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Neural and Fuzzy Logic Control of Drives and Power Systems Apress

Understand the fundamentals of the emerging field of fuzzy neural networks, their applications and the most used paradigms with this carefully organized state-of-the-art textbook. Previously tested at a number of noteworthy conference tutorials, the simple numerical examples presented in this book provide excellent tools for progressive learning. UNDERSTANDING NEURAL NETWORKS AND FUZZY LOGIC offers a simple presentation and bottom-up approach that is ideal for working professional engineers, undergraduates, medical/biology majors, and anyone with a nonspecialist background. Sponsored by: IEEE Neural Networks Council

Foundations of Neural Networks, Fuzzy Systems, and Knowledge Engineering CRC Press

Computational Intelligence: Synergies of Fuzzy Logic, Neural Networks and Evolutionary Computing presents an introduction to some of the cutting edge technological paradigms under the umbrella of computational intelligence. Computational intelligence schemes are investigated with the development of a suitable framework for fuzzy logic, neural networks and evolutionary computing, neuro-fuzzy systems, evolutionary-fuzzy systems and evolutionary neural systems. Applications to linear and non-linear systems are discussed with examples. Key features: Covers all the aspects of fuzzy, neural and evolutionary approaches with worked out examples, MATLAB® exercises and applications in each chapter Presents the synergies of technologies of computational intelligence such as evolutionary fuzzy neural fuzzy and evolutionary neural systems Considers real world problems in the domain of systems modelling, control and optimization Contains a foreword written by Lotfi Zadeh Computational Intelligence: Synergies of Fuzzy Logic, Neural Networks and Evolutionary Computing is an ideal text for final year undergraduate, postgraduate and research students in electrical, control, computer, industrial and manufacturing engineering.

NEURAL NETWORKS, FUZZY SYSTEMS AND EVOLUTIONARY ALGORITHMS : SYNTHESIS AND APPLICATIONS Newnes

This volume covers the integration of fuzzy logic and expert systems. A vital resource in the field, it includes techniques for applying fuzzy systems to neural networks for modeling and control, systematic design procedures for realizing fuzzy neural systems, techniques for the design of rule-based expert systems using the massively parallel processing capabilities of neural networks, the transformation of neural systems into rule-based expert systems, the characteristics and relative merits of integrating fuzzy sets, neural networks, genetic algorithms, and rough sets, and applications to system identification and control as well as nonparametric, nonlinear estimation. Practitioners, researchers, and students in industrial, manufacturing, electrical, and mechanical engineering, as well as computer scientists and engineers will appreciate this reference source to diverse application methodologies. Fuzzy system techniques applied to neural networks for modeling and control Systematic design procedures for realizing fuzzy neural systems Techniques for the design of rule-based expert systems Characteristics and relative merits of integrating fuzzy sets, neural networks, genetic algorithms, and rough sets System identification and control Nonparametric, nonlinear estimation Practitioners, researchers, and students in industrial, manufacturing, electrical, and mechanical engineering, as well as computer scientists and engineers will find this volume a unique and comprehensive reference to these diverse application methodologies

Deep Neuro-Fuzzy Systems with Python Springer Nature

Artificial neural networks can mimic the biological information-processing mechanism in a very limited sense. Fuzzy logic provides a basis for representing uncertain and imprecise knowledge and

forms a basis for human reasoning. Neural networks display genuine promise in solving problems, but a definitive theoretical basis does not yet exist for their design. Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms integrates neural net, fuzzy system, and evolutionary computing in system design that enables its readers to handle complexity - offsetting the demerits of one paradigm by the merits of another. This book presents specific projects where fusion techniques have been applied. The chapters start with the design of a new fuzzy-neural controller. Remaining chapters discuss the application of expert systems, neural networks, fuzzy control, and evolutionary computing techniques in modern engineering systems. These specific applications include: direct frequency converters electro-hydraulic systems motor control toaster control speech recognition vehicle routing fault diagnosis Asynchronous Transfer Mode (ATM) communications networks telephones for hard-of-hearing people control of gas turbine aero-engines telecommunications systems design Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms covers the spectrum of applications - comprehensively demonstrating the advantages of fusion techniques in industrial applications.

Geophysical Applications of Artificial Neural Networks and Fuzzy Logic Elsevier

The extensively revised and updated edition provides a logical and easy-to-follow progression through C++ programming for two of the most popular technologies for artificial intelligence--neural and fuzzy programming. The authors cover theory as well as practical examples, giving programmers a solid foundation as well as working examples with reusable code.

Computational Intelligence Pearson Education

Provides an in-depth and even treatment of the three pillars of computational intelligence and how they relate to one another This book covers the three fundamental topics that form the basis of computational intelligence: neural networks, fuzzy systems, and evolutionary computation. The text focuses on inspiration, design, theory, and practical aspects of implementing procedures to solve real-world problems. While other books in the three fields that comprise computational intelligence are written by specialists in one discipline, this book is co-written by current former Editor-in-Chief of IEEE Transactions on Neural Networks and Learning Systems, a former Editor-in-Chief of IEEE Transactions on Fuzzy Systems, and the founding Editor-in-Chief of IEEE Transactions on Evolutionary Computation. The coverage across the three topics is both uniform and consistent in style and notation. Discusses single-layer and multilayer neural networks, radial-basis function networks, and recurrent neural networks Covers fuzzy set theory, fuzzy relations, fuzzy logic interference, fuzzy clustering and classification, fuzzy measures and fuzzy integrals Examines evolutionary optimization, evolutionary learning and problem solving, and collective intelligence Includes end-of-chapter practice problems that will help readers apply methods and techniques to real-world problems Fundamentals of Computational Intelligence is written for advanced undergraduates, graduate students, and practitioners in electrical and computer engineering, computer science, and other engineering disciplines.

Fuzzy Logic and Intelligent Systems PHI Learning Pvt. Ltd.

Esta dissertação investiga o desempenho de técnicas de inteligência computacional na previsão de carga em curto prazo. O objetivo deste trabalho foi propor e avaliar sistemas de redes neurais, lógica nebulosa, neuro-fuzzy e híbridos para previsão de carga em curto prazo, utilizando como entradas variáveis que influenciam o comportamento da carga, tais como: temperatura, índice de conforto e perfil de consumo. Este trabalho envolve 4 etapas principais: um estudo sobre previsão de carga e sobre as variáveis que influenciam o comportamento da carga; um estudo da aplicação de técnicas de inteligência computacional em previsão de carga; a definição de sistemas de redes neurais, lógica fuzzy e neuro-fuzzy em previsão de carga; e estudo de casos. No estudo sobre previsão de carga, foi observada a influência de algumas variáveis no comportamento da curva de carga de uma empresa de energia elétrica. Entre estas variáveis se encontram alguns dados meteorológicos (Temperatura, Umidade, Luminosidade, Índice de conforto, etc.), além de

informações sobre o perfil de consumo de carga das empresas. Também foi observado o comportamento da série de carga com relação ao dia da semana, sua sazonalidade e a correlação entre o valor atual e valores passados. Foi realizado um levantamento bibliográfico sobre a aplicação de técnicas de inteligência computacional na previsão de carga. Os modelos de redes neurais, são os mais explorados até o momento. Os modelos de lógica fuzzy começaram a ser utilizados mais recentemente. Modelos neuro-fuzzy são mais recentes que os demais, não existindo portanto, muita bibliografia a respeito. Os projetos de aplicação dos três modelos foram classificados quanto à sua arquitetura, desempenho, erros medidos, entradas utilizadas e horizonte da previsão. Foram propostos e implementados 4 sistemas de previsão de carga: lógica fuzzy, redes neurais, sistema neuro-fuzzy hierárquico e um sistema híbrido neural/neuro-fuzzy. Os sistemas foram especializados para cada dia da semana, pelo fato do comportamento da carga ser distinto entre estes dias. Para os sistemas neural, neuro-fuzzy e híbrido os dados também foram separados em inverno e verão, pois o perfil de consumo de carga é diferente nestas estações. O sistema com lógica fuzzy foi modelado para realizar previsões de curtíssimo prazo (10 em 10 minutos), utilizando para isto o histórico de carga, hora do dia e intervalo de dez minutos dentro da hora do dia. As regras do sistema foram geradas automaticamente a partir do histórico de carga e os conjuntos nebulosos foram pré-definidos. O sistema com redes neurais teve sua arquitetura definida através de experimentos, utilizando-se apenas dados de carga, hora do dia e mês como entradas. O modelo de rede escolhido foi com retropropagação do erro (backpropagation). Foram realizados testes incluindo outras entradas como temperatura e perfil de consumo. Para o sistema neuro-fuzzy foi escolhido um sistema neuro-fuzzy hierárquico, que define automaticamente sua estrutura e as regras a partir do histórico dos dados. Em uma última etapa, foi estudado um sistema híbrido neural/ neuro-fuzzy, no qual a previsão da rede neural é uma entrada do sistema neuro-fuzzy. Para os três últimos modelos as previsões realizadas foram em curto prazo, com um horizonte de uma hora Os sistemas propostos foram testados em estudos de casos e os resultados comparados entre si e com os resultados obtidos em outros projetos na área. Os dados de carga utilizados no sistema com lógica fuzzy foram da CEMIG, no período de 1994 a 1996, em intervalos de 10 minutos, para previsões em curtíssimo prazo. Os resultados obtidos podem ser considerados bons em comparação com um sistema de redes neurais utilizando os mesmos dados. Para os demais modelos foram utilizados os seguintes dados: dados horários de carga da Light e da CPFL, no período de 1996 a 1998; dados de temperatura (horária para região de atuação da Light e diária para a região da CPFL) no período de 1996 a 1998; a codificação do mês e hora do dia; e um perfil de carga por classe de consumo, para realizar previsões de curto prazo (1 hora, 24 passos a frente). Os dados foram separados em inverno e verão, além de dia da semana, o que torna os modelos bastante especializados. Os resultados obtidos pelos modelos foram da ordem de 0,0 % para o sistema com lógica fuzzy, 0,0 % para redes neurais, 0,0 % para o sistema neuro-fuzzy e 0,0 % para o sistema híbrido. Este trabalho verificou a aplicabilidade das técnicas de inteligência computacional na previsão de carga, demonstrando que um estudo preliminar das séries a serem previstas e a sua relação com outras variáveis tem forte influência sobre as previsões.

Fuzzy And Neural Approaches in Engineering M & T Books

Artificial neural networks can mimic the biological information-processing mechanism in - a very limited sense. Fuzzy logic provides a basis for representing uncertain and imprecise knowledge and forms a basis for human reasoning. Neural networks display genuine promise in solving problems, but a definitive theoretical basis does not yet exist for their design. Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms integrates neural net, fuzzy system, and evolutionary computing in system design that enables its readers to handle complexity - offsetting the demerits of one paradigm by the merits of another. This book presents specific projects where fusion techniques have been applied. The chapters start with the design of a new fuzzy-neural controller. Remaining chapters discuss the application of expert systems, neural networks, fuzzy control, and evolutionary computing techniques in modern engineering systems. These specific applications include: direct frequency converters electro-hydraulic systems motor control toaster control speech recognition vehicle routing fault diagnosis Asynchronous Transfer Mode (ATM) communications networks telephones for hard-of-hearing people control of gas turbine aero-engines telecommunications systems design Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms covers the spectrum of applications - comprehensively demonstrating the advantages of fusion techniques in industrial applications.

Prentice Hall

This book describes hybrid intelligent systems using type-2 fuzzy logic and modular neural networks for pattern recognition applications. Hybrid intelligent systems combine several intelligent computing paradigms, including fuzzy logic, neural networks, and bio-inspired optimization algorithms, which can be used to produce powerful pattern recognition systems. Type-2 fuzzy logic is an extension of traditional type-1 fuzzy logic that enables managing higher levels of uncertainty in complex real world problems, which are of particular importance in the area of pattern recognition. The book is organized in three main parts, each containing a group of chapters built around a similar subject. The first part consists of chapters with the main theme of theory and design algorithms, which are basically chapters that propose new models and concepts, which are the basis for achieving intelligent pattern recognition. The second part contains chapters with the main theme of using type-2 fuzzy models and modular neural networks with the aim of designing intelligent systems for complex pattern recognition problems, including iris, ear, face and voice recognition. The third part contains chapters with the theme of evolutionary optimization of type-2 fuzzy systems and modular neural networks in the area of intelligent pattern recognition, which includes the application of genetic algorithms for obtaining optimal type-2 fuzzy integration systems and ideal neural network architectures for solving problems in this area.

Neural Networks and Other Soft Computing Techniques with Applications in the Oil Industry Springer
The introduction of artificial intelligence, neural networks, and fuzzy logic into industry has given a new perspective to manufacturing processes in the U.S. and abroad. To help readers keep pace, this book addresses topics of intelligent manufacturing from a variety of theoretical, empirical, design, and implementation perspectives.

Design and Implementation of Intelligent Manufacturing Systems Springer Science & Business Media

One of the attractions of fuzzy logic is its utility in solving many real engineering problems. As many have realised, the major obstacles in building a real intelligent machine involve dealing with random disturbances, processing large amounts of imprecise data, interacting with a dynamically changing environment, and coping with uncertainty. Neural-fuzzy techniques help one to solve many of these problems. Fuzzy Logic and Intelligent Systems reflects the most recent developments in neural networks and fuzzy logic, and their application in intelligent systems. In addition, the balance between theoretical work and applications makes the book suitable for both researchers and engineers, as well as for graduate students.

Modular Neural Networks and Type-2 Fuzzy Systems for Pattern Recognition CRC Press
Intelligent Control considers non-traditional modelling and control approaches to nonlinear systems. Fuzzy logic, neural networks and evolutionary computing techniques are the main tools used. The book presents a modular switching fuzzy logic controller where a PD-type fuzzy controller is

executed first followed by a PI-type fuzzy controller thus improving the performance of the controller compared with a PID-type fuzzy controller. The advantage of the switching-type fuzzy controller is that it uses one rule-base thus minimises the rule-base during execution. A single rule-base is developed by merging the membership functions for change of error of the PD-type controller and sum of error of the PI-type controller. Membership functions are then optimized using evolutionary algorithms. Since the two fuzzy controllers were executed in series, necessary further tuning of the differential and integral scaling factors of the controller is then performed. Neural-network-based tuning for the scaling parameters of the fuzzy controller is then described and finally an evolutionary algorithm is applied to the neurally-tuned-fuzzy controller in which the sigmoidal function shape of the neural network is determined. The important issue of stability is addressed and the text demonstrates empirically that the developed controller was stable within the operating range. The text concludes with ideas for future research to show the reader the potential for further study in this area. Intelligent Control will be of interest to researchers from engineering and computer science backgrounds working in the intelligent and adaptive control.

C++ Neural Networks and Fuzzy Logic McGraw-Hill Companies

We describe in this book, recent developments on fuzzy logic, neural networks and optimization algorithms, as well as their hybrid combinations, and their application in areas such as, intelligent control and robotics, pattern recognition, medical diagnosis, time series prediction and optimization of complex problems. The book contains a collection of papers focused on hybrid intelligent systems based on soft computing. There are some papers with the main theme of type-1 and type-2 fuzzy logic, which basically consists of papers that propose new concepts and algorithms based on type-1 and type-2 fuzzy logic and their applications. There also some papers that presents theory and practice of meta-heuristics in different areas of application. Another group of papers describe diverse applications of fuzzy logic, neural networks and hybrid intelligent systems in medical applications. There are also some papers that present theory and practice of neural networks in different areas of application. In addition, there are papers that present theory and practice of optimization and evolutionary algorithms in different areas of application. Finally, there are some papers describing applications of fuzzy logic, neural networks and meta-heuristics in pattern recognition problems.

Explainable Neural Networks Based on Fuzzy Logic and Multi-criteria Decision Tools
NEURAL NETWORKS, FUZZY SYSTEMS AND EVOLUTIONARY ALGORITHMS : SYNTHESIS AND APPLICATIONS

NEURAL NETWORKS, FUZZY SYSTEMS AND EVOLUTIONARY ALGORITHMS : SYNTHESIS AND APPLICATIONS PHI Learning Pvt. Ltd.

Neural Networks and Fuzzy Systems Seagull Books Pvt Ltd

CD-ROM contains: BackProp -- Data files -- Display -- Images -- MATLAB examples

Neural Networks, Fuzzy Logic and Genetic Algorithms Springer Science & Business Media

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

Intelligent Control IET

The research presented in this book shows how combining deep neural networks with a special class of fuzzy logical rules and multi-criteria decision tools can make deep neural networks more interpretable - and even, in many cases, more efficient. Fuzzy logic together with multi-criteria decision-making tools provides very powerful tools for modeling human thinking. Based on their common theoretical basis, we propose a consistent framework for modeling human thinking by using the tools of all three fields: fuzzy logic, multi-criteria decision-making, and deep learning to help reduce the black-box nature of neural models; a challenge that is of vital importance to the whole research community.

Fusion of Neural Networks, Fuzzy Systems and Genetic Algorithms Lecture Notes in Artificial Intelligence

Intelligent Hybrid Systems: Fuzzy Logic, Neural Networks, and Genetic Algorithms is an organized edited collection of contributed chapters covering basic principles, methodologies, and applications of fuzzy systems, neural networks and genetic algorithms. All chapters are original contributions by leading researchers written exclusively for this volume. This book reviews important concepts and models, and focuses on specific methodologies common to fuzzy systems, neural networks and evolutionary computation. The emphasis is on development of cooperative models of hybrid systems. Included are applications related to intelligent data analysis, process analysis, intelligent adaptive information systems, systems identification, nonlinear systems, power and water system design, and many others. Intelligent Hybrid Systems: Fuzzy Logic, Neural Networks, and Genetic Algorithms provides researchers and engineers with up-to-date coverage of new results, methodologies and applications for building intelligent systems capable of solving large-scale problems.

Artificial neural networks, fuzzy logic and neuro-fuzzy system in the role of short term load forecast CRC Press

The second edition of this book provides a comprehensive introduction to a consortium of technologies underlying soft computing, an evolving branch of computational intelligence, which in recent years, has turned synonymous to it. The constituent technologies discussed comprise neural network (NN), fuzzy system (FS), evolutionary algorithm (EA), and a number of hybrid systems, which include classes such as neuro-fuzzy, evolutionary-fuzzy, and neuro-evolutionary systems. The

hybridization of the technologies is demonstrated on architectures such as fuzzy backpropagation network (NN-FS hybrid), genetic algorithm-based backpropagation network (NN-EA hybrid), simplified fuzzy ARTMAP (NN-FS hybrid), fuzzy associative memory (NN-FS hybrid), fuzzy logic controlled genetic algorithm (EA-FS hybrid) and evolutionary extreme learning machine (NN-EA hybrid) Every architecture has been discussed in detail through illustrative examples and applications. The algorithms have been presented in pseudo-code with a step-by-step illustration of the same in problems. The applications, demonstrative of the potential of the architectures, have been chosen from diverse disciplines of science and engineering. This book, with a wealth of information that is clearly presented and illustrated by many examples and applications, is designed for use as a text for the courses in soft computing at both the senior undergraduate and first-year

postgraduate levels of computer science and engineering. It should also be of interest to researchers and technologists desirous of applying soft computing technologies to their respective fields of work. *Soft Computing in Water Resources Engineering* World Scientific
Neural Networks and Fuzzy-Logic Control introduces a simple integrated environment for programming displays and report generation. It includes the only currently available software that permits combined simulation of multiple neural networks, fuzzy-logic controllers, and dynamic systems such as robots or physiological models. The enclosed educational version of DESIRE/NEUNET differs for the full system mainly in the size of its data area and includes a compiler, two screen editors, color graphics, and many ready-to-run examples. The software lets users or instructors add their own help screens and interactive menus. The version of DESIRE/NEUNET included here is for PCs, viz. 286/287, 386/387, 486DX, Pentium, P6, SX with math coprocessor.

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