Neural Networks And Fuzzy Systems Kosko | ea80ba6c89e1a8364e8111be2a1483ae

Fuzzy Neural Intelligent Systems

Understanding Neural Networks and Fuzzy Logic

Fuzzy Neural Network Theory and Application Fundamentals of Computational Intelligence

Neural Networks and Fuzzy-logic Control on Personal Computers and Workstations

Introduction to Neuro-Fuzzy Systems

Fuzzy and Neural: Interactions and Applications

Foundations of Neural Networks, Fuzzy Systems, and Knowledge Engineering

Fuzzy Sets, Neural Networks, and Soft Computing Type-2 Fuzzy Neural Networks and Their Applications

Explainable Neural Networks Based on Fuzzy Logic and Multi-criteria Decision Tools

Soft Computing Deep Neuro-Fuzzy Systems with Python

Fuzzy Logic and Neural Network Handbook

Neural Networks and Fuzzy Systems

Neural Networks and Fuzzy Systems

Fuzzy + neural can mean many things: (1) approximations between fuzzy systems and neural nets (Chapter 4); (2) building hybrid neural nets to equal fuzzy systems (Chapter 5); (3) using neural nets to solve fuzzy problems (Chapter 6); (4) approximations between fuzzy neural nets and other fuzzy systems (Chapter 8); (5) constructing hybrid fuzzy neural nets for certain fuzzy systems (Chapters 9, 10); or (6) computing with words (Chapter 11). This book is not intend to be used primarily as a text book for a course in fuzzy + neural because we have not included problems at the end of each chapter, we have omitted most proofs (given in the references), and we have given very few references. We wanted to keep the mathematical prerequisites to a minimum so all longer, involved, proofs were omitted. Elementary differential calculus is the only prerequisite needed since we do mention partial derivatives once or twice.

Soft computing encompasses various computational methodologies, which, unlike conventional algorithms, are tolerant of imprecision, uncertainty, and partial truth. Soft computing technologies offer...
adaptibility as a characteristic feature and thus permit the tracking of a problem through a changing environment. Besides some recent developments in areas like rough sets and probabilistic networks, fuzzy logic, evolutionary algorithms, and artificial neural networks are core ingredients of soft computing, which are all bio-inspired and can easily be combined synergetically. This book presents a well-balanced integration of fuzzy logic, evolutionary computing, and neural information processing. The three constituents are introduced to the reader systematically and brought together in differentiated combinations step by step. The text was developed from courses given by the authors and offers numerous illustrations as

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.

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.

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.

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.

This book deals with the theory, design principles, and application of hybrid intelligent systems using type-2 fuzzy sets in combination with other paradigms of Soft Computing technology such as Neuro-Computing and Evolutionary Computing. It provides a self-contained exposition of the foundation of type-2 fuzzy sets and neuro-fuzzy systems, and presents a compendium of its applications in data mining, data analysis, pattern recognition, and other real problems. Type-2 Fuzzy Neural Networks and Their Applications is helpful for teachers and students of universities and colleges, for scientists and practitioners from various fields such as control, decision analysis, pattern recognition and similar fields.
The past fifteen years has witnessed an explosive growth in the fundamental research and applications of artificial neural networks (ANNs) and fuzzy logic (FL). The main impetus behind this growth has been the ability of such methods to offer solutions not amenable to conventional techniques, particularly in application domains involving pattern recognition, prediction and control. Although the origins of ANNs and FL may be traced back to the 1940s and 1960s, respectively, the most rapid progress has only been achieved in the last fifteen years. This has been due to significant theoretical advances in our understanding of ANNs and FL, complemented by major technological developments in high-speed computing. In geophysics, ANNs and FL have enjoyed significant success and are now employed routinely in the following areas (amongst others): 1. Exploration Seismology. (a) Seismic data processing (trace editing; first break picking; deconvolution and multiple suppression; wavelet estimation; velocity analysis; noise identification/reduction; statics analysis; dataset matching/prediction, attenuation), (b) AVO analysis, (c) Chimneys, (d) Compression I dimensionality reduction, (e) Shear-wave analysis, (f) Interpretation (event tracking; lithology prediction and well-log analysis; prospect appraisal; hydrocarbon prediction; inversion; reservoir characterisation; quality assessment; tomography). 2. Earthquake Seismology and Subterranean Nuclear Explosions. 3. Mineral Exploration. 4. Electromagnetic I Potential Field Exploration. (a) Electromagnetic methods, (b) Potential field methods, (c) Ground penetrating radar, (d) Remote sensing, (e) inversion.

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

Engineers have attempted to solve water resources engineering problems with the help of empirical, regression-based and numerical models. Empirical models are not universal, nor are regression-based models. The numerical models are, on the other hand, physics-based but require substantial data measurement and parameter estimation. Hence, there is a need to employ models that are robust, user-friendly, and practical and that do not have the shortcomings of the existing methods. Artificial intelligence methods meet this need. Soft Computing in Water Resources Engineering introduces the basics of artificial neural networks (ANN), fuzzy logic (FL) and genetic algorithms (GA). It gives details on the feed forward back propagation algorithm and also introduces neuro-fuzzy modelling to readers. Artificial intelligence method applications covered in the book include predicting and forecasting flow; locating seepage path in an earth-fill dam body, and the predicting dispersion coefficient in natural channels. The author also provides an analysis comparing the artificial intelligence models and contemporary non-artificial intelligence methods (empirical, numerical, regression, etc.). The ANN, FL, and GA are fairly new methods in water resources engineering. The first publications appeared in the early 1990s and quite a few studies followed in the early 2000s. Although these methods are currently widely known in journal publications, they are still very new for many scientific readers and they are totally new for students, especially undergraduates. Numerical methods were first taught at the graduate level but are now taught at the undergraduate level. There are already a few graduate courses developed on AI methods in engineering and included in the graduate curriculum of some universities. It is expected that these courses, too, will soon be taught at the undergraduate levels.

Although fuzzy systems and neural networks are central to the field of soft computing, most research work has focused on the development of the theories, algorithms, and designs of systems for specific applications. There has been little theoretical support for fuzzy neural systems, especially their mathematical foundations. Intelligent Systems fills this mathematical basis for fuzzy neural networks, offers a better way of combining fuzzy logic systems with neural networks, and explores some of their engineering applications. Dividing their focus into three main areas of interest, the authors give a systematic, comprehensive treatment of the relevant concepts and modern practical applications: Fundamental concepts and theories for fuzzy systems and neural networks. Foundation for fuzzy neural networks and important related topics Case examples for neuro-fuzzy systems, fuzzy systems, neural network systems, and fuzzy-neural systems Suitable for self-study, as a reference, and ideal as a textbook, Fuzzy Neural Intelligent Systems is accessible to students with a basic background in linear algebra and engineering mathematics. Mastering the material in this textbook will prepare students to better understand, design, and implement fuzzy neural systems, develop new applications, and further advance the field.

This book presents a powerful hybrid intelligent system based on fuzzy logic, neural networks, genetic algorithms and related intelligent techniques. The new compensatory genetic fuzzy neural networks have been widely used in fuzzy logic, nonlinear system modeling, compression of a fuzzy rule base, expansion of a sparse fuzzy rule base, fuzzy knowledge discovery, time series prediction, fuzzy games and pattern recognition. This effective soft computing system is able to perform both linguistic-word-level fuzzy reasoning and numerical-data-level information processing. The book also proposes various novel soft computing techniques.

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.

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

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

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.

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.

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

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.

This book contains introductory material to neuro-fuzzy systems. Its main purpose is to explain the information processing in mostly-used fuzzy inference systems, neural networks and neuro-fuzzy systems. More than 180 figures and a large number of (numerical) exercises (with solutions) have been inserted to explain the principles of fuzzy, neural and neuro-fuzzy systems. Also the mathematics applied in the models is carefully explained, and in many cases exact computational formulas have been derived for the rules in error correction learning procedures. Numerous models treated in the book will help the reader to design his own neuro-fuzzy system for his specific (managerial, industrial, financial) problem. The book can serve as a textbook for students in computer and management sciences who are interested in adaptive technologies.

Written by one of the foremost experts in the field of neural networks, this is the first book to combine the theories and applications or neural networks and fuzzy systems. The book is divided into three sections: Neural Network Theory, Neural Network Applications, and Fuzzy Theory and Applications. It describes how neural networks are used in applications such as: signal and image processing, function estimation, robotics and control, analog VLSI and optical hardware design; and concludes with a presentation of the new geometric theory of fuzzy sets, systems, and associative memories.

Motor monitoring, incipient fault detection, and diagnosis are important and difficult topics in the engineering field. These topics deal with motors ranging from small DC motors used in intensive care units to the huge motors used in nuclear power plants. With proper machine monitoring and fault detection schemes, improved safety and reliability can be achieved for different engineering system operations. The importance of incipient fault detection can be found in the cost saving which can be obtained by detecting potential machine failures before they occur. Non-invasive, inexpensive, and reliable fault detection techniques are often preferred by many engineers. A large number of techniques, such as expert system approaches and vibration analysis, have been developed for motor fault detection purposes. Those techniques have been developed for motor fault detection purposes. However, due to the complexity and importance of the systems, there is a need to further improve existing fault detection techniques. A major key to the success in fault detection is the ability to use appropriate technology to effectively fuse the relevant information to provide accurate and reliable results. The advance in technology will provide opportunities for improving existing fault detection schemes. With the maturing technology of artificial neural network and fuzzy logic, the motor fault detection problem can be solved using an innovative approach based on measurements that are easily accessible, without the need for rigorous mathematical models. This approach can identify and aggregate the relevant information for accurate and reliable motor fault detection. This book will introduce the necessary concepts of neural network and fuzzy logic, describe the advantages and challenges of using these technologies to solve motor fault detection problems, and discuss several design considerations and methodologies in applying these techniques to motor incipient fault detection.

Neural Fuzzy Systems provides a comprehensive, up-to-date introduction to the basic theories of fuzzy systems and neural networks, as well as an exploration of how these two fields can be integrated to create Neural-Fuzzy Systems. It includes Matlab software, with a Neural Network Toolkit, and a Fuzzy System Toolkit.

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.

A practical reference that presents concise and comprehensive reports on the major activities in fuzzy logic and neural networks, with emphasis on the applications and systems of interest to computer engineers. Each of the 31 chapters focuses on the most important activity of a specific topic, and the chapters are organized into three parts: principles and algorithms; applications; and architectures and systems. The applications for fuzzy logic include home appliance design and manufacturing process; those for neural networks include radar, sonar, and speech signal processing, remote sensing, and electrical power systems. Annotation copyright by Book News, Inc., Portland, OR

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Neural networks and fuzzy systems are different approaches to introducing human-like reasoning into expert systems. This text is the first to combine the study of these two subjects, their basics and their use, along with symbolic AI methods to build comprehensive artificial intelligence systems. In a clear and accessible style, Kasabov describes rules-based and connectionist techniques and then their combinations, with fuzzy logic included, showing the application of the different techniques to a set of simple prototype problems, which makes comparisons possible. A particularly strong feature of the text is that it is filled with applications in engineering, business, and finance. AI problems that cover most of the application-oriented research in the field (pattern recognition, speech and image processing, classification, planning, optimization, prediction, control, decision making, and game simulations) are discussed and illustrated with concrete examples. Intended both as a text for advanced undergraduate and postgraduate students as well as a reference for researchers in the field of knowledge engineering, Foundations of Neural Networks, Fuzzy Systems, and Knowledge Engineering has chapters structured for various levels of teaching and includes original work by the author along with the classic material. Data sets for the examples in the book as well as an integrated software environment that can be used to solve the problems and do the exercises at the end of each chapter are available free through anonymous ftp.

This textbook provides a thorough introduction to the field of learning from experimental data and soft computing. Support vector machines (SVM) and neural networks (NN) are the mathematical structures, or models, that underlie learning, while fuzzy logic systems (FLS) enable us to embed structured human knowledge into workable algorithms. The book assumes that it is not only useful, but necessary, to treat SVM, NN, and FLS as parts of a connected whole. Throughout, the theory and algorithms are illustrated by practical examples, as well as by problem sets and simulated experiments. This approach enables the reader to develop SVM, NN, and FLS in addition to understanding them. The book also presents three case studies: on NN-based control, financial time series analysis, and computer graphics. A solutions manual and all of the MATLAB programs needed for the simulated experiments are available.

This book provides comprehensive introduction to a consortium of technologies underlying soft computing, an evolving branch of computational intelligence. The constituent technologies discussed comprise neural networks, fuzzy logic, genetic algorithms, and a number of hybrid systems which include classes such as neuro–fuzzy, fuzzy–genetic, and neuro–genetic systems. The hybridization of the technologies is demonstrated on architectures such as Fuzzy-Back-propagation Networks (NN-FL), Simplified Fuzzy ARTMAP (NN-FL), and Fuzzy Associative Memories. The book also gives an exhaustive discussion of FL-GA hybridization. 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 courses in soft computing at both the senior undergraduate and first-year post-graduate engineering levels. It should also be of interest to researchers and technologists desirous of applying soft computing technologies to their respective fields of work.

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.

Neural Networks and Fuzzy Systems: Theory and Applications discusses theories that have proven useful in applying neural networks and fuzzy systems to real world problems. The book includes performance comparison of neural networks and fuzzy systems using data gathered from real systems. Topics covered include the Hopfield network for combinatorial optimization problems, multilayered neural networks for pattern classification and function approximation, fuzzy systems that have the same functions as multilayered networks, and composite systems that have been successfully applied to real world problems. The author also includes representative neural network models such as the Kohonen network and radial basis function network. New fuzzy systems with learning capabilities are also covered. The advantages and disadvantages of neural networks and fuzzy systems are examined. The performance of these two systems in license plate recognition, a water purification plant, blood cell classification, and other real world problems is compared.

Although fuzzy systems and neural networks are central to the field of soft computing, most research work has focused on the development of the theories, algorithms, and designs of systems for specific
applications. There has been little theoretical support for fuzzy neural systems, especially their mathematical foundations. Fuzzy Neural Intelligent Systems fills this gap. It develops a mathematical basis for fuzzy neural networks, offers a better way of combining fuzzy logic systems with neural networks, and explores some of their engineering applications. Dividing their focus into three main areas of interest, the authors give a systematic, comprehensive treatment of the relevant concepts and modern practical applications: Fundamental concepts and theories for fuzzy systems and neural networks. Foundation for fuzzy neural networks and important related topics Case examples for neuro-fuzzy systems, fuzzy systems, neural network systems, and fuzzy-neural systems Suitable for self-study, as a reference, and ideal as a textbook, Fuzzy Neural Intelligent Systems is accessible to students with a basic background in linear algebra and engineering mathematics. Mastering the material in this textbook will prepare students to better understand, design, and implement fuzzy neural systems, develop new applications, and further advance the field.

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.

Gain insight into fuzzy logic and neural networks, and how the integration between the two models makes intelligent systems in the current world. This book simplifies the implementation of fuzzy logic and neural network concepts using Python. You’ll start by walking through the basics of fuzzy sets and relations, and how each member of the set has its own membership function values. You’ll also look at different architectures and models that have been developed, and how rules and reasoning have been defined to make the architectures possible. The book then provides a closer look at neural networks and related architectures, focusing on the various issues neural networks may encounter during training, and how different optimization methods can help you resolve them. In the last section of the book you’ll examine the integrations of fuzzy logics and neural networks, the adaptive neuro fuzzy inference systems, and various approximations related to the same. You’ll review different types of deep neuro fuzzy classifiers, fuzzy neurons, and the adaptive learning capability of the neural networks. The book concludes by reviewing advanced neuro fuzzy models and applications. What You’ll Learn Understand fuzzy logic, membership functions, fuzzy relations, and fuzzy inference Review neural networks, back propagation, and optimization Work with different architectures such as Takagi-Sugeno model, Hybrid model, genetic algorithms, and approximations Apply Python implementations of deep neuro fuzzy system Who This book is for Data scientists and software engineers with a basic understanding of Machine Learning who want to expand into the hybrid applications of deep learning and fuzzy logic.

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