

Introduction To Intelligent Systems In Traffic And Transportation Synthesis Lectures On Artificial Intelligence And Machine Learning

"The more we know about smart and intelligent systems and their use, the more productive organizations can become, and the more quality of life will improve."—Gavriel Salvendy, President Academy of Science, Engineering and Medicine of Florida, University Distinguished Professor University of Central Florida "Robots, drones, self-driving cars, and personal assistants are only some of the 'intelligent' and 'smart' systems which are populating our world and changing the way we use technology to carry out our everyday activities, bringing about both exciting opportunities for human-technology symbiosis, as well as compelling design and development challenges. Through a carefully selected choice of chapters, authored by top scientists in the field, this book, edited by Abbas Moallem, sheds light on fundamental aspects of intelligent and smart systems, investigating the role and impact of affective and psychophysiological computing, machine learning, cybersecurity, agent transparency, and human-agent teaming in the shaping of this new interaction paradigm, as well as the human factors involved in their application in critical domains such as health, education, and manufacturing in the emerging technological landscape."—Constantine Stephanidis, Professor of Computer Science, University of Crete, Distinguished member of Foundation for Research and Technology - Hellas (FORTH) In today's digital world, the words "smart" and "intelligent" are now used to label devices, machinery, systems, and even environments. What is a "smart" system? Is "smart" synonymous with "intelligent"? If not, what does an "intelligent system" mean? Are all smart systems intelligent? This book tries to answer these questions by summarizing the existing research in various areas and providing new research findings. Smart and Intelligent Systems: The Human Elements in Artificial Intelligence, Robotics, and Cybersecurity presents new areas of smart and intelligent system design. It defines smart and intelligent systems, offers a human factors approach, discusses networking applications, and combines the human element with smart and intelligent systems. This book is perfect for engineering students in data sciences and artificial intelligence and practitioners at all levels in the fields of human factors and ergonomics, systems engineering, computer science, software engineering, and robotics.

Computational intelligence is a well-established paradigm, where new theories with a sound biological understanding have been evolving. The current experimental systems have many of the characteristics of biological computers (brains in other words) and are beginning to be built to perform a variety of tasks that are difficult or impossible to do with conventional computers. As evident, the ultimate achievement in this field would be to mimic or exceed human cognitive capabilities including reasoning, recognition, creativity, emotions, understanding, learning and so on. This book comprising of 17 chapters offers a step-by-step introduction (in a chronological order) to the various modern computational intelligence tools used in practical problem solving. Starting with different search techniques including informed and uninformed search, heuristic search, minmax, alpha-beta pruning methods, evolutionary algorithms and swarm intelligent techniques; the authors illustrate the design of knowledge-based systems and advanced expert systems, which incorporate uncertainty and fuzziness. Machine learning algorithms including decision trees and artificial neural networks are presented and finally the fundamentals of hybrid intelligent systems are also depicted. Academics, scientists as well as engineers engaged in research, development and application of computational intelligence techniques, machine learning and data mining would find the comprehensive coverage of this book invaluable.

The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications. Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnetic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components. Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in the field. As intelligent systems continue to replace and sometimes outperform human intelligence in decision-making processes, they have made substantial contributions to the solution of very complex problems. As a result, the field of computational intelligence has branched out in several directions. For instance, artificial neural networks can learn how to classify patterns, such as images or sequences of events, and effectively model complex nonlinear systems. Simple and easy to implement, fuzzy systems can be applied to successful modeling and system control. Illustrating how these and other tools help engineers model nonlinear system behavior, determine and evaluate system parameters, and ensure overall system control, Intelligent Systems: Addresses various aspects of neural networks and fuzzy systems Focuses on system optimization, covering new techniques such as evolutionary methods, swarm, and ant colony optimizations Discusses several applications that deal with methods of computational intelligence Other volumes in the set: Fundamentals of Industrial Electronics Power Electronics and Motor Drives Control and Mechatronics Industrial Communication Systems

Solving challenging computational problems involving time has been a critical component in the development of artificial intelligence systems almost since the inception of the field. This book provides a concise introduction to the core computational elements of temporal reasoning for use in AI systems for planning and scheduling, as well as systems that extract temporal information from data. It presents a survey of temporal frameworks based on constraints, both qualitative and quantitative, as well as of major temporal consistency techniques. The book also introduces the reader to more recent extensions to the core model that allow AI systems to explicitly represent temporal preferences and temporal uncertainty. This book is intended for students and researchers interested in constraint-based temporal reasoning. It provides a self-contained guide to the different representations of time, as well as examples of recent applications of time in AI systems.

From artificial neural net / game theory / semantic applications, to modeling tools, smart manufacturing systems, and data science research – this book offers a broad overview of modern intelligent methods and applications of machine learning, evolutionary computation, Industry 4.0 technologies, and autonomous agents leading to the Internet of Things and potentially a new technological revolution. Though chiefly intended for IT professionals, it will also help a broad range of users of future emerging technologies adapt to the new smart / intelligent wave. In separate chapters, the book highlights fourteen successful examples of recent advances in the rapidly evolving area of intelligent systems. Covering major European projects paving the way to a serious smart / intelligent collaboration, the chapters explore e.g. cyber-security issues, 3D digitization, aerial robots, and SMEs that have introduced cyber-physical production systems. Taken together, they offer unique insights into contemporary artificial intelligence and its potential for innovation.

The third edition of this bestseller examines the principles of artificial intelligence and their application to engineering and science, as well as techniques for developing intelligent systems to solve practical problems. Covering the full spectrum of intelligent systems techniques, it incorporates knowledge-based systems, computational intelligence, and their hybrids. Using clear and concise language, Intelligent Systems for Engineers and Scientists, Third Edition features updates and improvements throughout all chapters. It includes expanded and separated chapters on genetic algorithms and single-candidate optimization techniques, while the chapter on neural networks now covers spiking networks and a range of recurrent networks. The book also provides extended coverage of fuzzy logic, including type-2 and

fuzzy control systems. Example programs using rules and uncertainty are presented in an industry-standard format, so that you can run them yourself. The first part of the book describes key techniques of artificial intelligence—including rule-based systems, Bayesian updating, certainty theory, fuzzy logic (types 1 and 2), frames, objects, agents, symbolic learning, case-based reasoning, genetic algorithms, optimization algorithms, neural networks, hybrids, and the Lisp and Prolog languages. The second part describes a wide range of practical applications in interpretation and diagnosis, design and selection, planning, and control. The author provides sufficient detail to help you develop your own intelligent systems for real applications. Whether you are building intelligent systems or you simply want to know more about them, this book provides you with detailed and up-to-date guidance. Check out the significantly expanded set of free web-based resources that support the book at:

<http://www.adrianhopgood.com/aitoolkit/>

An Introduction to Fuzzy Logic Applications in Intelligent Systems consists of a collection of chapters written by leading experts in the field of fuzzy sets. Each chapter addresses an area where fuzzy sets have been applied to situations broadly related to intelligent systems. The volume provides an introduction to and an overview of recent applications of fuzzy sets to various areas of intelligent systems. Its purpose is to provide information and easy access for people new to the field. The book also serves as an excellent reference for researchers in the field and those working in the specifics of systems development. People in computer science, especially those in artificial intelligence, knowledge-based systems, and intelligent systems will find this to be a valuable sourcebook. Engineers, particularly control engineers, will also have a strong interest in this book. Finally, the book will be of interest to researchers working in decision support systems, operations research, decision theory, management science and applied mathematics. An Introduction to Fuzzy Logic Applications in Intelligent Systems may also be used as an introductory text and, as such, it is tutorial in nature.

As modern technologies continue to develop and evolve, the ability of users to adapt with new systems becomes a paramount concern. Research into new ways for humans to make use of advanced computers and other such technologies through artificial intelligence and computer simulation is necessary to fully realize the potential of tools in the 21st century. Advanced Methodologies and Technologies in Artificial Intelligence, Computer Simulation, and Human-Computer Interaction provides emerging research in advanced trends in robotics, AI, simulation, and human-computer interaction. Readers will learn about the positive applications of artificial intelligence and human-computer interaction in various disciplines such as business and medicine. This book is a valuable resource for IT professionals, researchers, computer scientists, and researchers invested in assistive technologies, artificial intelligence, robotics, and computer simulation.

Data science is an emerging field and innovations in it need to be explored for the success of society 5.0. This book not only focuses on the practical applications of data science to achieve computational excellence, but also digs deep into the issues and implications of intelligent systems. This book highlights innovations in data science to achieve computational excellence that can optimize performance of smart applications. The book focuses on methodologies, framework, design issues, tools, architectures, and technologies necessary to develop and understand data science and its emerging applications in the present era. This book will be useful for the research community, start-up entrepreneurs, academicians, and data centered industries and professors that are interested in exploring innovations in varied applications and areas of data science.

Intelligent systems and technologies are increasingly finding their ways in our daily lives. This book presents a sample of recent research results from key researchers. The contributions include: Introduction to intelligent systems; A Fuzzy Density Analysis of Subgroups by means of DNA Oligonucleotides; Evolution of Cooperating Classification Rules with an Archiving Strategy to Underpin Collaboration; Designing Agents with Dynamic Capability; Localized versus Locality Preserving Representation Methods in Face Recognition Tasks; Invariance Properties of Recurrent Neural Networks; Solving Bioinformatics Problems by Soft Computing Techniques; Transforming an Interactive Expert Code into a Statefull Service and a Multicoreenabled System; Ro-WordNet with Paradigmatic Morphology and Subjectivity Mark-up; Special Cases of Relative Object Qualification using the AMONG Operator; Effective Speaker Tracking Strategies for Multi-party Human-Computer Dialogue; The Fuzzy Interpolative Control for Passive Greenhouses; GPS safety system for airplanes; 3D Collaborative Interfaces for E-learning; Open Projects in Contemporary E-Learning; Software Platform for Archaeological Patrimony Inventory and Management. The book is directed to the graduate students, researchers, professors and the practitioner of intelligent systems.

This book introduces multiagent planning under uncertainty as formalized by decentralized partially observable Markov decision processes (Dec-POMDPs). The intended audience is researchers and graduate students working in the fields of artificial intelligence related to sequential decision making: reinforcement learning, decision-theoretic planning for single agents, classical multiagent planning, decentralized control, and operations research.

Intelligent systems, or artificial intelligence technologies, are playing an increasing role in areas ranging from medicine to the major manufacturing industries to financial markets. The consequences of flawed artificial intelligence systems are equally wide ranging and can be seen, for example, in the programmed trading-driven stock market crash of October 19, 1987. Intelligent Systems: Technology and Applications, Six Volume Set connects theory with proven practical applications to provide broad, multidisciplinary coverage in a single resource. In these volumes, international experts present case-study examples of successful practical techniques and solutions for diverse applications ranging from robotic systems to speech and signal processing, database management, and manufacturing.

This book explores the latest research trends in intelligent systems and smart applications. It presents high-quality empirical and review studies focusing on various topics, including information systems and software engineering, knowledge management, technology in education, emerging technologies, and social networks. It provides insights into the theoretical and practical aspects of intelligent systems and smart applications.

Artificial Intelligence has changed significantly in recent years and many new resources and approaches are now available to explore and implement this important technology. Intelligent Systems: Principles, Paradigms, and Pragmatics takes a modern, 21st-century approach to the concepts of Artificial Intelligence and includes the latest developments, developmental tools, programming, and approaches related to AI. The author is careful to make the important distinction between theory and practice, and focuses on a broad core of technologies, providing students with an accessible and comprehensive introduction to key AI topics.

This book comprises selected papers from the 16th International Conference on Intelligent Systems Design and Applications (ISDA'16), which was held in Porto, Portugal from December 1 to 16, 2016. ISDA 2016 was jointly organized by the Portugal-based Instituto Superior de Engenharia do Porto and the US-based Machine Intelligence Research Labs (MIR Labs) to serve as a forum for the dissemination of state-of-the-art research and development of intelligent systems, intelligent technologies, and applications. The papers included address a wide variety of themes ranging from theories to applications of intelligent systems and computational intelligence area and provide a valuable resource for students and researchers in academia and industry alike.

Urban mobility is not only one of the pillars of modern economic systems, but also a key issue in the quest for equality of opportunity, once it can improve access to other services. Currently, however, there are a number of negative issues related to traffic, especially in mega-cities, such as economical issues (cost of opportunity caused by delays), environmental (externalities related to emissions of pollutants), and social (traffic accidents). Solutions to these issues are more and more closely tied to information and communication technology. Indeed, a search in the technical literature (using the keyword "urban traffic" to filter out articles on data network traffic) retrieved the following number of articles (as of December 3, 2013): 9,443 (ACM Digital Library), 26,054 (Scopus), and 1,730,000 (Google Scholar). Moreover, articles listed in the ACM query relate to conferences as diverse as MobiCom, CHI, PADS, and AAMAS. This means that there is a big and diverse community of computer scientists and computer engineers who tackle research that is connected to the development of intelligent traffic and transportation systems. It is also possible to see that this community is growing, and that research projects are getting more and more interdisciplinary. To foster the cooperation among the involved communities, this book aims at giving a broad introduction into the basic but relevant concepts related to transportation systems, targeting researchers and practitioners from computer science and information technology. In addition, the second part of the book gives a panorama of some of the most exciting and newest technologies, originating in computer science and computer engineering, that are now being employed in projects related to car-to-car communication, interconnected vehicles, car navigation, platooning, crowd sensing and sensor networks, among others. This material will also be of interest to engineers and researchers from the traffic and transportation community.

The deployment of intelligent systems to tackle complex processes is now commonplace in many fields from medicine and agriculture to industry and tourism. This book presents scientific contributions from the 1st International Conference on Applications of Intelligent Systems (APPIS 2018) held at the Museo Elder in Las Palmas de Gran Canaria, Spain, from 10 to 12 January 2018. The aim of APPIS 2018 was to bring together scientists working on the development of intelligent computer systems and methods for machine learning, artificial intelligence, pattern recognition, and related techniques with an emphasis on their application to various problems. The 34 peer-reviewed papers included here cover an extraordinarily wide variety of topics – everything from semi-supervised learning to matching electro-chemical sensor information with human odor perception – but what they all have in common is the design and application of intelligent systems and their role in tackling diverse and complex challenges. The book will be of particular interest to all those involved in the development and application of intelligent systems.

Intelligent system is an advanced machine that can perceive, learn, and solve the problems with a great accuracy. Technologies with intelligent system are currently available in the market and used in real-world applications, i.e., self-driving cars, Siri, Alexa, Facebook, and so on. To exceed human cognitive capabilities, the important keys rely on the development of sensors and algorithms. Therefore, the insight into artificial intelligence (AI) methods becomes a fundamental building block for design and construction of intelligent system with particular applications. This book aims to describe the AI systems ranging from the basic knowledge, i.e., algorithm and mathematical models of AI techniques, fundamentals of machine learning, genetic algorithm, and fuzzy logic, to the current state-of-the-art applications, such as smart road and biomedical applications.

This book presents the proceedings of the 2019 International Conference on Intelligent Systems Applications in Multi-modal Information Analytics, held in Shenyang, China on February 19-20, 2019. It provides comprehensive coverage of the latest advances and trends in information technology, science and engineering, addressing a number of broad themes, including data mining, multi-modal informatics, agent-based and multi-agent systems for health and education informatics, which inspire the development of intelligent information technologies. The contributions cover a wide range of topics: AI applications and innovations in health and education informatics; data and knowledge management; multi-modal application management; and web/social media mining for multi-modal informatics. Outlining promising future research directions, the book is a valuable resource for students, researchers and professionals, and provides a useful reference guide for newcomers to the field.

From aeronautics and manufacturing to healthcare and disaster management, systems engineering (SE) now focuses on designing applications that ensure performance optimization, robustness, and reliability while combining an emerging group of heterogeneous systems to realize a common goal. Use SoS to Revolutionize Management of Large Organizations, Factories, and Systems Intelligent Control Systems with an Introduction to System of Systems Engineering integrates the fundamentals of artificial intelligence and systems control in a framework applicable to both simple dynamic systems and large-scale system of systems (SoS). For decades, NASA has used SoS methods, and major manufacturers—including Boeing, Lockheed-Martin, Northrop-Grumman, Raytheon, BAE Systems—now make large-scale systems integration and SoS a key part of their business strategies, dedicating entire business units to this remarkably efficient approach. Simulate Novel Robotic Systems and Applications Transcending theory, this book offers a complete and practical review of SoS and some of its fascinating applications, including: Manipulation of robots through neural-based network control Use of robotic swarms, based on ant colonies, to detect mines Other novel systems in which intelligent robots, trained animals, and humans cooperate to achieve humanitarian objectives Training engineers to integrate traditional systems control theory with soft computing techniques further nourishes emerging SoS technology. With this in mind, the authors address the fundamental precepts at the core of SoS, which uses human heuristics to model complex systems, providing a scientific rationale for integrating independent, complex systems into a single coordinated, stabilized, and optimized one. They provide readers with MATLAB® code, which can be downloaded

from the publisher's website to simulate presented results and projects that offer practical, hands-on experience using concepts discussed throughout the book.

A detailed study of neural networks offers an informative look at the operation and uses of these systems, discussing their role in the development of artificial intelligence, as well as their applications in speech, vision, robotics, and pattern recognition

Sleep medicine has been developing for more than 40 years. The current concepts in sleep technology are mainly centered on polysomnography (PSG) and issues related to sleep technicians. However, the editors believe that the true value of technology is revealed only when benefits to humanity are manifest. To this end, they endeavor to create a new era in sleep technology, one that will improve the quality of people's sleep and daily lives. This edited book, Introduction to Modern Sleep Technology, provides a comprehensive reference volume to the latest advancements in the area of Sleep Technology. It offers an excellent range of insights and opinions from leading researchers and experts in multiple disciplines spanning academia, clinical practice and industry. Up-to-date insights into the current research topics in this field are featured in addition to the latest technological advances with reference to appropriate working examples. The current book combines the five dimensions of knowledge, i.e., sleep medicine, clinical psychology engineering, industrial design and technology management to ensure the content is applicable to people's daily lives.

Presenting a reference model architecture for the design of intelligent systems Engineering of Mind presents the foundations for a computational theory of intelligence. It discusses the main streams of investigation that will eventually converge in a scientific theory of mind and proposes an avenue of research that might best lead to the development of truly intelligent systems. This book presents a model of the brain as a hierarchy of massive parallel computational modules and data structures interconnected by information pathways. Using this as the basic model on which intelligent systems should be based, the authors propose a reference model architecture that accommodates concepts from artificial intelligence, control theory, image understanding, signal processing, and decision theory. Algorithms, procedures, and data embedded within this architecture would enable the analysis of situations, the formulation of plans, the choice of behaviors, and the computation of uncertainties. The computational power to implement the model can be achieved in practical systems in the foreseeable future through hierarchical and parallel distribution of computational tasks. The authors' reference model architecture is expressed in terms of the Real-time Control System (RCS) that has been developed primarily at the National Institute of Standards and Technology. Suitable for engineers, computer scientists, researchers, and students, Engineering of Mind blends current theory and practice to achieve a coherent model for the design of intelligent systems.

"The fusion of AI and IoT enables the systems to be predictive, prescriptive, and autonomous, and this convergence has evolved the nature of emerging applications from being assisted to augmented, and ultimately to autonomous intelligence. This book discusses algorithmic applications in the field of machine learning and IoT with pertinent applications. It further discusses challenges and future directions in the machine learning area and develops understanding of its role in technology, in terms of IoT security issues. Pertinent applications described include speech recognition, medical diagnosis, optimizations, predictions, and security aspects. Features: Focuses on algorithmic and practical parts of the artificial intelligence approaches in IoT applications. Discusses supervised and unsupervised machine learning for IoT data and devices. Presents an overview of the different algorithms related to Machine learning and IoT. Covers practical case studies on industrial and smart home automation. Includes implementation of AI from case studies in personal and industrial IoT. This book aims at Researchers and Graduate students in Computer Engineering, Networking Communications, Information Science Engineering, and Electrical Engineering"--

A detailed study of neural networks offers an informative look at the operation and uses of these systems, discussing their role in the development of artificial intelligence, as well as their applications in speech, vision, robotics, and pattern recognition

Produce a fully functioning Intelligent System that leverages machine learning and data from user interactions to improve over time and achieve success. This book teaches you how to build an Intelligent System from end to end and leverage machine learning in practice. You will understand how to apply your existing skills in software engineering, data science, machine learning, management, and program management to produce working systems. Building Intelligent Systems is based on more than a decade of experience building Internet-scale Intelligent Systems that have hundreds of millions of user interactions per day in some of the largest and most important software systems in the world.

What You'll Learn Understand the concept of an Intelligent System: What it is good for, when you need one, and how to set it up for success Design an intelligent user experience: Produce data to help make the Intelligent System better over time Implement an Intelligent System: Execute, manage, and measure Intelligent Systems in practice Create intelligence: Use different approaches, including machine learning Orchestrate an Intelligent System: Bring the parts together throughout its life cycle and achieve the impact you want Who This Book Is For Software engineers, machine learning practitioners, and technical managers who want to build effective intelligent systems

Providing a thorough introduction to the field of soft computing techniques, Intelligent Systems: Modeling, Optimization, and Control covers every major technique in artificial intelligence in a clear and practical style. This book highlights current research and applications, addresses issues encountered in the development of applied systems, and describes a wide range of intelligent systems techniques, including neural networks, fuzzy logic, evolutionary strategy, and genetic algorithms. The book demonstrates concepts through simulation examples and practical experimental results. Case studies are also presented from each field to facilitate understanding.

"This book provides knowledge and insights on present and future AI applications in Operations Management presenting tools and decisions in terms of theoretical and empirical models, methods and proposed applications"--Provided by publisher.

Intelligent control is a rapidly developing, complex and challenging field with great practical importance and potential. Because of the rapidly developing and interdisciplinary nature of the subject, there are only a few edited volumes consisting of research papers on intelligent control systems but little is known and published about the fundamentals and the general know-how in designing, implementing and operating intelligent control systems. Intelligent control system emerged from artificial intelligence and computer

controlled systems as an interdisciplinary field. Therefore the book summarizes the fundamentals of knowledge representation, reasoning, expert systems and real-time control systems and then discusses the design, implementation verification and operation of real-time expert systems using G2 as an example. Special tools and techniques applied in intelligent control are also described including qualitative modelling, Petri nets and fuzzy controllers. The material is illustrated with simple examples taken from the field of intelligent process control.

This book presents Proceedings of the 2021 Intelligent Systems Conference which is a remarkable collection of chapters covering a wider range of topics in areas of intelligent systems and artificial intelligence and their applications to the real world. The conference attracted a total of 496 submissions from many academic pioneering researchers, scientists, industrial engineers, and students from all around the world. These submissions underwent a double-blind peer-review process. Of the total submissions, 180 submissions have been selected to be included in these proceedings. As we witness exponential growth of computational intelligence in several directions and use of intelligent systems in everyday applications, this book is an ideal resource for reporting latest innovations and future of AI. The chapters include theory and application on all aspects of artificial intelligence, from classical to intelligent scope. We hope that readers find the book interesting and valuable; it provides the state-of-the-art intelligent methods and techniques for solving real-world problems along with a vision of the future research.

This book is dedicated to intelligent systems of broad-spectrum application, such as personal and social biosafety or use of intelligent sensory micro-nanosystems such as "e-nose", "e-tongue" and "e-eye". In addition to that, effective acquiring information, knowledge management and improved knowledge transfer in any media, as well as modeling its information content using meta-and hyper heuristics and semantic reasoning all benefit from the systems covered in this book. Intelligent systems can also be applied in education and generating the intelligent distributed eLearning architecture, as well as in a large number of technical fields, such as industrial design, manufacturing and utilization, e.g., in precision agriculture, cartography, electric power distribution systems, intelligent building management systems, drilling operations etc. Furthermore, decision making using fuzzy logic models, computational recognition of comprehension uncertainty and the joint synthesis of goals and means of intelligent behavior biosystems, as well as diagnostic and human support in the healthcare environment have also been made easier.

Introduction to Intelligent Systems in Traffic and Transportation Morgan & Claypool Publishers

This accessible introduction shows the reader how to understand, implement, adapt, and apply Learning Classifier Systems (LCSs) to interesting and difficult problems. The text builds an understanding from basic ideas and concepts. The authors first explore learning through environment interaction, and then walk through the components of LCS that form this rule-based evolutionary algorithm. The applicability and adaptability of these methods is highlighted by providing descriptions of common methodological alternatives for different components that are suited to different types of problems from data mining to autonomous robotics. The authors have also paired exercises and a simple educational LCS (eLCS) algorithm (implemented in Python) with this book. It is suitable for courses or self-study by advanced undergraduate and postgraduate students in subjects such as Computer Science, Engineering, Bioinformatics, and Cybernetics, and by researchers, data analysts, and machine learning practitioners.

The book presents a remarkable collection of chapters covering a wide range of topics in the areas of intelligent systems and artificial intelligence, and their real-world applications. It gathers the proceedings of the Intelligent Systems Conference 2019, which attracted a total of 546 submissions from pioneering researchers, scientists, industrial engineers, and students from all around the world. These submissions underwent a double-blind peer-review process, after which 190 were selected for inclusion in these proceedings. As intelligent systems continue to replace and sometimes outperform human intelligence in decision-making processes, they have made it possible to tackle a host of problems more effectively. This branching out of computational intelligence in several directions and use of intelligent systems in everyday applications have created the need for an international conference as a venue for reporting on the latest innovations and trends. This book collects both theory and application based chapters on virtually all aspects of artificial intelligence; presenting state-of-the-art intelligent methods and techniques for solving real-world problems, along with a vision for future research, it represents a unique and valuable asset.

This book consists of various contributions in conjunction with the keywords "reasoning" and "intelligent systems", which widely covers theoretical to practical aspects of intelligent systems. Therefore, it is suitable for researchers or graduate students who want to study intelligent systems generally.

Principles for constructing intelligent systems Design of Logic-based Intelligent Systems develops principles and methods for constructing intelligent systems for complex tasks that are readily done by humans but are difficult for machines. Current Artificial Intelligence (AI) approaches rely on various constructs and methods (production rules, neural nets, support vector machines, fuzzy logic, Bayesian networks, etc.). In contrast, this book uses an extension of propositional logic that treats all aspects of intelligent systems in a unified and mathematically compatible manner. Topics include: * Levels of thinking and logic * Special cases: expert systems and intelligent agents * Formulating and solving logic systems * Reasoning under uncertainty * Learning logic formulas from data * Nonmonotonic and incomplete reasoning * Question-and-answer processes * Intelligent systems that construct intelligent systems Design of Logic-based Intelligent Systems is both a handbook for the AI practitioner and a textbook for advanced undergraduate and graduate courses on intelligent systems. Included are more than forty algorithms, and numerous examples and exercises. The purchaser of the book may obtain an accompanying software package (Leibniz System) free of charge via the internet at leibnizsystem.com.

This volume helps to fill the gap between data analytics, image processing, and soft computing practices. Soft computing methods are used to focus on data analytics and image processing to develop good intelligent systems. To this end, readers of this volume will find quality research that presents the current trends, advanced methods, and hybridized techniques relating to data analytics and intelligent systems. The book also features case studies related to medical diagnosis with the use of image processing and soft computing algorithms in particular models. Providing extensive coverage of biometric systems, soft computing, image processing, artificial intelligence, and data analytics, the chapter authors discuss the latest research issues, present solutions to research problems, and look at comparative analysis with earlier results. Topics include some of the most important challenges and discoveries in intelligent systems today, such as computer vision concepts and image identification, data analysis and computational paradigms, deep learning techniques, face and speaker recognition systems, and more.

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