
LOGIC AND DISCRETE MATHEMATICS

*A Computer Science
Perspective*

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Logic And Discrete Mathematics A Computer Science Perspective

**Davide Ciucci, Guoyin Wang, Sushmita
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Logic and Discrete Mathematics Winfried Karl Grassmann, Jean-Paul Tremblay, 1996 For one two semester sophomore level courses in Discrete Mathematics This text covers all the traditional topics of discrete mathematics logic sets relations functions and graphs and reflects recent trends in computer science

Logic and Discrete Mathematics Winfried K. Grassmann, Jean-Paul Tremblay, 1998 A Logical Approach to Discrete Math David Gries, Fred B. Schneider, 1993-10-22 Here the authors strive to change the way logic and discrete math are taught in computer science and mathematics while many books treat logic simply as another topic of study this one is unique in its willingness to go one step further The book treats logic as a basic tool which may be applied in essentially every other area Lectures On Discrete Mathematics For Computer Science Bakhadyr M Khoussainov, Nodira Khoussainova, 2012-03-21 This textbook presents fundamental topics in discrete mathematics introduced from the perspectives of a pure mathematician and an applied computer scientist The synergy between the two complementary perspectives is seen throughout the book key concepts are motivated and explained through real world examples and yet are still formalized with mathematical rigor The book is an excellent introduction to discrete mathematics for computer science software engineering and mathematics students The first author is a leading mathematician in the area of logic computability and theoretical computer science with more than 25 years of teaching and research experience The second author is a computer science PhD student at the University of Washington specializing in database systems The father and daughter team merges two different views to create a unified book for students interested in learning discrete mathematics the connections between discrete mathematics and computer science and the mathematical foundations of computer science Readers will learn how to formally define abstract concepts reason about objects such as programs graphs and numbers investigate properties of algorithms and prove their correctness The textbook studies several well known algorithmic problems including the path problem for graphs and finding the greatest common divisor inductive definitions proofs of correctness of algorithms via loop invariants and induction the basics of formal methods such as propositional logic finite state machines counting probability as well as the foundations of databases such as relational calculus

A Logical Approach to Discrete Math David Gries, Fred B. Schneider, 2013-03-14 This text attempts to change the way we teach logic to beginning students Instead of teaching logic as a subject in isolation we regard it as a basic tool and show how to use it We strive to give students a skill in the propositional and predicate calculi and then to exercise that skill thoroughly in applications that arise in computer science and discrete mathematics We are not logicians but programming methodologists and this text reflects that perspective We are among the first generation of scientists who are more interested in using logic than in studying it With this text we hope to empower further generations of computer scientists and mathematicians to become serious users of logic Logic is the glue Logic is the glue that binds together methods of reasoning in all domains The traditional proof methods for example proof by assumption contradiction mutual

implication and induction have their basis in formal logic Thus whether proofs are to be presented formally or informally a study of logic can provide understanding

Classical and Quantum Computing Yorick Hardy, Willi H. Steeb, 2012-12-06 Classical and Quantum computing provides a self contained systematic and comprehensive introduction to all the subjects and techniques important in scientific computing The style and presentation are readily accessible to undergraduates and graduates A large number of examples accompanied by complete C and Java code wherever possible cover every topic Features and benefits Comprehensive coverage of the theory with many examples Topics in classical computing include boolean algebra gates circuits latches error detection and correction neural networks Turing machines cryptography genetic algorithms For the first time genetic expression programming is presented in a textbook Topics in quantum computing include mathematical foundations quantum algorithms quantum information theory hardware used in quantum computing This book serves as a textbook for courses in scientific computing and is also very suitable for self study Students professionals and practitioners in computer science applied mathematics and physics will benefit from using the book and the included software simulations

Software Engineering Processes Yingxu Wang, Graham King, 2000-04-21 Software engineering is playing an increasingly significant role in computing and informatics necessitated by the complexities inherent in large scale software development To deal with these difficulties the conventional life cycle approaches to software engineering are now giving way to the process system approach encompassing development me

Rough Sets, Fuzzy Sets, Data Mining, and Granular Computing Dominik Ślęzak, 2005-08-22 The two volume set LNAI 3641 and LNAI 3642 constitutes the refereed proceedings of the 10th International Conference on Rough Sets Fuzzy Sets Data Mining and Granular Computing RSFDGrC 2005 held in Regina Canada in August September 2005 The 119 revised full papers presented were carefully reviewed and selected from a total of 277 submissions They comprise the two volumes together with 6 invited papers 22 approved workshop papers and 5 special section papers that all were carefully selected and thoroughly revised The first volume includes 75 contributions related to rough set approximations rough algebraic foundations feature selection and reduction reasoning in information systems rough probabilistic approaches rough fuzzy hybridization fuzzy methods in data analysis evolutionary computing machine learning approximate and uncertain reasoning probabilistic network models spatial and temporal reasoning non standard logics and granular computing The second volume contains 77 contributions and deals with rough set software data mining hybrid and hierarchical methods information retrieval image recognition and processing multimedia applications medical applications web content analysis business and industrial applications the approved workshop papers and the papers accepted for a special session on intelligent and sapient systems

High Performance Networking, Computing, and Communication Systems Yanwen Wu, 2011-11-02 This book constitutes the refereed post proceedings of the Second International Conference on High Performance Networking Computing and Communication systems ICHCC 2011 held in Singapore in May 2011 The conference was held together with the Second

International Conference on Theoretical and Mathematical Foundations of Computer Science ICTMF 2011 which proceedings are published in CCIS 164 The 84 revised selected papers presented were carefully reviewed and selected for inclusion in the book The topics covered range from computational science engineering and technology to digital signal processing and computational biology to game theory and other related topics

Introduction to Discrete Mathematics via Logic and Proof Calvin Jongsma, 2019-11-08 This textbook introduces discrete mathematics by emphasizing the importance of reading and writing proofs Because it begins by carefully establishing a familiarity with mathematical logic and proof this approach suits not only a discrete mathematics course but can also function as a transition to proof Its unique deductive perspective on mathematical logic provides students with the tools to more deeply understand mathematical methodology an approach that the author has successfully classroom tested for decades Chapters are helpfully organized so that as they escalate in complexity their underlying connections are easily identifiable Mathematical logic and proofs are first introduced before moving onto more complex topics in discrete mathematics Some of these topics include Mathematical and structural induction Set theory Combinatorics Functions relations and ordered sets Boolean algebra and Boolean functions Graph theory Introduction to Discrete Mathematics via Logic and Proof will suit intermediate undergraduates majoring in mathematics computer science engineering and related subjects with no formal prerequisites beyond a background in secondary mathematics

Rough Sets and Knowledge Technology Davide Ciucci, Guoyin Wang, Sushmita Mitra, Wei-Zhi Wu, 2015-11-21 This book constitutes the thoroughly refereed conference proceedings of the 10th International Conference on Rough Sets and Knowledge Technology RSKT 2015 held in Tianjin China in November 2015 as part of the International Joint Conference on Rough Sets IJCRS 2015 together with the 15th International Conference on Rough Sets Fuzzy Sets Data Mining and Granular Computing RSFDgrC 2015 The 66 papers presented at IJCRS 2015 were carefully reviewed and selected from 97 submissions The 38 papers included in this volume are organized in the following topical sections rough sets the experts speak reducts and rules three way decisions logic and algebra clustering rough sets and graphs and modeling and learning In addition the volume contains 6 contributions by new fellows of the International Rough Set Society an invited talk and a tutorial

Rough Sets and Knowledge Technology Peng Wen, Yuefeng Li, Lech Polkowski, Yiyu Y. Yao, Shusaku Tsumoto, 2009-06-24 This book constitutes the refereed proceedings of the Fourth International Conference on Rough Sets and Knowledge Technology RSKT 2009 held in Gold Coast Australia in July 2009 The 85 revised full papers papers presented together with 3 keynote papers and 2 special sessions were carefully reviewed and selected from 229 submissions The papers are organized in topical sections on rough sets and computing rough sets and data reduction data mining and knowledge discovery granular computing and cognitive computing fuzzy sets and computing knowledge technology and intelligent systems computational intelligence and applications image processing and understanding and formal concept analysis

Perspectives of Neural-Symbolic Integration Barbara Hammer, Pascal Hitzler, 2007-08-14 The

human brain possesses the remarkable capability of understanding interpreting and producing human language thereby relying mostly on the left hemisphere The ability to acquire language is innate as can be seen from disorders such as specific language impairment SLI which manifests itself in a missing sense for grammaticality Language exhibits strong compositionality and structure Hence biological neural networks are naturally connected to processing and generation of high level symbolic structures Unlike their biological counterparts artificial neural networks and logic do not form such a close liaison Symbolic inference mechanisms and statistical machine learning constitute two major and very different paradigms in artificial intelligence which both have their strengths and weaknesses Statistical methods offer flexible and highly effective tools which are ideally suited for possibly corrupted or noisy data high uncertainty and missing information as occur in everyday life such as sensor streams in robotics measurements in medicine such as EEG and EKG financial and market indices etc The models however are often reduced to black box mechanisms which complicate the integration of prior high level knowledge or human inspection and they lack the ability to cope with a rich structure of objects classes and relations Symbolic mechanisms on the other hand are perfectly applicable for intuitive human machine interaction the integration of complex prior knowledge and well founded recursive inference Their capability of dealing with uncertainty and noise and their efficiency when addressing corrupted large scale real world data sets however is limited Thus the inherent strengths and weaknesses of these two methods ideally complement each other

Discrete Mathematics and Theoretical Computer Science Cristian S. Calude, Michael J. Dinneen, Vincent Vajnovszki, 2007-03-05 The refereed proceedings of the 4th International Conference on Discrete Mathematics and Theoretical Computer Science DMTCS 2003 held in Dijon France in July 2003 The 18 revised full papers presented together with 5 invited papers were carefully reviewed and selected from 35 submissions A broad variety of topics in discrete mathematics and the theory of computing is addressed including information theory coding algorithms complexity automata computational mathematics combinatorial computations graph computations algorithmic geometry relational methods game theoretic methods combinatorial optimization and finite state systems

Collected Papers Of Stephen Smale, The (In 3 Volumes) - Volume 3 Roderick S C Wong, Felipe Cucker, 2000-06-30 This invaluable book contains the collected papers of Stephen Smale These are divided into eight groups topology calculus of variations dynamics mechanics economics biology electric circuits and mathematical programming theory of computation miscellaneous In addition each group contains one or two articles by world leaders on its subject which comment on the influence of Smale's work and another article by Smale with his own retrospective views

From Calculus to Computers Amy Shell-Gellasch, Dick Jardine, 2005 Classroom resource material allowing the integration of mathematics history into undergraduate mathematics teaching

Mathematics of Discrete Structures for Computer Science Gordon J. Pace, 2012-09-13 Mathematics plays a key role in computer science some researchers would consider computers as nothing but the physical embodiment of mathematical systems And whether you are designing a digital circuit a computer

program or a new programming language you need mathematics to be able to reason about the design its correctness robustness and dependability This book covers the foundational mathematics necessary for courses in computer science The common approach to presenting mathematical concepts and operators is to define them in terms of properties they satisfy and then based on these definitions develop ways of computing the result of applying the operators and prove them correct This book is mainly written for computer science students so here the author takes a different approach he starts by defining ways of calculating the results of applying the operators and then proves that they satisfy various properties After justifying his underlying approach the author offers detailed chapters covering propositional logic predicate calculus sets relations discrete structures structured types numbers and reasoning about programs The book contains chapter and section summaries detailed proofs and many end of section exercises key to the learning process The book is suitable for undergraduate and graduate students and although the treatment focuses on areas with frequent applications in computer science the book is also suitable for students of mathematics and engineering

Theoretical Computer Science Josep Diaz,Ivan Lanese,Davide Sangiorgi,2014-08-23 This book constitutes the refereed proceedings of the 8th FIP WG 2 2 International Conference TCS 2014 held in Rome Italy in September 2014 The 26 revised full papers presented together with two invited talks were carefully reviewed and selected from 73 submissions Suggestion please check and add more if needed TCS 2014 consisted of two tracks with separate program committees which dealt respectively with Track A Algorithms Complexity and Models of Computation and Track B Logic Semantics Specification and Verification

The Collected Papers of Stephen Smale Stephen Smale,Felipe Cucker,Roderick Wong,2000 This invaluable book contains the collected papers of Stephen Smale These are divided into eight groups topology calculus of variations dynamics mechanics economics biology electric circuits and mathematical programming theory of computation miscellaneous In addition each group contains one or two articles by world leaders on its subject which comment on the influence of Smale s work and another article by Smale with his own retrospective views

Philosophy of Computer Science William J. Rapaport,2023-01-16 A unique resource exploring the nature of computers and computing and their relationships to the world Philosophy of Computer Science is a university level textbook designed to guide readers through an array of topics at the intersection of philosophy and computer science Accessible to students from either discipline or complete beginners to both the text brings readers up to speed on a conversation about these issues so that they can read the literature for themselves form their own reasoned opinions and become part of the conversation by contributing their own views Written by a highly qualified author in the field the book looks at some of the central questions in the philosophy of computer science including What is philosophy for readers who might be unfamiliar with it What is computer science and its relationship to science and to engineering What are computers computing algorithms and programs Includes a line by line reading of portions of Turing s classic 1936 paper that introduced Turing Machines as well as discussion of the Church Turing Computability Thesis and

hypercomputation challenges to it How do computers and computation relate to the physical world What is artificial intelligence and should we build AIs Should we trust decisions made by computers A companion website contains annotated suggestions for further reading and an instructor s manual Philosophy of Computer Science is a must have for philosophy students computer scientists and general readers who want to think philosophically about computer science

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