Tiling With Polyominoes And Combinatorial Group Theory

It is with greatpleasure that we present the proceedings of the 5th International Symposium on Visual Computing (ISVC 2009), which was held in Las Vegas, Nevada. ISVC o?ers a common umbrella for the four main areas of visual c- puting includingvision,graphics,visualization,andvirtualreality.Thegoalisto provide a forum for researchers, scientists, engineers, and practitioners throu- out the world to present their latest research ?ndings, ideas, developments, and applications in the broader area of visual computing. This year, the program consisted of 16 oral sessions, one poster session, 7 special tracks, and 6 keynote presentations. Also, this year ISVC hosted the Third Semantic Robot Vision Challenge.The responseto the call for papers was verygood;wereceivedover320submissionsfor themainsymposiumfromwhich we accepted 97 papers for oral presentation and 63 papers for poster presen- tion. Special track papers were solicited separately through the Organizing and Program Committees of each track. A total of 40 papers were accepted for oral presentation and 15 papers for poster presentation in the special tracks. All papers were reviewed with an emphasis on potential to contribute to the state of the art in the ?eld. Selection criteria included accuracy and originality of ideas, clarity and signi?cance of results, and presentation quality. The review process was quite rigorous, involving two to three independent blind reviews followed by several days of discussion. During the discussion period we tried to correct anomalies and errors that might have existed in the initial reviews.

This book constitutes the refereed proceedings of the 15th IAPR International Conference on Discrete Geometry for Computer Imagery, DGCI 2009, held in Montréal, Canada, in September/October 2009. The 42 revised full papers were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on discrete shape, representation, recognition and analysis; discrete and combinatorial tools for image segmentation and analysis; discrete and combinatorial Topology; models for discrete geometry; geometric transforms; and discrete tomography.

This proceedings volume contains extended abstracts of talks presented at the 18th Symposium on Operations Research held at the University of Cologne, September 1-3, 1993. The Symposia on Operations Research are the annual meetings of the Gesellschaft fiir Mathematik, Okonometrie und Operations Research (GMOOR), a scientific society providing a link between research and applications in the areas of applied mathematics, economics and operations research. The broad range of interests and scientific activities covered by GMOOR and its members was demonstrated by about 250 talks presented at the 18th Symposium. As in l'ecent years, emphasis was placed on optimization and stochastics, this year with a special focus on combinatorial optimization and discrete mathematics. We appreciate that with sections on parallel and distributed computing and on scientific computing also new fields could be integrated into the scope of the GMOOR. This book contains extended abstracts of most of the papers presented at the con ference. Long versions and full papers of the talks are expected to appear elsewhere in refereed periodicals. The contributions were divided into sixteen sections: (1) Theory of Optimization, (2) Computational Methods of Optimization, (3) Combinatorial Optimization and Dis crete Mathematics, (4) Scientific Computing, (5) Decision Theory, (6) Mathematical Economics and Game Theory, (7) Banking, Finance and Insurance, (8) Econometrics, (9) Macroeconomics and Economic Theory, (10) Stochastics, (11) Production and Lo gistics, (12) System and Control Theory, (13) Routing and Scheduling, (14) Knowledge Based Systems, (15) Information Systems and (16) Parallel and Distributed Compu ting.

This volume presents the proceedings of the 10th International Workshop on Combinatorial Image Analysis, held December 1–3, 2004, in Auckland, New Zealand. Prior meetings took place in Paris (France, 1991), Ube (Japan, 1992), Washington DC (USA, 1994), Lyon (France, 1995), Hiroshima (Japan, 1997), Madras (India, 1999), Caen (France, 2000), Philadelphia (USA, 2001), and - lermo (Italy, 2003). For this workshop we received 86 submitted papers from 23 countries. Each paper was evaluated by at least two independent referees. We selected 55 papers for the conference. Three invited lectures by Vladimir Kovalevsky (Berlin), Akira Nakamura (Hiroshima), and Maurice Nivat (Paris) completed the program. Conference papers are presented in this volume under the following topical part titles: discrete tomography (3 papers), combinatorics and computational models (6), combinatorial algorithms (6), combinatorial mathematics (4), d- ital topology (7), digital geometry (7), approximation of digital sets by curves and surfaces (5), algebraic approaches (5), fuzzy image analysis (2), image s- mentation (6), and matching and recognition (7). These subjects are dealt with in the context of digital image analysis or computer vision.

Third International Conference, LATA 2009, Tarragona, Spain, April 2-8, 2009. Proceedings

Tracking the Automatic ANT

22th International Workshop, IWOCA 2011, Victoria, Canada, July 20-22, 2011, Revised Selected Papers

Mathematical Magic Show

10th International Workshop, IWCIA 2004, Auckland, New Zealand, December 1-3, 2004, Proceedings

This book presents the proceedings of the 10th International Conference on Fundamentals of Computation Theory, FCT '95, held in Dresden, Germany in August 1995. The volume contains five invited lectures and 32 revised papers carefully selected for presentation at FCT '95. A broad spectrum of theoretical computer science is covered; among topics addressed are algorithms and data structures, automata and formal languages, categories and types, computability and complexity, computational logics, computational geometry, systems specification, learning theory, parallelism and concurrency, rewriting and high-level replacement systems, and semantics.

This book constitutes the refereed proceedings of the Third International Conference on Language and Automata Theory and Applications, LATA 2009, held in Tarragona, Spain, in April 2009. The 58 revised full papers presented together with 3 invited lectures and two tutorials were carefully reviewed and selected from 121 submissions. The papers address all the various issues related to automata theory and formal languages.

This book constitutes revised and selected papers from the 18th International Conference on Mathematical Optimization Theory and Operations Research, MOTOR 2019, held in Ekaterinburg, Russia, in July 2019. The 40 full papers and 4 short papers presented in this volume were carefully reviewed and selected from a total of 170 submissions. The papers in the volume are organised according to the following topical headings: combinatorial optimization; game theory and mathematical economics; data mining and computational geometry; integer programming; mathematical programming; operations research; optimal control and applications.

The thesis contains a first charter with preliminaries on two-dimensional languages, we give a brief review of the main results and the different characterizations of tiling system recognizable languages which play the central role in the thesis. Then we describe the algebraic structure of the families of local languages. We show that this structure is a lattice with respect to the inclusion and we investigate the properties of the lattice. Moreover we deal with computational problems, studying their decidability and we give the position, in the arithmetical hierarchy, of the classical problems on string languages now turned to two-dimensional languages. In the thesis after some basic definitions concerning polyominoes, we deal with the recognizability of several classes of polyominoes by tiling system recognizable languages. In particular we give the tiling systems for languages representing some classes of convex polyominoes, as the H-convex or parallelogram. Moreover we investigate the recognizability of L-convex polyominoes. finally, the la test part of the thesis is devoted to the application of tiling system recognizable languages to DNA computation. We give the idea about the construction with DNA of some classes of polyominoes (i.e. the class of parallelogram polyominoes), get through to the family of tiling system recognizable languages.

5th International Symposium, ISVC 2009, Las Vegas, NV, USA, November 30 - December 2, 2009, Proceedings, Part II

Advances in Visual Computing

Operations Research '93

Algorithms -- ESA 2004

Combinatorial Image Analysis

13th International Conference, WALCOM 2019, Guwahati, India, February 27 – March 2, 2019, Proceedings

For those fascinated by the abstract universe of mathematics, David Gale's columns in "The Mathematical Intelligencer" have been a prime source of entertainment, and here his columns are collected for the first time in book form. Encouraged by the magazine's editor, Sheldon Axler, to write on whatever pleased him, Gale ranged far and wide across the field of mathematics, frequently returning to favorite themes: triangles, tilings, games and paradoxes, as well as the particular automaton that gives this collection its title, the "automatic ant." Suitable for everyone having some familiarity with mathematical ideas.

With endocrinologists deploying nuclear medicine on a daily basis, and with the rapid development of the latter, this concise and up-to-date guide to the vital information required has been designed to maximize relevance and ease of use in clinical practice.

This book contains the extended abstracts presented at the 12th International Conference on Power Series and Algebraic Combinatorics (FPSAC '00) that took place at Moscow State University, June 26-30, 2000. These proceedings cover the most recent trends in algebraic and bijective combinatorics, including classical combinatorics, combinatorial computer algebra, combinatorial identities, combinatorics of classical groups, Lie algebra and quantum groups, enumeration, symmetric functions, young tableaux etc...

Sixteen columns from the French edition of Scientific American feature oddball characters and wacky wordplay in a mathematical wonderland of puzzles and games that also imparts significant mathematical ideas. 1992 edition.

A Gardner's Workout

Another Fine Math You've Got Me Into. . .

13th International Conference, DGCI 2006, Szeged, Hungary, October 25-27, 2006, Proceedings

Combinatorial Algorithms

Combinatorial Remarks on Two-dimensional Languages

Algebra and Tiling: Homorphisms in the Service of Geometry

Inspiring popular video games like Tetris while contributing to the study of combinatorial geometry and tiling theory, polyominoes have continued to spark interest ever since their inventor, Solomon Golomb, introduced them to puzzle enthusiasts several decades ago. In this fully revised and expanded edition of his landmark book, the author takes a new generation of readers on a mathematical journey into the world of the deceptively simple polyomino. Golomb incorporates important, recent developments, and poses problems, inviting the reader to play with and develop an understanding of the extraordinary properties of polyominoes.

This book constitutes the refereed proceedings of the 12th Annual European Symposium on Algorithms, ESA 2004, held in Bergen, Norway, in September 2004. The 70 revised full papers presented were carefully reviewed from 208 submissions. The scope of the papers spans the entire range of algorithmics from design and mathematical issues to real-world applications in various fields, and engineering and analysis of algorithms.

Many thanks to the authors for high quality chapters and to the referees for helping improve the manuscripts. The book is interdisciplinary, it covers fields from organic chemistry to mathematics, and raises different aspects of oligomerization. It is a great source of information as every chapter introduces general knowledge and deep details. Mixing communities is to instigate novel ideas and hopefully help looking at oligomerization with new eyes.

Martin Gardner's Mathematical Games columns in Scientific American inspired and entertained several generations of mathematicians and scientists. Gardner in his crystal-clear prose illuminated corners of mathematics, especially recreational mathematics, that most people had no idea existed. His playful spirit and inquisitive nature invite the reader into an exploration of beautiful mathematical ideas along with him. These columns were both a revelation and a gift when he wrote them; no one--before Gardner--had written about mathematics like this. They continue to be a marvel. This volume, first published in 1977, contains columns published in the magazine from 1965-1968. This 1990 MAA edition contains a foreword by Persi Diaconis and Ron Graham and a postscript and extended bibliography added by Gardner for this edition.

Homomorphisms in the Service of Geometry

12th International Conference, FPSAC'00, Moscow, Russia, June 2000, Proceedings

Language and Automata Theory and Applications

18th International Conference, MOTOR 2019, Ekaterinburg, Russia, July 8 - 12, 2019, Revised Selected Papers

1st Latin American Symposium on Theoretical Informatics, Sao Paulo, Brazil, April 6-10, 1992. Proceedings

Neural Network Parallel Computing

Polyominoes: A Guide to Puzzles and Problems in TilingAmerican Mathematical Soc.

Tilings and Patterns: An Introduction presents in convenient paperback form the first half of Tilings and Patterns. Omitting the more specialized material of the earlier volume, this abbreviated edition make's the authors' contributions to tiling theory and its practical applications accessible to a wide audience.

Algebra and Tiling is accessible to undergraduate mathematics majors, as most of the tools necessary to read the book are found in standard upper division algebra courses, but teachers, researchers, and professional mathematicians will find the book equally appealing. Beginners will find the exercises and the appendices especially useful. The unsolved problems will challenge both beginners and experts. The book could serve as the basis of an undergraduate or graduate seminar or a source of applications to enrich an algebra or geometry course.

There is algebraic structure in time, computation and biological systems. Algebraic engineering exploits this structure to achieve better understanding and design. In this book, pure and applied results in semigroups, language theory and algebra are applied to areas ranging from circuit design to software engineering to biological evolution.

Introductory Tiling Theory for Computer Graphics

15th IAPR International Conference, DGCI 2009, Montréal, Canada, September 30 - October 2, 2009, Proceedings

Handbook of Convex Geometry

Algebraic Engineering - Proceedings Of The First International Conference On Semigroups And Algebraic Eng And Workshop On For

A Primer for Undergraduate Research

10th International Conference, FCT '95, Dresden, Germany, August 22 - 25, 1995. Proceedings

Algebra and Tiling is a book about how to cover surfaces with shapes.

Polyominoes will delight not only students and teachers of mathematics at all levels, but will be appreciated by anyone who likes a good geometric challenge. There are no prerequisites. If you like jigsaw puzzles, or if you hate jigsaw puzzles but have ever wondered about the pattern of some floor tiling, there is much here to interest you. A polyomino is a shape cut along the lines from square graph paper; the pronunciation of polyomino begins as does polygon and ends as does domino. Tilings, also called tessellations of mosaic patterns, are older than civilization itself. Tiling with polyominoes provides challenges that range from the popular jigsaw-like puzzles to easily understood mathematical research problems. You will find unsolved puzzles and problems of both kinds here. Answers are provided for most of the problems that have known solutions. It is only fair to repeat here the warning stated in the preface to this book, "Playing with polyominoes can be habit forming."

Handbook of Convex Geometry, Volume A offers a survey of convex geometry and its many ramifications and relations with other areas of mathematics, including convexity, geometric inequalities, and convex sets. The selection first offers information on the history of convexity, characterizations of convex sets, and mixed volumes. Topics include elementary convexity, equality in the Aleksandrov-Fenchel inequality, mixed surface area measures, characteristic properties of convex sets in analysis and differential geometry, and extensions of the notion of a convex set. The text then reviews the standard isoperimetric theorem and stability of geometric inequalities. The manuscript takes a look at selected affine isoperimetric inequalities, extremum problems for convex discs and polyhedra, and rigidity. Discussions focus on include infinitesimal and static rigidity related to surfaces, isoperimetric problem for convex polyhedral, bounds for the volume of a convex polyhedron, curvature image inequality, Busemann intersection inequality and its relatives, and Petty projection inequality. The book then tackles geometric algorithms, convexity and discrete optimization, mathematical programming and convex geometry, and the combinatorial aspects of convex polytopes. The selection is a valuable source of data for mathematicians and researchers interested in convex geometry.

The LNCS series reports state-of-the-art results in computer science research, development, and education, at a high level and in both printed and electronic form. Enjoying tight cooperation with the R&D community, with numerous individuals, as well as with prestigious organizations and societies, LNCS has grown into the most comperhensive computer science research forum avaiable. The scope of LNCS, including its subseries LNAI and LNBI, spans the whole range of computer science and information technology including interdisciplinary topics in a variety of application fields. In parallel to the printed book, each new volume is published electronically in LNCS Online.

And Other Mathematical Explorations

Extended Abstracts of the 18th Symposium on Operations Research held at the University of Cologne September 1–3, 1993

Fundamentals of Computation Theory
Proceedings of the Seventh Annual ACM-SIAM Symposium on Discrete Algorithms
An Introduction
15th Annual Symposium on Theoretical Aspects of Computer Science, Paris, France, February 25-27, 1998, Proceedings

Tiling theory is an elegant branch of mathematics that has applications in several areas of computer science. The most immediate application area is graphics, where tiling theory has been used in the contexts of texture generation, sampling theory, remeshing, and of course the generation of decorative patterns. The combination of a solid theoretical base (complete with tantalizing open problems), practical algorithmic techniques, and exciting applications make tiling theory a worthwhile area of study for practitioners and students in computer science. This synthesis lecture introduces the mathematical and algorithmic foundations of tiling theory to a computer graphics audience. The goal is primarily to introduce concepts and terminology, clear up common misconceptions, and state and apply important results. The book also describes some of the algorithms and data structures that allow several aspects of tiling theory to be used in practice. Table of Contents: Introduction / Tiling Basics / Symmetry / Tilings by Polygons / Isohedral Tilings / Nonperiodic and Aperiodic Tilings / Survey

-~- T he articles in this book are dedicated to Martin Gardner, the world's greatest expositor and popularizer of mathematics. While our papers are confined to this single subject, Gardner's interests and accomplishments have a wide range of subjects. Hence, we have entitled the book the Mathematical Gardner, and would like to see other volumes such as the Magical, the Literary, the Philosophical, or the Scientific Gardner accompany it. Of course, our title is also an appropriate pun, for Martin Gardner's relationship to the mathematical community is similar to a gardener's relationship to a beautiful flower garden. The contributors to this volume comprise only a small part of a large body of mathematicians whose work has been nurtured by its exposition in "Mathematical Games"; Martin's column which appears every month in Scientific American. More than just a mathematical journalist, Martin connects his readers by passing along problems and information and stimulating creative activity. Thus, he is a force behind the scenes as well as a public figure. Two people were particularly helpful in putting this book together.

This book constitutes the refereed proceedings of the 13th International Conference on Discrete Geometry for Computer Imagery, DGCI 2006, held in Szeged, Hungary in October 2006. The 28 revised full papers and 27 revised poster papers presented together with two invited papers were carefully reviewed and selected from 99 submissions.

Neural Network Parallel Computing is the first book available to the professional market on neural network computing for optimization problems. This introductory book is not only for the novice reader, but for experts in a variety of areas including parallel computing, neural network computing, computer science, communications, graph theory, computer aided design for VLSI circuits, molecular biology, management science, and operations research. The goal of the book is to facilitate an understanding as to the uses of neural network models in real-world applications. Neural Network Parallel Computing presents a major breakthrough in science and a variety of engineering fields. The computational power of neural network computing is demonstrated by solving numerous problems such as N-queen, crossbar switch scheduling, four-coloring and k-colorability, graph planarization and channel routing, RNA secondary structure prediction, knight's tour, spare allocation, sorting and searching, and tiling. Neural Network Parallel Computing is an excellent reference for researchers in all areas covered by the book. Furthermore, the text may be used in a senior or graduate level course on the topic.

Algebra and Tiling
Discrete Geometry for Computer Imagery
Geometric Etudes in Combinatorial Mathematics
Mathematical Optimization Theory and Operations Research
16th Annual International Conference, COCOON 2010, Nha Trang, Vietnam, July 19-21, 2010 Proceedings
Polyominoes: A Guide to Puzzles and Problems in Tiling

This volume constitutes the refereed proceedings of the 16th International Workshop on Combinatorial Image Analysis, IWCIA 2014, held in Brno, Czech Republic, in May 2014. The 20 revised full papers and 3 invited papers presented were carefully reviewed and selected from numerous submissions. The topics covered include discrete geometry and topology in imaging science, new results in image representation, segmentation, grouping, and reconstruction, medical image processing.

This volume is the proceedings of LATIN '92, the first of an intended series of symposia on theoretical informatics in a Latin American context. It includes ten invited papers by distinguished guest lecturers as well as numerous selected contributions.

This book constitutes the proceedings of the 13th International Conference and Workshop on Algorithms and Computation, WALCOM 2019, held in Guwahati, India, in February/ March 2019. The 30 full papers presented were carefully reviewed and selected from 100 submissions. The papers are organized in topical headings on the facility location problem; computational geometry; graph drawing; graph algorithms; approximation algorithms; miscellaneous; data structures; parallel and distributed algorithms; and packing and covering.

Geometric Etudes in Combinatorial Mathematics is not only educational, it is inspirational. This distinguished mathematician captivates the young readers, propelling them to search for solutions of life ' s problems–problems that previously seemed hopeless. Review from the first edition: The etudes presented here are not simply those of Czerny, but are better compared to the etudes of Chopin, not only technically demanding and addressed to a variety of specific skills, but at the same time possessing an exceptional beauty that characterizes the best of art...Keep this book at hand as you plan your next problem solving seminar. –The American Mathematical Monthly

Tilings and Patterns
IEEE International Symposium on Information Theory
Formal Power Series and Algebraic Combinatorics
Proceedings Nineteen Ninety-Four IEEE International Symposium on Information Theory
From Groups and Tiles to Frames and Vaccines
Computing and Combinatorics

This text covers the proceedings of the Seventh Annual ACM-SIAM Symposium on Discrete Algorithms, which was held in Atlanta, Georgia, in January 1996.

This book constitutes the strictly refereed proceedings of the 15th Annual Symposium on Theoretical Aspects of Computer Science, STACS 98, held in Paris, France, in February 1998. The volume presents three invited surveys together with 52 revised full papers selected from a total of 155 submissions. The papers are organized in topical sections on algorithms and data structures, logic, complexity, and automata and formal languages.

This highly readable book aims to ease the many challenges of starting undergraduate research. It accomplishes this by presenting a diverse series of self-contained, accessible articles which include specific open problems and prepare the reader to tackle them with ample background material and references. Each article also contains a carefully selected bibliography for further reading. The content spans the breadth of mathematics, including many topics that are not normally addressed by the undergraduate curriculum (such as matroid theory, mathematical biology, and operations research), yet have few enough prerequisites that the interested student can start exploring them under the guidance of a faculty member. Whether trying to start an undergraduate thesis, embarking on a summer REU, or preparing for graduate school, this book is appropriate for a variety of students and the faculty who guide them.

For many decades, Martin Gardner, the Grand Master of mathematical puzzles, has provided the tools and projects to furnish our all-too-sluggish minds with an athletic workout. Gardner's problems foster an agility of the mind as they entertain. This volume presents a new collection of problems and puzzles not previously published in book form. Marti

Library of Congress Subject Headings
Oligomerization of Chemical and Biological Compounds
16th International Workshop, IWCIA 2014, Brno, Czech Republic, May 28-30, 2014, Proceedings
The Mathematical Gardner
Training the Mind and Entertaining the Spirit
12th Annual European Symposium, Bergen, Norway, September 14-17, 2004, Proceedings