
Bio Inspired Artificial Intelligence Theories Methods And Technologies Intelligent Robotics And Autonomous Agents Series

Swarm Intelligence and Bio-Inspired Computation

Biomimetic Technologies

The Self-Assembling Brain

How Neural Networks Grow Smarter

Handbook of Research on New Investigations in Artificial Life, AI, and Machine Learning

11th EAI International Conference, BICT 2019, Pittsburgh, PA, USA, March 13-14, 2019, Proceedings

Third International Work-Conference on the Interplay Between Natural and Artificial Computation, IWINAC 2009, Santiago de Compostela, Spain, June 22-26, 2009, Proceedings, Part II

Computational Intelligence

Machine Nature

Internet of Things for Industry 4.0

Biologically Inspired Design

An Introductory Analysis with Applications to Biology, Control, and Artificial Intelligence

Bio-Inspired Systems: Computational and Ambient Intelligence

Design, Challenges and Solutions

Time-Space, Spiking Neural Networks and Brain-Inspired Artificial Intelligence

Principles and Applications

10th International Work-Conference on Artificial Neural Networks, IWANN 2009, Salamanca, Spain, June 10-12, 2009. Proceedings, Part I

Emerging Trends and Applications

The Quest for Artificial Intelligence

Artificial Intelligence in the Age of Neural Networks and Brain Computing
Bio-Inspired Artificial Intelligence
Encyclopedia of Artificial Intelligence
Bioinspired Applications in Artificial and Natural Computation
Bio-inspired Computation in Unmanned Aerial Vehicles
Internet of Things in Smart Technologies for Sustainable Urban Development
Adaptation in Natural and Artificial Systems
Theory and Applications
7th International Conference on Intelligent Computing, ICIC2011, Zhengzhou, China, August 11-14. 2011, Revised Papers
A New Theory of Intelligence
The Allure of Machinic Life
The Biology, Intelligence, and Technology of Self-Organizing Machines
Computational Methods and Tools
The Sciences of the Artificial, third edition
Bio-Inspired Computing for Information Retrieval Applications
Bio-Inspired Artificial Intelligence
Biologically Inspired Artificial Intelligence for Computer Games
Theories, Methods, and Technologies
Proceedings of the 11th Annual Meeting of the BICA Society
Brain-Inspired Cognitive Architectures for Artificial Intelligence: BICA*AI 2020

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Swarm Intelligence and Bio-Inspired

Computation IGI Global

This book covers the latest technological advances in neuro-computational intelligence in biological processes where the primary focus is on biologically inspired neuro-computational techniques. The theoretical and practical aspects of biomedical neural computing, brain-

inspired computing, bio-computational models, artificial intelligence (AI) and machine learning (ML) approaches in biomedical data analytics are covered along with their qualitative and quantitative features. The contents cover numerous computational applications, methodologies and emerging challenges in

the field of bio-soft computing and bio-signal processing. The authors have taken meticulous care in describing the fundamental concepts, identifying the research gap and highlighting the problems with the strategical computational approaches to address the ongoing challenges in bio-inspired models and algorithms. Given the range of topics covered, this book can be a valuable resource for students, researchers as well as practitioners interested in the rapidly evolving field of neurocomputing and biomedical data analytics.

Biomimetic Technologies Academic Press

Artificial Intelligence in the Age of Neural Networks and Brain Computing demonstrates that existing disruptive implications and applications of AI is a development of the unique attributes of neural networks, mainly machine learning, distributed architectures, massive parallel processing, black-box inference, intrinsic nonlinearity and smart autonomous search engines. The book covers the major basic ideas of brain-like computing behind AI, provides a framework to deep learning, and launches novel and intriguing

paradigms as future alternatives. The success of AI-based commercial products proposed by top industry leaders, such as Google, IBM, Microsoft, Intel and Amazon can be interpreted using this book. Developed from the 30th anniversary of the International Neural Network Society (INNS) and the 2017 International Joint Conference on Neural Networks (IJCNN) Authored by top experts, global field pioneers and researchers working on cutting-edge applications in signal processing, speech recognition, games, adaptive control and decision-making Edited by high-level academics and researchers in intelligent systems and neural networks

The Self-Assembling Brain Springer Nature Spiking neural networks (SNN) are biologically inspired computational models that represent and process information internally as trains of spikes. This monograph book presents the classical theory and applications of SNN, including original author's contribution to the area. The book introduces for the first time not only deep learning and deep knowledge representation in the human brain and in brain-inspired SNN, but takes that further

to develop new types of AI systems, called in the book brain-inspired AI (BI-AI). BI-AI systems are illustrated on: cognitive brain data, including EEG, fMRI and DTI; audio-visual data; brain-computer interfaces; personalized modelling in bio-neuroinformatics; multisensory streaming data modelling in finance, environment and ecology; data compression; neuromorphic hardware implementation. Future directions, such as the integration of multiple modalities, such as quantum-, molecular- and brain information processing, is presented in the last chapter. The book is a research book for postgraduate students, researchers and practitioners across wider areas, including computer and information sciences, engineering, applied mathematics, bio- and neurosciences.

How Neural Networks Grow Smarter Springer

A bestselling author, neuroscientist, and computer engineer unveils a theory of intelligence that will revolutionize our understanding of the brain and the future of AI. For all of neuroscience's advances, we've made little progress on its biggest question: How do simple cells in the brain

create intelligence? Jeff Hawkins and his team discovered that the brain uses maplike structures to build a model of the world-not just one model, but hundreds of thousands of models of everything we know. This discovery allows Hawkins to answer important questions about how we perceive the world, why we have a sense of self, and the origin of high-level thought. A Thousand Brains heralds a revolution in the understanding of intelligence. It is a big-think book, in every sense of the word.

Handbook of Research on New Investigations in Artificial Life, AI, and Machine Learning John Wiley & Sons

This book provides solution for challenges facing engineers in urban environments looking towards smart development and IoT. The authors address the challenges faced in developing smart applications along with the solutions. Topics addressed include reliability, security and financial issues in relation to all the smart and sustainable development solutions discussed. The solutions they provide are affordable, resistive to threats, and provide high reliability. The book pertains to researchers, academics, professionals,

and students. Provides solutions to urban sustainable development problems facing engineers in developing and developed countries Discusses results with industrial problems and current issues in smart city development Includes solutions that are reliable, secure and financially sound
11th EAI International Conference, BICT 2019, Pittsburgh, PA, USA, March 13-14, 2019, Proceedings MIT Press

This book covers challenges and solutions in establishing Industry 4.0 standards for Internet of Things. It proposes a clear view about the role of Internet of Things in establishing standards. The sensor design for industrial problem, challenges faced, and solutions are all addressed. The concept of digital twin and complexity in data analytics for predictive maintenance and fault prediction is also covered. The book is aimed at existing problems faced by the industry at present, with the goal of cost-efficiency and unmanned automation. It also concentrates on predictive maintenance and predictive failures. In addition, it includes design challenges and a survey of literature.

Third International Work-Conference on

the Interplay Between Natural and Artificial Computation, IWINAC 2009, Santiago de Compostela, Spain, June 22-26, 2009, Proceedings, Part II Springer Science & Business Media

This book constitutes the refereed conference proceedings of the 11th International Conference on Bio-Inspired Information and Communications Technologies, held in Pittsburgh, PA, USA, in March 2019. The 13 revised full papers and 2 short papers were selected from 29 submissions. Past iterations of the conference have attracted contributions in Direct Bioinspiration (physical biological materials and systems used within technology) as well as Indirect Bioinspiration (biological principles, processes and mechanisms used within the design and application of technology). This year, the scope has expanded to include a third thrust: Foundational Bioinspiration (bioinspired aspects of game theory, evolution, information theory, and philosophy of science).
Computational Intelligence MIT Press
A comprehensive introduction to new approaches in artificial intelligence and robotics that are inspired by self-

organizing biological processes and structures. New approaches to artificial intelligence spring from the idea that intelligence emerges as much from cells, bodies, and societies as it does from evolution, development, and learning. Traditionally, artificial intelligence has been concerned with reproducing the abilities of human brains; newer approaches take inspiration from a wider range of biological structures that are capable of autonomous self-organization. Examples of these new approaches include evolutionary computation and evolutionary electronics, artificial neural networks, immune systems, biorobotics, and swarm intelligence—to mention only a few. This book offers a comprehensive introduction to the emerging field of biologically inspired artificial intelligence that can be used as an upper-level text or as a reference for researchers. Each chapter presents computational approaches inspired by a different biological system; each begins with background information about the biological system and then proceeds to develop computational models that make use of biological concepts. The chapters

cover evolutionary computation and electronics; cellular systems; neural systems, including neuromorphic engineering; developmental systems; immune systems; behavioral systems—including several approaches to robotics, including behavior-based, biomimetic, epigenetic, and evolutionary robots; and collective systems, including swarm robotics as well as cooperative and competitive co-evolving systems. Chapters end with a concluding overview and suggested reading.

Machine Nature Springer Science & Business Media

Foreword by Michael Arbib This introduction to the principles, design, and practice of intelligent behavior-based autonomous robotic systems is the first true survey of this robotics field. The author presents the tools and techniques central to the development of this class of systems in a clear and thorough manner. Following a discussion of the relevant biological and psychological models of behavior, he covers the use of knowledge and learning in autonomous robots, behavior-based and hybrid robot architectures, modular perception, robot

colonies, and future trends in robot intelligence. The text throughout refers to actual implemented robots and includes many pictures and descriptions of hardware, making it clear that these are not abstract simulations, but real machines capable of perception, cognition, and action.

Internet of Things for Industry 4.0 Newnes

An account of the creation of new forms of life and intelligence in cybernetics, artificial life, and artificial intelligence that analyzes both the similarities and the differences among these sciences in actualizing life. The Allure of Machinic Life Biologically Inspired Design Morgan Kaufmann

The growing presence of biologically-inspired processing has caused significant changes in data retrieval. With the ubiquity of these technologies, more effective and streamlined data processing techniques are available. Bio-Inspired Computing for Information Retrieval Applications is a key resource on the latest advances and research regarding current techniques that have evolved from biologically-inspired processes and its application to a variety of problems.

Highlighting multidisciplinary studies on data processing, swarm-based clustering, and evolutionary computation, this publication is an ideal reference source for researchers, academics, professionals, students, and practitioners.

An Introductory Analysis with Applications to Biology, Control, and Artificial Intelligence Woodhead Publishing

From simple cases such as hook and latch attachments found in Velcro to articulated-wing flying vehicles, biology often has been used to inspire many creative design ideas. The scientific challenge now is to transform the paradigm into a repeatable and scalable methodology. Biologically Inspired Design explores computational techniques and tools that can help integrate the method into design practice. With an inspiring foreword from Janine Benyus, Biologically Inspired Design contains a dozen chapters written by some of the leading scholars in the transdisciplinary field of bioinspired design, such as Frank Fish, Julian Vincent and Jeannette Yen from biology, and Amaresk Chakrabarti, Satyandra Gupta and Li Shu from engineering. Based in part

on discussions at two workshops sponsored by the United States National Science Foundation, this volume introduces and develops several methods and tools for bioinspired design including: Information-processing theories, Natural language techniques, Knowledge-based tools, and Functional approaches and Pedagogical techniques. By exploring these fundamental theories, techniques and tools for supporting biologically inspired design, this volume provides a comprehensive resource for design practitioners wishing to explore the paradigm, an invaluable guide to design educators interested in teaching the method, and a preliminary reading for design researchers wanting to investigate bioinspired design.

Bio-Inspired Systems: Computational and Ambient Intelligence Springer Science & Business Media

"This book examines modern artificial intelligence to display how it may be applied to computer games. It spans the divide that exists between the academic research community working with advanced artificial intelligence and the games programming community which

must create and release new and interesting games, creating an invaluable collection supporting both technological research and the gaming industry"-- Provided by publisher.

Design, Challenges and Solutions MIT Press

The book focuses on machine learning. Divided into three parts, the first part discusses the feature selection problem. The second part then describes the application of machine learning in the classification problem, while the third part presents an overview of real-world applications of swarm-based optimization algorithms. The concept of machine learning (ML) is not new in the field of computing. However, due to the ever-changing nature of requirements in today's world it has emerged in the form of completely new avatars. Now everyone is talking about ML-based solution strategies for a given problem set. The book includes research articles and expository papers on the theory and algorithms of machine learning and bio-inspiring optimization, as well as papers on numerical experiments and real-world applications.

Time-Space, Spiking Neural Networks and Brain-Inspired Artificial Intelligence

Elsevier

Bio-Inspired Artificial Intelligence Theories, Methods, and Technologies MIT Press

Principles and Applications CRC Press

Biomimetic engineering takes the principles of biological organisms and copies, mimics or adapts these in the design and development of new materials and technologies. Biomimetic Technologies reviews the key materials and processes involved in this groundbreaking field, supporting theoretical background by outlining a range of applications. Beginning with an overview of the key principles and materials associated with biomimetic technologies in Part One, the book goes on to explore biomimetic sensors in more detail in Part Two, with bio-inspired tactile, hair-based, gas-sensing and sonar systems all reviewed. Biomimetic actuators are then the focus of Part Three, with vision systems, tissue growth and muscles all discussed. Finally, a wide range of applications are investigated in Part Four, where biomimetic technology and artificial intelligence are reviewed for

such uses as bio-inspired climbing robots and multi-robot systems, microrobots with CMOS IC neural networks locomotion control, central pattern generators (CPG's) and biologically inspired antenna arrays. Includes a solid overview of modern artificial intelligence as background to the principles of biomimetic engineering Reviews a selection of key bio-inspired materials and sensors, highlighting their current strengths and future potential Features cutting-edge examples of biomimetic technologies employed for a broad range of applications

10th International Work-Conference on Artificial Neural Networks, IWANN 2009, Salamanca, Spain, June 10-12, 2009. Proceedings, Part I Springer

Even since computers were invented, many researchers have been trying to understand how human beings learn and many interesting paradigms and approaches towards emulating human learning abilities have been proposed. The ability of learning is one of the central features of human intelligence, which makes it an important ingredient in both traditional Artificial Intelligence (AI) and emerging Cognitive Science. Machine

Learning (ML) draws upon ideas from a diverse set of disciplines, including AI, Probability and Statistics, Computational Complexity, Information Theory, Psychology and Neurobiology, Control Theory and Philosophy. ML involves broad topics including Fuzzy Logic, Neural Networks (NNs), Evolutionary Algorithms (EAs), Probability and Statistics, Decision Trees, etc. Real-world applications of ML are widespread such as Pattern Recognition, Data Mining, Gaming, Bio-science, Telecommunications, Control and Robotics applications. This books reports the latest developments and futuristic trends in ML.

Emerging Trends and Applications IGI Global

Bio-inspired computational algorithms are always hot research topics in artificial intelligence communities. Biology is a bewildering source of inspiration for the design of intelligent artifacts that are capable of efficient and autonomous operation in unknown and changing environments. It is difficult to resist the fascination of creating artifacts that display elements of lifelike intelligence, thus needing techniques for control,

optimization, prediction, security, design, and so on. Bio-Inspired Computational Algorithms and Their Applications is a compendium that addresses this need. It integrates contrasting techniques of genetic algorithms, artificial immune systems, particle swarm optimization, and hybrid models to solve many real-world problems. The works presented in this book give insights into the creation of innovative improvements over algorithm performance, potential applications on various practical tasks, and combination of different techniques. The book provides a reference to researchers, practitioners, and students in both artificial intelligence and engineering communities, forming a foundation for the development of the field.

The Quest for Artificial Intelligence MIT Press

Swarm Intelligence and bio-inspired computation have become increasingly popular in the last two decades. Bio-inspired algorithms such as ant colony algorithms, bat algorithms, bee algorithms, firefly algorithms, cuckoo search and particle swarm optimization have been applied in almost every area of

science and engineering with a dramatic increase in the number of relevant publications. This book reviews the latest developments in swarm intelligence and bio-inspired computation from both the theory and application side, providing a complete resource that analyzes and discusses the latest and future trends in research directions. It can help new researchers to carry out timely research and inspire readers to develop new algorithms. With its impressive breadth and depth, this book will be useful for advanced undergraduate students, PhD students and lecturers in computer science, engineering and science as well as researchers and engineers. Focuses on the introduction and analysis of key algorithms. Includes case studies for real-world applications. Contains a balance of theory and applications, so readers who are interested in either algorithm or applications will all benefit from this timely book.

Artificial Intelligence in the Age of Neural Networks and Brain Computing MIT Press

Bio-inspired Computation in Unmanned Aerial Vehicles focuses on the aspects of

path planning, formation control, heterogeneous cooperative control and vision-based surveillance and navigation in Unmanned Aerial Vehicles (UAVs) from the perspective of bio-inspired computation. It helps readers to gain a comprehensive understanding of control-related problems in UAVs, presenting the latest advances in bio-inspired computation. By combining bio-inspired computation and UAV control problems, key questions are explored in depth, and each piece is content-rich while remaining accessible. With abundant illustrations of simulation work, this book links theory, algorithms and implementation procedures, demonstrating the simulation results with graphics that are intuitive without sacrificing academic rigor. Further, it pays due attention to both the conceptual framework and the implementation procedures. The book offers a valuable resource for scientists, researchers and graduate students in the field of Control, Aerospace Technology and Astronautics, especially those interested in artificial intelligence and Unmanned Aerial Vehicles. Professor Haibin Duan and Dr. Pei Li, both work at Beihang University

(formerly Beijing University of Aeronautics & Astronautics, BUAA). Prof Duan's academic website is: <http://hbduan.buaa.edu.cn>

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