Stable Adaptive Neural Network Control

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Neural Network-Based State Estimation of Nonlinear Systems - Heidar A. Talebi 2009-12-04
"Neural Network-Based State Estimation of Nonlinear Systems" presents efficient, easy to implement neural network schemes for state estimation, system identification, and fault detection and Isolation with mathematical proof of stability, experimental evaluation, and Robustness against unmolded dynamics, external disturbances, and measurement noises.
Adaptive Neural Network Control of Robotic Manipulators - Tong Heng Lee 1998
Introduction; Mathematical background; Dynamic modelling of robots; Structured network modelling of robots; Adaptive neural network control of robots; Neural network model reference adaptive control; Flexible joint

robots; task space and force control; Bibliography; Computer simulation; Simulation software in C.

Advances in Neural Networks - ISNN 2005 - Jun Wang 2005-05-04

The three volume set LNCS 3496/3497/3498 constitutes the refereed proceedings of the Second International Symposium on Neural Networks, ISNN 2005, held in Chongqing, China in May/June 2005. The 483 revised papers presented were carefully reviewed and selected from 1.425 submissions. The papers are organized in topical sections on theoretical analysis, model design, learning methods, optimization methods, kernel methods, component analysis, pattern analysis, systems modeling, signal processing, image processing, financial analysis, control systems, robotic systems, telecommunication networks, incidence detection, fault diagnosis, power systems, biomedical applications, industrial applications, and other applications.

Advances in Neural Networks - ISNN 2007 - Derong Liu 2007-07-14

This book is part of a three volume set that constitutes the refereed proceedings of the 4th International Symposium on Neural Networks, ISNN 2007, held in Nanjing, China in June 2007. Coverage includes neural networks for control applications, robotics, data mining and feature extraction, chaos and synchronization, support vector machines, fault diagnosis/detection, image/video processing, and applications of neural networks.

System Identification and Adaptive Control - Yiannis Boutalis 2014-04-23

Presenting current trends in the development and applications of intelligent systems in engineering, this monograph focuses on recent research results in system identification and control. The recurrent neurofuzzy and the fuzzy cognitive network (FCN) models are presented. Both models are suitable for partially-known or unknown

complex time-varying systems. Neurofuzzy Adaptive Control contains rigorous proofs of its statements which result in concrete conclusions for the selection of the design parameters of the algorithms presented. The neurofuzzy model combines concepts from fuzzy systems and recurrent high-order neural networks to produce powerful system approximations that are used for adaptive control. The FCN model stems from fuzzy cognitive maps and uses the notion of "concepts" and their causal relationships to capture the behavior of complex systems. The book shows how, with the benefit of proper training algorithms, these models are potent system emulators suitable for use in engineering systems. All chapters are supported by illustrative simulation experiments, while separate chapters are devoted to the potential industrial applications of each model including projects in: • contemporary power generation; • process control and • conventional benchmarking problems. Researchers and graduate students working in adaptive estimation and intelligent control will find Neurofuzzy Adaptive Control of interest both for the currency of its models and because it demonstrates their relevance for real systems. The monograph also shows industrial engineers how to test intelligent adaptive control easily using proven theoretical results.

Deterministic Learning Theory for Identification, Recognition, and Control- Cong Wang 2018-10-03

Deterministic Learning Theory for Identification, Recognition, and Control presents a unified conceptual framework for knowledge acquisition, representation, and knowledge utilization in uncertain dynamic environments. It provides systematic design approaches for identification, recognition, and control of linear uncertain systems. Unlike many books currently available that focus on statistical principles, this

book stresses learning through closed-loop neural control, effective representation and recognition of temporal patterns in a deterministic way. A Deterministic View of Learning in Dynamic Environments The authors begin with an introduction to the concepts of deterministic learning theory, followed by a discussion of the persistent excitation property of RBF networks. They describe the elements of deterministic learning, and address dynamical pattern recognition and pattern-based control processes. The results are applicable to areas such as detection and isolation of oscillation faults, ECG/EEG pattern recognition, robot learning and control, and security analysis and control of power systems. A New Model of Information Processing This book elucidates a learning theory which is developed using concepts and tools from the discipline of systems and control. Fundamental knowledge about system dynamics is obtained from dynamical processes, and is then utilized to achieve rapid recognition of dynamical patterns and pattern-based closed-loop control via the so-called internal and dynamical matching of system dynamics. This actually represents a new model of information processing, i.e. a model of dynamical parallel distributed processing (DPDP).

Neural Information Processing - Jun Wang 2006-10-03

The three volume set LNCS 4232, LNCS 4233, and LNCS 4234 constitutes the refereed proceedings of the 13th International Conference on Neural Information Processing, ICONIP 2006, held in Hong Kong, China in October 2006. The 386 revised full papers presented were carefully reviewed and selected from 1175 submissions.

Radial Basis Function (RBF) Neural Network Control for Mechanical Systems - Jinkun Liu 2013-01-26

Radial Basis Function (RBF) Neural Network Control for Mechanical Systems is motivated by the need for

systematic design approaches to stable adaptive control system design using neural network approximation-based techniques. The main objectives of the book are to introduce the concrete design methods and MATLAB simulation of stable adaptive RBF neural control strategies. In this book, a broad range of implementable neural network control design methods for mechanical systems are presented, such as robot manipulators, inverted pendulums, single link flexible joint robots, motors, etc. Advanced neural network controller design methods and their stability analysis are explored. The book provides readers with the fundamentals of neural network control system design. This book is intended for the researchers in the fields of neural adaptive control, mechanical systems, Matlab simulation, engineering design, robotics and automation. Jinkun Liu is a professor at Beijing University of Aeronautics and Astronautics.

Modern Adaptive Fuzzy Control Systems - Ardashir Mohammadzadeh 2022-12-04 This book explains the basic concepts, theory and applications of fuzzy systems in control in a simple unified approach with clear ex-amples and simulations in the MATLAB programming language. Fuzzy systems, especially, type-2 neuro-fuzzy systems, are now used extensively in various engineering fields for different purposes. In plain language, this book aims to practically explain fuzzy sys-tems and different methods of training and optimizing these systems. For this purpose, type-2 neuro-fuzzy systems are first analyzed along with various methods of training and optimizing these systems through implementation in MATLAB. These systems are then em-ployed to design adaptive fuzzy controllers. The authors aim at pre-senting all the well-known optimization methods clearly and code them in the MATLAB language.

Mechanical Engineers' Handbook, Volume 2 - Myer

Kutz 2015-02-06
Full coverage of electronics, MEMS, and instrumentation andcontrol in mechanical engineering This second volume of Mechanical Engineers' Handbookcovers electronics, MEMS, and instrumentation and control, givingyou accessible and in-depth access to the topics you'll encounterin the discipline: computer-aided design, product design formanufacturing and assembly, design optimization, total qualitymanagement in mechanical system design, reliability in themechanical design process for sustainability, life-cycle design,design for remanufacturing processes, signal processing, dataacquisition and display systems, and much more. The book provides a quick guide to specialized areas you mayencounter in your work, giving you access to the basics of each andpointing you toward trusted resources for further reading, ifneeded. The accessible information inside offers discussions,examples, and analyses of the topics covered, rather than thestraight data, formulas, and calculations you'll find in otherhandbooks. Presents the most comprehensive coverage of the entirediscipline of Mechanical Engineering anywhere in four interrelatedbooks Offers the option of being purchased as a four-book set or assingle books Comes in a subscription format through the Wiley Online Libraryand in electronic and custom formats Engineers at all levels will find Mechanical Engineers'Handbook, Volume 2 an excellent resource they can turn to forthe basics of electronics, MEMS, and instrumentation andcontrol.

Advances in Neural Networks - Fuchun Sun 2008-09-08
The two volume set LNCS 5263/5264 constitutes the refereed proceedings of the 5th International Symposium on Neural Networks, ISNN 2008, held in Beijing, China in September 2008. The 192 revised papers presented were

carefully reviewed and selected from a total of 522 submissions. The papers are organized in topical sections on computational neuroscience; cognitive science; mathematical modeling of neural systems; stability and nonlinear analysis; feedforward and fuzzy neural networks; probabilistic methods; supervised learning; unsupervised learning; support vector machine and kernel methods; hybrid optimisation algorithms; machine learning and data mining; intelligent control and robotics; pattern recognition; audio image processinc and computer vision; fault diagnosis; applications and implementations; applications of neural networks in electronic engineering; cellular neural networks and advanced control with neural networks; nature inspired methods of high-dimensional discrete data analysis; pattern recognition and information processing using neural networks.

Autonomous Mobile Robots - Frank L. Lewis 2018-10-03

It has long been the goal of engineers to develop tools that enhance our ability to do work, increase our quality of life, or perform tasks that are either beyond our ability, too hazardous, or too tedious to be left to human efforts. Autonomous mobile robots are the culmination of decades of research and development, and their potential is seemingly unlimited. Roadmap to the Future Serving as the first comprehensive reference on this interdisciplinary technology, Autonomous Mobile Robots: Sensing, Control, Decision Making, and Applications authoritatively addresses the theoretical, technical, and practical aspects of the field. The book examines in detail the key components that form an autonomous mobile robot, from sensors and sensor fusion to modeling and control, map building and path planning, and decision making and autonomy, and to the final integration of these components for diversified applications. Trusted Guidance A duo of accomplished experts

leads a team of renowned international researchers and professionals who provide detailed technical reviews and the latest solutions to a variety of important problems. They share hard-won insight into the practical implementation and integration issues involved in developing autonomous and open robotic systems, along with in-depth examples, current and future applications, and extensive illustrations. For anyone involved in researching, designing, or deploying autonomous robotic systems, Autonomous Mobile Robots is the perfect resource.

Advances in Neural Networks - ISNN 2006 - Jun Wang 2006-05-10

This is Volume II of a three volume set constituting the refereed proceedings of the Third International Symposium on Neural Networks, ISNN 2006. 616 revised papers are organized in topical sections on neurobiological analysis, theoretical analysis, neurodynamic optimization, learning algorithms, model design, kernel methods, data preprocessing, pattern classification, computer vision, image and signal processing, system modeling, robotic systems, transportation systems, communication networks, information security, fault detection, financial analysis, bioinformatics, biomedical and industrial applications, and more.

Advances in Neural Networks -- ISNN 2011 - Derong Liu 2011-05-10

The three-volume set LNCS 6675, 6676 and 6677 constitutes the refereed proceedings of the 8th International Symposium on Neural Networks, ISNN 2011, held in Guilin, China, in May/June 2011. The total of 215 papers presented in all three volumes were carefully reviewed and selected from 651 submissions. The contributions are structured in topical sections on computational neuroscience and cognitive science; neurodynamics and complex systems; stability and convergence analysis; neural

network models; supervised learning and unsupervised learning; kernel methods and support vector machines; mixture models and clustering; visual perception and pattern recognition; motion, tracking and object recognition; natural scene analysis and speech recognition; neuromorphic hardware, fuzzy neural networks and robotics; multi-agent systems and adaptive dynamic programming; reinforcement learning and decision making; action and motor control; adaptive and hybrid intelligent systems; neuroinformatics and bioinformatics; information retrieval; data mining and knowledge discovery; and natural language processing.

Modeling, Control and Coordination of Helicopter Systems - Beibei Ren 2012-02-02

Modeling, Control and Coordination of Helicopter Systems provides a comprehensive treatment of helicopter systems, ranging from related nonlinear flight dynamic modeling and stability analysis to advanced control design for single helicopter systems, and also covers issues related to the coordination and formation control of multiple helicopter systems to achieve high performance tasks. Ensuring stability in helicopter flight is a challenging problem for nonlinear control design and development. This book is a valuable reference on modeling, control and coordination of helicopter systems,providing readers with practical solutions for the problems that still plague helicopter system design and implementation. Readers will gain a complete picture of helicopters at the systems level, as well as a better understanding of the technical intricacies involved.

Nature-Inspired Computing: Concepts, Methodologies, Tools, and Applications - Management Association, Information Resources 2016-07-26

As technology continues to become more sophisticated, mimicking natural processes and phenomena also becomes

more of a reality. Continued research in the field of natural computing enables an understanding of the world around us, in addition to opportunities for man-made computing to mirror the natural processes and systems that have existed for centuries. Nature-Inspired Computing: Concepts, Methodologies, Tools, and Applications takes an interdisciplinary approach to the topic of natural computing, including emerging technologies being developed for the purpose of simulating natural phenomena, applications across industries, and the future outlook of biologically and nature-inspired technologies. Emphasizing critical research in a comprehensive multi-volume set, this publication is designed for use by IT professionals, researchers, and graduate students studying intelligent computing.

Application of Neural Networks to Adaptive Control of Nonlinear Systems - G. W. Ng 1997-04-30

This book investigates the ability of a neural network (NN) to learn how to control an unknown (nonlinear, in general) system, using data acquired on-line, that is during the process of attempting to exert control. Two algorithms are developed to train the neural network for real-time control applications. The first algorithm is known as Learning by Recursive Least Squares (LRLS) algorithm and the second algorithm is known as Integrated Gradient and Least Squares (IGLS) algorithm. The ability of these algorithms for training the NN controller for real-time control is demonstrated on practical applications and the local convergence and stability requirements of these algorithms are analysed. In addition, network topology, learning algorithms (particularly supervised learning) and neural network control strategies including a new classification system for them, are presented.

Neural Network-Based Adaptive Control of Uncertain Nonlinear

Systems - Kasra Esfandiari 2021-06-18
The focus of this book is the application of artificial neural networks in uncertain dynamical systems. It explains how to use neural networks in concert with adaptive techniques for system identification, state estimation, and control problems. The authors begin with a brief historical overview of adaptive control, followed by a review of mathematical preliminaries. In the subsequent chapters, they present several neural network-based control schemes. Each chapter starts with a concise introduction to the problem under study, and a neural network-based control strategy is designed for the simplest case scenario. After these designs are discussed, different practical limitations (i.e., saturation constraints and unavailability of all system states) are gradually added, and other control schemes are developed based on the primary scenario. Through these exercises, the authors present structures that not only provide mathematical tools for navigating control problems, but also supply solutions that are pertinent to real-life systems.

Adaptive Sliding Mode Neural Network Control for Nonlinear Systems - Yang Li 2018-11-16
Adaptive Sliding Mode Neural Network Control for Nonlinear Systems introduces nonlinear systems basic knowledge, analysis and control methods, and applications in various fields. It offers instructive examples and simulations, along with the source codes, and provides the basic architecture of control science and engineering. Introduces nonlinear systems' basic knowledge, analysis and control methods, along with applications in various fields Offers instructive examples and simulations, including source codes Provides the basic architecture of control science and engineering

Active Vibration Control and Stability Analysis of Flexible Beam Systems - Wei He 2018-12-17
This book presents theoretical

explorations of several fundamental problems in the dynamics and control of flexible beam systems. By integrating fresh concepts and results to form a systematic approach to control, it establishes a basic theoretical framework. It includes typical control design examples verified using MATLAB simulation, which in turn illustrate the successful practical applications of active vibration control theory for flexible beam systems. The book is primarily intended for researchers and engineers in the control system and mechanical engineering community, offering them a unique resource.

Applied Artificial Higher Order Neural Networks for Control and Recognition - Zhang, Ming 2016-05-05

In recent years, Higher Order Neural Networks (HONNs) have been widely adopted by researchers for applications in control signal generating, pattern recognition, nonlinear recognition, classification, and predition of control and recognition scenarios. Due to the fact that HONNs have been proven to be faster, more accurate, and easier to explain than traditional neural networks, their applications are limitless. Applied Artificial Higher Order Neural Networks for Control and Recognition explores the ways in which higher order neural networks are being integrated specifically for intelligent technology applications. Emphasizing emerging research, practice, and real-world implementation, this timely reference publication is an essential reference source for researchers, IT professionals, and graduate-level computer science and engineering students.

Advances in Neural Networks – ISNN 2015 - Xiaolin Hu 2015-10-14

The volume LNCS 9377 constitutes the refereed proceedings of the 12th International Symposium on Neural Networks, ISNN 2015, held in Jeju, South Korea in October 2015. The 55 revised full papers presented were

carefully reviewed and selected from 97 submissions. These papers cover many topics of neural network-related research including intelligent control, neurodynamic analysis, memristive neurodynamics, computer vision, signal processing, machine learning, and optimization.

Social Robotics Shuzhi Sam Ge 2012-11-04

This book constitutes the refereed proceedings of the 4th International Conference on Social Robotics, ICSR 2012, held in Chengdu, China, in October 2012. The 66 revised full papers were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on affective and cognitive sciences for socially interactive robots, situated interaction and embodiment, robots to assist the elderly and persons with disabilities, social acceptance of robots and their impact to the society, artificial empathy, HRI through non-verbal communication and control, social telepresence robots, embodiments and networks, interaction and collaboration among robots, humans and environment, human augmentation, rehabilitation, and medical robots I and II.

Stable Adaptive Control and Estimation for Nonlinear Systems - Jeffrey T. Spooner 2004-04-07

Includes a solution manual for problems. Provides MATLAB code for examples and solutions. Deals with robust systems in both theory and practice.

Stable Adaptive Neural Network Control - S.S. Ge 2002

While neural network control has been successfully applied in various practical applications, many important issues, such as stability, robustness, and performance, have not been extensively researched for neural adaptive systems. Motivated by the need for systematic neural control strategies for nonlinear systems, Stable Adaptive Neural Network Control offers an in-depth study of stable adaptive control designs using

approximation-based techniques, and presents rigorous analysis for system stability and control performance. Both linearly parameterized and multi-layer neural networks (NN) are discussed and employed in the design of adaptive NN control systems for completeness. Stable adaptive NN control has been thoroughly investigated for several classes of nonlinear systems, including nonlinear systems in Brunovsky form, nonlinear systems in strict-feedback and pure-feedback forms, nonaffine nonlinear systems, and a class of MIMO nonlinear systems. In addition, the developed design methodologies are not only applied to typical example systems, but also to real application-oriented systems, such as the variable length pendulum system, the underactuated inverted pendulum system and nonaffine nonlinear chemical processes (CSTR).

Radial Basis Function (RBF) Neural Network Control for Mechanical Systems - Jinkun Liu 2015-06-26

Radial Basis Function (RBF) Neural Network Control for Mechanical Systems is motivated by the need for systematic design approaches to stable adaptive control system design using neural network approximation-based techniques. The main objectives of the book are to introduce the concrete design methods and MATLAB simulation of stable adaptive RBF neural control strategies. In this book, a broad range of implementable neural network control design methods for mechanical systems are presented, such as robot manipulators, inverted pendulums, single link flexible joint robots, motors, etc. Advanced neural network controller design methods and their stability analysis are explored. The book provides readers with the fundamentals of neural network control system design. This book is intended for the researchers in the fields of neural adaptive control, mechanical systems, Matlab simulation, engineering

design, robotics and automation. Jinkun Liu is a professor at Beijing University of Aeronautics and Astronautics.

Advances in Natural Computation - Lipo Wang 2005-08-25

This book and its sister volumes, i.e., LNCS vols. 3610, 3611, and 3612, are the proceedings of the 1st International Conference on Natural Computation (ICNC 2005), jointly held with the 2nd International Conference on Fuzzy Systems and Knowledge Discovery (FSKD 2005, LNAI vols. 3613 and 3614) from 27 to 29 August 2005 in Changsha, Hunan, China.

Adaptive Control with Recurrent High-order Neural Networks - George A. Rovithakis 2012-12-06

The series Advances in Industrial Control aims to report and encourage technology transfer in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. New theory, new controllers, actuators, sensors, new industrial processes, computer methods, new applications, new philosophies ... , new challenges. Much of this development work resides in industrial reports, feasibility study papers and the reports of advanced collaborative projects. The series offers an opportunity for researchers to present an extended exposition of such new work in all aspects of industrial control for wider and rapid dissemination. Neural networks is one of those areas where an initial burst of enthusiasm and optimism leads to an explosion of papers in the journals and many presentations at conferences but it is only in the last decade that significant theoretical work on stability, convergence and robustness for the use of neural networks in control systems has been tackled. George Rovithakis and Manolis Christodoulou have been interested in these theoretical problems and in the practical aspects of neural network applications to industrial problems. This very welcome

addition to the Advances in Industrial Control series provides a succinct report of their research. The neural network model at the core of their work is the Recurrent High Order Neural Network (RHONN) and a complete theoretical and simulation development is presented. Different readers will find different aspects of the development of interest. The last chapter of the monograph discusses the problem of manufacturing or production process scheduling.

Modeling and Control of Complex Systems - Petros A. Ioannou 2007-12-26

Comprehension of complex systems comes from an understanding of not only the behavior of constituent elements but how they act together to form the behavior of the whole. However, given the multidisciplinary nature of complex systems, the scattering of information across different areas creates a chaotic situation for those trying to understand possible solutions and applications. Modeling and Control of Complex Systems brings together a number of research experts to present some of their latest approaches and future research directions in a language accessible to system theorists. Contributors discuss complex systems such as networks for modeling and control of civil structures, vehicles, robots, biomedical systems, fluid flow systems, and home automation systems. Each chapter provides theoretical and methodological descriptions of a specific application in the control of complex systems, including congestion control in computer networks, autonomous multi-robot docking systems, modeling and control in cancer genomics, and backstepping controllers for stabilization of turbulent flow PDEs. With this unique reference, you will discover how complexity is dealt with in different disciplines and learn about the latest methodologies, which are applicable to your own specialty. The balanced mix of theory and simulation

presented by Modeling and Control of Complex Systems supplies a strong vehicle for enlarging your knowledge base a fueling future advances and incredible breakthroughs.

Adaptive Neural Network Control of Robotic Manipulators - Shuzhi S. Ge 1998

Recently, there has been considerable research interest in neural network control of robots, and satisfactory results have been obtained in solving some of the special issues associated with the problems of robot control in an "on-and-off" fashion. This book is dedicated to issues on adaptive control of robots based on neural networks. The text has been carefully tailored to (i) give a comprehensive study of robot dynamics, (ii) present structured network models for robots, and (iii) provide systematic approaches for neural network based adaptive controller design for rigid robots, flexible joint robots, and robots in constraint motion. Rigorous proof of the stability properties of adaptive neural network controllers is provided. Simulation examples are also presented to verify the effectiveness of the controllers, and practical implementation issues associated with the controllers are also discussed.

Artificial Neural Networks – ICANN 2009 - Cesare Alippi 2009-09-03

This volume is part of the two-volume proceedings of the 19th International Conf- ence on Artificial Neural Networks (ICANN 2009), which was held in Cyprus during September 14–17, 2009. The ICANN conference is an annual meeting sp- sored by the European Neural Network Society (ENNS), in cooperation with the - ternational Neural Network Society (INNS) and the Japanese Neural Network Society (JNNS). ICANN 2009 was technically sponsored by the IEEE Computational Intel-gence Society. This series of conferences has been held annually since 1991 in various European countries and covers the field of neurocomputing, learning systems and related areas. Artificial neural

networks provide an information-processing structure inspired by biological nervous systems. They consist of a large number of highly interconnected processing elements, with the capability of learning by example. The field of artificial neural networks has evolved significantly in the last two decades, with active partici- tion from diverse fields, such as engineering, computer science, mathematics, artificial intelligence, system theory, biology, operations research, and neuroscience. Artificial neural networks have been widely applied for pattern recognition, control, optimization, image processing, classification, signal processing, etc.

Advances in Neural Networks-ISNN 2013 - Chengan Guo 2013-07-04

The two-volume set LNCS 7951 and 7952 constitutes the refereed proceedings of the 10th International Symposium on Neural Networks, ISNN 2013, held in Dalian, China, in July 2013. The 157 revised full papers presented were carefully reviewed and selected from numerous submissions. The papers are organized in following topics: computational neuroscience, cognitive science, neural network models, learning algorithms, stability and convergence analysis, kernel methods, large margin methods and SVM, optimization algorithms, varational methods, control, robotics, bioinformatics and biomedical engineering, brain-like systems and brain-computer interfaces, data mining and knowledge discovery and other applications of neural networks.

Neural Network Control of Nonlinear Discrete-Time Systems - Jagannathan Sarangapani 2018-10-03

Intelligent systems are a hallmark of modern feedback control systems. But as these systems mature, we have come to expect higher levels of performance in speed and accuracy in the face of severe nonlinearities, disturbances, unforeseen dynamics, and unstructured uncertainties.

Artificial neural networks offer a combination of adaptability, parallel processing, and learning capabilities that outperform other intelligent control methods in more complex systems. Borrowing from Biology Examining neurocontroller design in discrete-time for the first time, Neural Network Control of Nonlinear Discrete-Time Systems presents powerful modern control techniques based on the parallelism and adaptive capabilities of biological nervous systems. At every step, the author derives rigorous stability proofs and presents simulation examples to demonstrate the concepts. Progressive Development After an introduction to neural networks, dynamical systems, control of nonlinear systems, and feedback linearization, the book builds systematically from actuator nonlinearities and strict feedback in nonlinear systems to nonstrict feedback, system identification, model reference adaptive control, and novel optimal control using the Hamilton-Jacobi-Bellman formulation. The author concludes by developing a framework for implementing intelligent control in actual industrial systems using embedded hardware. Neural Network Control of Nonlinear Discrete-Time Systems fosters an understanding of neural network controllers and explains how to build them using detailed derivations, stability analysis, and computer simulations.

*Wireless Algorithms, Systems, and Applications*Liran Ma 2017-06-09

This book constitutes the proceedings of the 12th International Conference on Wireless Algorithms, Systems, and Applications, WASA 2017, held in Guilin, China, in June 2017.The 70 full papers and 9 short papers presented in this book werde carefully reviewed and selected from 238 submissions. The papers cover various topics such as cognitive radio networks; wireless sensor networks; cyber-physical systems; distributed and localized algorithm design and analysis; information and

coding theory for wireless networks; localization; mobile cloud computing; topology control and coverage; security and privacy; underwater and underground networks; vehicular networks; internet of things; information processing and data management; programmable service interfaces; energy-efficient algorithms; system and protocol design; operating system and middle-ware support; and experimental test-beds, models and case studies.

Advances in Neural Networks - ISNN 2006 - 2006

Robust Adaptive Control for Fractional-Order Systems with Disturbance and Saturation - Mou Chen 2017-10-20

A treatise on investigating tracking control and synchronization control of fractional-order nonlinear systems with system uncertainties, external disturbance, and input saturation Robust Adaptive Control for Fractional-Order Systems, with Disturbance and Saturation provides the reader with a good understanding on how to achieve tracking control and synchronization control of fractional-order nonlinear systems with system uncertainties, external disturbance, and input saturation. Although some texts have touched upon control of fractional-order systems, the issues of input saturation and disturbances have rarely been considered together. This book offers chapter coverage of fractional calculus and fractional-order systems; fractional-order PID controller and fractional-order disturbance observer; design of fractional-order controllers for nonlinear chaotic systems and some applications; sliding mode control for fractional-order nonlinear systems based on disturbance observer; disturbance observer based neural control for an uncertain fractional-order rotational mechanical system; adaptive neural tracking control for uncertain fractional-order chaotic systems subject to input saturation and

disturbance; stabilization control of continuous-time fractional positive systems based on disturbance observer; sliding mode synchronization control for fractional-order chaotic systems with disturbance; and more. Based on the approximation ability of the neural network (NN), the adaptive neural control schemes are reported for uncertain fractional-order nonlinear systems Covers the disturbance estimation techniques that have been developed to alleviate the restriction faced by traditional feedforward control and reject the effect of external disturbances for uncertain fractional-order nonlinear systems By combining the NN with the disturbance observer, the disturbance observer based adaptive neural control schemes have been studied for uncertain fractional-order nonlinear systems with unknown disturbances Considers, together, the issue of input saturation and the disturbance for the control of fractional-order nonlinear systems in the present of system uncertainty, external disturbance, and input saturation Robust Adaptive Control for Fractional-Order Systems, with Disturbance and Saturation can be used as a reference for the academic research on fractional-order nonlinear systems or used in Ph.D. study of control theory and engineering.

Applications of Neural Networks in High Assurance Systems - Johann M.Ph. Schumann 2010-02-28 "Applications of Neural Networks in High Assurance Systems" is the first book directly addressing a key part of neural network technology: methods used to pass the tough verification and validation (V&V) standards required in many safety-critical applications. The book presents what kinds of evaluation methods have been developed across many sectors, and how to pass the tests. A new adaptive structure of V&V is developed in this book, different from the simple six sigma methods usually used for

large-scale systems and different from the theorem-based approach used for simplified component subsystems.

Proceedings of ELM-2017
Jiuwen Cao 2018-10-16
This book contains some selected papers from the International Conference on Extreme Learning Machine (ELM) 2017, held in Yantai, China, October 4–7, 2017. The book covers theories, algorithms and applications of ELM. Extreme Learning Machines (ELM) aims to enable pervasive learning and pervasive intelligence. As advocated by ELM theories, it is exciting to see the convergence of machine learning and biological learning from the long-term point of view. ELM may be one of the fundamental `learning particles' filling the gaps between machine learning and biological learning (of which activation functions are even unknown). ELM represents a suite of (machine and biological) learning techniques in which hidden neurons need not be tuned: inherited from their ancestors or randomly generated. ELM learning theories show that effective learning algorithms can be derived based on randomly generated hidden neurons (biological neurons, artificial neurons, wavelets, Fourier series, etc) as long as they are nonlinear piecewise continuous, independent of training data and application environments. Increasingly, evidence from neuroscience suggests that similar principles apply in biological learning systems. ELM theories and algorithms argue that "random hidden neurons" capture an essential aspect of biological learning mechanisms as well as the intuitive sense that the efficiency of biological learning need not rely on computing power of neurons. ELM theories thus hint at possible reasons why the brain is more intelligent and effective than current computers. This conference will provide a forum for academics, researchers and engineers to share and exchange R&D

experience on both theoretical studies and practical applications of the ELM technique and brain learning. It gives readers a glance of the most recent advances of ELM.

Stable Adaptive Neural Network Control - S.S. Ge 2013-03-09

Recent years have seen a rapid development of neural network control tech niques and their successful applications. Numerous simulation studies and actual industrial implementations show that artificial neural network is a good candidate for function approximation and control system design in solving the control problems of complex nonlinear systems in the presence of different kinds of uncertainties. Many control approaches/methods, reporting inventions and control applications within the fields of adaptive control, neural control and fuzzy systems, have been published in various books, journals and conference proceedings. In spite of these remarkable advances in neural control field, due to the complexity of nonlinear systems, the present research on adaptive neural control is still focused on the development of fundamental methodologies. From a theoretical viewpoint, there is, in general, lack of a firmly mathematical basis in stability, robustness, and performance analysis of neural network adaptive control systems. This book is motivated by the need for systematic design approaches for stable adaptive control using approximation-based techniques. The main objec tives of the book are to develop stable adaptive neural control strategies, and to perform transient performance analysis of the resulted neural control systems analytically. Other linear-in-the-parameter function approximators can replace the linear-in-the-parameter neural networks in the controllers presented in the book without any difficulty, which include polynomials, splines, fuzzy systems, wavelet networks, among others. Stability is one of the most important issues being

concerned if an adaptive neural network controller is to be used in practical applications.

Intelligent Control Design and MATLAB Simulation - Jinkun Liu 2017-09-20

This book offers a comprehensive introduction to intelligent control system design, using MATLAB simulation to verify typical intelligent controller designs. It also uses real-world case studies that present the results of intelligent controller implementations to illustrate the successful application of the theory. Addressing the need for systematic design approaches to intelligent control system design using neural network and fuzzy-based techniques, the book introduces the concrete design method and MATLAB simulation of intelligent control strategies; offers a catalog of implementable intelligent control design methods for engineering applications; provides advanced intelligent controller design methods and their stability analysis methods; and presents a sample simulation and Matlab program for each intelligent control algorithm. The main topics addressed are expert control, fuzzy logic control, adaptive fuzzy control, neural network control, adaptive neural control and intelligent optimization algorithms, providing several engineering application examples for each method.