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Intelligence Approach 1st  
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*Artificial Immune  
Systems A New  
Computational  
Intelligence Approach  
1st Edition*

# Acces PDF Artificial Immune Systems A New Computational Intelligence Approach 1st Edition

This book constitutes the refereed proceedings of the 7th International Conference on Artificial Immune Systems, ICARIS 2008, held in Phuket, Thailand, in August 2008. The 40 revised full papers presented were

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carefully reviewed and selected from 67 submissions. The papers are organized in topical sections on computational immunology, applied AIS, and theoretical AIS. Position papers and conceptual papers

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are also included.

This book outlines three emergent disciplines, which are now poised to engineer a paradigm shift from hypothesis- to data-driven research: theoretical immunology,

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immunoinformatics, and  
Artificial Immune Systems.

It details how these  
disciplines will enable new  
understanding to emerge from  
the analysis of complex  
datasets. Coverage shows how  
these three are set to

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transform immunological  
science and the future of  
health care.

The present thesis aims to  
make an in-depth study of  
adaptive identification,  
digital channel  
equalization, functional

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link artificial neural  
network (FLANN) and  
Artificial Immune Systems  
(AIS). Two learning  
algorithms CPSO and IPSO are  
also developed in this  
thesis. These new algorithms  
are employed to train the

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weights of a low complexity  
FLANN structure by way of  
minimizing the squared error  
cost function of the hybrid  
model. These new models are  
applied for adaptive  
identification of complex  
nonlinear dynamic plants and



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equalization of nonlinear  
digital channel.

Investigation has been made  
for identification of  
complex Hammerstein models.  
To validate the performance  
of these new models  
simulation study is carried

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Edition  
out using benchmark complex  
plants and nonlinear  
channels. The results of  
simulation are compared with  
those obtained with FLANN-  
GA, FLANN-PSO and MLP-BP  
based hybrid approaches.  
Improved identification and

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equalization performance of the proposed method have been observed in all cases. Computational Intelligence: An Introduction, Second Edition offers an in-depth exploration into the adaptive mechanisms that

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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

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intelligence, fuzzy systems,  
artificial neural networks,  
artificial immune systems  
and evolutionary  
computation. Engelbrecht  
provides readers with a wide  
knowledge of Computational  
Intelligence (CI) paradigms

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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

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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

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coverge of the most recent  
developments in  
computational intelligence  
with more elaborate  
discussions on intelligence  
and artificial intelligence  
(AI). New discussion of  
Darwinian evolution versus



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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

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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

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experimental framework.

Computational Intelligence:  
An Introduction, Second  
Edition is essential reading  
for third and fourth year  
undergraduate and  
postgraduate students  
studying CI. The first

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Edition  
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

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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>

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for examples, assignments  
and Java code implementing  
the algorithms.

10th International  
Conference, ICARIS 2011,  
Cambridge, UK, July 18-21,  
2011. Proceedings  
Biologically Inspired

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Artificial Intelligence for  
Edition  
Computer Games

Search Methodologies

In Silico Immunology

Artificial Immune Systems

and their Applications in

Software Personalization

Artificial Immune System

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Based Algorithms for  
Optimization and Self-tuning  
Control in Power Systems

Natural Computing is the field of  
research that investigates both  
human-designed computing  
inspired by nature and computing  
taking place in nature, i.e., it



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investigates models and computational techniques inspired by nature and also it investigates phenomena taking place in nature in terms of information processing. Examples of the first strand of research covered by the handbook include neural computation

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inspired by the functioning of the brain; evolutionary computation inspired by Darwinian evolution of species; cellular automata inspired by intercellular communication; swarm intelligence inspired by the behavior of groups of organisms; artificial immune systems inspired

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by the natural immune system;  
artificial life systems inspired by  
the properties of natural life in  
general; membrane computing  
inspired by the compartmentalized  
ways in which cells process  
information; and amorphous  
computing inspired by

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morphogenesis. Other examples of natural-computing paradigms are molecular computing and quantum computing, where the goal is to replace traditional electronic hardware, e.g., by bioware in molecular computing. In molecular computing, data are encoded as

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biology tools are used to transform the data, thus performing computations. In quantum computing, one exploits quantum-mechanical phenomena to perform computations and secure communications more efficiently

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than classical physics and, hence, traditional hardware allows. The second strand of research covered by the handbook, computation taking place in nature, is represented by investigations into, among others, the computational nature of self-assembly, which lies

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at the core of nanoscience, the computational nature of developmental processes, the computational nature of biochemical reactions, the computational nature of bacterial communication, the computational nature of brain processes, and the

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systems biology approach to  
bionetworks where cellular  
processes are treated in terms of  
communication and interaction,  
and, hence, in terms of  
computation. We are now  
witnessing exciting interaction  
between computer science and the



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natural sciences. While the natural sciences are rapidly absorbing notions, techniques and methodologies intrinsic to information processing, computer science is adapting and extending its traditional notion of computation, and computational

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techniques, to account for computation taking place in nature around us. Natural Computing is an important catalyst for this two-way interaction, and this handbook is a major record of this important development.

This book constitutes the refereed

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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

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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

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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

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and in vivo solutions.

"This book offers new ideas and recent developments in Natural Computing, especially on artificial immune systems"--Provided by publisher.

Genetic algorithms are playing an increasingly important role in

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studies of complex adaptive systems, ranging from adaptive agents in economic theory to the use of machine learning techniques in the design of complex devices such as aircraft turbines and integrated circuits. Adaptation in Natural and Artificial Systems is

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the book that initiated this field of study, presenting the theoretical foundations and exploring applications. In its most familiar form, adaptation is a biological process, whereby organisms evolve by rearranging genetic material to survive in



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environments confronting them. In this now classic work, Holland presents a mathematical model that allows for the nonlinearity of such complex interactions. He demonstrates the model's universality by applying it to economics, physiological

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psychology, game theory, and artificial intelligence and then outlines the way in which this approach modifies the traditional views of mathematical genetics. Initially applying his concepts to simply defined artificial systems with limited numbers of

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parameters, Holland goes on to explore their use in the study of a wide range of complex, naturally occurring processes, concentrating on systems having multiple factors that interact in nonlinear ways. Along the way he accounts for major effects of coadaptation and

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coevolution: the emergence of building blocks, or schemata, that are recombined and passed on to succeeding generations to provide, innovations and improvements.

7th International Conference,  
ICARIS 2008, Phuket, Thailand,  
August 10-13, 2008, Proceedings

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World Congress of Medical  
Physics and Biomedical  
Engineering 2006

8th International Conference,  
ICARIS 2009, York, UK, August  
9-12, 2009, Proceedings

Applications in Computer Security  
Adaptation in Natural and Artificial

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Artificial Immune Systems Based  
Committee Machine for  
Classification Application

*"This book focuses on  
the technologies and  
applications of*

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*artificial immune  
systems in malware and  
spam detection proposed  
in recent years by the  
computation intelligence  
laboratory at Peking  
University, China. It*

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*offers a theoretical  
perspective and  
practical solutions to  
graduate students,  
practitioners, and  
researchers working in  
the area of artificial*



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*immune system, machine  
learning, pattern  
recognition, and  
computer security" --  
Applications of  
Computational  
Intelligence in Multi-*

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*Disciplinary Research  
provides the readers  
with a comprehensive  
handbook for applying  
the powerful principles,  
concepts, and algorithms  
of computational*

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*intelligence to a wide  
spectrum of research  
cases. The book covers  
the main approaches used  
in computational  
intelligence, including  
fuzzy logic, neural*

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*networks, evolutionary  
computation, learning  
theory, and  
probabilistic methods,  
all of which can be  
collectively viewed as  
soft computing. Other*

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*key approaches included  
are swarm intelligence  
and artificial immune  
systems. These  
approaches provide  
researchers with  
powerful tools for*

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*analysis and problem-  
solving when data is  
incomplete and when the  
problem under  
consideration is too  
complex for standard  
mathematics and the*

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*crisp logic approach of  
Boolean computing.*

*Provides an overview of  
the key methods of  
computational  
intelligence, including  
fuzzy logic, neural*

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*networks, evolutionary  
computation, learning  
theory, and  
probabilistic methods  
Includes case studies  
and real-world examples  
of computational*



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*intelligence applied in  
a variety of research  
topics, including  
bioinformatics,  
biomedical engineering,  
big data analytics,  
information security,*

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*signal processing,  
machine learning,  
nanotechnology, and  
optimization techniques  
Presents a thorough  
technical explanation on  
how computational*

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*intelligence is applied  
that is suitable for a  
wide range of  
multidisciplinary and  
interdisciplinary  
research*

*This book offers*

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*students and AI  
programmers a new  
perspective on the study  
of artificial  
intelligence concepts.  
The essential topics and  
theory of AI are*

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*presented, but it also  
includes practical  
information on data  
input & reduction as  
well as data output  
(i.e., algorithm usage).  
Because traditional AI*

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*concepts such as pattern recognition, numerical optimization and data mining are now simply types of algorithms, a different approach is needed. This “sensor /*

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*algorithm / effector”  
approach grounds the  
algorithms with an  
environment, helps  
students and AI  
practitioners to better  
understand them, and*

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*subsequently, how to  
apply them. The book has  
numerous up to date  
applications in game  
programming, intelligent  
agents, neural networks,  
artificial immune*



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*systems, and more. A CD-  
ROM with simulations,  
code, and figures  
accompanies the book.  
Recently there has been  
a growing interest in  
the use of the*

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*biological immune system  
as a source of  
inspiration for solving  
complicated  
computational problems.  
The immune system  
involves many*

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*information-processing  
abilities including  
pattern recognition,  
learning, memory and  
inherent distributed  
parallel processing and  
for these, and other*

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*reasons, it has received a significant amount of interest as a metaphor within computing. This emerging field is known as Artificial Immune Systems (AIS), and*

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*applications of AIS  
include, machine  
learning, fault  
diagnosis, computer  
security, scheduling,  
virus detection and  
optimisation.*

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*Cellular Network  
Planning  
A Systems Approach  
Artificial Immune System  
Theory and Applications  
Machine Learning  
Paradigms*

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*Anti-Spam Techniques  
Based on Artificial  
Immune System*

*The study of artificial immune systems is a relatively new field that tries to exploit the mechanisms of the natural immune system (NIS) in order to develop problem-*

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*solving techniques. In this book, we have combined the artificial immune system with the genetic algorithms in one hybrid algorithm. The hybrid algorithm used for evolving a fuzzy rule system to solve the well known Wisconsin Breast Cancer Diagnosis problem (WBCD). The hybrid algorithm overcomes both the GAs and*



*the AIS, so that it reached the classification ratio 97.36, by only one rule, in the earlier generations than the two other algorithms. The learning and memory acquisition of the hybrid algorithm was verified through its application to a binary character recognition problem, the hybrid algorithm*

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*overcomes also both GAs and AIS and reached the convergence point before them.*

*The first edition of Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques was originally put together to offer a basic introduction to the various*

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*search and optimization techniques that students might need to use during their research, and this new edition continues this tradition. Search Methodologies has been expanded and brought completely up to date, including new chapters covering scatter search, GRASP, and very large neighborhood search. The chapter*

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*authors are drawn from across Computer Science and Operations Research and include some of the world's leading authorities in their field. The book provides useful guidelines for implementing the methods and frameworks described and offers valuable tutorials to students and*

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*researchers in the field. “As I embarked on the pleasant journey of reading through the chapters of this book, I became convinced that this is one of the best sources of introductory material on the search methodologies topic to be found. The book’s subtitle, “Introductory Tutorials in Optimization and Decision*

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*Support Techniques”, aptly describes its aim, and the editors and contributors to this volume have achieved this aim with remarkable success. The chapters in this book are exemplary in giving useful guidelines for implementing the methods and frameworks described.” Fred Glover, Leeds School of Business, University of*

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*Colorado Boulder, USA “[The book] aims to present a series of well written tutorials by the leading experts in their fields. Moreover, it does this by covering practically the whole possible range of topics in the discipline. It enables students and practitioners to study and appreciate the beauty and the power of some of the*

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*computational search techniques that are able to effectively navigate through search spaces that are sometimes inconceivably large. I am convinced that this second edition will build on the success of the first edition and that it will prove to be just as popular.” Jacek Blazewicz, Institute of Computing*



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*Science, Poznan University of Technology  
and Institute of Bioorganic Chemistry,  
Polish Academy of Sciences*

*Email has become an indispensable  
communication tool in daily life.*

*However, high volumes of spam waste  
resources, interfere with productivity, and  
present severe threats to computer system*

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*security and personal privacy. This book introduces research on anti-spam techniques based on the artificial immune system (AIS) to identify and filter spam.*

*It*

*Nature-Inspired Algorithms have been gaining much popularity in recent years due to the fact that many real-world*

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*optimisation problems have become increasingly large, complex and dynamic. The size and complexity of the problems nowadays require the development of methods and solutions whose efficiency is measured by their ability to find acceptable results within a reasonable amount of time, rather than an ability to*

*guarantee the optimal solution. This volume 'Nature-Inspired Algorithms for Optimisation' is a collection of the latest state-of-the-art algorithms and important studies for tackling various kinds of optimisation problems. It comprises 18 chapters, including two introductory chapters which address the fundamental*

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*issues that have made optimisation problems difficult to solve and explain the rationale for seeking inspiration from nature. The contributions stand out through their novelty and clarity of the algorithmic descriptions and analyses, and lead the way to interesting and varied new applications.*

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*Nature-Inspired Algorithms for  
Optimisation*

*5th International Conference, ICARIS  
2006, Oeiras, Portugal, September 4-6,  
2006, Proceedings*

*Investigation of a New Artificial Immune  
System Model Applied to Pattern  
Recognition*

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*Recent Developments in Biologically  
Inspired Computing*

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

*The topic of this monograph falls*

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*within the, so-called, biologically motivated computing paradigm, in which biology provides the source of models and inspiration towards the development of computational intelligence and machine learning systems.*



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*Specifically, artificial immune systems are presented as a valid metaphor towards the creation of abstract and high level representations of biological components or functions that lay the foundations for an alternative*

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*machine learning paradigm.*

*Therefore, focus is given on  
addressing the primary problems  
of Pattern Recognition by  
developing Artificial Immune  
System-based machine learning  
algorithms for the problems of*

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*Clustering, Classification and  
One-Class Classification. Pattern  
Classification, in particular, is  
studied within the context of the  
Class Imbalance Problem. The  
main source of inspiration stems  
from the fact that the Adaptive*

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*Immune System constitutes one of the most sophisticated biological systems that is exceptionally evolved in order to continuously address an extremely unbalanced pattern classification problem, namely,*

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*the self / non-self discrimination process. The experimental results presented in this monograph involve a wide range of degenerate binary classification problems where the minority class of interest is to be*

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*recognized against the vast  
volume of the majority class of  
negative patterns. In this context,  
Artificial Immune Systems are  
utilized for the development of  
personalized software as the  
core mechanism behind the*

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*implementation of Recommender  
Systems. The book will be useful  
to researchers, practitioners and  
graduate students dealing with  
Pattern Recognition and Machine  
Learning and their applications in  
Personalized Software and*

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*Recommender Systems. It is intended for both the expert/researcher in these fields, as well as for the general reader in the field of Computational Intelligence and, more generally, Computer Science who wishes to*



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*learn more about the field of  
Intelligent Computing Systems  
and its applications. An extensive  
list of bibliographic references at  
the end of each chapter guides  
the reader to probe further into  
application area of interest to*

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him/her.

*"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*

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*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*

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*the gaming industry"--Provided  
by publisher.*

*Artificial Immune Systems: A  
New Computational Intelligence  
Approach Springer Science &  
Business Media*

*This book constitutes the*

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*refereed proceedings of the 9th  
International Conference on  
Artificial Immune Systems,  
ICARIS 2010, held in Edinburgh,  
UK, in July 2010. The 23 revised  
full papers and extended immune  
modeling abstracts presented*

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*together with 9 PerAda workshop  
position statements were  
carefully reviewed and selected  
from 41 submissions. The papers  
are organized in topical sections  
on immune system modeling;  
theoretical artificial immune*

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*systems; and applied artificial  
immune systems.*

*Applying Complex Adaptive  
Technologies*

*Third International Conference,  
ICARIS 2004, Catania, Sicily,  
Italy, September 13-16, 2004,*

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*Proceedings*

*Second International Conference,  
ICARIS 2003, Edinburgh, UK,*

*September 1-3, 2003,*

*Proceedings*

*Theoretical Aspects of Artificial  
Immune Systems*



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*August 27 - September 1, 2006*

*COEX Seoul, Korea*

*9th International Conference,*

*ICARIS 2010, Edinburgh, UK,*

*July 26-29, 2010, Proceedings*

This book constitutes the  
refereed proceedings of the

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Second International  
Conference on Artificial  
Immune Systems, ICARIS  
2003, held in Edinburgh, UK  
in September 2003. The 27  
revised full papers  
presented were carefully

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reviewed and selected from  
41 submissions. The book  
presents the first coherent  
account of the state of the  
art in artificial immune  
systems reserch. The papers  
are organized in topical

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sections on applications of  
artificial immune systems,  
immunocomputing,  
emerging metaphors,  
augmentation of artificial  
immune systems algorithms,  
theory of artificial immune

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systems, and  
representations and  
operators.

Artificial immune systems  
(AIS) is a diverse and  
maturing area of research  
that bridges the disciplines

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of immunology and  
engineering. The scope of  
AIS ranges from immune-ins-  
pired algorithms and engineer-  
ing solutions in software and ha-  
-ware, to the understanding  
of immunology through

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modeling and simulation of  
immune system concepts.

AIS algorithms have been  
applied to a wide variety of  
applications, including  
computer security, fault  
tolerance, data mining and

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optimization. In addition,  
theoretical aspects of  
artificial and real immune s-  
tems have been the subject  
of mathematical and  
computational models and  
simulations. The 8th



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International Conference on  
AIS (ICARIS 2009) built on  
the success of previous  
years, providing a forum for  
a diverse group of AIS  
researchers to present and  
discuss their latest results

and advances. After two years outside Europe, ICARIS 2009 returned to England, the venue for the first ICARIS back in 2002. This year's conference was located in the historic city of

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York, and was held in St.  
William's College, the  
conference venue of York  
Minster, northern Europe's  
largest Gothic cathedral.  
This book constitutes the  
refereed proceedings of the

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10th International  
Conference on Artificial  
Immune Systems, ICARIS  
2011, held in Cambridge,  
UK, in July 2011. The 37  
revised full papers were  
carefully reviewed and

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selected from numerous  
submissions. The papers are  
organized in topical sections  
on immunoinformatics and  
computational immunology;  
theory of immunological  
computation; and applied

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immunological computation.  
A comprehensive  
introduction to new  
approaches in artificial  
intelligence and robotics  
that are inspired by self-  
organizing biological

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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,

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development, and learning.  
Traditionally, artificial  
intelligence has been  
concerned with reproducing  
the abilities of human  
brains; newer approaches  
take inspiration from a



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wider range of biological structures that that are capable of autonomous self-organization. Examples of these new approaches include evolutionary computation and

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evolutionary electronics,  
artificial neural networks,  
immune systems,  
biorobotics, and swarm  
intelligence—to mention  
only a few. This book offers  
a comprehensive

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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

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computational approaches  
inspired by a different  
biological system; each  
begins with background  
information about the  
biological system and then  
proceeds to develop

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computational models that  
make use of biological  
concepts. The chapters  
cover evolutionary  
computation and  
electronics; cellular systems;  
neural systems, including

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neuromorphic engineering;  
developmental systems;  
immune systems; behavioral  
systems—including several  
approaches to robotics,  
including behavior-based,  
bio-mimetic, epigenetic, and

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evolutionary robots; and  
collective systems, including  
swarm robotics as well as  
cooperative and competitive  
co-evolving systems.  
Chapters end with a  
concluding overview and

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suggested reading.

Applications of  
Computational Intelligence  
in Multi-Disciplinary  
Research  
Handbook of Natural  
Computing



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6th International  
Conference, ICARIS 2007,  
Santos, Brazil, August 26-29,  
2007, Proceedings  
Computational Intelligence  
Immunological Computation  
Artificial Intelligence: A

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## Systems Approach

These proceedings of the World Congress 2006, the fourteenth conference in this series, offer a strong scientific program covering a wide range of issues and challenges which are currently present in Medical physics and

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Biomedical Engineering. About 2,500 peer reviewed contributions are presented in a six volume book, comprising 25 tracks, joint conferences and symposia, and including invited contributions from well known researchers in this field. Clearly, nature has been very

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effective in creating organisms that are capable of protecting themselves against a wide variety of pathogens such as bacteria, fungi, and parasites. The powerful information-processing capabilities of the immune system, such as feature extraction, pattern

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recognition, learning, memory, and its distributive nature provide rich metaphors that researchers are finding very useful for the development of computational models. While some of these models are designed to give us a better understanding of the immune

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system, other models are being developed to solve complex real-world problems such as anomaly detection, pattern recognition, data analysis (clustering), function optimization, and computer security. Immunological Computation: Theory and

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Applications is devoted to discussing different immunological mechanisms and their relation to information processing and problem solving. This unique volume presents a compendium of up-to-date work related to immunity-based techniques. After presenting

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the general abstractions of immune elements and processes used in computational models, it then—  
Edition  
Reviews standard procedures, representations, and matching rules that are used in all immunological computation models Covers the details of one of the earliest and



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most well-known immune algorithms, based on the negative selection (NS) process that occurs in the thymus Examines promising immune models, including those based on danger theory, cytokine network models, and MHC-based models The text goes further to

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describe a wide variety of applications, which include computer security, the detection and analysis of anomalies and faults, robotics, and data mining among others. To enhance understanding of this emerging field of study, each chapter

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includes a summary, review questions, and exercises for readers to practice; as well as issues that will require future research.

"Artificial immune systems (AIS) are new computational intelligence methods inspired by various

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mechanisms of the biological immune system. AIS are adaptive systems inspired by theoretical immunology and its functions, principles and models. The work depicted in this thesis centers on the applications of AIS based algorithms for optimization and self-

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tuning control in power systems. The optimization is carried out using an algorithm based on the clonal selection principle and the self-tuning characteristics of control for parameters are inspired by the humoral immune response of the human body. The work in this

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thesis is written in two papers as follows: Paper 1 - CSA is used to design multiple optimal power system stabilizers (PSS). The proper tuning of PSSs has a significant influence on its effectiveness in providing the required damping under different

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operating conditions and disturbances. CSA is used to determine the optimal parameters of four PSSs in a two area multi-machine power system. CSA optimized PSSs efficiently damp out the oscillations introduced in the system and its damping

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performance is slightly better than that of particle swarm optimization (PSO) optimized PSSs. The main contribution of CSA is that it converges faster and requires fewer computations than the standard PSO algorithm. Paper 2 - CSA is used for optimization of four



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benchmark functions in literature. It is then used to design an optimal synchronous machine excitation controller which reduces oscillations introduced in the terminal voltage during disturbances. Immune feedback law is used to incorporate self-tuning

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characteristics in the optimal controller. The self-tuning optimal excitation controller reduces overshoot and settling time of oscillations. It also reduces power losses in the field circuit, thus, enhancing its life"--Abstract, leaf iv. This book constitutes the refereed

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proceedings of the Third International Conference on Artificial Immune Systems, ICARIS 2004, held in Catania, Sicily, Italy, in September 2004. The 34 revised full papers presented were carefully reviewed and selected from 58 submissions. The papers are

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organized in topical sections on applications of artificial immune systems; conceptual, formal, and theoretical frameworks; artificial immune systems for robotics; emerging metaphors; immunoinformatics; theoretical and experimental studies; future

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applications; networks; modeling;  
and distinguishing properties of  
artificial immune systems.

Artificial Immune Systems and  
Their Applications  
Theories, Methods, and  
Technologies  
Robot Soccer

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Bio-Inspired Artificial Intelligence  
Artificial Immune Systems  
Hybrid Artificial Immune System  
Over the recent years,  
few books have been  
published covering all  
the subjects needed to

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understand the very  
fundamental concepts of  
cell planning. Most  
books which deal with  
this topic are destined  
to very specific  
audiences, and the vast

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majority introduce the  
subject at a very basic,  
or technical, level, or  
are destined to an  
academic audience.

Cellular Network

Planning begins with an



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introduction to the  
subject, covering  
conventional and  
contemporary wireless  
systems. Spectral  
allocation and the  
frequency plan are

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discussed, along with  
the essential  
characteristics of  
wireless systems. The  
design of mobile  
cellular systems  
includes cell planning,

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traffic and channel  
problems. The book  
presents a review of  
existing models,  
considering both green  
field dimensioning and  
network expansion

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strategies, and  
discusses multi-  
objective optimization  
and base station  
deployment based on  
artificial immune  
systems. It also

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discusses a cost-effective base station deployment approach based on artificial immune systems, and introduces the modified MO-AIS algorithm.

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Technical topics  
discussed in the book  
include: Mobile Cellular  
Network Basics Evolution  
of Mobile Cellular  
System The Mobile  
Communications

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Channel Propagation

Models Cell Planning Green  
Field

Dimensioning Network

Expansion Cost-effective

Planning Strategies

This book constitutes

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the refereed proceedings  
of the 5th International  
Conference on Artificial  
Immune Systems, ICARIS  
2006. The book presents  
34 revised full papers,  
are organized in topical



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sections on computer  
simulation of classical  
immunology, computer  
simulation of idiotypic  
network,  
immunoinformatics  
conceptual papers,

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pattern recognition type  
of application,  
optimization type of  
application, control and  
time-series type of  
application, danger  
theory inspired

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application, and text  
mining application.

Cyber immune systems try  
to mimic the adaptive  
immune system of humans  
and animals because of  
their capability to

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detect and fend off new,  
unseen pathogens.

Today's current  
cybersecurity systems  
provide an effective  
defense mechanism  
against known cyber-

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attacks but are not so good when it comes to defending against unknown attacks. This book describes the possible development and organization of self-

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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

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and data exchange in  
manufacturing  
technologies and  
processes which include  
cyber-physical systems  
(CPS), the internet of  
things (IoT), industrial

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internet of things  
(IIOT), cloud computing,  
cognitive computing and  
artificial intelligence.  
The book describes the  
author's research and  
development of cyber-



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immunity systems that  
will prevent the  
destruction of critical  
information  
infrastructure by future  
unknown cyber-attacks  
and thus avoid the

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significant or  
catastrophic  
consequences of such  
attacks. The book is  
designed for  
undergraduate and post-  
graduate students, for

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engineers in related  
fields as well as  
managers of corporate  
and state structures,  
chief information  
officers (CIO), chief  
information security

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officers (CISO),  
architects, and research  
engineers in the field  
of cybersecurity. This  
book contains four  
chapters Cyber Immunity  
Concept of the Industry

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4.0; Mathematical  
Framework for Immune  
Protection of Industry  
4.0; Trends and  
prospects of the  
development of Immune  
Protection of Industry

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4.0; From detecting  
cyber-attacks to self-  
healing Industry 4.0  
Investigation of a New  
Artificial Immune System  
Model Applied to Pattern  
Recognition.

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A New Multiobjective  
Optimization Algorithm  
Based on Artificial  
Immune Systems and Its  
Engineering Application  
An Introduction  
Introductory Tutorials

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in Optimization and  
Decision Support  
Techniques  
11th International  
Conference, ICARIS 2012,  
Taormina, Italy, August  
28-31, 2012, Proceedings



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Artificial Immune  
Systems: Principle,  
Algorithms and  
Applications  
Developing a  
Cybersecurity Immune  
System for Industry 4. 0

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*Recent Developments in  
Biologically Inspired  
Computing is necessary  
reading for undergraduate and  
graduate students, and  
researchers interested in  
knowing the most recent*

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*advances in problem solving  
techniques inspired by nature.  
This book covers the most  
relevant areas in  
computational intelligence,  
including evolutionary  
algorithms, artificial neural*

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*networks, artificial immune systems and swarm systems. It also brings together novel and philosophical trends in the exciting fields of artificial life and robotics. This book has the advantage of covering a large*

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*number of computational approaches, presenting the state-of-the-art before entering into the details of specific extensions and new developments. Pseudocodes, flow charts and examples of*

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*applications are provided so as to help newcomers and mature researchers to get the point of the new approaches presented.*

*A new adaptive learning  
Artificial Immune System (AIS)*

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*based committee machine is developed in this thesis. The new proposed approach efficiently tackles the general problem of clustering high-dimensional data. In addition, it helps on deriving useful*

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*decision and results related to other application domains such classification and prediction. Artificial Immune System (AIS) is a branch of computational intelligence field inspired by the biological*



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*immune system, and has gained increasing interest among researchers in the development of immune-based models and techniques to solve diverse complex computational or engineering problems. This*

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*work presents some applications of AIS techniques to health problems, and a thorough survey of existing AIS models and algorithms. The main focus of this research is devoted to building*

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*an ensemble model integrating different AIS techniques (i.e. Artificial Immune Networks, Clonal Selection, and Negative Selection) for classification applications to achieve better classification results. A new*

*AIS-based ensemble  
architecture with adaptive  
learning features is proposed  
by integrating different  
learning and adaptation  
techniques to overcome  
individual limitations and to*

*achieve synergetic effects through the combination of these techniques. Various techniques related to the design and enhancements of the new adaptive learning architecture are studied,*

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*including a neuro-fuzzy based  
detector and an optimizer  
using particle swarm  
optimization method to  
achieve enhanced  
classification performance. An  
evaluation study was*

*conducted to show the performance of the new proposed adaptive learning ensemble and to compare it to alternative combining techniques. Several experiments are presented*

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*using different medical datasets for the classification problem and findings and outcomes are discussed. The new adaptive learning architecture improves the accuracy of the ensemble.*



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*Moreover, there is an improvement over the existing aggregation techniques. The outcomes, assumptions and limitations of the proposed methods with its implications for further research in this*

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*area draw this research to its conclusion.*

*The idea of using soccer game for promoting science and technology of artificial intelligence and robotics was presented in the early 90s of*

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*the last century. Researchers  
in many different scientific  
fields all over the world  
recognized this idea as an  
inspiring challenge. Robot  
soccer research is  
interdisciplinary, complex,*

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*demanding but most of all, fun  
and motivational. Obtained  
knowledge and results of  
research can easily be  
transferred and applied to  
numerous applications and  
projects dealing with relating*

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*fields such as robotics,  
electronics, mechanical  
engineering, artificial  
intelligence, etc. As a  
consequence, we are witnesses  
of rapid advancement in this  
field with numerous robot*

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*soccer competitions and a vast number of teams and team members. The best illustration is numbers from the RoboCup 2009 world championship held in Graz, Austria which gathered around 2300*

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*participants in over 400 teams  
from 44 nations. Attendance  
numbers at various robot  
soccer events show that  
interest in robot soccer goes  
beyond the academic and R  
Based on the new MOAIS, a*

*constrained MOAIS is proposed to deal with constrained multiobjective optimization problems. An efficient constraint-handling technique is proposed by extending a single-objective*



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*constraint-handling technique to multiobjective optimization procedure. Comparative studies are performed quantitatively to assess the performance of the constrained MOAIS.*

*Simulation results demonstrate that the constrained MOAIS is highly competitive with other state-of-the-art constrained multiobjective algorithms on a number of complex*

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*constrained multiobjective  
optimization test problems.  
This thesis is devoted to  
developing an efficient  
multiobjective optimization  
algorithm based on artificial  
immune systems.*

*Multiobjective optimization is a very important research topic both in science and engineering since the presence of multiple and often competing objectives is natural in most real-world problems.*

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*In most cases, multiobjective optimization problems are difficult to solve because the multiple objectives often conflict across a complex and high-dimension search space. Therefore, efficient*

*multiobjective optimization techniques are required to be able to deal with the problem difficulty. This thesis proposes an efficient multiobjective optimization algorithm named MOAIS, which is based on*

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*artificial immune systems. A new unified architecture is developed in the proposed algorithm by integrating both clonal selection principle and immune network theory. A sensitivity analysis is*

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*performed to investigate how the parameters defined in the algorithm affect the performance of the algorithm. In addition, comparative studies are made to demonstrate the performance*



*of the proposed algorithm with respect to other advanced multiobjective optimization algorithms. Results show that the proposed algorithm is highly competitive with other state-of-the-art multiobjective*

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*algorithms in finding a set of well-converged and well-distributed Pareto-optimal solutions on a number of difficult multiobjective test problems. The constrained MOAIS is applied to solving a*

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*complex multiobjective cam  
shape optimization problem  
for a revolutionary cam drive  
engine. The superiority and  
efficiency of the constrained  
MOAIS are demonstrated  
through the engineering*

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application.

*Applications on Breast Cancer  
Diagnosis and Pattern  
Recognition*

*Artificial Immune Systems: A  
New Computational  
Intelligence Approach*

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*Handbook of Research on  
Artificial Immune Systems and  
Natural Computing: Applying  
Complex Adaptive  
Technologies*

This is a pioneering work on the  
emerging field of artificial immune

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systems-highly distributed systems based on the principles of the natural system. Like artificial neural networks, artificial immune systems can learn new information and recall previously learned information. This book provides an overview of artificial

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immune systems, explaining its applications in areas such as immunological memory, anomaly detection algorithms, and modeling the effects of prior infection on vaccine efficacy.

This book constitutes the refereed

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proceedings of the 6th International Conference on Artificial Immune Systems, ICARIS 2007, held in Santos, Brazil, August 2007. The papers are organized in topical sections on search and optimization, classification and clustering, anomaly



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detection and negative selection,  
robotics, control and electronics.

Modeling papers, conceptual papers,  
and technical papers and general  
applications are also included.