

# Genetic Algorithms And Genetic Programming Modern Concepts And Practical Applications Numerical Insights

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*Computational Science - ICCS 2022* - Derek Groen 2022-06-21

The four-volume set LNCS 13350, 13351, 13352, and 13353 constitutes the proceedings of the 22nd International Conference on Computational Science, ICCS 2022, held in London, UK, in June 2022.\* The total of 175 full papers and 78 short papers presented in this book set were carefully reviewed and selected from 474 submissions. 169 full and 36 short papers were accepted to the main track; 120 full and 42 short papers were accepted to the workshops/ thematic tracks. \*The conference was held in a hybrid format

**Computer Aided Systems Theory -- EUROCAST 2013** - Roberto Moreno-Díaz 2013-12-12

The two-volume set LNCS 8111 and LNCS 8112 constitute the papers presented at the 14th International Conference on Computer Aided Systems Theory, EUROCAST 2013, held in February 2013 in Las Palmas de Gran Canaria, Spain. The total of 131 papers presented were carefully reviewed and selected for inclusion in the books. The contributions are organized in topical sections on modelling biological systems; systems theory and applications; intelligent information processing; theory and

applications of metaheuristic algorithms; model-based system design, verification and simulation; process modeling simulation and system optimization; mobile and autonomous transportation systems; computer vision, sensing, image processing and medical applications; computer-based methods and virtual reality for clinical and academic medicine; digital signal processing methods and applications; mechatronic systems, robotics and marine robots; mobile computing platforms and technologies; systems applications.

**Software Reuse: Bridging with Social-Awareness** - Georgia M. Kapitsaki 2016-05-20

This book constitutes the refereed proceedings of the 15th International Conference on Software Reuse, ICSR 2016, held in Limassol, Cyprus, in June 2016. The 21 revised full papers presented together with 4 revised short papers were carefully reviewed and selected from 51 submissions. The papers cover different areas of software engineering, where software reuse plays an important role, such as software product lines, domain analysis and modeling, software tools and business aspects of software. ICSR 2016 has provided a complete view on the advancements

in the area of software reuse in the last years for interested researchers and practitioners.

**Intelligent Data analysis and its Applications, Volume II** - Jeng-Shyang Pan 2014-06-05

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.

**Computational Problems in Science and Engineering** - Nikos Mastorakis 2015-10-26

This book provides readers with modern computational techniques for solving variety of problems from electrical, mechanical, civil and chemical engineering. Mathematical methods are presented in a unified manner, so they can be applied consistently to problems in applied electromagnetics, strength of materials, fluid mechanics, heat and mass transfer, environmental engineering, biomedical engineering, signal processing, automatic control and more.

**Soft Computing Models in Industrial and Environmental Applications** - Václav Snášel 2012-08-23

This volume of Advances in Intelligent and Soft Computing contains accepted papers presented at SOCO 2012, held in the beautiful and historic city of Ostrava (Czech Republic), in September 2012. Soft computing represents a collection or set of computational techniques in machine learning, computer science and some engineering disciplines, which investigate, simulate, and analyze very complex issues and phenomena. After a through peer-review process, the SOCO 2012 International Program Committee selected 75 papers which are published in these conference proceedings, and represents an

acceptance rate of 38%. In this relevant edition a special emphasis was put on the organization of special sessions. Three special sessions were organized related to relevant topics as: Soft computing models for Control Theory & Applications in Electrical Engineering, Soft computing models for biomedical signals and data processing and Advanced Soft Computing Methods in Computer Vision and Data Processing. The selection of papers was extremely rigorous in order to maintain the high quality of the conference and we would like to thank the members of the Program Committees for their hard work in the reviewing process. This is a crucial process to the creation of a high standard conference and the SOCO conference would not exist without their help.

**Genetic Programming Theory and Practice XIV** - Rick Riolo 2018-10-24

These contributions, written by the foremost international researchers and practitioners of Genetic Programming (GP), explore the synergy between theoretical and empirical results on real-world problems, producing a comprehensive view of the state of the art in GP. Chapters in this volume include: Similarity-based Analysis of Population Dynamics in GP Performing Symbolic Regression Hybrid Structural and Behavioral Diversity Methods in GP Multi-Population Competitive Coevolution for Anticipation of Tax Evasion Evolving Artificial General Intelligence for Video Game Controllers A Detailed Analysis of a PushGP Run Linear Genomes for Structured Programs Neutrality, Robustness, and Evolvability in GP Local Search in GP PRETSL: Distributed Probabilistic Rule Evolution for Time-Series Classification Relational Structure in Program Synthesis Problems with Analogical Reasoning An Evolutionary Algorithm for Big Data Multi-Class Classification Problems A Generic Framework for Building Dispersion Operators in the Semantic Space Assisting Asset Model Development with Evolutionary Augmentation Building Blocks of Machine Learning Pipelines for Initialization of a Data Science Automation Tool Readers will discover large-scale, real-world applications of GP to a variety of problem domains via in-depth presentations of the latest and most significant results.

**Evolutionary Algorithms in Engineering Applications** - Dipankar

Dasgupta 1997-05-20

Evolutionary algorithms - an overview. Robust encodings in genetic algorithms. Genetic engineering and design problems. The generation of form using an evolutionary approach. Evolutionary optimization of composite structures. Flaw detection and configuration with genetic algorithms. A genetic algorithm approach for river management. Hazards in genetic design methodologies. The identification and characterization of workload classes. Lossless and Lossy data compression. Database design with genetic algorithms. Designing multiprocessor scheduling algorithms using a distributed genetic algorithm system. Prototype based supervised concept learning using genetic algorithms. Prototyping intelligent vehicle modules using evolutionary algorithms. Gate-level evolvable hardware: empirical study and application. Physical design of VLSI circuits and the application of genetic algorithms. Statistical generalization of performance-related heuristics for knowledge-lean applications. Optimal scheduling of thermal power generation using evolutionary algorithms. Genetic algorithms and genetic programming for control. Global structure evolution and local parameter learning for control system model reductions. Adaptive recursive filtering using evolutionary algorithms. Numerical techniques for efficient sonar bearing and range searching in the near field using genetic algorithms. Signal design for radar imaging in radar astronomy: genetic optimization. Evolutionary algorithms in target acquisition and sensor fusion. Strategies for the integration of evolutionary/ adaptive search with the engineering design process. Identification of mechanical inclusions. GeneAS: a robust optimal design technique for mechanical component design. Genetic algorithms for optimal cutting. Practical issues and recent advances in Job- and Open-Shop scheduling. The key steps to achieve mass customization.

**Genetic Programming Theory and Practice XV** - Wolfgang Banzhaf  
2018-07-05

These contributions, written by the foremost international researchers and practitioners of Genetic Programming (GP), explore the synergy between theoretical and empirical results on real-world problems,

producing a comprehensive view of the state of the art in GP. Topics in this volume include: exploiting subprograms in genetic programming, schema frequencies in GP, Accessible AI, GP for Big Data, lexibase selection, symbolic regression techniques, co-evolution of GP and LCS, and applying ecological principles to GP. It also covers several chapters on best practices and lessons learned from hands-on experience. Readers will discover large-scale, real-world applications of GP to a variety of problem domains via in-depth presentations of the latest and most significant results.

**Genetic Algorithms + Data Structures = Evolution Programs** -  
Zbigniew Michalewicz 2013-03-09

Genetic algorithms are founded upon the principle of evolution, i.e., survival of the fittest. Hence evolution programming techniques, based on genetic algorithms, are applicable to many hard optimization problems, such as optimization of functions with linear and nonlinear constraints, the traveling salesman problem, and problems of scheduling, partitioning, and control. The importance of these techniques is still growing, since evolution programs are parallel in nature, and parallelism is one of the most promising directions in computer science. The book is self-contained and the only prerequisite is basic undergraduate mathematics. This third edition has been substantially revised and extended by three new chapters and by additional appendices containing working material to cover recent developments and a change in the perception of evolutionary computation.

Nature Inspired Cooperative Strategies for Optimization (NICSO 2013) -  
German Terrazas 2013-08-15

Biological and other natural processes have always been a source of inspiration for computer science and information technology. Many emerging problem solving techniques integrate advanced evolution and cooperation strategies, encompassing a range of spatio-temporal scales for visionary conceptualization of evolutionary computation. This book is a collection of research works presented in the VI International Workshop on Nature Inspired Cooperative Strategies for Optimization (NICSO) held in Canterbury, UK. Previous editions of NICSO were held

in Granada, Spain (2006 & 2010), Acireale, Italy (2007), Tenerife, Spain (2008), and Cluj-Napoca, Romania (2011). NICSO 2013 and this book provides a place where state-of-the-art research, latest ideas and emerging areas of nature inspired cooperative strategies for problem solving are vigorously discussed and exchanged among the scientific community. The breadth and variety of articles in this book report on nature inspired methods and applications such as Swarm Intelligence, Hyper-heuristics, Evolutionary Algorithms, Cellular Automata, Artificial Bee Colony, Dynamic Optimization, Support Vector Machines, Multi-Agent Systems, Ant Clustering, Evolutionary Design Optimisation, Game Theory and other several Cooperation Models.

Genetic Programming Theory and Practice III - Tina Yu 2006-06-18

Genetic Programming Theory and Practice III provides both researchers and industry professionals with the most recent developments in GP theory and practice by exploring the emerging interaction between theory and practice in the cutting-edge, machine learning method of Genetic Programming (GP). The contributions developed from a third workshop at the University of Michigan's Center for the Study of Complex Systems, where leading international genetic programming theorists from major universities and active practitioners from leading industries and businesses meet to examine and challenge how GP theory informs practice and how GP practice impacts GP theory. Applications are from a wide range of domains, including chemical process control, informatics, and circuit design, to name a few.

*Genetic Programming Theory and Practice XVII* - Wolfgang Banzhaf 2020-05-07

These contributions, written by the foremost international researchers and practitioners of Genetic Programming (GP), explore the synergy between theoretical and empirical results on real-world problems, producing a comprehensive view of the state of the art in GP. In this year's edition, the topics covered include many of the most important issues and research questions in the field, such as: opportune application domains for GP-based methods, game playing and co-evolutionary search, symbolic regression and efficient learning strategies, encodings

and representations for GP, schema theorems, and new selection mechanisms. The volume includes several chapters on best practices and lessons learned from hands-on experience. Readers will discover large-scale, real-world applications of GP to a variety of problem domains via in-depth presentations of the latest and most significant results.

**Genetic Programming** - John R. Koza 1992

In this ground-breaking book, John Koza shows how this remarkable paradigm works and provides substantial empirical evidence that solutions to a great variety of problems from many different fields can be found by genetically breeding populations of computer programs. Genetic programming may be more powerful than neural networks and other machine learning techniques, able to solve problems in a wider range of disciplines. In this ground-breaking book, John Koza shows how this remarkable paradigm works and provides substantial empirical evidence that solutions to a great variety of problems from many different fields can be found by genetically breeding populations of computer programs. Genetic Programming contains a great many worked examples and includes a sample computer code that will allow readers to run their own programs. In getting computers to solve problems without being explicitly programmed, Koza stresses two points: that seemingly different problems from a variety of fields can be reformulated as problems of program induction, and that the recently developed genetic programming paradigm provides a way to search the space of possible computer programs for a highly fit individual computer program to solve the problems of program induction. Good programs are found by evolving them in a computer against a fitness measure instead of by sitting down and writing them.

**Genetic Programming Theory and Practice XI** - Rick Riolo 2014-04-01

These contributions, written by the foremost international researchers and practitioners of Genetic Programming (GP), explore the synergy between theoretical and empirical results on real-world problems, producing a comprehensive view of the state of the art in GP. Topics in this volume include: evolutionary constraints, relaxation of selection

mechanisms, diversity preservation strategies, flexing fitness evaluation, evolution in dynamic environments, multi-objective and multi-modal selection, foundations of evolvability, evolvable and adaptive evolutionary operators, foundation of injecting expert knowledge in evolutionary search, analysis of problem difficulty and required GP algorithm complexity, foundations in running GP on the cloud - communication, cooperation, flexible implementation, and ensemble methods. Additional focal points for GP symbolic regression are: (1) The need to guarantee convergence to solutions in the function discovery mode; (2) Issues on model validation; (3) The need for model analysis workflows for insight generation based on generated GP solutions - model exploration, visualization, variable selection, dimensionality analysis; (4) Issues in combining different types of data. Readers will discover large-scale, real-world applications of GP to a variety of problem domains via in-depth presentations of the latest and most significant results.

*Computer Aided Systems Theory - EUROCAST 2017* - Roberto Moreno-Díaz 2018-01-25

The two-volume set LNCS 10671 and 10672 constitutes the thoroughly refereed proceedings of the 16th International Conference on Computer Aided Systems Theory, EUROCAST 2017, held in Las Palmas de Gran Canaria, Spain, in February 2017. The 117 full papers presented were carefully reviewed and selected from 160 submissions. The papers are organized in topical sections on: pioneers and landmarks in the development of information and communication technologies; systems theory, socio-economic systems and applications; theory and applications of metaheuristic algorithms; stochastic models and applications to natural, social and technical systems; model-based system design, verification and simulation; applications of signal processing technology; algebraic and combinatorial methods in signal and pattern analysis; computer vision, deep learning and applications; computer and systems based methods and electronics technologies in medicine; intelligent transportation systems and smart mobility.

*Computational Intelligence in Security for Information Systems 2010* - Álvaro Herrero 2010-10-07

The 3 International Conference on Computational Intelligence in Security for Information Systems (CISIS 2010) provided a broad and interdisciplinary forum to present the most recent developments in several very active scientific areas such as Machine Learning, Infrastructure Protection, Intelligent Methods in Energy and Transportation, Network Security, Biometry, Cryptography, High-performance and Grid Computing, and Industrial Perspective among others. The global purpose of CISIS series of conferences has been to form a broad and interdisciplinary meeting ground offering the opportunity to interact with the leading research team and industries actively involved in the critical area of security, and have a picture of the current solutions adopted in practical domains. This volume of Advances in Intelligence and Soft Computing contains accepted papers presented at CISIS 2010, which was held in León, Spain, on November 11-12, 2010. CISIS 2010 received over 50 technical submissions. After a thorough peer-review process, the International Program Committee - lected 25 papers which are published in this conference proceedings. This allowed the Scientific Committee to verify the vital and crucial nature of the topics - volved in the event, and resulted in an acceptance rate close to 50% of the ori- nally submitted manuscripts.

*Genetic Algorithms and Genetic Programming in Computational Finance* - Shu-Heng Chen 2012-12-06

After a decade of development, genetic algorithms and genetic programming have become a widely accepted toolkit for computational finance. Genetic Algorithms and Genetic Programming in Computational Finance is a pioneering volume devoted entirely to a systematic and comprehensive review of this subject. Chapters cover various areas of computational finance, including financial forecasting, trading strategies development, cash flow management, option pricing, portfolio management, volatility modeling, arbitraging, and agent-based simulations of artificial stock markets. Two tutorial chapters are also included to help readers quickly grasp the essence of these tools. Finally, a menu-driven software program, Simple GP, accompanies the volume, which will enable readers without a strong programming background to

gain hands-on experience in dealing with much of the technical material introduced in this work.

**Soft Computing Models in Industrial and Environmental Applications, 6th International Conference SOCO 2011** - Emilio Corchado 2011-03-04

This volume of *Advances in Intelligent and Soft Computing* contains accepted papers presented at SOCO 2011 held in the beautiful and historic city of Salamanca, Spain, April 2011. This volume presents the papers accepted for the 2011 edition, both for the main event and the Special Sessions. SOCO 2011 Special Sessions are a very useful tool in order to complement the regular program with new or emerging topics of particular interest to the participating community. Four special sessions were organized related to relevant topics as: Optimization and Control in Industry, Speech Processing and Soft Computing, Systems, Man & Cybernetics and Soft Computing for Medical Applications.

*Pattern Mining with Evolutionary Algorithms* - Sebastián Ventura 2016-06-13

This book provides a comprehensive overview of the field of pattern mining with evolutionary algorithms. To do so, it covers formal definitions about patterns, patterns mining, type of patterns and the usefulness of patterns in the knowledge discovery process. As it is described within the book, the discovery process suffers from both high runtime and memory requirements, especially when high dimensional datasets are analyzed. To solve this issue, many pruning strategies have been developed. Nevertheless, with the growing interest in the storage of information, more and more datasets comprise such a dimensionality that the discovery of interesting patterns becomes a challenging process. In this regard, the use of evolutionary algorithms for mining pattern enables the computation capacity to be reduced, providing sufficiently good solutions. This book offers a survey on evolutionary computation with particular emphasis on genetic algorithms and genetic programming. Also included is an analysis of the set of quality measures most widely used in the field of pattern mining with evolutionary algorithms. This book serves as a review of the most important

evolutionary algorithms for pattern mining. It considers the analysis of different algorithms for mining different type of patterns and relationships between patterns, such as frequent patterns, infrequent patterns, patterns defined in a continuous domain, or even positive and negative patterns. A completely new problem in the pattern mining field, mining of exceptional relationships between patterns, is discussed. In this problem the goal is to identify patterns which distribution is exceptionally different from the distribution in the complete set of data records. Finally, the book deals with the subgroup discovery task, a method to identify a subgroup of interesting patterns that is related to a dependent variable or target attribute. This subgroup of patterns satisfies two essential conditions: interpretability and interestingness.

*Metaheuristic Search Concepts* - Günther Zäpfel 2010-03-10

In many decision problems, e.g. from the area of production and logistics management, the evaluation of alternatives and the determination of an optimal or at least suboptimal solution is an important but difficult task. For most such problems no efficient algorithm is known and classical approaches of Operations Research like Mixed Integer Linear Programming or Dynamic Programming are often of limited use due to excessive computation time. Therefore, dedicated heuristic solution approaches have been developed which aim at providing good solutions in reasonable time for a given problem. However, such methods have two major drawbacks: First, they are tailored to a specific problem and their adaptation to other problems is difficult and in many cases even impossible. Second, they are typically designed to "build" one single solution in the most effective way, whereas most decision problems have a vast number of feasible solutions. Hence usually the chances are high that there exist better ones. To overcome these limitations, problem independent search strategies, in particular metaheuristics, have been proposed. This book provides an elementary step by step introduction to metaheuristics focusing on the search concepts they are based on. The first part demonstrates underlying concepts of search strategies using a simple example optimization problem.

**A Field Guide to Genetic Programming** - 2008

Genetic programming (GP) is a systematic, domain-independent method for getting computers to solve problems automatically starting from a high-level statement of what needs to be done. Using ideas from natural evolution, GP starts from an ooze of random computer programs, and progressively refines them through processes of mutation and sexual recombination, until high-fitness solutions emerge. All this without the user having to know or specify the form or structure of solutions in advance. GP has generated a plethora of human-competitive results and applications, including novel scientific discoveries and patentable inventions. This unique overview of this exciting technique is written by three of the most active scientists in GP. See [www.gp-field-guide.org.uk](http://www.gp-field-guide.org.uk) for more information on the book.

*Genetic Algorithms and Genetic Programming* - Michael Affenzeller  
2009-04-09

*Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications* discusses algorithmic developments in the context of genetic algorithms (GAs) and genetic programming (GP). It applies the algorithms to significant combinatorial optimization problems and describes structure identification using HeuristicLab as a platform for algorithm development. The book focuses on both theoretical and empirical aspects. The theoretical sections explore the important and characteristic properties of the basic GA as well as main characteristics of the selected algorithmic extensions developed by the authors. In the empirical parts of the text, the authors apply GAs to two combinatorial optimization problems: the traveling salesman and capacitated vehicle routing problems. To highlight the properties of the algorithmic measures in the field of GP, they analyze GP-based nonlinear structure identification applied to time series and classification problems. Written by core members of the HeuristicLab team, this book provides a better understanding of the basic workflow of GAs and GP, encouraging readers to establish new bionic, problem-independent theoretical concepts. By comparing the results of standard GA and GP implementation with several algorithmic extensions, it also shows how to substantially increase achievable solution quality.

**Genetic Algorithms and Genetic Programming** - Michael Affenzeller  
2018-03-31

*Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications* discusses algorithmic developments in the context of genetic algorithms (GAs) and genetic programming (GP). It applies the algorithms to significant combinatorial optimization problems and describes structure identification using HeuristicLab as a platform for algorithm development. The book focuses on both theoretical and empirical aspects. The theoretical sections explore the important and characteristic properties of the basic GA as well as main characteristics of the selected algorithmic extensions developed by the authors. In the empirical parts of the text, the authors apply GAs to two combinatorial optimization problems: the traveling salesman and capacitated vehicle routing problems. To highlight the properties of the algorithmic measures in the field of GP, they analyze GP-based nonlinear structure identification applied to time series and classification problems. Written by core members of the HeuristicLab team, this book provides a better understanding of the basic workflow of GAs and GP, encouraging readers to establish new bionic, problem-independent theoretical concepts. By comparing the results of standard GA and GP implementation with several algorithmic extensions, it also shows how to substantially increase achievable solution quality.

*Optimization Techniques for Solving Complex Problems* - Enrique Alba  
2009-02-17

Real-world problems and modern optimization techniques to solve them Here, a team of international experts brings together core ideas for solving complex problems in optimization across a wide variety of real-world settings, including computer science, engineering, transportation, telecommunications, and bioinformatics. Part One—covers methodologies for complex problem solving including genetic programming, neural networks, genetic algorithms, hybrid evolutionary algorithms, and more. Part Two—delves into applications including DNA sequencing and reconstruction, location of antennae in telecommunication networks, metaheuristics, FPGAs, problems arising in

telecommunication networks, image processing, time series prediction, and more. All chapters contain examples that illustrate the applications themselves as well as the actual performance of the algorithms. Optimization Techniques for Solving Complex Problems is a valuable resource for practitioners and researchers who work with optimization in real-world settings.

Identification for Automotive Systems - Daniel Alberer 2011-12-09

Increasing complexity and performance and reliability expectations make modeling of automotive system both more difficult and more urgent. Automotive control has slowly evolved from an add-on to classical engine and vehicle design to a key technology to enforce consumption, pollution and safety limits. Modeling, however, is still mainly based on classical methods, even though much progress has been done in the identification community to speed it up and improve it. This book, the product of a workshop of representatives of different communities, offers an insight on how to close the gap and exploit this progress for the next generations of vehicles.

**An Introduction to Genetic Algorithms** - Melanie Mitchell 1998-03-02

Genetic algorithms have been used in science and engineering as adaptive algorithms for solving practical problems and as computational models of natural evolutionary systems. This brief, accessible introduction describes some of the most interesting research in the field and also enables readers to implement and experiment with genetic algorithms on their own. It focuses in depth on a small set of important and interesting topics—particularly in machine learning, scientific modeling, and artificial life—and reviews a broad span of research, including the work of Mitchell and her colleagues. The descriptions of applications and modeling projects stretch beyond the strict boundaries of computer science to include dynamical systems theory, game theory, molecular biology, ecology, evolutionary biology, and population genetics, underscoring the exciting "general purpose" nature of genetic algorithms as search methods that can be employed across disciplines. An Introduction to Genetic Algorithms is accessible to students and researchers in any scientific discipline. It includes many thought and

computer exercises that build on and reinforce the reader's understanding of the text. The first chapter introduces genetic algorithms and their terminology and describes two provocative applications in detail. The second and third chapters look at the use of genetic algorithms in machine learning (computer programs, data analysis and prediction, neural networks) and in scientific models (interactions among learning, evolution, and culture; sexual selection; ecosystems; evolutionary activity). Several approaches to the theory of genetic algorithms are discussed in depth in the fourth chapter. The fifth chapter takes up implementation, and the last chapter poses some currently unanswered questions and surveys prospects for the future of evolutionary computation.

**Recent Advances in Intelligent Engineering Systems** - János Fodor 2011-09-25

This volume is a collection of 19 chapters on intelligent engineering systems written by respectable experts of the fields. The book consists of three parts. The first part is devoted to the foundational aspects of computational intelligence. It consists of 8 chapters that include studies in genetic algorithms, fuzzy logic connectives, enhanced intelligence in product models, nature-inspired optimization technologies, particle swarm optimization, evolution algorithms, model complexity of neural networks, and fitness landscape analysis. The second part contains contributions to intelligent computation in networks, presented in 5 chapters. The covered subjects include the application of self-organizing maps for early detection of denial of service attacks, combating security threats via immunity and adaptability in cognitive radio networks, novel modifications in WSN network design for improved SNR and reliability, a conceptual framework for the design of audio based cognitive infocommunication channels, and a case study on the advantages of fuzzy and anytime signal- and image processing techniques. Computational intelligence represents a widely spread interdisciplinary research area with many applications in various disciplines including engineering, medicine, technology, environment, among others. Therefore, third part of this book consists of 6 chapters on applications. This is a very

important part of the volume because the reader can find in it a wide range of fields where computational intelligence plays a significant role.

**Proceedings of the International Conference on Information Systems Design and Intelligent Applications 2012 (India 2012) held in Visakhapatnam, India, January 2012** - Suresh Chandra Satapathy 2011-12-14

This volume contains the papers presented at INDIA-2012: International conference on Information system Design and Intelligent Applications held on January 5-7, 2012 in Vishakhapatnam, India. This conference was organized by Computer Society of India (CSI), Vishakhapatnam chapter well supported by Vishakhapatnam Steel, RINL, Govt of India. It contains 108 papers contributed by authors from six different countries across four continents. These research papers mainly focused on intelligent applications and various system design issues. The papers cover a wide range of topics of computer science and information technology discipline ranging from image processing, data base application, data mining, grid and cloud computing, bioinformatics among many others. The various intelligent tools like swarm intelligence, artificial intelligence, evolutionary algorithms, bio-inspired algorithms have been applied in different papers for solving various challenging IT related problems.

**Foundations of Genetic Programming** - William B. Langdon 2002-02-14

Genetic programming (GP), one of the most advanced forms of evolutionary computation, has been highly successful as a technique for getting computers to automatically solve problems without having to tell them explicitly how. Since its inception more than ten years ago, GP has been used to solve practical problems in a variety of application fields. Along with this ad-hoc engineering approaches interest increased in how and why GP works. This book provides a coherent consolidation of recent work on the theoretical foundations of GP. A concise introduction to GP and genetic algorithms (GA) is followed by a discussion of fitness landscapes and other theoretical approaches to natural and artificial evolution. Having surveyed early approaches to GP theory it presents

new exact schema analysis, showing that it applies to GP as well as to the simpler GAs. New results on the potentially infinite number of possible programs are followed by two chapters applying these new techniques.

**Practical Genetic Algorithms** - Randy L. Haupt 2004-07-30

\* This book deals with the fundamentals of genetic algorithms and their applications in a variety of different areas of engineering and science \* Most significant update to the second edition is the MATLAB codes that accompany the text \* Provides a thorough discussion of hybrid genetic algorithms \* Features more examples than first edition

*Frontiers of Evolutionary Computation* - Anil Menon 2004-02-29

The articles feature a mixture of informal discussion interspersed with formal statements, thus providing the reader an opportunity to observe a wide range of EC problems from the investigative perspective of world-renowned researchers."

*Advances in Evolutionary and Deterministic Methods for Design, Optimization and Control in Engineering and Sciences* - António Gaspar-Cunha 2020-11-23

This book presents improved and extended versions of selected papers from EUROGEN 2019, a conference with interest on developing or applying evolutionary and deterministic methods in optimization of design and emphasizing on industrial and societal applications.

**Metaheuristics Algorithms in Power Systems** - Erik Cuevas 2019-01-11

This book discusses the use of efficient metaheuristic algorithms to solve diverse power system problems, providing an overview of the various aspects of metaheuristic methods to enable readers to gain a comprehensive understanding of the field and of conducting studies on specific metaheuristic algorithms related to power-system applications. By bridging the gap between recent metaheuristic techniques and novel power system methods that benefit from the convenience of metaheuristic methods, it offers power system practitioners who are not metaheuristic computation researchers insights into the techniques, which go beyond simple theoretical tools and have been adapted to solve important problems that commonly arise. On the other hand, members of

the metaheuristic computation community learn how power engineering problems can be translated into optimization tasks, and it is also of interest to engineers and application developers. Further, since each chapter can be read independently, the relevant information can be quickly found. Power systems is a multidisciplinary field that addresses the multiple approaches used for design and analysis in areas ranging from signal processing, and electronics to computational intelligence, including the current trend of metaheuristic computation.

*Nostradamus: Modern Methods of Prediction, Modeling and Analysis of Nonlinear Systems* - Ivan Zelinka 2012-10-24

This proceeding book of Nostradamus conference

(<http://nostradamus-conference.org>) contains accepted papers presented at this event in 2012. Nostradamus conference was held in the one of the biggest and historic city of Ostrava (the Czech Republic, <http://www.ostrava.cz/en>), in September 2012. Conference topics are focused on classical as well as modern methods for prediction of dynamical systems with applications in science, engineering and economy. Topics are (but not limited to): prediction by classical and novel methods, predictive control, deterministic chaos and its control, complex systems, modelling and prediction of its dynamics and much more.

**Applications of Evolutionary Computation** - Antonio M. Mora 2015-03-16

This book constitutes the refereed conference proceedings of the 18th International Conference on the Applications of Evolutionary Computation, EvoApplications 2015, held in Copenhagen, Spain, in April 2015, colocated with the Evo 2015 events EuroGP, EvoCOP, and EvoMUSART. The 72 revised full papers presented were carefully reviewed and selected from 125 submissions. EvoApplications 2015 consisted of the following 13 tracks: EvoBIO (evolutionary computation, machine learning and data mining in computational biology), EvoCOMNET (nature-inspired techniques for telecommunication networks and other parallel and distributed systems), EvoCOMPLEX (evolutionary algorithms and complex systems), EvoENERGY

(evolutionary computation in energy applications), EvoFIN (evolutionary and natural computation in finance and economics), EvoGAMES (bio-inspired algorithms in games), EvoIASP (evolutionary computation in image analysis, signal processing, and pattern recognition), EvoINDUSTRY (nature-inspired techniques in industrial settings), EvoNUM (bio-inspired algorithms for continuous parameter optimization), EvoPAR (parallel implementation of evolutionary algorithms), EvoRISK (computational intelligence for risk management, security and defence applications), EvoROBOT (evolutionary computation in robotics), and EvoSTOC (evolutionary algorithms in stochastic and dynamic environments).

**Genetic Programming** - Leonardo Vanneschi 2009-04-10

This book constitutes the refereed proceedings of the 11th European Conference on Genetic Programming, EuroGP 2009, held in Tübingen, Germany, in April 2009 colocated with the Evo\* 2009 events. The 21 revised plenary papers and 9 revised poster papers were carefully reviewed and selected from a total of 57 submissions. A great variety of topics are presented reflecting the current state of research in the field of genetic programming, including the latest work on representations, theory, operators and analysis, feature selection, generalisation, coevolution and numerous applications.

*Genetic Programming Theory and Practice XII* - Rick Riolo 2015-06-04

These contributions, written by the foremost international researchers and practitioners of Genetic Programming (GP), explore the synergy between theoretical and empirical results on real-world problems, producing a comprehensive view of the state of the art in GP. Topics in this volume include: gene expression regulation, novel genetic models for glaucoma, inheritable epigenetics, combinatorics in genetic programming, sequential symbolic regression, system dynamics, sliding window symbolic regression, large feature problems, alignment in the error space, HUMIE winners, Boolean multiplexer function, and highly distributed genetic programming systems. Application areas include chemical process control, circuit design, financial data mining and bioinformatics. Readers will discover large-scale, real-world applications

of GP to a variety of problem domains via in-depth presentations of the latest and most significant results.

*Hagenberg Research* - Bruno Buchberger 2009-05-29

Bruno Buchberger This book is a synopsis of basic and applied research done at the various research institutions of the Softwarepark Hagenberg in Austria. Starting with 15 coworkers in my Research Institute for Symbolic Computation (RISC), I initiated the Softwarepark Hagenberg in 1987 on request of the Upper Austrian Government with the objective of creating a scientific, technological, and economic impulse for the region and the international community. In the meantime, in a joint effort, the Softwarepark Hagenberg has grown to the current (2009) size of over 1000 R&D employees and 1300 students in six research institutions, 40 companies and 20 academic study programs on the bachelor, master's and PhD level. The goal of the Softwarepark Hagenberg is innovation of economy in one of the most important current technologies: software. It is the message of this book that this can only be achieved and guaranteed long term by "watering the root", namely emphasis on research, both basic and applied. In this book, we summarize what has been achieved in terms of research in the various research institutions in the Softwarepark Hagenberg and what research vision we have for the

imminent future. When I founded the Softwarepark Hagenberg, in addition to the "watering the root" principle, I had the vision that such a technology park can only prosper if we realize the "magic triangle", i.e. the close interaction of research, academic education, and business applications at one site, see Figure 1.

**Computer Aided Systems Theory - EUROCAST 2015** - Roberto Moreno-Díaz 2015-12-17

This volume constitutes the papers presented at the 15th International Conference on Computer Aided Systems Theory, EUROCAST 2015, held in February 2015 in Las Palmas de Gran Canaria, Spain. The total of 107 papers presented were carefully reviewed and selected for inclusion in the book. The contributions are organized in topical sections on Systems Theory and Applications; Modelling Biological Systems; Intelligent Information Processing; Theory and Applications of Metaheuristic Algorithms; Computer Methods, Virtual Reality and Image Processing for Clinical and Academic Medicine; Signals and Systems in Electronics; Model-Based System Design, Verification, and Simulation; Digital Signal Processing Methods and Applications; Modelling and Control of Robots; Mobile Platforms, Autonomous and Computing Traffic Systems; Cloud and Other Computing Systems; and Marine Sensors and Manipulators.