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Bio-Inspired Artificial Intelligence Swarm Intelligence and Bio-Inspired Computation Artificial Intelligence for Biology and Agriculture Swarm Intelligence and Bio-Inspired Computation Intelligence, Biosecurity and Bioterrorism Assessing Intelligence Artificial Intelligence and Molecular Biology Big Data Analytics and Machine Intelligence in Biomedical and Health Informatics Information and Meaning Bio-Intelligence Science Using Artificial Intelligence in Chemistry and Biology Artificial Intelligence The Biology and Technology of Intelligent Autonomous Agents Donald Michie: Machine Intelligence, Biology and More Evolutionary Robotics Swarm Intelligence and Bio-Inspired Computation Swarm Intelligence and Bio-Inspired Computation Neural Networks and Artificial Intelligence for Biomedical Engineering Intelligence Emerging Swarm Intelligence and Bio-Inspired Computation Foundations of Computational Intelligence Bio-inspired Neurocomputing Artificial Intelligence Methods and Tools for Systems Biology In Silico Dreams Handbook of Computational Intelligence in Biomedical Engineering and Healthcare Biosignal Processing and Classification Using Computational Learning and Intelligence Intelligence and Evolutionary Biology Development of a Methodology for the Use of EU-funded Research Results in Policy Development Computational Intelligence and Pattern Analysis in Biology Informatics Innovative Smart Healthcare and Bio-Medical Systems On Intelligence-- More Or Less Analysis of the Key Contributions to Resource Efficiency Biomedical Signal Processing and Artificial Intelligence in Healthcare Computational Intelligence and Data Sciences Building the Future of Innovation on Millions of Years of Natural Intelligence Medical Informatics and Bioimaging Using Artificial Intelligence Bio-Inspired Computational Algorithms and Their Applications Handbook of Artificial Intelligence in Biomedical Engineering Computational Intelligence and Data Sciences Bio-Inspired Hybrid Intelligent Systems for Image Analysis and Pattern Recognition

Learn how AI and data science are upending the worlds of biology and medicine In Silico Dreams: How Artificial Intelligence and Biotechnology Will Create the Medicines of the Future delivers an illuminating and fresh perspective on the convergence of two powerful technologies: AI and biotech. Accomplished genomics expert, executive, and author Brian Hilbush offers readers a brilliant exploration of the most current work of pioneering tech giants and biotechnology startups who have already started disrupting healthcare. The book provides an in-depth understanding of the sources of innovation that are driving the shift in the pharmaceutical industry away from serendipitous therapeutic discovery and toward engineered medicines and curative therapies. In this fascinating book, you'll discover: An overview of the rise of data science methods and the paradigm shift in biology that led to the in silico revolution An outline of the fundamental breakthroughs in AI and deep learning and their applications across medicine A compelling argument for the notion that AI and biotechnology tools will rapidly accelerate the development of therapeutics A summary of innovative breakthroughs in biotechnology with a focus on gene editing and cell reprogramming technologies for therapeutic development A guide to the startup landscape in AI in medicine, revealing where investments are poised to shape the innovation base for the pharmaceutical industry Perfect for anyone with an interest in scientific topics and technology, In Silico Dreams also belongs on the bookshelves of decision-makers in a wide range of industries, including healthcare, technology, venture capital, and government.

Offering an alternative approach to the current models of assessing intelligence, this volume presents a comprehensive and informed understanding of the biological and cultural influences on intellectual behavior. In Assessing Intelligence, authors Eleanor Armour-Thomas and Sharon-Ann Gopaul-McNicol propose a "bio-cultural" model for intelligence assessment. This volume begins by examining the issues pertaining to intellectual assessment, the nature of intelligence, and the biological influences on cognition. It then explores a new model for assessing all childrenùThe Four-Tier Bio-Cultural Assessment System--and it presents an evaluation of that system. Finally, it offers training suggestions for teachers, parents, counselors, and psychologists for enhancing the intellectual potential of all children, and it presents implications for future research and clinical work as well as a vision for policymakers to ensure culturally sensitive assessment. Assessing Intelligence offers a diverse perspective from the fields of clinical psychology, school psychology, education, and education psychology. It will be a valuable resource for practitioners, researchers, and policymakers in the fields of general psychology, clinical psychology, education, social psychology, cross-cultural psychology, multicultural psychology, political science, and cultural studies. 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. Foundations of Computational Intelligence Volume 4: Bio-Inspired Data Mining Theoretical Foundations and Applications Recent advances in the computing and electronics technology, particularly in sensor devices, databases and distributed systems, are leading to an exponential growth in the amount of data stored in databases. It has been estimated that this amount doubles every 20 years. For some applications, this increase is even steeper. Databases storing DNA sequence, for example, are doubling their size every 10 months. This growth is occurring in several applications areas besides bioinformatics, like financial transactions, government data, environmental mo- toring, satellite and medical images, security data and web. As large organizations recognize the high value of data stored in their databases and the importance of their data collection to support decision-making, there is a clear demand for - phisticated Data Mining tools. Data mining tools play a key role in the extraction of useful knowledge from databases. They can be used either to confirm a parti- lar hypothesis or to automatically find patterns. In the second case, which is - lated to this book, the goal may be either to describe the main patterns present in dataset, what is known as descriptive Data Mining or to find patterns able to p- dict behaviour of specific attributes or features, known as predictive Data Mining. While the first goal is associated with tasks like clustering, summarization and association, the second is found in classification and regression problems. 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.

This volume contains a total of thirteen papers covering a variety of AI topics ranging from computer vision and robotics to intelligent modeling, neural networks and fuzzy logic. There are two general articles on robotics and fuzzy logic. The article on robotics focuses on the application of robotics technology in plant production. The second article on fuzzy logic provides a general overview of the basics of fuzzy logic and a typical agricultural application of fuzzy logic. The article `End effectors for tomato harvesting' enhances further the robotic research as applied to tomato harvesting. The application of computer vision techniques for different biological/agricultural applications, for example, length determination of cheese threads, recognition of plankton images and morphological identification of cotton fibers, depicts the complexity and heterogeneities of the problems and their solutions. The development of a real-time orange grading system in the article `Video grading of oranges in real-time' further reports the capability of computer vision technology to meet the demand of high quality food products. The integration of neural network technology with computer vision and fuzzy logic for defect detection in eggs and identification of lettuce growth shows the power of hybridization of AI technologies to solve agricultural problems. Additional papers also focus on automated modeling of physiological processes during postharvest distribution of agricultural products, the applications of neural networks, fusion of AI technologies and three dimensional computer vision technologies for different problems ranging from botanical identification and cell migration analysis to food microstructure evaluation. Handbook of Computational Intelligence in Biomedical Engineering and Healthcare helps readers analyze and conduct advanced research in specialty healthcare applications surrounding oncology, genomics and genetic data, ontologies construction, bio-memetic systems, biomedical electronics, protein structure prediction, and biomedical data analysis. The book provides the reader with a comprehensive guide to advanced computational intelligence, spanning deep learning, fuzzy logic, connectionist systems, evolutionary computation, cellular automata, self-organizing systems, soft computing, and hybrid intelligent systems in biomedical and healthcare applications. Sections focus on important biomedical engineering applications, including biosensors, enzyme immobilization techniques, immuno-assays, and nanomaterials for biosensors and other biomedical techniques. Other sections cover gene-based solutions and applications through computational intelligence techniques and the impact of nonlinear/unstructured data on experimental analysis. Presents a comprehensive handbook that covers an Introduction to Computational Intelligence in Biomedical Engineering and Healthcare, Computational Intelligence Techniques, and Advanced and Emerging Techniques in Computational Intelligence Helps readers analyze and do advanced research in specialty healthcare applications Includes links to websites, videos, articles and other online content to expand and support primary learning objectives This monograph explores problems with existing theories of intelligence, offering a critique of what the author calls "conceptual myopia" that has influenced the way researchers think about intelligence and its development. Handbook of Artificial Intelligence in Biomedical Engineering focuses on recent AI technologies and applications that provide some very promising solutions and enhanced technology in the biomedical field. Recent advancements in computational techniques, such as machine learning, Internet of Things (IoT), and big data, accelerate the deployment of biomedical devices in various healthcare applications. This volume explores how artificial intelligence (AI) can be applied to these expert systems by mimicking the human expert’s knowledge in order to predict and monitor the health status in real time. The accuracy of the AI systems is drastically increasing by using machine learning, digitized medical data acquisition, wireless medical data communication, and computing infrastructure AI approaches, helping to solve complex issues in the biomedical industry and playing a vital role in future healthcare applications. The volume takes a multidisciplinary perspective of employing these new applications in biomedical engineering, exploring the combination of engineering principles with biological knowledge that contributes to the development of revolutionary and life-saving concepts. Swarm intelligence (SI) and bio-inspired computing in general have attracted great interest in almost every area of science, engineering, and industry over the last two decades. In this chapter, we provide an overview of some of the most widely used bio-inspired algorithms, especially those based on SI such as cuckoo search, firefly algorithm, and particle swarm optimization. We also analyze the essence of algorithms and their connections to self-organization. Furthermore, we highlight the main challenging issues associated with these metaheuristic algorithms with in-depth discussions. Finally, we provide some key, open problems that need to be addressed in the next decade. An overview of the basic concepts and methodologies of evolutionary robotics, which views robots as autonomous artificial organisms that develop their own skills in close interaction with the environment and without human intervention. Bio-Inspired Hybrid Intelligent Systems for Image Analysis and Pattern Recognition comprises papers on diverse aspects of bio-inspired models, soft computing and hybrid intelligent systems. The articles are divided into four main parts. The first one consists of papers that propose new fuzzy and bio-inspired models to solve general problems. The second part deals with the main theme of modular neural networks in pattern recognition, which are basically papers using bio-inspired techniques. The third part contains papers that apply hybrid intelligent systems to the problem of time series analysis and prediction, while the fourth one shows papers dealing with bio-inspired models in optimization and robotics applications. An edited book in which both theoretical and application aspects are covered. These original contributions provide a current sampling of AI approaches to problems of biological significance; they are the first to treat the computational needs of the biology community hand-in-hand with appropriate advances in artificial intelligence. The enormous amount of data generated by the Human Genome Project and other large-scale biological research has created a rich and challenging domain for research in artificial intelligence. These original contributions provide a current sampling of AI approaches to problems of biological significance; they are the first to treat the computational needs of the biology community hand-in-hand with appropriate advances in artificial intelligence. Focusing on novel technologies and approaches, rather than on proven applications, they cover genetic sequence analysis, protein structure representation and prediction, automated data analysis aids, and simulation of biological systems. A brief introductory primer on molecular biology and Al gives computer scientists sufficient background to understand much of the biology discussed in the book. Lawrence Hunter is Director of the Machine Learning Project at the National Library of Medicine, National Institutes of Health. Biosignal Processing and Classification Using Computational Learning and Intelligence: Principles, Algorithms and Applications posits an approach for biosignal processing and classification using computational learning and intelligence, highlighting that the term biosignal refers to all kinds of signals that can be continuously measured and monitored in living beings. The book is composed of five relevant parts. Part One is an introduction to biosignals and Part Two describes the relevant techniques for biosignal processing, feature extraction and feature selection/dimensionality reduction. Part Three presents the fundamentals of computational learning (machine learning). Then, the main techniques of computational intelligence are described in Part Four. The authors focus primarily on the explanation of the most used methods in the last part of this book, which is the most extensive portion of the book. This part consists of a recapitulation of the newest applications and reviews in which these techniques have been successfully applied to the biosignals’ domain, including EEG-based Brain-Computer Interfaces (BCI) focused on P300 and Imagined Speech, emotion recognition from voice and video, leukemia recognition, infant cry recognition, EEGbased ADHD identification among others. Provides coverage of the fundamentals of signal processing, including sensing the heart, sending the brain, sensing human acoustic, and sensing other organs Includes coverage biosignal pre-processing techniques such as filtering, artifiact removal, and feature extraction techniques such as Fourier transform, wavelet transform, and MFCC Covers the latest techniques in machine learning and computational intelligence, including Supervised Learning, common classifiers, feature selection, dimensionality reduction, fuzzy logic, neural networks, Deep Learning, bio-inspired algorithms, and Hybrid Systems Written by engineers to help engineers, computer scientists, researchers, and clinicians understand the technology and applications of computational learning to biosignal processing In view of labor division in swarm intelligence, a new research paradigm of “problem-oriented approach to swarm intelligence” is constructed. The key to the success of such an approach is to grasp the features of problem objects sufficiently. At first, the labor division behaviors of ant colonies are

discoursed and some descriptions of ant colony’s labor division models are given. Taking three practical problems as the backgrounds, the corresponding modeling and simulation approaches to ant colony’s labor division are investigated. Considering the diverse nature of virtual enterprise tasks, ant colony’s labor division model with multitask is proposed. Similarly, ant colony’s labor division model with multistate is also proposed by considering the diverse characteristics of product varieties in pull production systems. According to the relation of resource constraints of task allocation in resilient supply chains, ant colony’s labor division model with multiconstraint is put forward. Finally, the key points to implement “problem-oriented approach to swarm intelligence” are refined and expounded. Automatic music composition has blossomed with the introduction of intelligent methodologies in computer science. Thereby, many methodologies for automatic music composition have been or could be described as “intelligent,” but what exactly is it that makes them intelligent? Furthermore, is there any categorization of intelligent music composition (IMC) methodologies that is both consistent and descriptive? This chapter aims to provide some insights on what IMC methodologies are, through proposing and analyzing a detailed categorization of them. Toward this perspective, methodologies that incorporate bioinspired intelligent algorithms (such as cellular automata, L-systems, genetic algorithms, swarm intelligence, among others) as well as their combinations are considered and briefly reviewed. At the same time, a consistent categorization of these methodologies is proposed, taking into account the utilization of their intelligent algorithm in accordance to their overall compositional aims. To this end, three main categories can be defined: the “unsupervised,” the “supervised,” and the “interactive” IMC methodologies. Donald Michie was many things; a computing pioneer in machine intelligence, a cryptographer who made key breakthroughs at Bletchley Park, and a geneticist. Tragically, two years ago he died in a car crash. Here, Ashwin Srinivasan presents an engaging collection of lively essays from Michie's writings, on thinking computers, mice, and much more. Possessing great potential power for gathering and managing data in chemistry, biology, and other sciences, Artificial Intelligence (AI) methods are prompting increased exploration into the most effective areas for implementation. A comprehensive resource documenting the current state-of-the-science and future directions of the field is required to This book provides simultaneously a design blueprint, user guide, research agenda, and communication platform for current and future developments in artificial intelligence (AI) approaches to systems biology. It places an emphasis on the molecular dimension of life phenomena and in one chapter on anatomical and functional modeling of the brain. As design blueprint, the book is intended for scientists and other professionals tasked with developing and using AI technologies in the context of life sciences research. As a user guide, this volume addresses the requirements of researchers to gain a basic understanding of key AI methodologies for life sciences research. Its emphasis is not on an intricate mathematical treatment of the presented AI methodologies. Instead, it aims at providing the users with a clear understanding and practical know-how of the methods. As a research agenda, the book is intended for computer and life science students, teachers, researchers, and managers who want to understand the state of the art of the presented methodologies and the areas in which gaps in our knowledge demand further research and development. Our aim was to maintain the readability and accessibility of a textbook throughout the chapters, rather than compiling a mere reference manual. The book is also intended as a communication platform seeking to bride the cultural and technological gap among key systems biology disciplines. To support this function, contributors have adopted a terminology and approach that appeal to audiences from different backgrounds. This book explores how potential bio-threats and risks may evolve post 9/11 given the rapid changes in biotechnology and synthetic biology. It also explores what role intelligence communities can play in understanding threats and risks. It argues that although bio-threats and risks are largely low probability and high impact in nature, intelligence in ‘Five Eyes’ countries remain insufficiently prepared to understand them. This book identifies key areas where intelligence reforms need to take place including a more strategic and systematic collaboration between national security/law enforcement intelligence and the scientific community. It is aimed at intelligence analysts, those in the scientific community working on health security threats, policy makers and researchers working on biosecurity and bioterrorism threats and risks. Information and Meaning is the third book in a trilogy exploring the nature of information, intelligence and meaning. It begins by providing an overview of the first two works of the trilogy, then goes on to consider the meaning of meaning. This explorat ion leads to a theory of how the brain works. This book differs from others in the field, in that it is written from the perspective of a theoretical biologist looking at the evolution of information systems as a basis for studying the phenomena of information, intelligence and meaning. It describes how neurons create a brain which understands information inputs and then is able to operate on such information. An investigation of intelligence as an emergent phenomenon, integrating the perspectives of evolutionary biology, neuroscience, and artificial intelligence. Emergence—the formation of global patterns from solely local interactions—is a frequent and fascinating theme in the scientific literature both popular and academic. In this book, Keith Downing undertakes a systematic investigation of the widespread (if often vague) claim that intelligence is an emergent phenomenon. Downing focuses on neural networks, both natural and artificial, and how their adaptability in three time frames—phylogenetic (evolutionary), ontogenetic (developmental), and epigenetic (lifetime learning)—underlie the emergence of cognition. Integrating the perspectives of evolutionary biology, neuroscience, and artificial intelligence, Downing provides a series of concrete examples of neurocognitive emergence. Doing so, he offers a new motivation for the expanded use of bio-inspired concepts in artificial intelligence (AI), in the subfield known as Bio-AI. One of Downing's central claims is that two key concepts from traditional AI, search and representation, are key to understanding emergent intelligence as well. He first offers introductory chapters on five core concepts: emergent phenomena, formal search processes, representational issues in Bio-AI, artificial neural networks (ANNs), and evolutionary algorithms (EAs). Intermediate chapters delve deeper into search, representation, and emergence in ANNs, EAs, and evolving brains. Finally, advanced chapters on evolving artificial neural networks and information-theoretic approaches to assessing emergence in neural systems synthesize earlier topics to provide some perspective, predictions, and pointers for the future of Bio-AI. Artificial intelligence (AI) is taking on an increasingly important role in our society today. In the early days, machines fulfilled only manual activities. Nowadays, these machines extend their capabilities to cognitive tasks as well. And now AI is poised to make a huge contribution to medical and biological applications. From medical equipment to diagnosing and predicting disease to image and video processing, among others, AI has proven to be an area with great potential. The ability of AI to make informed decisions, learn and perceive the environment, and predict certain behavior, among its many other skills, makes this application of paramount importance in today's world. This book discusses and examines AI applications in medicine and biology as well as challenges and opportunities in this fascinating area. Today, it is considered that intelligence includes at least two skills: the ability to memorize and store knowledge, and the ability to process knowledge. The person (or machine) without any knowledge cannot be considered intelligent. The ability of learning - acquisition of new knowledge, is also one of the aspects of the intelligence, although we can classify it as an ability to solve problems. As an "intelligent feature" we can also consider the ability to communicate with other intelligent beings. For the concept of intelligence - two questions are essential: the question of knowledge and the reasoning (making conclusions), and, this corresponds to the terms of a knowledge base and a reasoning process. The component of reasoning (inference) also represents a kind of knowledge - it is knowledge about the process of carrying out new information from an existing knowledge base.This edition covers different topics from bio-intelligence science, and application of bio-intelligence in different domains - the bio-medical domain, the learning, the medicine etc.Section 1 focuses on biological aspects of the intelligence, describing biological vs. artificial intelligence, brain as an emergent finite automaton, biological neural network structure and spike activity prediction based on multi-neuron spike train data, an experiment in use of brain computer interfaces for cognitive researches, and chessboard model of human brain and an application on memory capacity.Section 2 focuses on topics from neuroscience, describing patterns discovery in brain signals using decision trees, an interactive immersive tool for brain education,

art, and neuro-therapy, analyzing brain functions by subject classification of functional near-infrared spectroscopy data using convolutional neural networks analysis, modeling neuromorphic persistent firing networks, and creativity as central to critical reasoning and the facilitative role of moral education. Section 3 focuses on pattern recognition in neuro and medical applications, describing Brain-k for structural image processing: creating electrical models of the human head, application of machine learning in postural control kinematics for the diagnosis of Alzheimer's disease, and semi supervised clustering by iterative partition and regression with neuroscience applications.Section 4 focuses on neural networks applications, describing quantum-inspired neural networks with application, training feedforward neural networks using symbiotic organisms search algorithm, artificial intelligence for speech recognition based on neural networks, and deep recurrent neural network-based auto-encoders for acoustic novelty detection. This book emphasizes the latest developments and achievements in artificial intelligence and related technologies, focusing on the applications of artificial intelligence and medical diagnosis. The book describes the theory, applications, concept visualization, and critical surveys covering most aspects of AI for medical informatics. 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 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, bio-mimetic, 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. BIG DATA ANALYTICS AND MACHINE INTELLIGENCE IN BIOMEDICAL AND HEALTH INFORMATICS Provides coverage of developments and state-of-the-art methods in the broad and diversified data analytics field and applicable areas such as big data analytics, data mining, and machine intelligence in biomedical and health informatics. The novel applications of Big Data Analytics and machine intelligence in the biomedical and healthcare sector is an emerging field comprising computer science, medicine, biology, natural environmental engineering, and pattern recognition. Biomedical and health informatics is a new era that brings tremendous opportunities and challenges due to the plentifully available biomedical data and the aim is to ensure high-quality and efficient healthcare by analyzing the data. The 12 chapters in??Big Data Analytics and Machine Intelligence in Biomedical and Health Informatics??cover the latest advances and developments in health informatics, data mining, machine learning, and artificial intelligence. They have been organized with respect to the similarity of topics addressed, ranging from issues pertaining to the Internet of Things (IoT) for biomedical engineering and health informatics, computational intelligence for medical data processing, and Internet of Medical Things??(IoMT). New researchers and practitioners working in the field will benefit from reading the book as they can quickly ascertain the best performing methods and compare the different approaches. Audience Researchers and practitioners working in the fields of biomedicine, health informatics, big data analytics, Internet of Things, and machine learning. This book presents futuristic trends in computational intelligence including algorithms used in different application domains in health informatics covering bio-medical, bioinformatics, &biological sciences. It provides conceptual framework with a focus on computational intelligence techniques in biomedical engineering &health informatics. Bio-inspired models have taken inspiration from the nature to solve challenging problems in an intelligent manner. Major aims of such bio-inspired models of computation are to propose new unconventional computing architectures and novel problem solving paradigms. Computing models such as artificial neural network (ANN), genetic algorithm (GA), and swarm intelligence (SI) are major constituent models of the bio-inspired approach. Applications of these models are ubiquitous and hence proposed to be applied for Semantic Web. The chapter discusses fundamentals of these bio-inspired constituents along with some heuristic that can be used to design and implement these constituents and briefly surveys recent applications of these models for the Semantic Web. The study shows that the objective of the Semantic Web is better met with such approach and the Web can be accessed in more human-oriented way. At the end, a generic framework for web content filtering based on neuro-fuzzy approach is presented. By considering online webpages and fuzzy user profile, the proposed system classifies the webpages into vague categories using a neural network. This book presents futuristic trends in computational intelligence including algorithms as applicable to different application domains in health informatics covering bio-medical, bioinformatics, and biological sciences. Latest evolutionary approaches to solve optimization problems under biomedical engineering field are discussed. It provides conceptual framework with a focus on application of computational intelligence techniques in the domain of biomedical engineering and health informatics including real-time issues. An invaluable tool in Bioinformatics, this unique volume provides both theoretical and experimental results, and describes basic principles of computational intelligence and pattern analysis while deepening the reader's understanding of the ways in which these principles can be used for analyzing biological data in an efficient manner. This book synthesizes current research in the integration of computational intelligence and pattern analysis techniques, either individually or in a hybridized manner. The purpose is to analyze biological data and enable extraction of more meaningful information and insight from it. Biological data for analysis include sequence data, secondary and tertiary structure data, and microarray data. These data types are complex and advanced methods are required, including the use of domain-specific knowledge for reducing search space, dealing with uncertainty, partial truth and imprecision, efficient linear and/or sub-linear scalability, incremental approaches to knowledge discovery, and increased level and intelligence of interactivity with human experts and decision makers Chapters authored by leading researchers in CI in biology informatics. Covers highly relevant topics: rational drug design; analysis of microRNAs and their involvement in human diseases. Supplementary material included: program code and relevant data sets correspond to chapters. Biomedical/Electrical Engineering Neural Networks and Artificial Intelligence for Biomedical Engineering Using examples drawn from biomedicine and biomedical engineering, this reference text provides comprehensive coverage of all the major techniques currently available to build computer-assisted decision support systems. You will find practical solutions for biomedicine based on current theory and applications of neural networks, artificial intelligence, and other methods for the development of decision-making aids, including hybrid systems. Neural Networks and Artificial Intelligence for Biomedical Engineering offers students and scientists of biomedical engineering, biomedical informatics, and medical artificial intelligence a deeper understanding of the powerful techniques currently used with a wide range of biomedical applications. Highlighted topics include: Types of neural networks and neural network algorithms Knowledge-based representation and acquisition Reasoning methodologies and searching strategies Chaotic analysis of biomedical time series Genetic algorithms Probability-based systems and fuzzy systems Case study and MATLAB® exercises Evaluation and validation of decision support aids Despite endless change and disruption, massive upheaval and cosmic collisions, nature has survived the worst of times and thrived in the best of them for 3.8 billion years. She knows what works, what lasts and what contributes to the future of life on Earth. She is the undisputed master of continuous innovation, adaptation and, ultimately, regeneration. What if we humans could tap into the power of the Natural Intelligence that stood the test of time and model our businesses after

the proven success stories of nature? What if we could fast track innovation and develop responsible products and agile organisations? We might learn to become life-friendly and self-renewing right where we are and transform our current degenerative value system into a regenerative one. This may sound like science fiction, but is already happening. In this book, Leen Gorissen, PhD in Biology, covers breakthrough insights from the life sciences and how these change the way we look at change and innovation. She shares some of the most advanced thinking and novelties in bio-inspired innovation - covering disciplines like biomimicry, biophilia, permaculture, living systems thinking, nature-based solutions and regenerative design - and clusters these nature-inspired disciplines under the umbrella of NI. Because nature is the largest R&D project in history. Millions of years of field tests have led to designs that outclass any man-made design in terms of efficiency, effectiveness, adaptability, resiliency and endurance. By tapping into the potential of NI, the business world can become an important engine of planetary regeneration and a beacon of creativity and meaningful work spreading hope and ingenuity, not despair and burn-out. The NATO sponsored Advanced Study Institute 'The Biology and Tech nology of Intelligent Autonomous Agents' was an extraordinary event. For two weeks it brought together the leading proponents of the new behavior oriented approach to Artificial Intelligence in Castel Ivano near Trento. The goal of the meeting was to establish a solid scientific and technological foun dation for the field of intelligent autonomous agents with a bias towards the new methodologies and techniques that have recently been developed in Ar tificial Intelligence under the strong influence of biology. Major themes of the conference were: bottom-up AI research, artificial life, neural networks and techniques of emergent functionality. The meeting was such an extraordinary event because it not only featured very high quality lectures on autonomous agents and the various fields feeding it, but also robot laboratories which were set up by the MIT AI laboratory (with a lab led by Rodney Brooks) and the VUB AI laboratory (with labs led by Tim Smithers and Luc Steels). This way the participants could also gain practical experience and discuss in concreto what the difficulties and achievements were of different approaches. In fact, the meeting has been such a success that a follow up meeting is planned for September 1995 in Monte Verita (Switzerland). This meeting is organised by Rolf Pfeifer (University of Zurich). Advances in smart healthcare systems (SHS) and artificial intelligence (AI) domains highlight the need for ICT systems that aim not only to improve human quality of life but improve safety too. SHS bring together concepts and methodologies from various fields, such as communications and network systems, computer science, life sciences and healthcare. The well-known smart healthcare paradigms are; real-time monitoring devices, computer-aided surgery devices, telemedicine devices, population-based care devices, personalized medicine from a machine learning perspective, ubiquities intelligent computing, expert decision support systems, Health 2.0 and Internet of Things (IoT). This book presents models for the deployment of intelligent computing, information, and networking technologies to aid in preventing disease, improving the quality of care and lowering overall cost. It also discusses the potential role of the AI paradigms, computational intelligence and machine learning techniques which are used in developing the SHS. It will provide examples of potential usage of such technology in smart healthcare and and bio-medical systems. It will be an important read for researchers and professionals working in smart healthcare systems, as well as those working in the individual areas of networks, artificial intelligence and healthcare who want to see how an interdisciplinary approach can enhance the current technology. Biomedical Signal Processing and Artificial Intelligence in Healthcare is a new volume in the Developments in Biomedical Engineering and Bioelectronics series. This volume covers the basics of biomedical signal processing and artificial intelligence. It explains the role of machine learning in relation to processing biomedical signals and the applications in medicine and healthcare. The book provides background to statistical analysis in biomedical systems. Several types of biomedical signals are introduced and analyzed, including ECG and EEG signals. The role of Deep Learning, Neural Networks, and the implications of the expansion of artificial intelligence is covered. Biomedical Images are also introduced and processed, including segmentation, classification, and detection. This book covers different aspects of signals, from the use of hardware and software, and making use of artificial intelligence in problem solving. Dr Zgallai’s book has up to date coverage where readers can find the latest information, easily explained, with clear examples and illustrations. The book includes examples on the application of signal and image processing employing artificial intelligence to Alzheimer, Parkinson, ADHD, autism, and sleep disorders, as well as ECG and EEG signals. Developments in Biomedical Engineering and Bioelectronics is a 10-volume series which covers recent developments, trends and advances in this field. Edited by leading academics in the field, and taking a multidisciplinary approach, this series is a forum for cutting-edge, contemporary review articles and contributions from key ‘up-and-coming’ academics across the full subject area. The series serves a wide audience of university faculty, researchers and students, as well as industry practitioners. Coverage of the subject area and the latest advances and applications in biomedical signal processing and Artificial Intelligence. Contributions by recognized researchers and field leaders. On-line presentations, tutorials, application and algorithm examples. Swarm Intelligence and bio-inspired computation have become increasing 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 of 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. In evolutionary biology, "intelligence" must be defined in terms of traits that are subject to the major forces of organic evolution. Accordingly, this volume is concerned with the substantive questions that are relevant to the evolutionary problem. Comparisons of learning abilities are highlighted by a detailed report on similarities between honeybees and higher vertebrates. Several chapters are concerned with the evolution of cerebral lateralization and the control of language, and recent analyses of the evolution of encephalization and neocorticalization, including a review of effects of domestication on brain size are presented. The relationship between brain size and intelligence is debated vigorously. Most unusual, however, is the persistent concern with analytic and philosophical issues that arise in the study of this topic, from the applications of new developments on artificial intelligence as a source of cognitive theory, to the recognition of the evolutionary process itself as a theory of knowledge in "evolutionary epistemology".

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