



Artificial Immune Systems and Their Applications

Edited by D. Dasgupta



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Artificial Immune Systems And Their Applications

Dipankar Dasgupta



Artificial Immune Systems And Their Applications:

Artificial Immune Systems and Their Applications Dipankar Dasgupta, 2012-12-06 Artificial immune systems are highly distributed systems based on the principles of the natural system. This is a new and rapidly growing field offering powerful and robust information processing capabilities for solving complex problems. Like artificial neural networks, artificial immune systems can learn new information, recall previously learned information, and perform pattern recognition in a highly decentralized fashion. This volume provides an overview of the immune system from the computational viewpoint. It discusses computational models of the immune system and their applications and provides a wealth of insights on immunological memory and the effects of viruses in immune response. It will be of professional interest to scientists, academics, vaccine designers, and practitioners.

Handbook of Research on Artificial Immune Systems and Natural Computing: Applying Complex Adaptive Technologies Mo, Hongwei, 2009-04-30 This book offers new ideas and recent developments in Natural Computing, especially on artificial immune systems. Provided by publisher.

Artificial Immune Systems Jon Timmis, Peter Bentley, Emma Hart, 2003-11-03 In many ways, our immune systems are as complex as our brains. They learn, predict, remember, and adapt, protecting us from the maelstrom of pathogens that infect us daily. Computer Science frequently takes inspiration from the seemingly endless capabilities of natural systems. It should therefore be no surprise that like the field of Artificial Neural Networks, inspired from brains, we now have a vigorous field of research known as Artificial Immune Systems (AIS), inspired by our own immune systems. Although still relatively new, the previous 10 years have seen the paradigm of AIS rapidly establish itself as an important biological metaphor. Researchers all over the world fruitfully exploit immunological ideas in many different ways to provide mechanisms for tackling a wide variety of applications. In this volume, we present the proceedings of ICARIS 2003, the 2nd International Conference on Artificial Immune Systems. This was the second international conference entirely dedicated to the field and followed the extremely successful first conference held in Canterbury, UK, in 2002. The number and variety of papers in this year's conference is a tribute to the ever-growing number of researchers in the area and representative of the solid foundation of work that now exists in this area. The range of topics considered is wide. For example, at one end of the spectrum, we see a selection of papers providing a necessary theoretical grounding for the field. At the other end, we have an exciting range of applications to real-world problems, covering, for example, job shop scheduling and fault detection in refrigeration systems.

Developing a Cybersecurity Immune System for Industry 4.0 Sergei Petrenko, 2022-09-01 Cyber immune systems try to mimic the adaptive immune system of humans and animals because of its capability to detect and fend off new unseen pathogens. Today's current cybersecurity systems provide an effective defense mechanism against known cyber attacks but are not so good when it comes to defending against unknown attacks. This book describes the possible development and organization of self-healing computing based on cyber immunity techniques and aimed at working in the new realm of Industry 4.0. Industry 4.0 is the trend towards automation and data exchange in

manufacturing technologies and processes which include cyber physical systems CPS the internet of things IoT industrial internet of things IIOT cloud computing cognitive computing and artificial intelligence The book describes the author's research and development of cyber immunity systems that will prevent the destruction of critical information infrastructure by future unknown cyber attacks and thus avoid the significant or catastrophic consequences of such attacks The book is designed for undergraduate and post graduate students for engineers in related fields as well as managers of corporate and state structures chief information officers CIO chief information security officers CISO architects and research engineers in the field of cybersecurity This book contains four chapters

- 1 Cyber Immunity Concept of the Industry 4.0
- 2 Mathematical Framework for Immune Protection of Industry 4.0
- 3 Trends and prospects of the development of Immune Protection of Industry 4.0
- 4 From detecting cyber attacks to self healing Industry 4.0

Artificial Immune Systems: A New Computational Intelligence Approach Leandro Nunes de Castro, Jonathan Timmis, 2002-09-23 Artificial Immune Systems AIS are adaptive systems inspired by the biological immune system and applied to problem solving This book provides an accessible introduction that will be suitable for anyone who is beginning to study or work in this area It gives a clear definition of an AIS sets out the foundations of the topic including basic algorithms and analyses how the immune system relates to other biological systems and processes No prior knowledge of immunology is needed all the essential background information is covered in the introductory chapters Key features of the book include A discussion of AIS in the context of Computational Intelligence Case studies in Autonomous Navigation Computer Network Security Job Shop Scheduling and Data Analysis B7 An extensive survey of applications A framework to help the reader design and understand AIS A web site with additional resources including pseudocodes for immune algorithms and links to related sites Written primarily for final year undergraduate and postgraduate students studying Artificial Intelligence Evolutionary and Biologically Inspired Computing this book will also be of interest to industrial and academic researchers working in related areas

Applying Computational Intelligence Arthur Kordon, 2009-11-28 In theory there is no difference between theory and practice But in practice there is Jan L A van de Snepscheut The flow of academic ideas in the area of computational intelligence has penetrated industry with tremendous speed and persistence Thousands of applications have proved the practical potential of fuzzy logic neural networks evolutionary computation swarm intelligence and intelligent agents even before their theoretical foundation is completely understood And the popularity is rising Some software vendors have pronounced the new machine learning gold rush to Transfer Data into Gold New buzzwords like data mining genetic algorithms and swarm optimization have enriched the top executives vocabulary to make them look more visionary for the 21st century The phrase fuzzy math became political jargon after being used by US President George W Bush in one of the election debates in the campaign in 2000 Even process operators are discussing the performance of neural networks with the same passion as the performance of the Dallas Cowboys However for most of the engineers and scientists introducing computational intelligence technologies

into practice looking at the growing number of new approaches and understanding their theoretical principles and potential for value creation becomes a more and more difficult task

Biologically-Inspired Collaborative Computing Mike Hinchey, Anastasia Pagnoni, Franz J. Rammig, Hartmut Schmeck, 2008-07-09 Look deep into nature and you will understand everything better advised Albert Einstein In recent years the research communities in Computer Science Engineering and other disciplines have taken this message to heart and a relatively new field of biologically inspired computing has been born Inspiration is being drawn from nature from the behaviors of colonies of ants of swarms of bees and even the human body This new paradigm in computing takes many simple autonomous objects or agents and lets them jointly perform a complex task without having the need for centralized control In this paradigm these simple objects interact locally with their environment using simple rules Applications include optimization algorithms communications networks scheduling and decision making supply chain management and robotics to name just a few There are many disciplines involved in making such systems work from artificial intelligence to energy aware systems Often these disciplines have their own field of focus have their own conferences or only deal with specialized problems e.g. swarm intelligence biologically inspired computation sensor networks The Second IFIP Conference on Biologically Inspired Collaborative Computing aims to bridge this separation of the scientific community and bring together researchers in the fields of Organic Computing Autonomic Computing Self Organizing Systems Pervasive Computing and related areas We are very pleased to have two very important keynote presentations Swarm Robotics The Coordination of Robots via Swarm Intelligence Principles by Marco Dorigo Universit Libre de Bruxelles Belgium of which an abstract is included in this volume

Genetic and Evolutionary Computation--GECCO 2003 Erick Cantú-Paz, 2003-07-08 The set LNCS 2723 and LNCS 2724 constitutes the refereed proceedings of the Genetic and Evolutionary Computation Conference GECCO 2003 held in Chicago IL USA in July 2003 The 193 revised full papers and 93 poster papers presented were carefully reviewed and selected from a total of 417 submissions The papers are organized in topical sections on a life adaptive behavior agents and ant colony optimization artificial immune systems coevolution DNA molecular and quantum computing evolvable hardware evolutionary robotics evolution strategies and evolutionary programming evolutionary scheduling routing genetic algorithms genetic programming learning classifier systems real world applications and search based software engineering

Handbook of Computational Intelligence in Manufacturing and Production Management Laha, Dipak, Mandal, Purnendu, 2007-11-30 During the last two decades computer and information technologies have forced great changes in the ways businesses manage operations in meeting the desired quality of products and services customer demands competition and other challenges The Handbook of Computational Intelligence in Manufacturing and Production Management focuses on new developments in computational intelligence in areas such as forecasting scheduling production planning inventory control and aggregate planning among others This comprehensive collection of research provides cutting edge knowledge on information technology developments for both researchers and

professionals in fields such as operations and production management Web engineering artificial intelligence and information resources management

Evolvable Systems: From Biology to Hardware Andy M. Tyrrell, Pauline C. Haddow, Jim Torresen, 2007-10-08 The idea of evolving machines whose origins can be traced to the cybernetics movement of the 1940s and 1950s has recently resurged in the form of the nascent field of bio inspired systems and evolvable hardware The inaugural workshop Towards Evolvable Hardware took place in Lausanne in October 1995 followed by the First International Conference on Evolvable Systems From Biology to Hardware ICES held in Tsukuba Japan in October 1996 The second ICES conference was held in Lausanne in September 1998 with the third and fourth being held in Edinburgh April 2000 and Tokyo October 2001 respectively This has become the leading conference in the field of evolvable systems and the 2003 conference promised to be at least as good as if not better than the four that preceded it The fifth international conference was built on the success of its predecessors aiming at presenting the latest developments in the field In addition it brought together researchers who use biologically inspired concepts to implement real systems in artificial intelligence artificial life robotics VLSI design and related domains We would say that this fifth conference followed on from the previous four in that it consisted of a number of high quality interesting thought provoking papers

Computational Intelligence Andries P. Engelbrecht, 2007-10-22 Computational Intelligence An Introduction Second Edition offers an in depth exploration into the adaptive mechanisms that enable intelligent behaviour in complex and changing environments The main focus of this text is centred on the computational modelling of biological and natural intelligent systems encompassing swarm intelligence fuzzy systems artificial neural networks artificial immune systems and evolutionary computation Engelbrecht provides readers with a wide knowledge of Computational Intelligence CI paradigms and algorithms inviting readers to implement and problem solve real world complex problems within the CI development framework This implementation framework will enable readers to tackle new problems without any difficulty through a single Java class as part of the CI library Key features of this second edition include A tutorial hands on based presentation of the material State of the art coverage of the most recent developments in computational intelligence with more elaborate discussions on intelligence and artificial intelligence AI New discussion of Darwinian evolution versus Lamarckian evolution also including swarm robotics hybrid systems and artificial immune systems A section on how to perform empirical studies topics including statistical analysis of stochastic algorithms and an open source library of CI algorithms Tables illustrations graphs examples assignments Java code implementing the algorithms and a complete CI implementation and experimental framework Computational Intelligence An Introduction Second Edition is essential reading for third and fourth year undergraduate and postgraduate students studying CI The first edition has been prescribed by a number of overseas universities and is thus a valuable teaching tool In addition it will also be a useful resource for researchers in Computational Intelligence and Artificial Intelligence as well as engineers statisticians operational researchers and bioinformaticians with an interest in applying AI or CI to solve problems in their

domains Check out <http://www.ci.cs.up.ac.za> for examples assignments and Java code implementing the algorithms

Recent Developments in Intelligent Nature-Inspired Computing Patnaik, Srikanta, 2017-03-09 The development of nature inspired computational techniques has enhanced problem solving in dynamic and uncertain environments By implementing effective computing strategies this ensures adaptable self organizing and decentralized behavioral techniques Recent Developments in Intelligent Nature Inspired Computing is an authoritative reference source for the latest scholarly material on natural computation methods and applications in diverse fields Highlighting multidisciplinary studies on swarm intelligence global optimization and group technology this publication is an ideal reference source for professionals researchers scholars and engineers interested in the latest developments in computer science methodologies

Information Computing and Applications Yuhang Yang, Maode Ma, Baoxiang Liu, 2013-12-19 This two volume set of CCIS 391 and CCIS 392 constitutes the refereed proceedings of the Fourth International Conference on Information Computing and Applications ICICA 2013 held in Singapore in August 2013 The 126 revised full papers presented in both volumes were carefully reviewed and selected from 665 submissions The papers are organized in topical sections on Internet computing and applications engineering management and applications Intelligent computing and applications business intelligence and applications knowledge management and applications information management system computational statistics and applications

Advances in Evolutionary and Deterministic Methods for Design, Optimization and Control in Engineering and Sciences David Greiner, Blas Galván, Jacques Périaux, Nicolas Gauger, Kyriakos Giannakoglou, Gabriel Winter, 2014-11-14 This book contains state of the art contributions in the field of evolutionary and deterministic methods for design optimization and control in engineering and sciences Specialists have written each of the 34 chapters as extended versions of selected papers presented at the International Conference on Evolutionary and Deterministic Methods for Design Optimization and Control with Applications to Industrial and Societal Problems EUROGEN 2013 The conference was one of the Thematic Conferences of the European Community on Computational Methods in Applied Sciences ECCOMAS Topics treated in the various chapters are classified in the following sections theoretical and numerical methods and tools for optimization theoretical methods and tools numerical methods and tools and engineering design and societal applications turbo machinery structures materials and civil engineering aeronautics and astronautics societal applications electrical and electronics applications focused particularly on intelligent systems for multidisciplinary design optimization mdo problems based on multi hybridized software adjoint based and one shot methods uncertainty quantification and optimization multidisciplinary design optimization applications of game theory to industrial optimization problems applications in structural and civil engineering optimum design and surrogate models based optimization methods in aerodynamic design

Advanced Intelligent Systems for Sustainable Development (AI2SD'2018) Mostafa Ezziyyani, 2019-02-05 This book gathers papers presented at the International Conference on Advanced Intelligent Systems

for Sustainable Development AI2SD 2018 which was held in Tangiers Morocco on 12-14 July 2018 Highlighting the latest research and advances in the field of healthcare it shares essential insights into the health sector and is intended to stimulate further discussion and promote closer interdisciplinary collaboration among researchers and health professionals

Intelligent Data analysis and its Applications, Volume I Jeng-Shyang Pan, Vaclav Snasel, Emilio S. Corchado, Ajith Abraham, Shyue-Liang Wang, 2014-05-26 This volume presents the proceedings of the First Euro China Conference on Intelligent Data Analysis and Applications ECC 2014 which was hosted by Shenzhen Graduate School of Harbin Institute of Technology and was held in Shenzhen City on June 13-15 2014 ECC 2014 was technically co-sponsored by Shenzhen Municipal People's Government IEEE Signal Processing Society Machine Intelligence Research Labs VSB Technical University of Ostrava Czech Republic National Kaohsiung University of Applied Sciences Taiwan and Secure E-commerce Transactions Shenzhen Engineering Laboratory of Shenzhen Institute of Standards and Technology *Implementing Computational Intelligence Techniques for Security Systems Design* Albastaki, Yousif Abdullatif, Awad, Wasan, 2020-02-14 Recently cryptology problems such as designing good cryptographic systems and analyzing them have been challenging researchers Many algorithms that take advantage of approaches based on computational intelligence techniques such as genetic algorithms genetic programming and so on have been proposed to solve these issues *Implementing Computational Intelligence Techniques for Security Systems Design* is an essential research book that explores the application of computational intelligence and other advanced techniques in information security which will contribute to a better understanding of the factors that influence successful security systems design Featuring a range of topics such as encryption self-healing systems and cyber fraud this book is ideal for security analysts IT specialists computer engineers software developers technologists academicians researchers practitioners and students **Integration of Heterogeneous Manufacturing Machinery in Cells and Systems** Wasim Ahmed Khan, Khalid Rehman, Ghulam Hussain, Ghulam Abbas, Xiaoping Wang, 2024-06-13 With the advent of the 4th Industrial Revolution the implementation of the nine pillars of technology has taken a firm root especially after the post-COVID pandemic era The integration of cyber-physical systems is one of the most important pillars that has led to the maximization of productivity which also leads to the maximization of profits from a manufacturing system This book discusses manufacturing enterprises then looks at the theoretical and practical aspects of integrating these manufacturing systems using legacy and modern communication methodologies and relates them to the current level of technology readiness *Integration of Heterogeneous Manufacturing Machinery in Cells and Systems Policies and Practices* focuses on the methods covering the use of Artificial Intelligence Augmented Reality the Internet of Things and cellular and physical industrial communication It describes the nine pillars of technology which include the Internet of Things Cloud Computing Autonomous and Robotics Systems Big Data Analytics Augmented Reality Cyber Security Simulation System integration and Additive Manufacturing The book highlights the methods used that cover

mechanical electrical electronics and computer software aspects of developing manufacturing machinery and discusses computer aided design CAD production planning and manufacturing as well as production databases with basics and semantics This book is an ideal reference for undergraduate graduate and postgraduate students of industrial manufacturing mechanical and mechatronics engineering along with professionals and general readers **Learning Classifier Systems**

Pier Luca Lanzi,2003-11-24 This book constitutes the refereed proceedings of the 5th International Workshop on Learning Classifier Systems IWLCS 2003 held in Granada Spain in September 2003 in conjunction with PPSN VII The 10 revised full papers presented together with a comprehensive bibliography on learning classifier systems were carefully reviewed and selected during two rounds of refereeing and improvement All relevant issues in the area are addressed **Agents and**

Multi-Agent Systems: Technologies and Applications 2020 G. Jezic,J. Chen-Burger,M. Kusek,R. Sperka,Robert J. Howlett,Lakhmi C. Jain,2020-05-20 The book highlights new trends and challenges in research on agents and the new digital and knowledge economy It includes papers on business process management agent based modeling and simulation and anthropic oriented computing that were originally presented at the 14th International KES Conference on Agents and Multi Agent Systems Technologies and Applications KES AMSTA 2020 being held as a Virtual Conference in June 17 19 2020 The respective papers cover topics such as software agents multi agent systems agent modeling mobile and cloud computing big data analysis business intelligence artificial intelligence social systems computer embedded systems and nature inspired manufacturing all of which contribute to the modern digital economy

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