Discrete Algebraic Methods Arithmetic Cryptograph

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Discrete Algebraic Methods Arithmetic Cryptograph ***2022-10-03***

JESUS WILLIAMS

Farey Sequences Springer Nature
Semirings as an algebraic structure have been known since 1934, but remained unapplied for mathematical purposes for a long time. It has only been in the past decade that they have been used in cryptography. The advantage of (additively) idempotent semirings is that the additive operation does not have an inverse, which can help in preventing the breakage of a cryptosystem. This book describes a number of cryptographic protocols, as well as the hard mathematical problems on which their security is based. It will appeal to cryptographers and specialists in applied algebra.
Pattern Recognition on Oriented Matroids Walter de Gruyter GmbH & Co KG
The book consists of contributions related mostly to public-key cryptography, including the design of new cryptographic primitives as well as cryptanalysis of previously suggested schemes. Most papers are original research papers in the area that can be loosely defined as ``non-commutative cryptography''; this means that groups (or other algebraic structures) which are used as platforms are non-commutative.
Algebraic Methods in Cryptography Walter de Gruyter GmbH & Co KG
Using mathematical tools from number theory and finite fields, Applied Algebra: Codes, Ciphers, and Discrete Algorithms, Second

Edition presents practical methods for solving problems in data security and data integrity. It is designed for an applied algebra course for students who have had prior classes in abstract or linear algebra. While the content has been reworked and improved, this edition continues to cover many algorithms that arise in cryptography and error-control codes. New to the Second Edition A CD-ROM containing an interactive version of the book that is powered by Scientific Notebook®, a mathematical word processor and easy-to-use computer algebra system New appendix that reviews prerequisite topics in algebra and number theory Double the number of exercises Instead of a general study on finite groups, the book considers finite groups of permutations and develops just enough of the theory of finite fields to facilitate construction of the fields used for error-control codes and the Advanced Encryption Standard. It also deals with integers and polynomials. Explaining the mathematics as needed, this text thoroughly explores how mathematical techniques can be used to solve practical problems. About the Authors Darel W. Hardy is Professor Emeritus in the Department of Mathematics at Colorado State University. His research interests include applied algebra and semigroups. Fred Richman is a professor in the Department of Mathematical Sciences at Florida Atlantic University. His research interests include Abelian group theory and constructive mathematics. Carol L. Walker is Associate Dean Emeritus in the Department of Mathematical Sciences at New Mexico State University. Her research interests include Abelian group theory, applications of homological algebra and category theory, and the mathematics of fuzzy sets and fuzzy logic.

Discrete Algebraic Methods Springer Science & Business Media

This book introduces polyhedra as a tool for graph theory and discusses their properties and applications in solving the Gauss crossing problem. The discussion is extended to embeddings on manifolds, particularly to surfaces of genus zero and non-zero via the joint tree model, along with solution algorithms. Given its rigorous approach, this book would be of interest to researchers in graph theory and discrete mathematics.

Elements of Discrete Mathematics Springer

Like its bestselling predecessor, Elliptic Curves: Number Theory and Cryptography, Second Edition develops the theory of elliptic curves to provide a basis for both number theoretic and cryptographic applications. With additional exercises, this edition offers more comprehensive coverage of the fundamental theory, techniques, and application

Geometry and Discrete Mathematics CRC Press

The AAECC Symposia Series was started in 1983 by Alain Poli (Toulouse), who, together with R. Desq, D. Lazard, and P. Camion, organized the ?rst conference. Originally the acronym AAECC meant “Applied Algebra and Error-Correcting Codes”. Over the years its meaning has shifted to “Applied Algebra, Algebraic Algorithms, and Error-Correcting Codes”, re?ecting the growing importance of complexity in both decoding algorithms and computational algebra. AAECC aims to encourage cross-fertilization between algebraic methods and their applications in computing and communications. The algebraic orientation is towards ?nite ?elds, complexity, polynomials, and graphs. The applications orientation is towards both theoretical and practical error-correction coding, and, since AAECC 13 (Hawaii, 1999), towards cryptography. AAECC was the ?rst symposium with

papers connecting Gr¨obner bases with E-C codes. The balance between theoretical and practical is intended to shift regularly; at AAECC-14 the focus was on the theoretical side. The main subjects covered were: – Codes: iterative decoding, decoding methods, block codes, code construction. – Codes and algebra: algebraic curves, Gr¨obner bases, and AG codes. – Algebra: rings and ?elds, polynomials. – Codes and combinatorics: graphs and matrices, designs, arithmetic. – Cryptography. – Computational algebra: algebraic algorithms. – Sequences for communications.

Codes: An Introduction to Information Communication and Cryptography Walter de Gruyter GmbH & Co KG

The discrete logarithm problem based on elliptic and hyperelliptic curves has gained a lot of popularity as a cryptographic primitive. The main reason is that no subexponential algorithm for computing discrete logarithms on small genus curves is currently available, except in very special cases. Therefore curve-based cryptosystems require much smaller key sizes than RSA to attain the same security level. This makes them particularly attractive for implementations on memory-restricted devices like smart cards and in high-security applications. The Handbook of Elliptic and Hyperelliptic Curve Cryptography introduces the theory and algorithms involved in curve-based cryptography. After a very detailed exposition of the mathematical background, it provides ready-to-implement algorithms for the group operations and computation of pairings. It explores methods for point counting and constructing curves with the complex multiplication method and provides the algorithms in an explicit manner. It also surveys generic methods to compute discrete logarithms and details index calculus methods for hyperelliptic curves. For some special curves the discrete logarithm problem can be transferred to an easier one; the consequences are explained and suggestions for good choices are given. The authors present applications to protocols for discrete-logarithm-based systems (including bilinear structures) and explain the use of elliptic and hyperelliptic curves in factorization and primality proving. Two chapters explore their design and efficient implementations in smart cards. Practical and theoretical aspects of side-channel attacks and countermeasures and a chapter devoted to (pseudo-)random number generation round off the exposition. The broad coverage of all- important areas makes this book a complete handbook of elliptic and hyperelliptic curve cryptography and an invaluable reference to anyone interested in this exciting field.

Graphs for Pattern Recognition American Mathematical Soc.

This book constitutes the refereed proceedings of the 11th International Conference on Combinatorics on Words, WORDS 2017, held in Montréal, QC, Canada, in September 2017. The 21 revised full papers presented together with 5invoted talks were carefully reviewed and selected from 26 submissions. Discrete geometry plays an expanding role in the fields of shape modeling, image synthesis, and image analysis. It deals with topological and geometrical definitions of digitized objects or digitized images and provides both a theoretical and computational framework for computer imaging.

Elliptic Curves Springer Science & Business Media

This self-contained introduction to modern cryptography emphasizes the mathematics behind the theory of public key cryptosystems and digital signature schemes. The book focuses on these key topics while developing the mathematical tools

needed for the construction and security analysis of diverse cryptosystems. Only basic linear algebra is required of the reader; techniques from algebra, number theory, and probability are introduced and developed as required. This text provides an ideal introduction for mathematics and computer science students to the mathematical foundations of modern cryptography. The book includes an extensive bibliography and index; supplementary materials are available online. The book covers a variety of topics that are considered central to mathematical cryptography. Key topics include: classical cryptographic constructions, such as Diffie–Hellmann key exchange, discrete logarithm-based cryptosystems, the RSA cryptosystem, and digital signatures; fundamental mathematical tools for cryptography, including primality testing, factorization algorithms, probability theory, information theory, and collision algorithms; an in-depth treatment of important cryptographic innovations, such as elliptic curves, elliptic curve and pairing-based cryptography, lattices, lattice-based cryptography, and the NTRU cryptosystem. The second edition of An Introduction to Mathematical Cryptography includes a significant revision of the material on digital signatures, including an earlier introduction to RSA, Elgamal, and DSA signatures, and new material on lattice-based signatures and rejection sampling. Many sections have been rewritten or expanded for clarity, especially in the chapters on information theory, elliptic curves, and lattices, and the chapter of additional topics has been expanded to include sections on digital cash and homomorphic encryption. Numerous new exercises have been included.

A Course in Mathematical Cryptography Springer

From the reviews: "This is a textbook in cryptography with emphasis on algebraic methods. It is supported by many exercises (with answers) making it appropriate for a course in mathematics or computer science. [...] Overall, this is an excellent expository text, and will be very useful to both the student and researcher." Mathematical Reviews

Discrete Algebraic Methods Walter de Gruyter GmbH & Co KG

From its history as an elegant but abstract area of mathematics, algebraic number theory now takes its place as a useful and accessible study with important real-world practicality. Unique among algebraic number theory texts, this important work offers a wealth of applications to cryptography, including factoring, primality-testing, and public-key cryptosystems. A follow-up to Dr. Mollin's popular Fundamental Number Theory with Applications, Algebraic Number Theory provides a global approach to the subject that selectively avoids local theory. Instead, it carefully leads the student through each topic from the level of the algebraic integer, to the arithmetic of number fields, to ideal theory, and closes with reciprocity laws. In each chapter the author includes a section on a cryptographic application of the ideas presented, effectively demonstrating the pragmatic side of theory. In this way Algebraic Number Theory provides a comprehensible yet thorough treatment of the material. Written for upper-level undergraduate and graduate courses in algebraic number theory, this one-of-a-kind text brings the subject matter to life with historical background and real-world practicality. It easily serves as the basis for a range of courses, from bare-bones algebraic number theory, to a course rich with cryptography applications, to a course using the basic theory to prove Fermat's

Last Theorem for regular primes. Its offering of over 430 exercises with odd-numbered solutions provided in the back of the book and, even-numbered solutions available a separate manual makes this the ideal text for both students and instructors.

Cryptology and Error Correction Cambridge University Press

A new approach to conveying abstract algebra, the area that studies algebraic structures, such as groups, rings, fields, modules, vector spaces, and algebras, that is essential to various scientific disciplines such as particle physics and cryptology. It provides a well written account of the theoretical foundations and it also includes a chapter on cryptography. End of chapter problems help readers with accessing the subjects.

Abstract Algebra CRC Press

This book constitutes the refereed proceedings of the 6th International Algorithmic Number Theory Symposium, ANTS 2004, held in Burlington, VT, USA, in June 2004. The 30 revised full papers presented together with 3 invited papers were carefully reviewed and selected for inclusion in the book. Among the topics addressed are zeta functions, elliptic curves, hyperelliptic curves, GCD algorithms, number field computations, complexity, primality testing, Weil and Tate pairings, cryptographic algorithms, function field sieve, algebraic function field mapping, quartic fields, cubic number fields, lattices, discrete logarithms, and public key cryptosystems.

Number Theoretic Methods in Cryptography Walter de Gruyter GmbH & Co KG

Developed from the author's popular graduate-level course, Computational Number Theory presents a complete treatment of number-theoretic algorithms. Avoiding advanced algebra, this self-contained text is designed for advanced undergraduate and beginning graduate students in engineering. It is also suitable for researchers new to the field and pract

Algebraic Number Theory CRC Press

This book gives an advanced overview of several topics in infinite group theory. It can also be considered as a rigorous introduction to combinatorial and geometric group theory. The philosophy of the book is to describe the interaction between these two important parts of infinite group theory. In this line of thought, several theorems are proved multiple times with different methods either purely combinatorial or purely geometric while others are shown by a combination of arguments from both perspectives. The first part of the book deals with Nielsen methods and introduces the reader to results and examples that are helpful to understand the following parts. The second part focuses on covering spaces and fundamental groups, including covering space proofs of group theoretic results. The third part deals with the theory of hyperbolic groups. The subjects are illustrated and described by prominent examples and an outlook on solved and unsolved problems.

An Introduction to Mathematical Cryptography Birkhäuser

The subject of this book is mathematical cryptography. By this we mean the mathematics involved in cryptographic protocols. As the field has expanded, using both commutative and noncommutative algebraic objects as cryptographic platforms, a book describing and explaining all these mathematical methods is of immeasurable value.

Topological Theory of Graphs Walter de Gruyter GmbH & Co

KG
The idea behind this book is to provide the mathematical foundations for assessing modern developments in the Information Age. It deepens and complements the basic concepts, but it also considers instructive and more advanced topics. The treatise starts with a general chapter on algebraic structures; this part provides all the necessary knowledge for the rest of the book. The next chapter gives a concise overview of cryptography. Chapter 3 on number theoretic algorithms is important for developping cryptosystems, Chapter 4 presents the deterministic primality test of Agrawal, Kayal, and Saxena. The account to elliptic curves again focuses on cryptographic applications and algorithms. With combinatorics on words and automata theory, the reader is introduced to two areas of theoretical computer science where semigroups play a fundamental role.The last chapter is devoted to combinatorial group theory and its connections to automata. Contents: Algebraic structures Cryptography Number theoretic algorithms Polynomial time primality test Elliptic curves Combinatorics on words Automata Discrete infinite groups

Number Theory for Computing Walter de Gruyter GmbH & Co KG
As a first comprehensive overview on Farey sequences and subsequences, this monograph is intended as a reference for anyone looking for specific material or formulas related to the subject. Duality of subsequences and maps between them are discussed and explicit proofs are shown in detail. From the Content Basic structural and enumerative properties of Farey sequences, Collective decision making, Committee methods in pattern recognition, Farey duality, Farey sequence, Fundamental Farey subsequences, Monotone bijections between Farey subsequences

Analog and Hybrid Computer Programming Springer
This book constitutes the refereed proceedings of the First International Workshop on the Arithmetic of Finite Fields, WAIFI 2007, held in Madrid, Spain in June 2007. It covers structures in finite fields, efficient implementation and architectures, efficient finite field arithmetic, classification and construction of mappings over finite fields, curve algebra, cryptography, codes, and discrete structures.

Elliptic Curves Walter de Gruyter GmbH & Co KG
The AAECC Symposia Series was started in 1983 by Alain Poli (Toulouse), who, together with R. Desq, D. Lazard, and P. Camion, organized the ?rst conference. Originally the acronym AAECC meant “Applied Algebra and Error-Correcting Codes”. Over the years its meaning has shifted to “Applied Algebra, Algebraic Algorithms, and Error-Correcting Codes”, re?ecting the growing importance of complexity in both decoding algorithms and computational algebra. AAECC aims to encourage cross-fertilization between algebraic methods and their applications in computing and communications. The algebraic orientation is towards ?nite ?elds, complexity, polynomials, and graphs. The applications orientation is towards both theoretical and practical error-correction coding, and, since AAECC 13 (Hawaii, 1999), towards cryptography. AAECC was the ?rst symposium with papers connecting Gr¨obner bases with E-C codes. The balance between theoretical and practical is intended to shift regularly; at AAECC-14 the focus was on the theoretical side. The main subjects covered were: – Codes: iterative decoding, decoding

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