
Theory Of Semirings With Applications In Mathematics And Theoretical Computer Science

Graph Algorithms in the Language of Linear Algebra
Semirings
New Models and Algorithms
Combinatorial Matrix Theory and Generalized Inverses of Matrices
The q -theory of Finite Semigroups
Algebraic Systems of Fixpoint Equations Over Semirings: Theory and Applications
Graphs, Dioids and Semirings
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Semirings and their Applications
Festschrift in Honor of Gabriel Thierrin
Category Theory And Applications: A Textbook For Beginners (Second Edition)
Algebraic Theory and Applications in Computer Science
Theory and Applications
Basic Modern Algebra with Applications
Iteration Theories
Algebraic Theory and Applications in Computer Science
Advances in Statistical Control, Algebraic Systems Theory, and Dynamic Systems
Characteristics
Proceedings of the Fifth International Fez Conference on Commutative Algebra and
Applications, Fez, Morocco, June 23-28, 2008
A Guide to the Literature on Semirings and their Applications in Mathematics and
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With Complete Bibliography

Semirings
Words, Semigroups & Transductions
Semirings and Affine Equations over Them
Heuristic Search
16th International Conference, DLT 2012, Taipei, Taiwan, August 14-17, 2012,
Proceedings

*Theory Of
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BARRON LANE

Graph Algorithms in the
Language of Linear
Algebra Springer Science
& Business Media

This is an excellent collection of papers dealing with combinatorics on words, codes, semigroups, automata, languages, molecular computing, transducers, logics, etc., related to the impressive work of Gabriel Thierrin. This volume is in honor of Professor Thierrin on the occasion of his 80th birthday.

Semirings CRC Press
This book provides an introduction to the algebraic theory of semirings and, in this context, to basic algebraic concepts as e.g. semigroups, lattices and rings. It includes an algebraic theory of infinite sums as well as a detailed treatment of several applications in theoretical computer science.

Complete proofs, various examples and exercises (some of them with solutions) make the book suitable for self-study. On the other hand, a more experienced reader who looks for information about the most common concepts and results on semirings will find cross-references throughout the book, a comprehensive bibliography and various hints to it. Contents: Basic Concepts Extensions of Semirings Partially Ordered Semirings Semirings with Infinite Sums Semialgebras, Semigroup Semirings and Semirings of Formal Power Series Readership: Pure mathematicians and computer scientists. Keywords: Semirings; Semigroups; Lattices; Rings; Partially Ordered Semirings; Infinite Sums; Semialgebras
New Models and Algorithms Springer Science & Business Media
Semiring theory stands with a foot in each of two mathematical domains. The first being abstract algebra and the other the

fields of applied mathematics such as optimization theory, the theory of discrete-event dynamical systems, automata theory, and formal language theory, as well as from the allied areas of theoretical computer science and theoretical physics. Most important applications of semiring theory in these areas turn out to revolve around the problem of finding the equalizer of a pair of affine maps between two semimodules. In this volume, we chart the state of the art on solving this problem, and present many specific cases of applications. This book is essentially the third part of a trilogy, along with *Semirings and their Applications*, and *Power Algebras over Semirings*, both written by the same author and published by Kluwer Academic Publishers in 1999. While each book can be read independently of the others, to get the full force of the theory and applications one should have access to all three.

This work will be of interest to academic and industrial researchers and graduate students. The intent of the book is to bring the applications to the attention of the abstract mathematicians and to make the abstract mathematics available to those who are using these tools in an ad-hoc manner without realizing the full force of the theory.

Combinatorial Matrix Theory and Generalized Inverses of Matrices

Infinite Study

There is no branch of mathematics, however abstract, which may not some day be applied to phenomena of the real world. - Nikolai Ivanovich Lobatchevsky This book is an extensively-revised and expanded version of "The Theory of Semirings, with Applications in Mathematics and Theoretical Computer Science" [Golan, 1992], first published by Longman. When that book went out of print, it became clear - in light of the significant advances in semiring theory over the past years and its new important applications in such areas as idempotent analysis and the theory of discrete-event dynamical systems - that a second edition incorporating minor changes would not

be sufficient and that a major revision of the book was in order. Therefore, though the structure of the first «dition was preserved, the text was extensively rewritten and substantially expanded. In particular, references to many interesting and applications of semiring theory, developed in the past few years, had to be added. Unfortunately, I find that it is best not to go into these applications in detail, for that would entail long digressions into various domains of pure and applied mathematics which would only detract from the unity of the volume and increase its length considerably. However, I have tried to provide an extensive collection of examples to arouse the reader's interest in applications, as well as sufficient citations to allow the interested reader to locate them. For the reader's convenience, an index to these citations is given at the end of the book .

The q-theory of Finite Semigroups Springer Science & Business Media The primary objective of this essential text is to emphasize the deep relations existing between the semiring and dioïd structures with graphs

and their combinatorial properties. It does so at the same time as demonstrating the modeling and problem-solving flexibility of these structures. In addition the book provides an extensive overview of the mathematical properties employed by "nonclassical" algebraic structures which either extend usual algebra or form a new branch of it. **Algebraic Systems of Fixpoint Equations Over Semirings: Theory and Applications** kassel university press GmbH The book is primarily intended as a textbook on modern algebra for undergraduate mathematics students. It is also useful for those who are interested in supplementary reading at a higher level. The text is designed in such a way that it encourages independent thinking and motivates students towards further study. The book covers all major topics in group, ring, vector space and module theory that are usually contained in a standard modern algebra text. In addition, it studies semigroup, group action, Hopf's group, topological groups and Lie groups with their actions, applications of ring theory

to algebraic geometry, and defines Zariski topology, as well as applications of module theory to structure theory of rings and homological algebra. Algebraic aspects of classical number theory and algebraic number theory are also discussed with an eye to developing modern cryptography. Topics on applications to algebraic topology, category theory, algebraic geometry, algebraic number theory, cryptography and theoretical computer science interlink the subject with different areas. Each chapter discusses individual topics, starting from the basics, with the help of illustrative examples. This comprehensive text with a broad variety of concepts, applications, examples, exercises and historical notes represents a valuable and unique resource.

Graphs, Dioids and Semirings

World Scientific

This book constitutes the refereed proceedings of the 16th International Conference on Developments in Language Theory, DLT 2012, held in Taipei, Taiwan, in August 2012. The 34 regular papers presented were carefully

reviewed and selected from numerous submissions. The volume also contains the papers or extended abstracts of 4 invited lectures, as well as a special memorial presentation in honor of Sheng Yu. The topics covered include grammars, acceptors and transducers for words, trees and graphs; algebraic theories of automata; algorithmic, combinatorial and algebraic properties of words and languages; variable length codes; symbolic dynamics; cellular automata; polyominoes and multidimensional patterns; decidability questions; image manipulation and compression; efficient text algorithms; relationships to cryptography, concurrency, complexity theory and logic; bio-inspired computing; quantum computing.

Commutative Algebra and its Applications

Cambridge University Press

In the world of mathematics, the study of fuzzy relations and its theories are well-documented and a staple in the area of calculative methods. What many researchers and scientists

overlook is how fuzzy theory can be applied to industries outside of arithmetic. The framework of fuzzy logic is much broader than professionals realize. There is a lack of research on the full potential this theoretical model can reach. The Handbook of Research on Emerging Applications of Fuzzy Algebraic Structures provides emerging research exploring the theoretical and practical aspects of fuzzy set theory and its real-life applications within the fields of engineering and science. Featuring coverage on a broad range of topics such as complex systems, topological spaces, and linear transformations, this book is ideally designed for academicians, professionals, and students seeking current research on innovations in fuzzy logic in algebra and other matrices.

Semirings and their Applications

World Scientific

The algebraic path problem is a generalization of the shortest path problem in graphs. Various instances of this abstract problem have appeared in the literature, and similar

solutions have been independently discovered and rediscovered. The repeated appearance of a problem is evidence of its relevance. This book aims to help current and future researchers add this powerful tool to their arsenal, so that they can easily identify and use it in their own work. Path problems in networks can be conceptually divided into two parts: A distillation of the extensive theory behind the algebraic path problem, and an exposition of a broad range of applications. First of all, the shortest path problem is presented so as to fix terminology and concepts: existence and uniqueness of solutions, robustness to parameter changes, and centralized and distributed computation algorithms. Then, these concepts are generalized to the algebraic context of semirings. Methods for creating new semirings, useful for modeling new problems, are provided. A large part of the book is then devoted to numerous applications of the algebraic path problem, ranging from mobile network routing to BGP routing to social networks. These applications show what kind of problems can

be modeled as algebraic path problems; they also serve as examples on how to go about modeling new problems. This monograph will be useful to network researchers, engineers, and graduate students. It can be used either as an introduction to the topic, or as a quick reference to the theoretical facts, algorithms, and application examples. The theoretical background assumed for the reader is that of a graduate or advanced undergraduate student in computer science or engineering. Some familiarity with algebra and algorithms is helpful, but not necessary. Algebra, in particular, is used as a convenient and concise language to describe problems that are essentially combinatorial. Table of Contents: Classical Shortest Path / The Algebraic Path Problem / Properties and Computation of Solutions / Applications / Related Areas / List of Semirings and Applications Festschrift in Honor of Gabriel Thierrin Walter de Gruyter This is a graduate text introducing the fundamentals of measure theory and integration theory, which is the

foundation of modern real analysis. The text focuses first on the concrete setting of Lebesgue measure and the Lebesgue integral (which in turn is motivated by the more classical concepts of Jordan measure and the Riemann integral), before moving on to abstract measure and integration theory, including the standard convergence theorems, Fubini's theorem, and the Carathéodory extension theorem. Classical differentiation theorems, such as the Lebesgue and Rademacher differentiation theorems, are also covered, as are connections with probability theory. The material is intended to cover a quarter or semester's worth of material for a first graduate course in real analysis. There is an emphasis in the text on tying together the abstract and the concrete sides of the subject, using the latter to illustrate and motivate the former. The central role of key principles (such as Littlewood's three principles) as providing guiding intuition to the subject is also emphasized. There are a large number of exercises throughout that develop

key aspects of the theory, and are thus an integral component of the text. As a supplementary section, a discussion of general problem-solving strategies in analysis is also given. The last three sections discuss optional topics related to the main matter of the book.

Category Theory And Applications: A Textbook For Beginners (Second Edition) Springer Science & Business Media

The proceedings of the First Multidisciplinary International Symposium on Positive Systems Theory and Applications (POSTA 2003) held in Rome, Italy, August 28-30, 2003. Positive Systems are systems in which the relevant variables assume nonnegative values. These systems are quite common in applications where variables represent positive quantities such as populations, goods, money, time, data packets flowing in a network, densities of chemical species, probabilities, etc. The aim of the symposium was to join together researchers working in the different areas related to positive systems such as telecommunications, economy, biomedicine, chemistry and physics in

order to provide a multidisciplinary forum where they have the opportunity to exchange ideas and compare results in a unifying framework.

Algebraic Theory and Applications in Computer Science Springer

This book contains original reviews by well-known workers in the field of mathematical linguistics and formal language theory, written in honour of Professor Solomon Marcus on the occasion of his 70th birthday. Some of the papers deal with contextual grammars, a class of generative devices introduced by Marcus, motivated by descriptive linguistics. Others are devoted to grammar systems, a very modern branch of formal language theory. Automata theory and the algebraic approach to computer science are other well-represented areas. While the contributions are mathematically oriented, practical issues such as cryptography, grammatical inference and natural language processing are also discussed.

Theory and Applications World Scientific

This book consists of eighteen articles in the

area of 'Combinatorial Matrix Theory' and 'Generalized Inverses of Matrices'. Original research and expository articles presented in this publication are written by leading Mathematicians and Statisticians working in these areas. The articles contained herein are on the following general topics: 'matrices in graph theory', 'generalized inverses of matrices', 'matrix methods in statistics' and 'magic squares'. In the area of matrices and graphs, specific topics addressed in this volume include energy of graphs, q-analog, immanants of matrices and graph realization of product of adjacency matrices. Topics in the book from 'Matrix Methods in Statistics' are, for example, the analysis of BLUE via eigenvalues of covariance matrix, copulas, error orthogonal model, and orthogonal projectors in the linear regression models. Moore-Penrose inverse of perturbed operators, reverse order law in the case of indefinite inner product space, approximation numbers, condition numbers, idempotent matrices, semiring of nonnegative matrices, regular matrices

over incline and partial order of matrices are the topics addressed under the area of theory of generalized inverses. In addition to the above traditional topics and a report on CMTGIM 2012 as an appendix, we have an article on old magic squares from India.

Basic Modern Algebra with Applications Cambridge University Press

A collection of articles showcasing the achievements of young Russian researchers in combinatorial and algebraic geometry and topology.

Iteration Theories Springer Science & Business Media

Automata theory is the oldest among the disciplines constituting the subject matter of this Monograph Series: theoretical computer science. Indeed, automata theory and the closely related theory of formal languages form nowadays such a highly developed and diversified body of knowledge that even an exposition of "reasonably important" results is not possible within one volume. The purpose of this book is to develop the theory of automata and formal languages, starting from ideas based on linear algebra. By what

was said above, it should be obvious that we do not intend to be encyclopedic. However, this book contains the basics of regular and context-free languages (including some new results), as well as a rather complete theory of pushdown automata and variations (e. g. counter automata). The wellknown AFL theory is extended to power series ("AFP theory"). Additional new results include, for instance, a grammatical characterization of the cones and the principal cones of context-free languages, as well as new decidability results.

Algebraic Theory and Applications in Computer Science

Morgan & Claypool Publishers

Category theory reveals commonalities between structures of all sorts. This book shows its potential in science, engineering, and beyond.

Advances in Statistical Control, Algebraic Systems Theory, and Dynamic Systems Characteristics World Scientific

A modern account of the subject and its applications. Excellent resource for those working in algebra and theoretical computer

science.

[Proceedings of the Fifth International Fez Conference on Commutative Algebra and Applications, Fez, Morocco, June 23-28, 2008](#) Semirings and their Applications

This comprehensive, encyclopedic text in four parts aims to give the reader — from the graduate student to the researcher/practitioner — a detailed understanding of modern finite semigroup theory, focusing in particular on advanced topics on the cutting edge of research. The q-theory of Finite Semigroups presents important techniques and results, many for the first time in book form, thereby updating and modernizing the semigroup theory literature.

A Guide to the Literature on Semirings and their Applications in Mathematics and Information Sciences

Cambridge University Press

This volume consists of refereed research and expository articles by both plenary and other speakers at the International Conference on Algebra and Applications held at Ohio

University in June 2008, to honor S.K. Jain on his 70th birthday. The articles are on a wide variety of areas in classical ring theory and module theory, such as rings satisfying polynomial identities, rings of quotients, group rings, homological algebra, injectivity and its generalizations, etc. Included are also applications of ring theory to problems in coding theory and in linear algebra.

Mathematical Aspects of Natural and Formal Languages Springer Science & Business Media
The purpose of this Handbook is to highlight both theory and applications of weighted automata. Weighted finite automata are classical nondeterministic finite

automata in which the transitions carry weights. These weights may model, e. g. , the cost involved when executing a transition, the amount of resources or time needed for this, or the probability or reliability of its successful execution. The behavior of weighted finite automata can then be considered as the function (suitably defined) associating with each word the weight of its execution. Clearly, weights can also be added to classical automata with infinite state sets like pushdown automata; this extension constitutes the general concept of weighted automata. To illustrate the diversity of weighted automata, let us consider

the following scenarios. Assume that a quantitative system is modeled by a classical automaton in which the transitions carry as weights the amount of resources needed for their execution. Then the amount of resources needed for a path in this weighted automaton is obtained simply as the sum of the weights of its transitions. Given a word, we might be interested in the minimal amount of resources needed for its execution, i. e. , for the successful paths realizing the given word. In this example, we could also replace the “resources” by “profit” and then be interested in the maximal profit realized, correspondingly, by a given word.

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