Download File PDF Neural Network Control Theory And Applications Rsdnet

Right here, we have countless book **Neural Network Control Theory And Applications Rsdnet** and collections to check out. We additionally provide variant types and as a consequence type of the books to browse. The welcome book, fiction, history, novel, scientific research, as competently as various supplementary sorts of books are readily to hand here.

As this Neural Network Control Theory And Applications Rsdnet, it ends stirring innate one of the favored ebook Neural Network Control Theory And Applications Rsdnet collections that we have. This is why you remain in the best website to see the incredible books to have.

8F1 - FREDERICK ADALYNN

Choice Outstanding Academic Title, 1996. In hundreds of articles by experts from around the world, and in overviews and "road maps" prepared by the editor, The Handbook of Brain Theory and Neural Networks charts the immense progress made in recent years in many specific areas related to great questions: How does the brain work? How can we build intelligent machines? While many books discuss limited aspects of one subfield or another of brain theory and neural networks, the Handbook covers the entire sweep of topics—from detailed models of single neurons, analyses of a wide variety of biological neural networks, and connectionist studies of psychology and language, to mathematical analyses of a variety of abstract neural networks, and technological applications of adaptive, artificial neural networks. Expository material makes the book accessible to readers with varied backgrounds while still offering a clear view of the recent, specialized research on specific topics.
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
This two volume set LNCS 6791 and LNCS 6792 constitutes the refereed proceedings of the 21th International Conference on Artificial Neural Networks, ICANN 2011, held in Espoo, Finland, in June 2011. The 106 revised full or poster papers presented were carefully reviewed and selected from numerous submissions. ICANN 2011 had two basic tracks: brain-inspired computing and machine learning research, with strong cross-disciplinary interactions and applications.
A Theory of Learning and Generalization provides a formal mathematical theory for addressing intuitive questions of the type: How does a machine learn a new concept on the basis of examples? How can a neural network, after sufficient training, correctly predict the output of a previously unseen input? How much training is required to achieve a specified level of accuracy in the prediction? How can one "identify" the dynamical behaviour of a nonlinear control system by observing its input-output behaviour over a finite interval of time? This is the first book to treat the problem of machine learning in conjunction with the theory of empirical processes, the latter being a well-established branch of probability theory. The treatment of both topics side by side leads to new insights, as well as new results in both topics. An extensive references section and open problems will help readers to develop their own work in the field.

For the first time, this book sets forth the concept and model for a process neural network. You'll discover how a process neural network expands the mapping relationship between the input and output of traditional neural networks and greatly enhances the expression capability of artificial neural networks. Detailed illustrations help you visualize information processing flow and the mapping relationship between inputs and outputs.
Introducing a wide variety of network types, including Kohenen nets, n-tuple nets and radial basis function networks as well as the more useful multilayer perception back-propagation networks, this book aims to give a detailed appreciation of the use of neural nets in these applications.
Recent rapid developments in computing power, such as parallel processing and neural networks, have stimulated new trends in control. However a discrepancy exists between available computing power and exploitable algorithms obtained classically from control theory. The aim of this book is to address the discrepancy from both the com putational power and control theory viewpoints. Areas such as identification, adaptive control, signal processing and neural networks therefore hold a prominent position in the text presented. The form of the book is such that it should be useful for readers at various levels, particularly those at the research and/or application stage. The book has resulted from the IFAC Workshop on the Mutual Impact of Computing Power and Control Theory, which was held at the Institute of Information Theory and Automation (UTIA), Prague, in September 1992. Organisation of the event was provided jointly by the Department of Adaptive Systems, UTIA, Prague and the School of Engineering and Information Sciences, University of Reading, UK. Selected papers from the Workshop have been chosen to give a good balance across the field, whilst at the same time highlighting important areas for future research. In this way the book represents edited Proceedings from the Workshop. One point, quickly apparent, is the international nature of the presentations themselves, which provide not only a technical appraisal of the field but also inject cultural aspects which are vitally important on the path ahead.
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.

How does a machine learn a new concept on the basis of examples? This second edition takes account of important new developments in the field. It also deals extensively with the theory of learning control systems, now comparably mature to learning of neural networks.
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.
How powerful new methods in nonlinear control engineering can be applied to neuroscience, from fundamental model formulation to advanced medical applications. Over the past sixty years, powerful methods of model-based control engineering have been responsible for such dramatic advances in engineering systems as autolanding aircraft, autonomous vehicles, and even weather forecasting. Over those same decades, our models of the nervous system have evolved from single-cell membranes to neuronal networks to large-scale models of the human brain. Yet until recently control theory was completely inapplicable to the types of nonlinear models being developed in neuroscience. The revolution in nonlinear control engineering in the late 1990s has made the intersection of control theory and neuroscience possible. In Neural Control Engineering, Steven Schiff seeks to bridge the two fields, examining the application of new methods in nonlinear control engineering to neuroscience. After presenting extensive material on formulating computational neuroscience models in a control environment—including some fundamentals of the algorithms helpful in crossing the divide from intuition to effective application—Schiff examines a range of applications, including brain-machine interfaces and neural stimulation. He reports on research that he and his colleagues have undertaken showing that nonlinear control theory methods can be applied to models of single cells, small neuronal networks, and large-scale networks in disease states of Parkinson's disease and epilepsy. With Neural Control Engineering the reader acquires a working knowledge of the fundamentals of control theory and computational neuroscience sufficient not only to understand the literature in this trandisciplinary area but also to begin working to advance the field. The book will serve as an essential guide for scientists in either biology or engineering and for physicians who wish to gain expertise in these areas.
Control problems offer an industrially important application and a guide to understanding control systems for those working in Neural Networks. Neural Systems for Control represents the most up-to-date developments in the rapidly growing aplication area of neural networks and focuses on research in natural and artifical neural systems directly applicable to control or making use of modern control theory. The book covers such important new developments in control systems such as intelligent sensors in semiconductor wafer manufacturing; the relation between muscles and cerebral neurons in speech recognition; online compensation of reconfigurable control for spacecraft aircraft and other systems; applications to rolling mills, robotics and process control; the usage of past output data to identify nonlinear systems by neural networks; neural approximate optimal control; model-free nonlinear control; and neural control based on a regulation of physiological investigation/blood pressure control. All researchers and students dealing with control systems will find the fascinating Neural Systems for Control of immense interest and assistance. Focuses on research in natural and artifical neural systems directly applicable to contol or making use of modern control theory Represents the most up-to-date developments in this rapidly growing application area of neural networks Takes a new and novel approach to system identification and synthesis

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.
This second edition presents the enormous progress made in recent years in the many subfields related to the two great questions : how does the brain work? and, How can we build intelligent machines? This second edition greatly increases the coverage of models of fundamental neurobiology, cognitive neuroscience, and neural network approaches to language. (Midwest).
Well-written, practice-oriented textbook, and compact textbook Presents the contemporary state of the art of control theory and its applications Introduces traditional problems that are useful in the automatic control of technical processes, plus presents current issues of control Explains methods can be easily applied for the determination of the decision algorithms in computer control and management systems
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 Develop-

ment 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.

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.

The theoretical foundations of Neural Networks and Analog Computation conceptualize neural networks as a particular type of computer consisting of multiple assemblies of basic processors interconnected in an intricate structure. Examining these networks under various resource constraints reveals a continuum of computational devices, several of which coincide with well-known classical models. On a mathematical level, the treatment of neural computations enriches the theory of computation but also explicated the computational complexity associated with biological networks, adaptive engineering tools, and related models from the fields of control theory and nonlinear dynamics. The material in this book will be of interest to researchers in a variety of engineering and applied sciences disciplines. In addition, the work may provide the base of a graduate-level seminar in neural networks for computer science students.

The subject matter of this book ranges from new control design methods to control theory applications in electrical and mechanical engineering and computers. The book covers certain aspects of control theory, including new methodologies, techniques, and applications. It promotes control theory in practical applications of these engineering domains and shows the way to disseminate researchers' contributions in the field. This project presents applications that improve the properties and performance of control systems in analysis and design using a higher technical level of scientific attainment. The authors have included worked examples and case studies resulting from their research in the field. Readers will benefit from new solutions and answers to questions related to the emerging realm of control theory in engineering applications and its implementation.

This book systematically synthesizes research achievements in the field of fuzzy neural networks in recent years. It also provides a comprehensive presentation of the developments in fuzzy neural networks, with regard to theory as well as their application to system modeling and image restoration. Special emphasis is placed on the fundamental concepts and architecture analysis of fuzzy neural networks. The book is unique in treating all kinds of fuzzy neural networks and their learning algorithms and universal approximations, and employing simulation examples which are carefully designed to help the reader grasp the underlying theory. This is a valuable reference for scientists and engineers working in mathematics, computer science, control or other fields related to information processing. It can also be used as a textbook for graduate courses in applied mathematics, computer science, automatic control and electrical engineering.

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.

"While the book is written to serve as an advanced control reference on NN control for researchers, postgraduates and senior undergraduates, it should be equally useful to those industrial practitioners who are keen to explore the use of advanced neural network control in real problems. The prerequisite for gaining maximum benefit from this book is a basic knowledge of control systems, such as that imparted by a first undergraduate course on control systems engineering."--Jacket.

There has been great interest in "universal controllers" that mimic the functions of human processes to learn about the systems they are controlling on-line so that performance improves automatically. Neural network controllers are derived for robot manipulators in a variety of applications including position control, force control, link flexibility stabilization and the management of high-frequency joint and motor dynamics. The first chapter provides a background on neural networks and the second on dynamical systems and control. Chapter three introduces the robot control problem and standard techniques such as torque, adaptive and robust control. Subsequent chapters give design techniques and Stability Proofs For NN Controllers For Robot Arms, Practical Robotic systems with high frequency vibratory modes, force control and a general class of non-linear systems. The last chapters are devoted to discrete- time NN controllers. Throughout the text, worked examples are provided.

Neural Networks for Control brings together examples of all the most important paradigms for the application of neural networks to robotics and control. Primarily concerned with engineering problems and approaches to their solution through neurocomputing systems, the book is divided into three sections: general principles, motion control, and applications domains (with evaluations of the possible applications by experts in the applications areas.) Special emphasis is placed on designs based on optimization or reinforcement, which will become increasingly important as researchers address more complex engineering challenges or real biological-control problems.A Bradford Book. Neural Network Modeling and Connectionism series

Parallel hybrid-electric propulsion systems would be beneficial for small unmanned aerial vehicles (UAVs) used for military, homeland security, and disaster monitoring missions involving intelligence, surveillance, or reconnaissance (ISR). The benefits include increased time-on-station and range than electric-powered UAVs and stealth modes not available with gasoline-powered UAVs. A conceptual design of a small UAV with a parallel hybrid-electric propulsion system, an optimization routine for the energy use, the application of a neural network to approximate the optimization results, and simulation results are provided. The two-point conceptual design includes an internal combustion engine sized for cruise and an electric motor and lithium-ion battery pack sized for endurance speed. The flexible optimization routine allows relative importance to be assigned between the use of gasoline, electricity, and recharging. The Cerebellar Model Arithmetic Computer (CMAC) neural network approximates the optimization results and is applied to the control of the parallel hybrid-electric propulsion system. The CMAC controller saves on the required memory compared to a large look-up table by two orders of magnitude. The energy use for the hybrid-electric UAV with the CMAC controller during a one-hour and a three-hour ISR mission is 58% and 27% less, respectively, than for a gasoline-powered UAV.

The series Advances in Industrial Control aims to report and encourage technology transfer in control engineering. The rapid development of control technology impacts 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. Within the control community there has been much discussion of and interest in the new Emerging Technologies and Methods. Neural networks along with Fuzzy Logic and Expert Systems is an emerging methodology which has the potential to contribute to the development of intelligent control technologies. This volume of some thirteen chapters edited by Kenneth Hunt, George Irwin and Kevin Warwick makes a useful contribution to the literature of neural network methods and applications. The chapters are arranged systematically progressing from theoretical foundations, through the training aspects of neural nets and concluding with four chapters of applications. The applications include problems as diverse as oven tempera ture control, and energy/load forecasting routines. We hope this interesting but balanced mix of material appeals to a wide range of readers from the theoretician to the industrial applications engineer.

Artificial neural networks possess several properties that make them particularly attractive for applications to modelling and control of complex non-linear systems. Among these properties are their universal approximation ability, their parallel network structure and the availability of on- and off--line learning methods for the interconnection weights. However, dynamic models that contain neural network architectures might be highly non-linear and difficult to analyse as a result. Artificial Neural Networks for Modelling and Control of Non-Linear Systems investigates the subject from a system theoretical point of view. However the mathematical theory that is required from the reader is limited to matrix calculus, basic analysis, differential equations and basic linear system theory. No preliminary knowledge of neural networks is explicitly required. The book presents both classical and novel network architectures and learning algorithms for modelling and control. Topics include non-linear system identification, neural optimal control, top-down model based neural control design and stability analysis of neural control systems. A major contribution of this book is to introduce NLq Theory as an extension towards modern control theory, in order to analyze and synthesize non-linear systems that contain linear together with static non-linear operators that satisfy a sector condition: neural state space control systems are an example. Moreover, it turns out that NLq Theory is unifying with respect to many problems arising in neural networks, systems and control. Examples show that complex non-linear systems can be modelled and controlled within NLq theory, including mastering chaos. The didactic flavor of this book makes it suitable for use as a text for a course on Neural Networks. In addition, researchers and designers will find many important new techniques, in particular NLq emTheory, that have applications in control theory, system theory, circuit theory and Time Series Analysis.

The two-volume set LNCS 7367 and 7368 constitutes the refereed proceedings of the 9th International Symposium on Neural Networks, ISNN 2012, held in Shenyang, China, in July 2012. The 147 revised full papers presented were carefully reviewed and selected from numerous submissions. The contributions are structured in topical sections on mathematical modeling; neurodynamics; cognitive neuroscience; learning algorithms; optimization; pattern recognition; vision; image processing; information processing; neurocontrol; and novel applications.

This book deals with continuous time dynamic neural networks theory applied to the solution of basic problems in robust control theory, including identification, state space estimation (based on neuro-observers) and trajectory tracking. The plants to be identified and controlled are assumed to be a priori unknown but belonging to a given class containing internal unmodelled dynamics and external perturbations as well. The error stability analysis and the corresponding error bounds for different problems are presented. The effectiveness of the suggested approach is illustrated by its application to various controlled physical systems (robotic, chaotic, chemical, etc.). Contents: Theoretical Study: Neural Networks Structures; Nonlinear System Identification: Differential Learning; Sliding Mode Identification: Algebraic Learning; Neural State Estimation; Passivation via Neuro Control; Neuro Trajectory Tracking; Neurocontrol Applications: Neural Control for Chaos; Neuro Control for Robot Manipulators; Identification of Chemical Processes; Neuro Control for Distillation Column; General Conclusions and Future Work; Appendices: Some Useful Mathematical Facts; Elements of Qualitative Theory of ODE; Locally Optimal Control and Optimization. Readership: Graduate students, researchers, academics/lecturers and industrialists in neural networks.

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.

The primary purpose of this book is to present a set of techniques which allow the design of controllers able to guarantee stability, convergence and robustness for dynamical systems with unknown nonlinearities and of manufacturing systems. To compensate for the significant amount of uncertainty in system structure, a neural network model developed recently, namely the Recurrent High Order Neural Network (RHONN), is employed. Real applications are provided with illustrations and tables for clarification; the book contains material on: - RHONN structure and approximation capabilities - indirect adaptive control - direct adaptive control - scheduling for manufacturing systems - test case for scheduling using RHONNs. The book is primarily intended for industrial and institutional practitioners but should be of significant interest to undergraduate and graduate students and academic scientists working with neural networks and their applications in engineering.

1. An overview of neural networks in control applications; 2. Artificial neural network based intelligent robot dynamic control; 3. Neural servo controller for position, force stabbing control of robotic manipulators; 4. Model-based adaptive neural structures for robotic control; 5. Intelligent co-ordination of multiple systems with neural networks; 6. Neural networks for mobile robot piloting control; 7. A neural network controller for the navigation and obstacle avoidance of a mobile robot; An ultrasonic 3-D robot vision system based on the statistical properties of artificial neural networks; Visual control of robotic manipulator based on neural networks; 10. Brain building for a biological robot; 11. Robustness of a distributed neural network controller for locomotion in a hexapod robot.

Though mathematical ideas underpin the study of neural networks, the author presents the fundamentals without the full mathematical apparatus. All aspects of the field are tackled, including artificial neurons as models of their real counterparts; the geometry of network action in pattern space; gradient descent methods, including back-propagation; associative memory and Hopfield nets; and self-organization and feature maps. The traditionally difficult topic of adaptive resonance theory is clarified within a hierarchical description of its operation. The book also includes several real-world examples to provide a concrete focus. This should enhance its appeal to those involved in the design, construction and management of networks in commercial environments and who wish to improve their understanding of network simulator packages. As a comprehensive and highly accessible introduction to one of the most important topics in cognitive and computer science, this volume should interest a wide range of readers, both students and professionals, in cognitive science, psychology, computer science and electrical engineering.

This book provides up-to-date developments in the stability analysis and (anti-)synchronization control area for complex-valued neural networks systems with time delay. It brings out the characteristic systematism in them and points out further insight to solve relevant problems. It presents a comprehensive, up-to-date, and detailed treatment of dynamical behaviors including stability analysis and (anti-)synchronization control. The materials included in the book are mainly based on the recent research work carried on by the authors in this domain. The book is a useful reference for all those from senior undergraduates, graduate students, to senior researchers interested in or working with control theory, applied mathematics, system analysis and integration, automation, nonlinear science, computer and other related fields, especially those relevant scientific and technical workers in the research of complex-valued neural network systems, dynamic systems, and intelligent control theory.

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

Surprising tales from the scientists who first learned how to use computers to understand the workings of the human brain. Since World War II, a group of scientists has been attempting to understand the human nervous system and to build computer systems that emulate the brain's abilities. Many of the early workers in this field of neural networks came from cybernetics; others came from neuroscience, physics, electrical engineering, mathematics, psychology, even economics. In this collection of interviews, those who helped to shape the field share their childhood memories, their influences, how they became interested in neural networks, and what they see as its future. The subjects tell stories that have been told, referred to, whispered about, and imagined throughout the history of the field. Together, the interviews form a Rashomon-like web of reality. Some of the mythic people responsible for the foundations of modern brain theory and cybernetics, such as Norbert Wiener, Warren McCulloch, and Frank Rosenblatt, appear prominently in the recollections. The interviewees agree about some things and disagree about more. Together, they tell the story of how science is actually done, including the false starts, and the Darwinian struggle for jobs, resources, and reputation. Although some of the interviews contain technical material, there is no actual mathematics in the book. Contributors James A. Anderson, Michael Arbib, Gail Carpenter, Leon Cooper, Jack Cowan, Walter Freeman, Stephen Grossberg, Robert Hecht-Neilsen, Geoffrey Hinton, Teuvo Kohonen, Bart Kosko, Jerome Lettvin, Carver Mead, David Rumelhart, Terry Sejnowski, Paul Werbos, Bernard Widrow

This book reports on the latest advances in concepts and further development of principal component analysis (PCA), discussing in detail a number of open problems related to dimensional reduction techniques and their extensions. It brings together research findings, previously scattered throughout many scientific journal papers worldwide, and presents them in a methodologically unified form. Offering vital insights into the subject matter in self-contained chapters that balance the theory and concrete applications, and focusing on open problems, it is essential reading for all researchers and practitioners with an interest in PCA