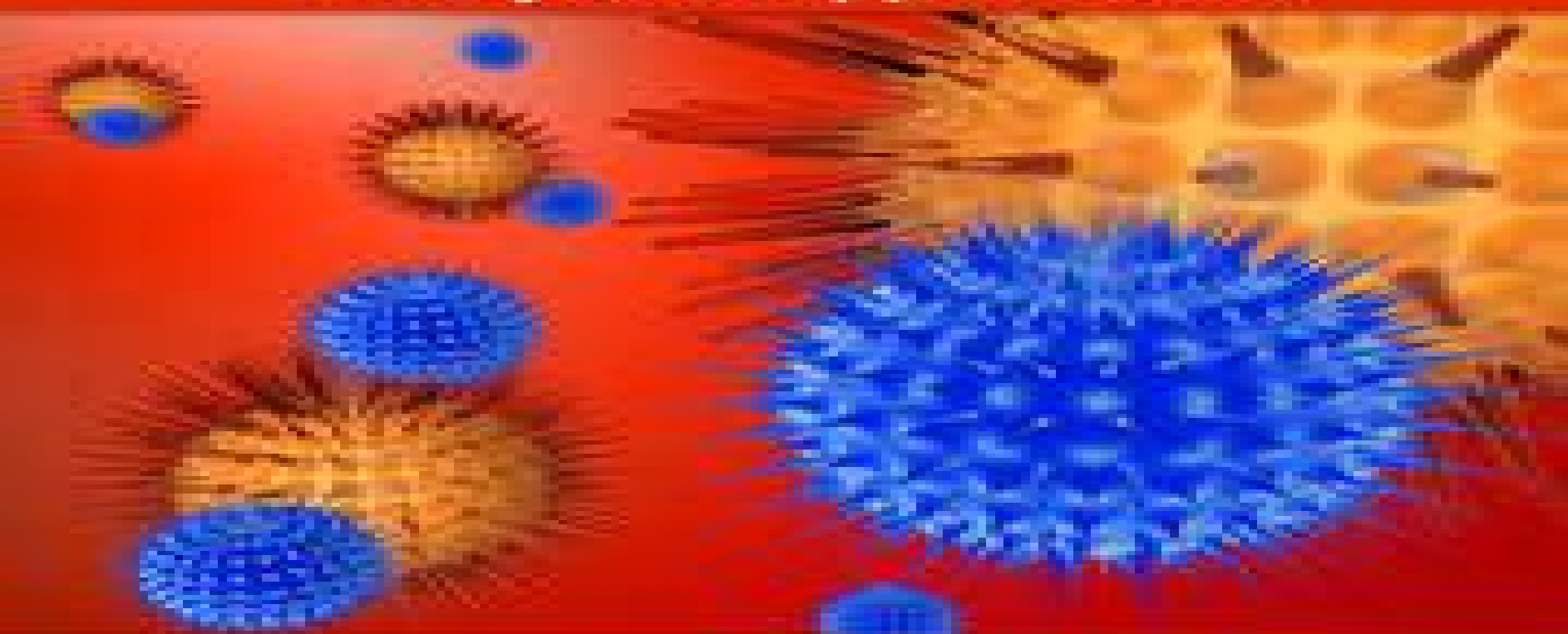


# Immunological Computation

Theory and Applications



Dipankar Dasgupta • Fernando Niño



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# Immunological Computation Theory And Applications

**Pietro Liáo, Giuseppe Nicosia, Thomas  
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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 cyber security 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 chapters1 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

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technologies that leverage the exploitation of artificial intelligence including artificial general intelligence AGI and weak artificial intelligence Provides scientific practical and methodological approaches based on bio inspired methods fuzzy models and algorithms predictive modelling computer vision and image processing The target audience of the book are practitioners enterprises representatives scientists PhD and Master students who perform scientific research or applications of intelligent models and algorithms in cyber physical systems for various domains *Computational Intelligence Assisted Design* Yi Chen,Yun Li,2018-06-19 Computational Intelligence Assisted Design framework mobilises computational resources makes use of multiple Computational Intelligence CI algorithms and reduces computational costs This book provides examples of real world applications of technology Case studies have been used to show the integration of services cloud big data technology and space missions It focuses on computational modelling of biological and natural intelligent systems encompassing swarm intelligence fuzzy systems artificial neural networks artificial immune systems and evolutionary computation This book provides readers with wide scale information on 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 difficulty through a few tested MATLAB source codes

*Advances in Intelligent Systems and Computing V* Natalya Shakhovska,Mykola O. Medykovskyy,2020-12-22 This book reports on new theories and applications in the field of intelligent systems and computing It covers cutting edge computational and artificial intelligence methods advances in computer vision big data cloud computing and computation linguistics as well as cyber physical and intelligent information management systems The respective chapters are based on selected papers presented at the workshop on intelligent systems and computing held during the International Conference on Computer Science and Information Technologies CSIT 2020 which was jointly organized on September 23 26 2020 by the Lviv Polytechnic National University Ukraine the Kharkiv National University of Radio Electronics Ukraine and the Technical University of Lodz Poland under patronage of Ministry of Education and Science of Ukraine Given its breadth of coverage the book provides academics and professionals with extensive information and a timely snapshot of the field of intelligent systems and is sure to foster new discussions and collaborations among different groups *High Performance Programming for Soft Computing* Oscar Humberto Montiel Ross,Roberto Sepulveda,2014-02-04 This book examines the present and future of soft computer techniques It explains how to use the latest technological tools such as multicore processors and graphics processing units to implement highly efficient intelligent system methods using a general purpose computer **Artificial Immune Systems** Emma Hart,Chris McEwan,Jon Timmis,Andy Hone,2010-07-16 Artificial immune systems AIS is a diverse and maturing area of research that bridges the disciplines of immunology and computation The original research impetus in AIS had a clear focus on applying immunological principles to computational problems in practical domains such as computer security data mining and optimization As the field has matured it has

diversified such that we now see a growing interest in formalizing the theoretical properties of earlier approaches elaborating underlying relationships between applied computational models and those from theoretical immunology as well a return to the roots of the domain in which the methods of computer science are being applied to immunological modelling problems Following the trends in the field the ICARIS conference intends to provide a forum for all these perspectives The 9th International Conference on Artificial Immune Systems ICARIS 2010 built on the success of previous years providing a convenient vantage point for broader reflection as it returned to Edinburgh the venue of the Second ICARIS in 2003 This time the conference was hosted by Edinburgh Napier University at its Craiglockhart Campus recently reopened after extensive refurbishment which has resulted in a stunning building and state of the art facilities The extent to which the field has matured over the preceding years is clear a substantial track of theoretical research now underpins the discipline The applied stream has expanded in its outlook and has examples of AIS algorithms being applied across a wide spectrum of practical problems ranging from sensor networks to semiconductor design

*Artificial Immune Systems* Carlos A. Coello-Coello, Julie Greensmith, Natalio Krasnogor, Pietro Liò, Giuseppe Nicosia, Mario Pavone, 2012-08-27 This book constitutes the refereed proceedings of the 11th International Conference on Artificial Immune Systems ICARIS 2012 held in Taormina Italy in August 2012 The 19 revised selected papers presented were carefully reviewed and selected for inclusion in this book In addition 4 papers of the workshop on bio and immune inspired algorithms and models for multi level complex systems are included in this volume Artificial immune systems AIS is a diverse and maturing area of research that bridges the disciplines of immunology biology medical science computer science physics mathematics and engineering The scope of AIS ranges from modelling and simulation of the immune system through to immune inspired algorithms and in silico in vitro and in vivo solutions

**Intelligent Data Engineering and Automated Learning -- IDEAL 2012** Hujun Yin, Jose A.F. Costa, Guilherme Barreto, 2012-08-01 This book constitutes the refereed proceedings of the 13th International Conference on Intelligent Data Engineering and Automated Learning IDEAL 2012 held in Natal Brazil in August 2012 The 100 revised full papers presented were carefully reviewed and selected from more than 200 submissions for inclusion in the book and present the latest theoretical advances and real world applications in computational intelligence

**Conceptual Modelling in Computational Immunology** Martina Husáková, 2015-09-10 Computational immunology offers in silico strategies for understanding of complex processes occurring in the natural immune system of a living organism that are difficult to explore by traditional in vivo or in vitro techniques The monograph introduces conceptual languages and approaches for modelling biological processes The Agent Modelling Language is investigated for conceptualisation of immune processes AML based diagrams represent properties and processes occurring in a lymph node

**Transactions on Computational Collective Intelligence X** Ngoc-Thanh Nguyen, 2013-05-20 These transactions publish research in computer based methods of computational collective intelligence CCI and their applications in a wide range of fields such as the Semantic Web social

networks and multi agent systems TCCI strives to cover new methodological theoretical and practical aspects of CCI understood as the form of intelligence that emerges from the collaboration and competition of many individuals artificial and or natural The application of multiple computational intelligence technologies such as fuzzy systems evolutionary computation neural systems consensus theory etc aims to support human and other collective intelligence and to create new forms of CCI in natural and or artificial systems This tenth issue contains 13 carefully selected and thoroughly revised contributions

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Neural Nets WIRN10 Bruno Apolloni, 2011      Theory of Evolutionary Computation Benjamin Doerr, Frank Neumann, 2019-11-20 This edited book reports on recent developments in the theory of evolutionary computation or more generally the domain of randomized search heuristics It starts with two chapters on mathematical methods that are often used in the analysis of randomized search heuristics followed by three chapters on how to measure the complexity of a search heuristic black box complexity a counterpart of classical complexity theory in black box optimization parameterized complexity aimed at a more fine grained view of the difficulty of problems and the fixed budget perspective which answers the question of how good a solution will be after investing a certain computational budget The book then describes theoretical results on three important questions in evolutionary computation how to profit from changing the parameters during the run of an algorithm how evolutionary algorithms cope with dynamically changing or stochastic environments and how population diversity influences performance Finally the book looks at three algorithm classes that have only recently become the focus of theoretical work estimation of distribution algorithms artificial immune systems and genetic programming Throughout the book the contributing authors try to develop an understanding for how these methods work and why they are so successful in many applications The book will be useful for students and researchers in theoretical computer science and evolutionary computing

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