

## GENETIC ALGORITHM BASED SOLUTION FOR FINAL EXAM SCHEDULING

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### ABSTRACT

The automatic generation of schedules has been in focus of researches for decades. Since small changes in the input have exponential impact on the tested state space, methods based on heuristics and artificial intelligence are the most successful.

In our paper we analysed the opportunities of automatic generation of the academic final exam scheduling, which is a special subtask of schedule generation. We examined the problem with the genetic algorithm approach. We created a point system, wherewith the goodness of the generated schedules is measurable and comparable. We analysed the effect on achievable results caused by the different changes on our algorithm. We evaluated the algorithms on a real test set of 100 students.

Our results show that for this complexity there is an acceptable solution, and with some improvements on our algorithm we will be able to give solutions, which are better and fairer, than the manually compiled schedules.

### INTRODUCTION

Final examination takes place at the end of the degree course in most universities. One current form of this is the oral examination, where at one time in one room only one student takes the exam in front of a board of examiners. All of these instructors have a special role, and only some particular people can fill in these places.

The scheduling of the final exams may be done manually, but the non-automated process can cause human errors, and it is hard to see through the whole scheduling, whether all requirements are realized and the timing is appropriate for everyone.

The complexity of this problem can be approached on two levels. The scheduling problem in itself is NP-complete [1], as there are too many possible combinations for scheduling people. In addition, many final-exam specific conditions must be satisfied during the scheduling and some of them contradict each other easily. For example, we may want to distribute the load among the examiners equally, but to perform certain tasks, such as filling the position of the president or examination from some subjects, only certain academics are suitable. Some teachers may have much more students than others, and it is also possible that not every necessary instructor is available at the same time.

# Final Exam And Solution For Genetic Algorithm

**Guan Gui,Ying Li,Yun Lin**



## **Final Exam And Solution For Genetic Algorithm:**

**Artificial Intelligence and Applications** Amita Yadav, Amit M. Joshi, Mehmet Ergezer, Valentina Emilia Balas, 2025-02-24 The papers in this book are high quality refereed papers presented at ICAIA 2024 the second International conference on Artificial Intelligence and Applications held at Maharaja Surajmal Institute of Technology New Delhi in collaboration with Wentworth Institute of Technology Boston USA in March 2024 This book presents new and innovative developments and applications in machine learning data mining neural networks computation optimisation technologies followed by research applications in signals language and classification prediction recommendations and systems This book is essential for researchers and practitioners in this field

**Information Systems and Technologies to Support Learning** Álvaro Rocha, Mohammed Serrhini, 2018-10-24 This book features a selection of articles from the second edition of the conference Europe Middle East B education in science technology engineering and Mathematics C emerging technologies in education learning innovation in the digital age D software systems architectures applications and tools E multimedia systems and applications F computer communications and networks G IOT smart cities and people wireless sensor and ad hoc networks H organizational models and information systems and technologies I human computer Interaction J computers K health informatics and medical informatics security l information and knowledge management m big data analytics and applications intelligent data systems and machine learning n artificial intelligence high performance computing o mobile embedded and ubiquitous systems p language and image processing computer graphics and vision and q the interdisciplinary field of fuzzy logic and data mining

**Modern Information Technology and IT Education** Vladimir Sukhomlin, Elena Zubareva, 2020-05-11 This book constitutes the refereed proceedings of the 13th International Conference on Modern Information Technology and IT Education held in Moscow Russia in November December 2018 The 30 full papers and 1 short papers were carefully reviewed and selected from 164 submissions The papers are organized according to the following topics IT education methodology methodological support e learning and IT in education educational resources and best practices of IT education research and development in the field of new IT and their applications scientific software in education and science school education in computer science and ICT economic informatics

**Grouping Genetic Algorithms** Michael Mutingi, Charles Mbohwa, 2016-10-04 This book presents advances and innovations in grouping genetic algorithms enriched with new and unique heuristic optimization techniques These algorithms are specially designed for solving industrial grouping problems where system entities are to be partitioned or clustered into efficient groups according to a set of guiding decision criteria Examples of such problems are vehicle routing problems team formation problems timetabling problems assembly line balancing group maintenance planning modular design and task assignment A wide range of industrial grouping problems drawn from diverse fields such as logistics supply chain management project management manufacturing systems engineering design and healthcare are presented Typical complex industrial grouping

problems with multiple decision criteria and constraints are clearly described using illustrative diagrams and formulations. The problems are mapped into a common group structure that can conveniently be used as an input scheme to specific variants of grouping genetic algorithms. Unique heuristic grouping techniques are developed to handle grouping problems efficiently and effectively. Illustrative examples and computational results are presented in tables and graphs to demonstrate the efficiency and effectiveness of the algorithms. Researchers, decision analysts, software developers, and graduate students from various disciplines will find this in-depth reader-friendly exposition of advances and applications of grouping genetic algorithms an interesting, informative, and valuable resource.

**ICT and Critical Infrastructure: Proceedings of the 48th Annual Convention of Computer Society of India- Vol II** Suresh Chandra Satapathy, P. S. Avadhani, Siba K. Udgata, Sadasivuni Lakshminarayana, 2013-10-19. This volume contains 85 papers presented at CSI 2013 48th Annual Convention of Computer Society of India with the theme ICT and Critical Infrastructure. The convention was held during 13th-15th December 2013 at Hotel Novotel Varun Beach Visakhapatnam and hosted by Computer Society of India Vishakhapatnam Chapter in association with Vishakhapatnam Steel Plant, the flagship company of RINL India. This volume contains papers mainly focused on Data Mining, Data Engineering, and Image Processing, Software Engineering, and Bio Informatics, Network Security, Digital Forensics, and Cyber Crime, Internet and Multimedia Applications, and E-Governance Applications.

**Practice and Theory of Automated Timetabling** Edmund Burke, Peter Ross, 1996-10-02. Provides detailed information about the signal transduction pathways used by interferons to activate gene transcription. In addition, this book discusses how the same pathways are used by many other cytokines and thus provide a forum for cross-talk among these important biological response modifiers. Additionally, the book introduces the interferon system and describes the interferon-inducible genes whose products are responsible for the cellular actions of interferons. The nature of the interferon receptors and how the transcriptional signals are transmitted from the receptors on the cell surface to the genes in the nucleus are discussed in detail. Finally, the use of similar pathways of signal transduction by other cytokines is highlighted.

**Trends in Developing Metaheuristics, Algorithms, and Optimization Approaches** Yin, Peng-Yeng, 2012-10-31. Developments in metaheuristics continue to advance computation beyond its traditional methods. With groundwork built on multidisciplinary research findings, metaheuristics algorithms and optimization approaches use memory manipulations in order to take full advantage of strategic-level problem solving. Trends in Developing Metaheuristics, Algorithms, and Optimization Approaches provides insight on the latest advances and analysis of technologies in metaheuristics computing. Offering widespread coverage on topics such as genetic algorithms, differential evolution, and ant colony optimization, this book aims to be a forum for researchers, practitioners, and students who wish to learn and apply metaheuristic computing.

**Genetic Algorithms in Molecular Modeling** James Devillers, 1996-06-07. Genetic Algorithms in Molecular Modeling is the first book available on the use of genetic algorithms in molecular design. This volume marks the beginning of a new series of books: Principles in QSAR and Drug

Design which will be an indispensable reference for students and professionals involved in medicinal chemistry pharmacology eco toxicology and agrochemistry Each comprehensive chapter is written by a distinguished researcher in the field Through its up to the minute content extensive bibliography and essential information on software availability this book leads the reader from the theoretical aspects to the practical applications It enables the uninitiated reader to apply genetic algorithms for modeling the biological activities and properties of chemicals and provides the trained scientist with the most up to date information on the topic Extremely topical and timely Sets the foundations for the development of computer aided tools for solving numerous problems in QSAR and drug design Written to be accessible without prior direct experience in genetic algorithms

*Solving Optimization Problems with MATLAB®* Dingyü Xue, 2020-04-06 This book focuses on solving optimization problems with MATLAB Descriptions and solutions of nonlinear equations of any form are studied first Focuses are made on the solutions of various types of optimization problems including unconstrained and constrained optimizations mixed integer multiobjective and dynamic programming problems Comparative studies and conclusions on intelligent global solvers are also provided

**Artificial Neural Nets and Genetic Algorithms** David W. Pearson, Nigel C. Steele, Rudolf Albrecht, 2011-06-28 The 2003 edition of ICANNNGA marks a milestone in this conference series because it is the tenth year of its existence The series began in 1993 with the inaugural conference at Innsbruck in Austria At that first conference the organisers decided to organise a similar scientific meeting every two years As a result conferences were organised at Ales in France 1995 Norwich in England 1997 Portoroz in Slovenia 1999 and Prague in the Czech Republic 2001 It is a great honour that the conference is taking place in France for the second time Each edition of ICANNNGA has been special and had its own character Not only that participants have been able to sample the life and local culture in five different European countries Originally limited to neural networks and genetic algorithms the conference has broadened its outlook over the past ten years and now includes papers on soft computing and artificial intelligence in general This is one of the reasons why the reader will find papers on fuzzy logic and various other topics not directly related to neural networks or genetic algorithms included in these proceedings We have however kept the same name International Conference on Artificial Neural Networks and Genetic Algorithms All of the papers were sorted into one of six principal categories neural network theory neural network applications genetic algorithm and evolutionary computation theory genetic algorithm and evolutionary computation applications fuzzy and soft computing theory fuzzy and soft computing applications

[e-Learning, e-Education, and Online Training](#) Guan Gui, Ying Li, Yun Lin, 2024-01-16 This four volume set constitutes the post conference proceedings of the 9th EAI International Conference on e Learning e Education and Online Training eLEOT 2023 held in Yantai China during August 17-18 2023 The 104 full papers presented were selected from 260 submissions The papers reflect the evolving landscape of education in the digital age They were organized in topical sections as follows IT promoted teaching platforms and systems AI based educational modes and methods automatic educational resource processing educational information evaluation

Geo-Spatial Knowledge and Intelligence Hanning Yuan, Jing Geng, Chuanlu Liu, Fuling Bian, Tisinee Surapunt, 2018-06-11

This two volume set CCIS 848 and CCIS 849 constitutes the thoroughly refereed proceedings of the 5th International Conference Geo Spatial Knowledge and Intelligence GSKI 2017 held in Chiang Mai Thailand in December 2018 The 142 full papers presented were carefully reviewed and selected from 579 submissions They are organized in topical sections on smart city in resource management and sustainable ecosystem spatial data acquisition through RS and GIS in resource management and sustainable ecosystem ecological and environmental data processing and management advanced geospatial model and analysis for understanding ecological and environmental process applications of geo informatics in resource management and sustainable ecosystem **Handbook of Metaheuristics** Fred W. Glover, Gary A.

Kochenberger, 2006-04-11 Metaheuristics in their original definition are solution methods that orchestrate an interaction between local improvement procedures and higher level strategies to create a process capable of escaping from local optima and performing a robust search of a solution space Over time these methods have also come to include any procedures that employ strategies for overcoming the trap of local optimality in complex solution spaces especially those procedures that utilize one or more neighborhood structures as a means of defining admissible moves to transition from one solution to another or to build or destroy solutions in constructive and destructive processes The degree to which neighborhoods are exploited varies according to the type of procedure In the case of certain population based procedures such as genetic algorithms neighborhoods are implicitly and somewhat restrictively defined by reference to replacing components of one solution with those of another by variously chosen rules of exchange popularly given the name of crossover In other population based methods based on the notion of path relinking neighborhood structures are used in their full generality including constructive and destructive neighborhoods as well as those for transitioning between complete solutions Certain hybrids of classical evolutionary approaches which link them with local search also use neighborhood structures more fully though apart from the combination process itself **Database and Expert Systems Applications** Stephen W. Liddle, Klaus-Dieter

Schewe, A Min Tjoa, Xiaofang Zhou, 2012-08-18 This two volume set LNCS 7446 and LNCS 7447 constitutes the refereed proceedings of the 23rd International Conference on Database and Expert Systems Applications DEXA 2012 held in Vienna Austria September 3-6 2012 The 49 revised full papers presented together with 37 short papers and 2 keynote talks were carefully reviewed and selected from 179 submissions These papers discuss a range of topics including database query processing in particular XML queries labelling of XML documents computational efficiency data extraction personalization preferences and ranking security and privacy database schema evaluation and evolution semantic Web privacy and provenance data mining data streaming distributed systems searching and query answering structuring compression and optimization failure fault analysis and uncertainty predication extraction and annotation ranking and personalisation database partitioning and performance measurement recommendation and prediction systems business processes social

networking      **Fundamentals of the New Artificial Intelligence** Toshinori Munakata, 2008-01-01 The book covers the most essential and widely employed material in each area particularly the material important for real world applications Our goal is not to cover every latest progress in the fields nor to discuss every detail of various techniques that have been developed New sections subsections added in this edition are Simulated Annealing Section 3 7 Boltzmann Machines Section 3 8 and Extended Fuzzy if then Rules Tables Sub section 5 5 3 Also numerous changes and typographical corrections have been made throughout the manuscript The Preface to the first edition follows General scope of the book Artificial intelligence AI as a field has undergone rapid growth in diversification and practicality For the past few decades the repertoire of AI techniques has evolved and expanded Scores of newer fields have been added to the traditional symbolic AI Symbolic AI covers areas such as knowledge based systems logical reasoning symbolic machine learning search techniques and natural language processing The newer fields include neural networks genetic algorithms or evolutionary computing fuzzy systems rough set theory and chaotic systems      Applied Informatics Hector Florez, Marcelo Leon, 2023-10-23 This book constitutes the proceedings of the 6th International Conference on Applied Informatics ICAI 2023 which took place in Guayaquil Ecuador in October 2023 The 30 papers presented in this volume were carefully reviewed and selected from 132 submissions The contributions are divided into the following thematic blocks Artificial Intelligence Data Analysis Decision Systems Enterprise Information Systems Applications Geoinformatics Health Care Information Systems Interdisciplinary Information Studies Learning Management Systems Virtual and Augmented Reality      *Impractical Python Projects* Lee Vaughan, 2018-11-27 Impractical Python Projects is a collection of fun and educational projects designed to entertain programmers while enhancing their Python skills It picks up where the complete beginner books leave off expanding on existing concepts and introducing new tools that you ll use every day And to keep things interesting each project includes a zany twist featuring historical incidents pop culture references and literary allusions You ll flex your problem solving skills and employ Python s many useful libraries to do things like Help James Bond crack a high tech safe with a hill climbing algorithm Write haiku poems using Markov Chain Analysis Use genetic algorithms to breed a race of gigantic rats Crack the world s most successful military cipher using cryptanalysis Derive the anagram I am Lord Voldemort using linguistical sieves Plan your parents secure retirement with Monte Carlo simulation Save the sorceress Zatanna from a stabby death using palindromes Model the Milky Way and calculate our odds of detecting alien civilizations Help the world s smartest woman win the Monty Hall problem argument Reveal Jupiter s Great Red Spot using optical stacking Save the head of Mary Queen of Scots with steganography Foil corporate security with invisible electronic ink Simulate volcanoes map Mars and more all while gaining valuable experience using free modules like Tkinter matplotlib Cprofile Pylint Pygame Pillow and Python Docx Whether you re looking to pick up some new Python skills or just need a pick me up you ll find endless educational geeky fun with Impractical Python Projects      **Practice and Theory of Automated Timetabling VI** Edmund Burke, Hana

Rudová,2007-11-25 Complete with online files and updates this fascinating volume has everything you need to know about the latest developments in automated timetabling It constitutes the refereed post proceedings of the 6th International Conference on Practice and Theory of Automated Timetabling PATAT 2006 The 25 revised full papers are organized in topical sections that cover everything from general issues and employee timetabling to school and examination timetabling

Handbook of Formal Optimization Anand J. Kulkarni,Amir H. Gandomi,2024-07-16 The formal optimization handbook is a comprehensive guide that covers a wide range of subjects It includes a literature review a mathematical formulation of optimization methods flowcharts and pseudocodes illustrations problems and applications results and critical discussions and much more The book covers a vast array of formal optimization fields including mathematical and Bayesian optimization neural networks and deep learning genetic algorithms and their applications hybrid optimization methods combinatorial optimization constraint handling in optimization methods and swarm based optimization This handbook is an excellent reference for experts and non specialists alike as it provides stimulating material The book also covers research trends challenges and prospective topics making it a valuable resource for those looking to expand their knowledge in this field

*International Conference on Innovative Computing and Communications* Ashish Khanna,Deepak Gupta,Siddhartha Bhattacharyya,Aboul Ella Hassanien,Sameer Anand,Ajay Jaiswal,2021-08-17 This book includes high quality research papers presented at the Fourth International Conference on Innovative Computing and Communication ICICC 2021 which is held at the Shaheed Sukhdev College of Business Studies University of Delhi Delhi India on February 20 21 2021 Introducing the innovative works of scientists professors research scholars students and industrial experts in the field of computing and communication the book promotes the transformation of fundamental research into institutional and industrialized research and the conversion of applied exploration into real time applications



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