

Application Of Genetic Algorithm In Optimization Of

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2019-09-18

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[Applying genetic algorithms to solve real-world deep learning and artificial intelligence problems](#) Springer Nature

Evolutionary Algorithms (EA) are powerful search and optimisation techniques inspired by the mechanisms of natural evolution. They imitate, on an abstract level, biological principles such as a population based approach, the inheritance of information, the variation of information via crossover/mutation, and the selection of individuals based on fitness. The most well-known class of EA are Genetic Algorithms (GA), which have received much attention not only in the scientific community lately. Other variants of EA, in particular Genetic Programming, Evolution Strategies, and Evolutionary Programming are less popular, though very powerful too. Traditionally, most practical applications of EA have appeared in the technical sector. Management problems, for a long time, have been a rather neglected field of EA-research. This is surprising, since the great potential of evolutionary approaches for the business and economics domain was recognised in pioneering publications quite a while ago. John Holland, for instance, in his seminal book *Adaptation in Natural and Artificial Systems* (The University of Michigan Press, 1975) identified economics as one of the prime targets for a theory of adaptation, as formalised in his reproductive plans (later called Genetic Algorithms).

EvoApplications 2010: EvoCOMPLEX, EvoGAMES, EvoASP, EvoINTELLIGENCE, EvoNUM, and EvoSTOC, Istanbul, Turkey, April 7-9, 2010, Proceedings, Part I Springer Science & Business Media "The area this project investigated involves the application of genetic algorithms using computers. Genetic algorithms make use of the adaptive capabilities exhibited in biological systems to approach problems in a variety of applications. The aim of this project was to design and develop a generic environment tool for simulating the application of genetic algorithms to various problems. This tool incorporates the following: Implements a software "shell" that is common to all genetic algorithms that use a binary representation. Provides the user with the ability to configure and alter all aspects of the simulation including the evaluation, selection, and reproduction phases. Provides a graphic, window-based user interface. The application of genetic algorithms in computing has made progress in recent years and has seen increased interest. Unfortunately, most work involves the application of the algorithms to specific areas of research. This software tool provides a simple, user-friendly environment where anyone interested can learn and experiment with genetic algorithms. My work with this project has focused my interest on learning and understanding the application of genetic algorithms. In addition, the result of the project is a tool that will continue to aid my interest and hopefully other's interest in genetic algorithms"-- Author's abstract.

[Real-World Applications of Genetic Algorithms](#) Springer Science & Business Media

Genetic Algorithms (GAs) are one of several techniques in the family of Evolutionary Algorithms - algorithms that search for solutions to optimization problems by "evolving" better and better solutions. Genetic Algorithms have been applied in science, engineering, business and social sciences. This book consists of 16 chapters organized into five sections. The first section deals with some applications in automatic control, the second section contains several applications in scheduling of resources, and the third section introduces some applications in electrical and electronics engineering. The next section illustrates some examples of character recognition and multi-criteria classification, and the last one deals with trading systems. These evolutionary techniques may be useful to engineers and scientists in various fields of specialization, who need some optimization techniques in their work and who may be using Genetic Algorithms in their applications for the first time. These applications may be useful to many other people who are getting familiar with the subject of Genetic Algorithms.

[Concepts and Designs](#) IGI Global

This comprehensive book gives an overview of the latest discussions in the application of genetic algorithms to solve engineering problems. Featuring real-world applications and an accompanying disk, giving the reader the opportunity to use an interactive genetic algorithms demonstration program.

Parallel Genetic Algorithms CRC Press

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.

[Frontiers in Guided Wave Optics and Optoelectronics](#) Springer

Evolutionary Computation (EC) techniques are efficient, nature-inspired methods based on the principles of natural evolution and genetics. Due to their efficiency and simple underlying principles, these methods can be used for a diverse range of activities including problem solving, optimization, machine learning and pattern recognition. A large and continuously increasing number of researchers and professionals make use of EC techniques in various application domains. This volume presents a careful selection of relevant EC examples combined with a thorough examination of the techniques used in EC. The papers in the volume illustrate the current state of the art in the application of EC and should help and inspire researchers and professionals to develop efficient EC methods for design and problem solving. All papers in this book were presented during EvoApplications 2010, which included a range of events on application-oriented aspects of EC. Since 1998, EvoApplications — formerly known as EvoWorkshops— has provided a unique opportunity for EC researchers to meet and discuss application aspects of EC and has been an important link between EC research and its application in a variety of domains. During these 12 years, new events have arisen, some have disappeared, while others have matured to become conferences of their own, such as EuroGP in 2000, EvoCOP in 2004, and EvoBIO in 2007. And from this year, EvoApplications has become a conference as well.

Genetic Algorithms and Genetic Programming University-Press.org

Authoritative coverage of a revolutionary technique for overcoming problems in electromagnetic design Genetic algorithms are stochastic search procedures modeled on the Darwinian concepts of natural selection and evolution. The machinery of genetic algorithms utilizes an optimization methodology that allows a global search of the cost surface via statistical random processes dictated by the Darwinian evolutionary concept. These easily programmed and readily implemented procedures robustly locate extrema of highly multimodal functions and therefore are

particularly well suited to finding solutions to a broad range of electromagnetic optimization problems. Electromagnetic Optimization by Genetic Algorithms is the first book devoted exclusively to the application of genetic algorithms to electromagnetic device design. Compiled by two highly competent and well-respected members of the electromagnetics community, this book describes numerous applications of genetic algorithms to the design and optimization of various low- and high-frequency electromagnetic components. Special features include: * Introduction by David E. Goldberg, "A Meditation on the Application of Genetic Algorithms" * Design of linear and planar arrays using genetic algorithms * Application of genetic algorithms to the design of broadband, wire, and integrated antennas * Genetic algorithm-driven design of dielectric gratings and frequency-selective surfaces * Synthesis of magnetostatic devices using genetic algorithms * Application of genetic algorithms to multiobjective electromagnetic backscattering optimization * A comprehensive list of the up-to-date references applicable to electromagnetic design problems Supplemented with more than 250 illustrations, *Electromagnetic Optimization by Genetic Algorithms* is a powerful resource for electrical engineers interested in modern electromagnetic designs and an indispensable reference for university researchers.

[Genetic Algorithms and Applications for Stock Trading Optimization](#) MIT Press

Explore the ever-growing world of genetic algorithms to solve search, optimization, and AI-related tasks, and improve machine learning models using Python libraries such as DEAP, scikit-learn, and NumPy Key Features Explore the ins and outs of genetic algorithms with this fast-paced guide Implement tasks such as feature selection, search optimization, and cluster analysis using Python Solve combinatorial problems, optimize functions, and enhance the performance of artificial intelligence applications Book Description Genetic algorithms are a family of search, optimization, and learning algorithms inspired by the principles of natural evolution. By imitating the evolutionary process, genetic algorithms can overcome hurdles encountered in traditional search algorithms and provide high-quality solutions for a variety of problems. This book will help you get to grips with a powerful yet simple approach to applying genetic algorithms to a wide range of tasks using Python, covering the latest developments in artificial intelligence. After introducing you to genetic algorithms and their principles of operation, you'll understand how they differ from traditional algorithms and what types of problems they can solve. You'll then discover how they can be applied to search and optimization problems, such as planning, scheduling, gaming, and analytics. As you advance, you'll also learn how to use genetic algorithms to improve your machine learning and deep learning models, solve reinforcement learning tasks, and perform image reconstruction. Finally, you'll cover several related technologies that can open up new possibilities for future applications. By the end of this book, you'll have hands-on experience of applying genetic algorithms in artificial intelligence as well as in numerous other domains. What you will learn Understand how to use state-of-the-art Python tools to create genetic algorithm-based applications Use genetic algorithms to optimize functions and solve planning and scheduling problems Enhance the performance of machine learning models and optimize deep learning network architecture Apply genetic algorithms to reinforcement learning tasks using OpenAI Gym Explore how images can be reconstructed using a set of semi-transparent shapes Discover other bio-inspired techniques, such as genetic programming and particle swarm optimization Who this book is for This book is for software developers, data scientists, and AI enthusiasts who want to use genetic algorithms to carry out intelligent tasks in their applications. Working knowledge of Python and basic knowledge of mathematics and computer science will help you get the most out of this book.

Proceedings of the First International Conference on Genetic Algorithms and their Applications IOS Press

A gentle introduction to genetic algorithms. Genetic algorithms revisited: mathematical foundations. Computer implementation of a genetic algorithm. Some applications of genetic algorithms. Advanced operators and techniques in genetic search. Introduction to genetics-based

machine learning. Applications of genetics-based machine learning. A look back, a glance ahead. A review of combinatorics and elementary probability. Pascal with random number generation for fortran, basic, and cobol programmers. A simple genetic algorithm (SGA) in pascal. A simple classifier system(SCS) in pascal. Partition coefficient transforms for problem-coding analysis.

Hands-On Genetic Algorithms with Python Lawrence Erlbaum Assoc Incorporated

Refuel your AI Models and ML applications with High-Quality Optimization and Search Solutions
DESCRIPTION Genetic algorithms are one of the most straightforward and powerful techniques used in machine learning. This book 'Learning Genetic Algorithms with Python' guides the reader right from the basics of genetic algorithms to its real practical implementation in production environments. Each of the chapters gives the reader an intuitive understanding of each concept. You will learn how to build a genetic algorithm from scratch and implement it in real-life problems. Covered with practical illustrated examples, you will learn to design and choose the best model architecture for the particular tasks. Cutting edge examples like radar and football manager problem statements, you will learn to solve high-dimensional big data challenges with ways of optimizing genetic algorithms. KEY FEATURES ● Complete coverage on practical implementation of genetic algorithms. ● Intuitive explanations and visualizations supply theoretical concepts. ● Added examples and use-cases on the performance of genetic algorithms. ● Use of Python libraries and a niche coverage on the performance optimization of genetic algorithms. WHAT YOU WILL LEARN ● Understand the mechanism of genetic algorithms using popular python libraries. ● Learn the principles and architecture of genetic algorithms. ● Apply and Solve planning, scheduling and analytics problems in Enterprise applications. ● Expert learning on prime concepts like Selection, Mutation and Crossover. WHO THIS BOOK IS FOR The book is for Data Science team, Analytics team, AI Engineers, ML Professionals who want to integrate genetic algorithms to refuel their ML and AI applications. No special expertise about machine learning is required although a basic knowledge of Python is expected. TABLE OF CONTENTS 1. Introduction 2. Genetic Algorithm Flow 3. Selection 4. Crossover 5. Mutation 6. Effectiveness 7. Parameter Tuning 8. Black-box Function 9. Combinatorial Optimization: Binary Gene Encoding 10. Combinatorial Optimization: Ordered Gene Encoding 11. Other Common Problems 12. Adaptive Genetic Algorithm 13. Improving Performance

Chromosome (Genetic Algorithm), Clonal Selection Algorithm, Crossover (Genetic Algorithm), Cultural Algorithm, Defining Length, Ed BoD - Books on Demand

Genetic algorithms (GAs) are computer-based search techniques patterned after the genetic mechanisms of biological organisms that have adapted and flourished in changing, highly competitive environments for millions of years. GAs have been successfully applied to problems in a variety of studies, and their popularity continues to increase because of their effectiveness, applicability, and ease of use. Industrial Applications of Genetic Algorithms shows how GAs have made the leap from their origins in the laboratory to the practicing engineer's toolbox. Each chapter in the book describes a project completed by a graduate student at the University of Alabama.

Introduction to Genetic Algorithms World Scientific

This book examines the implementation and applications of genetic algorithms (GA) to the domain

of AI. In recent years the trend towards, real world applications is gaining ground especially in GA. The general purpose nature of GA is examined from an interdisciplinary point of view. Despite the differences that may exist in between representations across domain problems the commonality of in the design of GA is upheld. This work provides an overview of the current developments in Europe a section is devoted to the programming of Parallel Genetic Algorithms (including GAME) and a section on Optimisation and Complex Modelling. Readers: researchers in AI, mathematics and computing.

Genetic Algorithms in Applications John Wiley & Sons

Genetic Algorithms (GAs) are one of several techniques in the family of Evolutionary Algorithms - algorithms that search for solutions to optimization problems by "evolving" better and better solutions. Genetic Algorithms have been applied in science, engineering, business and social sciences. This book consists of 16 chapters organized into five sections. The first section deals with some applications in automatic control, the second section contains several applications in scheduling of resources, and the third section introduces some applications in electrical and electronics engineering. The next section illustrates some examples of character recognition and multi-criteria classification, and the last one deals with trading systems. These evolutionary techniques may be useful to engineers and scientists in various fields of specialization, who need some optimization techniques in their work and who may be using Genetic Algorithms in their applications for the first time. These applications may be useful to many other people who are getting familiar with the subject of Genetic Algorithms.

Electromagnetic Optimization by Genetic Algorithms GRIN Verlag

This book focuses on the implementation, evaluation and application of DNA/RNA-based genetic algorithms in connection with neural network modeling, fuzzy control, the Q-learning algorithm and CNN deep learning classifier. It presents several DNA/RNA-based genetic algorithms and their modifications, which are tested using benchmarks, as well as detailed information on the implementation steps and program code. In addition to single-objective optimization, here genetic algorithms are also used to solve multi-objective optimization for neural network modeling, fuzzy control, model predictive control and PID control. In closing, new topics such as Q-learning and CNN are introduced. The book offers a valuable reference guide for researchers and designers in system modeling and control, and for senior undergraduate and graduate students at colleges and universities.

Genetic Algorithms in Applications IGI Global

Computer solutions to many difficult problems in science and engineering require the use of automatic search methods that consider a large number of possible solutions to the given problems. This book describes recent advances in the theory and practice of one such search method, called Genetic Algorithms. Genetic algorithms are evolutionary search techniques based on principles derived from natural population genetics, and are currently being applied to a variety of difficult problems in science, engineering, and artificial intelligence.

Genetic Algorithms in Applications IntechOpen

- Detailed MOEA applications discussed by international experts - State-of-the-art practical insights in tackling statistical optimization with MOEAs - A unique monograph covering a wide spectrum of real-world applications - Step-by-step discussion of MOEA applications in a variety of domains

Proceedings of the Second International Conference on Genetic Algorithms : July 28-31, 1987 at the Massachusetts Institute of Technology, Cambridge, MA Wiley-Interscience

Rapid developments in the field of genetic algorithms along with the popularity of the first edition precipitated this completely revised, thoroughly updated second edition of The Practical Handbook of Genetic Algorithms. Like its predecessor, this edition helps practitioners stay up to date on recent developments in the field and provides material

Applications, Second Edition CRC Press

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Applications and Techniques Springer Science & Business Media

This IMA Volume in Mathematics and its Applications EVOLUTIONARY ALGORITHMS is based on the proceedings of a workshop that was an integral part of the 1996-97 IMA program on "MATHEMATICS IN HIGH-PERFORMANCE COMPUTING." I thank Lawrence David Davis (Tica Associates), Kenneth De Jong (Computer Science, George Mason University), Michael D. Vose (Computer Science, The University of Tennessee), and L. Darrell Whitley (Computer Science, Colorado State University) for their excellent work in organizing the workshop and for editing the proceedings. Further appreciation is extended to Donald G. Truhlar (Chemistry and Supercomputing Institute, University of Minnesota) who was also one of the workshop organizers. In addition, I also take this opportunity to thank the National Science Foundation (NSF), Minnesota Supercomputing Institute (MSI), and the Army Research Office (ARO), whose financial support made the workshop possible. Willard Miller, Jr., Professor and Director v PREFACE The IMA Workshop on Evolutionary Algorithms brought together many of the top researchers working in the area of Evolutionary Computation for a week of intensive interaction. The field of Evolutionary Computation has developed significantly over the past 30 years and today consists a variety of subfields such as genetic algorithms, evolution strategies, evolutionary programming, and genetic programming, each with their own algorithmic perspectives and goals.

Genetic Algorithms IntechOpen

* 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