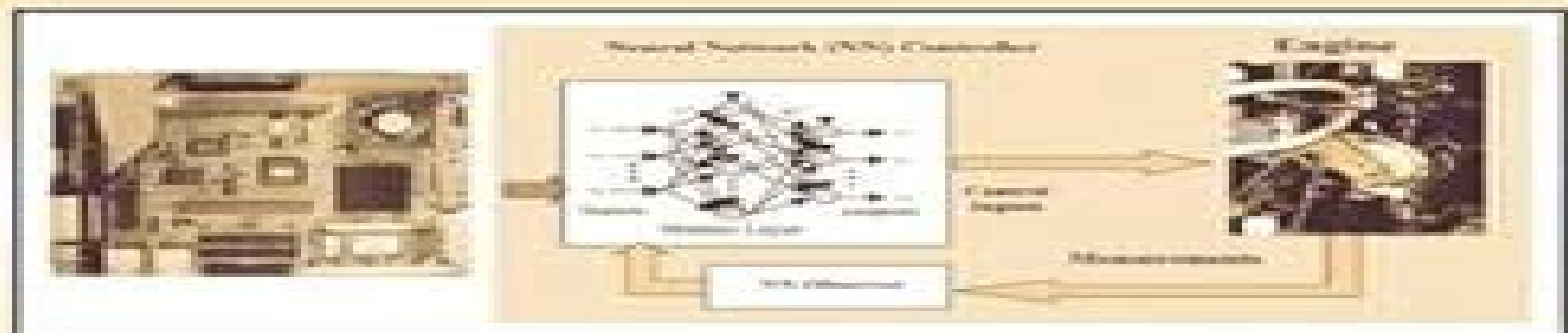


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Neural Network Control of Nonlinear Discrete-Time Systems Jagannathan Sarangapani, 2018-10-03 Intelligent systems are a hallmark of modern feedback control systems But as these systems mature we have come to expect higher levels of performance in speed 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

Deep Learning and Other Soft Computing Techniques Nguyen Hoang Phuong, Vladik Kreinovich, 2023-06-26 This book focuses on the use of artificial intelligence AI and computational intelligence CI in medical and related applications Applications include all aspects of medicine from diagnostics including analysis of medical images and medical data to therapeutics including drug design and radiotherapy to epidemic and pandemic related public health policies Corresponding techniques include machine learning especially deep learning techniques for processing expert knowledge e g fuzzy techniques and advanced techniques of applied mathematics such as innovative probabilistic and graph based techniques The book also shows that these techniques can be used in many other applications areas such as finance transportation physics This book helps practitioners and researchers to learn more about AI and CI methods and their biomedical and related applications and to further develop this important research direction

Computational Intelligence - Volume I Hisao Ishibuchi, 2015-12-30 Computational intelligence is a component of Encyclopedia of Technology Information and Systems Management Resources in the global Encyclopedia of Life Support Systems EOLSS which is an integrated compendium of twenty one Encyclopedias Computational intelligence is a rapidly growing research field including a wide variety of problem solving techniques inspired by nature Traditionally computational intelligence consists of three major research areas Neural Networks Fuzzy Systems and Evolutionary Computation Neural networks are mathematical models inspired by brains Neural networks have massively parallel network structures with many neurons and weighted connections

Whereas each neuron has a simple input output relation a neural network with many neurons can realize a highly non linear complicated mapping Connection weights between neurons can be adjusted in an automated manner by a learning algorithm to realize a non linear mapping required in a particular application task Fuzzy systems are mathematical models proposed to handle inherent fuzziness in natural language For example it is very difficult to mathematically define the meaning of cold in everyday conversations such as It is cold today and Can I have cold water The meaning of cold may be different in a different situation Even in the same situation a different person may have a different meaning Fuzzy systems offer a mathematical mechanism to handle inherent fuzziness in natural language As a result fuzzy systems have been successfully applied to real world problems by extracting linguistic knowledge from human experts in the form of fuzzy IF THEN rules Evolutionary computation includes various population based search algorithms inspired by evolution in nature Those algorithms usually have the following three mechanisms fitness evaluation to measure the quality of each solution selection to choose good solutions from the current population and variation operators to generate offspring from parents Evolutionary computation has high applicability to a wide range of optimization problems with different characteristics since it does not need any explicit mathematical formulations of objective functions For example simulation based fitness evaluation is often used in evolutionary design Subjective fitness evaluation by a human user is also often used in evolutionary art and music These volumes are aimed at the following five major target audiences University and College students Educators Professional practitioners Research personnel and Policy analysts managers and decision makers

Advanced Attitude Control of Satellite Bing Xiao,Zhaoyue Chen,Jingwen Xu,Lu Cao,2024-07-02 This book focuses on the high accuracy attitude control system design and approaches for satellite with modeling error including system uncertainties actuator faults and disturbances It presents a systematically and almost self contained description of the many facets of envisaging designing implementing or experimentally exploring modeling error compensation based attitude control of satellites The advanced treatment of practical issues in satellite attitude compensation control is one of the major features of the book which is particularly suited for readers who are interested to learn the latest solutions in attitude control system design of satellites The book intends to provide a unified platform for understanding and applicability of the modeling error compensation based attitude control for different purposes in aerospace engineering and some related fields It can benefit researchers engineers and graduate students in the fields of attitude control of satellites and other unmanned systems aerospace engineering etc

Intelligent Freight Transportation Petros A. Ioannou,2008-03-24 Increasing capacity at ports and goods movement in the supply chain in general while also satisfying environmental economic political labor union and other constraints is arguably the greatest challenge of modern transportation With space at a premium and costs through the roof it is increasingly obvious that the traditional solutions are

Reinforcement Learning for Optimal Feedback Control Rushikesh Kamalapurkar,Patrick Walters,Joel Rosenfeld,Warren Dixon,2018-05-10 Reinforcement Learning for Optimal

Feedback Control develops model based and data driven reinforcement learning methods for solving optimal control problems in nonlinear deterministic dynamical systems In order to achieve learning under uncertainty data driven methods for identifying system models in real time are also developed The book illustrates the advantages gained from the use of a model and the use of previous experience in the form of recorded data through simulations and experiments The book's focus on deterministic systems allows for an in depth Lyapunov based analysis of the performance of the methods described during the learning phase and during execution To yield an approximate optimal controller the authors focus on theories and methods that fall under the umbrella of actor critic methods for machine learning They concentrate on establishing stability during the learning phase and the execution phase and adaptive model based and data driven reinforcement learning to assist readers in the learning process which typically relies on instantaneous input output measurements This monograph provides academic researchers with backgrounds in diverse disciplines from aerospace engineering to computer science who are interested in optimal reinforcement learning functional analysis and functional approximation theory with a good introduction to the use of model based methods The thorough treatment of an advanced treatment to control will also interest practitioners working in the chemical process and power supply industry

Communication and Intelligent Systems Harish Sharma,Vivek Shrivastava,Kusum Kumari Bharti,Lipo Wang,2023-07-24 This book gathers selected research papers presented at the Fourth International Conference on Communication and Intelligent Systems ICCIS 2022 organized by National Institute of Technology Delhi India during December 19 20 2022 This book presents a collection of state of the art research work involving cutting edge technologies for communication and intelligent systems Over the past few years advances in artificial intelligence and machine learning have sparked new research efforts around the globe which explore novel ways of developing intelligent systems and smart communication technologies The book presents single and multi disciplinary research on these themes in order to make the latest results available in a single readily accessible source The book is presented in two volumes

Advances in Applied Artificial Intelligence Moonis Ali,Richard Dapoigny,2006-06-27 This book constitutes the refereed proceedings of the 19th International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems IEA AIE 2006 held in Annecy France June 2006 The book presents 134 revised full papers together with 3 invited contributions organized in topical sections on multi agent systems decision support genetic algorithms data mining and knowledge discovery fuzzy logic knowledge engineering machine learning speech recognition systems for real life applications and more

Advances in Computer and Computational Sciences Sanjiv K. Bhatia,Krishn K. Mishra,Shailesh Tiwari,Vivek Kumar Singh,2017-05-25 Exchange of information and innovative ideas are necessary to accelerate the development of technology With advent of technology intelligent and soft computing techniques came into existence with a wide scope of implementation in engineering sciences Keeping this ideology in preference this book includes the insights that reflect the Advances in Computer and Computational Sciences from upcoming

researchers and leading academicians across the globe It contains high quality peer reviewed papers of International Conference on Computer Communication and Computational Sciences ICCCCS 2016 held during 12 13 August 2016 in Ajmer India These papers are arranged in the form of chapters The content of the book is divided into two volumes that cover variety of topics such as intelligent hardware and software design advanced communications power and energy optimization intelligent techniques used in internet of things intelligent image processing advanced software engineering evolutionary and soft computing security and many more This book helps the perspective readers from computer industry and academia to derive the advances of next generation computer and communication technology and shape them into real life applications

Chemical, Mechanical and Materials Engineering Yiyi Zhouzhou, Qi Luo, 2011-07-27 Selected peer reviewed papers from the 2011 International Conference on Chemical Mechanical and Materials Engineering CMME 2011 July 8 10 2011 Guangzhou China

Proceedings of the 1992 International Conference on Industrial Electronics, Control, Instrumentation, and Automation: Signal processing [sic] and systems control, intelligent sensors and instrumentation, 1992

American Control Conference IEEE, IEEE, Press Staff, 1999 This set presents papers from the 1999 American Control Conference Topics covered include adaptive control observer based fault detection control applications advances in passivity based control methods stability and time delay systems and advance in control education

Discrete-Time Recurrent Neural Control Edgar N. Sanchez, 2018-09-03 The book presents recent advances in the theory of neural control for discrete time nonlinear systems with multiple inputs and multiple outputs The simulation results that appear in each chapter include rigorous mathematical analyses based on the Lyapunov approach to establish its properties The book contains two sections the first focuses on the analyses of control techniques the second is dedicated to illustrating results of real time applications It also provides solutions for the output trajectory tracking problem of unknown nonlinear systems based on sliding modes and inverse optimal control scheme This book on Discrete time Recurrent Neural Control is unique in the literature with new knowledge and information about the new technique of recurrent neural control especially for discrete time systems The book is well organized and clearly presented It will be welcome by a wide range of researchers in science and engineering especially graduate students and junior researchers who want to learn the new notion of recurrent neural control I believe it will have a good market It is an excellent book after all Guanrong Chen City University of Hong Kong This book includes very relevant topics about neural control In these days Artificial Neural Networks have been recovering their relevance and well established importance this due to its great capacity to process big amounts of data Artificial Neural Networks development always is related to technological advancements therefore it is not a surprise that now we are being witnesses of this new era in Artificial Neural Networks however most of the developments in this research area only focuses on applicability of the proposed schemes However Edgar N Sanchez author of this book does not lose focus and include both important applications as well as a deep theoretical analysis of Artificial Neural Networks to control

discrete time nonlinear systems It is important to remark that first the considered Artificial Neural Networks are development in discrete time this simplify its implementation in real time secondly the proposed applications ranging from modelling of unknown discrete time on linear systems to control electrical machines with an emphasize to renewable energy systems However its applications are not limited to these kind of systems due to their theoretical foundation it can be applicable to a large class of nonlinear systems All of these is supported by the solid research done by the author Alma Y Alanis University of Guadalajara Mexico This book discusses in detail how neural networks can be used for optimal as well as robust control design Design of neural network controllers for real time applications such as induction motors boost converters inverted pendulum and doubly fed induction generators has also been carried out which gives the book an edge over other similar titles This book will be an asset for the novice to the experienced ones Rajesh Joseph Abraham Indian Institute of Space Science Technology Thiruvananthapuram India *IEEE Transactions on Circuits and Systems*, 2005

1991 IEEE International Conference on Systems, Man, and Cybernetics, 1991 **Smart Engineering Systems** Cihan H. Dagli, 1998 Investigating a noise cancellation system for speakerphones Reproduced from typescripts Annotation copyrighted by Book News Inc Portland OR *The Directory of Graduate Studies*, 1999 **Manufacturing Science and Technology, ICMST2011** Wu Fan, 2011-11-22 Selected peer reviewed papers from the 2011 International Conference on Manufacturing Science and Technology ICMST 2011 September 16 18 2011 Singapore **Adaptive Systems in Control and Signal Processing 1995** Csilla Bányász, 1995 Paperback Leading academic and industrial researchers working with adaptive systems and signal processing have been given the opportunity to exchange ideas concepts and solutions at the IFAC Symposia on Adaptive Systems in Control and Signal Processing This postprint volume contains all those papers which were presented at the 5th IFAC Symposium in Budapest in 1995 The technical program was composed of a number of invited and contributed sessions and a special case study session providing a good balance between applications and theory oriented papers **2002 IEEE Region 10 Conference on Computers, Communications, Control and Power Engineering** TENCON (2002, Beijing), 2002

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