprehensive study of "soft" expert systems and applications for those systems. Topics covered include general purpose fuzzy expert systems, processing imperfect information using structured frameworks, the fuzzy linguistic inference network generator, fuzzy associative memories, the role of approximate reasoning in medical expert systems, MILORD (a fuzzy expert systems shell), and COMAX (an autonomous fuzzy expert system for tactical communications networks. Fuzzy Expert Systems provides an invaluable reference resource for researchers and students in artificial intelligence (AI) and approximate reasoning (AR), as well as for other researchers looking for methods to apply similar tools in their own designs of intelligent systems.

Fuzzy Control Systems This book presents recent research on the stability analysis of polynomial-fuzzy-model-based control systems where the concept of partially/imperfectly matched premises
and membership-function dependent analysis are considered. The membership-function-dependent analysis offers a new research direction for fuzzy-model-based control systems by taking into account the characteristic and information of the membership functions in the stability analysis. The book presents on a research level the most recent and advanced research results, promotes the research of polynomial-fuzzy-model-based control systems, and provides theoretical support and point a research direction to postgraduate students and fellow researchers. Each chapter provides numerical examples to verify the analysis results, demonstrate the effectiveness of the proposed polynomial fuzzy control schemes, and explain the design procedure. The book is comprehensively written enclosing detailed derivation steps and mathematical derivations also for readers without extensive knowledge on the topics including students with control background who are interested in polynomial fuzzy model-based control systems.

Neural Fuzzy Control Systems with Structure and Parameter Learning A general neural-network-based connectionist model, called Fuzzy Neural Network (FNN), is proposed in this book for the realization of a fuzzy logic control and decision system. The FNN is a feedforward multi-layered network which integrates the basic elements and functions of a traditional fuzzy logic controller into a connectionist structure which has distributed learning abilities. In order to set up this proposed FNN, the author recommends two complementary structure/parameter learning algorithms: a two-phase hybrid learning algorithm and an on-line supervised structure/parameter learning algorithm. Both of these learning algorithms require exact supervised training data for learning. In some real-time applications, exact training data may be expensive or even impossible to get. To solve this reinforcement learning problem for real-world applications, a Reinforcement Fuzzy Neural Network (RFNN) is further proposed. Computer simulation examples are presented to illustrate the performance and applicability of the proposed FNN, RFNN and their associated learning algorithms for various applications.

Fuzzy Reasoning in Information, Decision and Control Systems Networked control systems (NCS) confer advantages of cost reduction, system diagnosis and flexibility, minimizing wiring and simplifying the addition and replacement of individual elements; efficient data sharing makes taking globally intelligent control decisions easier with NCS. The applications of NCS range from the large scale of factory automation and plant monitoring to the smaller networks of computers in modern cars, places and autonomous robots. Networked Control Systems presents recent results in stability and robustness analysis and new developments related to networked fuzzy and optimal control. Many chapters contain case-studies, experimental, simulation or other application-related work showing how the theories put forward can be implemented. The state-of-the art research reported in this volume by an international team of contributors makes it an essential reference for researchers and postgraduate students in control, electrical, computer and mechanical engineering and computer science.

Fuzzy Logic Based in Optimization Methods and Control Systems and Its Applications This book introduces a dynamic, on-line fuzzy inference system. In this system membership functions and control rules are not determined until the system is applied and each output of its lookup table is calculated based on current inputs. The book describes the real-world uses of new fuzzy techniques to simplify readers’ tuning processes and enhance the performance of their control systems. It further contains application examples.

Fuzzy Reasoning in Information, Decision and Control Systems An Introduction to Fuzzy Logic Applications in Intelligent Systems consists of a collection of chapters written by leading experts in the field of fuzzy sets. Each chapter addresses an area where fuzzy sets have been applied to situations broadly related to intelligent systems. The volume provides an introduction to and an overview of recent applications of fuzzy sets to various areas of intelligent systems. Its purpose is to provide information and easy access for people new to the field. The book also serves as an excellent reference for researchers in the field and those working in the specifics of systems development. People in computer science, especially those in artificial intelligence, knowledge-based systems, and intelligent systems will find this to be a valuable sourcebook. Engineers, particularly control engineers, will also have a strong interest in this book. Finally, the book will be of interest to researchers working in decision support systems, operations research, decision theory, management science and applied mathematics. An Introduction to Fuzzy Logic Applications in Intelligent Systems may also be used as an introductory text and, as such, it is tutorial in nature.
Intelligent Control Systems with LabVIEW® Fuzzy Algorithms for Control gives an overview of the research results of a number of European research groups that are active and play a leading role in the field of fuzzy modeling and control. It contains 12 chapters divided into three parts. Chapters in the first part address the position of fuzzy systems in control engineering and in the AI community. State-of-the-art surveys on fuzzy modeling and control are presented along with a critical assessment of the role of these methodologists in control engineering. The second part is concerned with several analysis and design issues in fuzzy control systems. The analytical issues addressed include the algebraic representation of fuzzy models of different types, their approximation properties, and stability analysis of fuzzy control systems. Several design aspects are addressed, including performance specification for control systems in a fuzzy decision-making framework and complexity reduction in multivariable fuzzy systems. In the third part of the book, a number of applications of fuzzy control are presented. It is shown that fuzzy control in combination with other techniques such as fuzzy data analysis is an effective approach to the control of modern processes which present many challenges for the design of control systems. One has to cope with problems such as process nonlinearity, time-varying characteristics for incomplete process knowledge. Examples of real-world industrial applications presented in this book are a blast furnace, a lime kiln and a solar plant. Other examples of challenging problems in which fuzzy logic plays an important role and which are included in this book are mobile robotics and aircraft control. The aim of this book is to address both theoretical and practical subjects in a balanced way. It will therefore be useful for readers from the academic world and also from industry who want to apply fuzzy control in practice.

Introduction to Fuzzy Sets, Fuzzy Logic, and Fuzzy Control Systems 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 robot 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.

Neuro-Fuzzy Control of Industrial Systems with Actuator Nonlinearities This book is about fuzzy logic control and its applications in managing, controlling and operating electrical energy systems. It provides a comprehensive overview of fuzzy logic concepts and techniques required for designing fuzzy logic controllers, and then discusses several applications to control and management in energy systems.

Neural and Fuzzy Logic Control of Drives and Power Systems Fuzzy Control of Industrial Systems: Theory and Applications presents the basic theoretical framework of crisp and fuzzy set theory, relating these concepts to control engineering based on the analogy between the Laplace transfer function of linear systems and the fuzzy relation of a nonlinear fuzzy system. Included are generic aspects of fuzzy systems with an emphasis on the many degrees of freedom and its practical design implications, modeling and systems identification techniques based on fuzzy rules, parametrized rules and relational equations, and the principles of adaptive fuzzy and neurofuzzy systems. Practical design aspects of fuzzy controllers are covered by the detailed treatment of fuzzy and neurofuzzy software design tools with an emphasis on iterative fuzzy tuning, while novel stability limit testing methods and the definition and practical examples of the new concept of collaborative control systems are also given. In addition, case studies of successful applications in industrial automation, process control, electric power technology, electric traction, traffic engineering, wastewater treatment, manufacturing, mineral processing and automotive systems.
engineering are also presented, in order to assist industrial control systems engineers in recognizing situations when fuzzy and neurofuzzy would offer certain advantages over traditional methods, particularly in controlling highly nonlinear and time-variant plants and processes.

An Introduction to Fuzzy Logic Applications in Intelligent Systems

Industrial Fuzzy Logic Control Systems 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.

Copyright code: 06a92e173dd58b2a4cbe4ce673a25e8f