

Discrete And Computational Geometry

As recognized, adventure as with ease as experience approximately lesson, amusement, as well as arrangement can be gotten by just checking out a book **Discrete And Computational Geometry** then it is not directly done, you could receive even more as regards this life, with reference to the world.

We pay for you this proper as without difficulty as easy way to get those all. We offer Discrete And Computational Geometry and numerous books collections from fictions to scientific research in any way. in the midst of them is this Discrete And Computational Geometry that can be your partner.

Polyhedral and Algebraic Methods in Computational Geometry - Michael Joswig 2013-01-04
Polyhedral and Algebraic Methods in Computational Geometry provides a thorough introduction into algorithmic geometry and its applications. It presents its primary topics from the viewpoints of discrete, convex and elementary algebraic geometry. The first part of the book studies classical problems and techniques that refer to polyhedral structures. The authors include a study on algorithms for computing convex hulls as well as the construction of Voronoi diagrams and Delone triangulations. The second part of the book develops the primary concepts of (non-linear) computational algebraic geometry. Here, the book looks at Gröbner bases and solving systems of polynomial equations. The theory is illustrated by applications in computer graphics, curve reconstruction and robotics. Throughout the book, interconnections between computational geometry and other disciplines (such as algebraic geometry, optimization and numerical mathematics) are established. Polyhedral and Algebraic Methods in Computational Geometry is directed towards advanced undergraduates in mathematics and computer science, as well as towards engineering students who are interested in the applications of computational geometry.

Classical Topics in Discrete Geometry - Károly Bezdek 2010-06-23

Geometry is a classical core part of mathematics which, with its birth, marked the beginning of the mathematical sciences. Thus, not surprisingly, geometry has played a key role in many important developments of mathematics in the past, as well as in present times. While focusing on modern mathematics, one has to emphasize the increasing role of discrete mathematics, or equivalently, the broad movement to establish discrete analogues of major components of mathematics. In this way, the works of a number of outstanding mathematicians including H. S. M. Coxeter (Canada), C. A. Rogers (United Kingdom), and L. Fejes-Tóth (Hungary) led to the new and fast developing field called discrete geometry. One can briefly describe this branch of geometry as the study of discrete arrangements of geometric objects in Euclidean, as well as in non-Euclidean spaces. This, as a classical core part, also includes the theory of polytopes and tilings in addition to the theory of packing and covering. Discrete geometry is driven by problems often featuring a very clear visual and applied character. The solutions use a variety of methods of modern mathematics, including convex and combinatorial geometry, coding theory, calculus of variations, differential geometry, group theory, and topology, as well as geometric analysis and number theory.

Discrete and Computational Geometry - Jin Akiyama 2005-11-24

This volume consists of the refereed proceedings of the Japan Conference on Discrete and Computational Geometry (JCDCG 2004) held at Tokai University in Tokyo, Japan, October, 8-11, 2004, to honor János Pach on his 50th year. János Pach has generously supported the efforts to promote research in discrete and computational geometry among mathematicians in Asia for many years. The conference was attended by close to 100 participants from 20 countries. Since it was first organized in 1997, the annual JCDCG has attracted a growing international participation. The earlier conferences were held in Tokyo, followed by conferences in Manila, Philippines, and Bandung, Indonesia. The proceedings of JCDCG 1998, 2000, 2002 and IJCCGGT 2003 were published by Springer as part of the series Lecture Notes in Computer Science (LNCS) volumes 1763, 2098, 2866 and 3330, respectively, while the proceedings of JCDCG 2001 were also published by Springer as a special issue of the journal Graphs and Combinatorics, Vol. 18, No. 4, 2002. The organizers of JCDCG 2004 gratefully

acknowledge the sponsorship of Tokai University, the support of the conference secretariat and the participation of the principal speakers: Ferran Hurtado, Hiro Ito, Alberto M. A. Marquez, Jiří Matoušek, János Pach, Jonathan Shewchuk, William Steiger, Endre Szemerédi, Géza Tóth, Godfried Toussaint and Jorge Urrutia.

Forbidden Configurations in Discrete Geometry - David Eppstein 2018-05-17

Unifies discrete and computational geometry by using forbidden patterns of points to characterize many of its problems.

Surveys on Discrete and Computational Geometry - Jacob E. Goodman 2008-02-29

This volume contains nineteen survey papers describing the state of current research in discrete and computational geometry as well as a set of open problems presented at the 2006 AMS-IMS-SIAM Summer Research Conference "Discrete and Computational Geometry--Twenty Years Later", held in Snowbird, Utah, in June 2006. Topics surveyed include metric graph theory, lattice polytopes, the combinatorial complexity of unions of geometric objects, line and pseudoline arrangements, algorithmic semialgebraic geometry, persistent homology, unfolding polyhedra, pseudo-triangulations, nonlinear computational geometry, k -sets, and the computational complexity of convex bodies. Discrete and computational geometry originated as a discipline in the mid-1980s when mathematicians in the well-established field of discrete geometry and computer scientists in the (then) nascent field of computational geometry began working together on problems of common interest. The combined field has experienced a huge growth in the past twenty years, which the present volume attests to.

Computational Discrete Mathematics - Sriram Pemmaraju 2009-10-15

This book was first published in 2003. Combinatorica, an extension to the popular computer algebra system Mathematica®, is the most comprehensive software available for teaching and research applications of discrete mathematics, particularly combinatorics and graph theory. This book is the definitive reference/user's guide to Combinatorica, with examples of all 450 Combinatorica functions in action, along with the associated mathematical and algorithmic theory. The authors cover classical and advanced topics on the most important combinatorial objects: permutations, subsets, partitions, and Young tableaux, as well as all important areas of graph theory: graph construction operations, invariants, embeddings, and algorithmic graph theory. In addition to being a research tool, Combinatorica makes discrete mathematics accessible in new and exciting ways to a wide variety of people, by encouraging computational experimentation and visualization. The book contains no formal proofs, but enough discussion to understand and appreciate all the algorithms and theorems it contains.

Differential Geometry and Topology, Discrete and Computational Geometry - Mohamed Boucetta

Computational Geometry - Franco P. Preparata 2012-12-06

From the reviews: "This book offers a coherent treatment, at the graduate textbook level, of the field that has come to be known in the last decade or so as computational geometry. ... The book is well organized and lucidly written; a timely contribution by two founders of the field. It clearly demonstrates that computational geometry in the plane is now a fairly well-understood branch of computer science and mathematics. It also points the way to the solution of the more challenging problems in dimensions higher than two." #Mathematical Reviews#1 "... This remarkable book is a comprehensive and systematic study

on research results obtained especially in the last ten years. The very clear presentation concentrates on basic ideas, fundamental combinatorial structures, and crucial algorithmic techniques. The plenty of results is cleverly organized following these guidelines and within the framework of some detailed case studies. A large number of figures and examples also aid the understanding of the material. Therefore, it can be highly recommended as an early graduate text but it should prove also to be essential to researchers and professionals in applied fields of computer-aided design, computer graphics, and robotics." #Biometrical Journal#2

Differential Geometry and Topology, Discrete and Computational Geometry - Mohamed Boucetta 2005
The aim of this volume is to give an introduction and overview to differential topology, differential geometry and computational geometry with an emphasis on some interconnections between these three domains of mathematics. The chapters give the background required to begin research in these fields or at their interfaces. They introduce new research domains and both old and new conjectures in these different subjects show some interaction between other sciences close to mathematics. Topics discussed are; the basis of differential topology and combinatorial topology, the link between differential geometry and topology, Riemannian geometry (Levi-Civita connection, curvature tensor, geodesic, completeness and curvature tensor), characteristic classes (to associate every fibre bundle with isomorphic fiber bundles), the link between differential geometry and the geometry of non smooth objects, computational geometry and concrete applications such as structural geology and graphism.

Discrete and Computational Geometry, Graphs, and Games - Jin Akiyama 2021-10-28
This book constitutes the thoroughly refereed post-conference proceedings of the 21st Japanese Conference on Discrete and Computational Geometry and Graphs, JCDCGGG 2018, held in Quezon City, Philippines, in September 2018. The total of 14 papers included in this volume was carefully reviewed and selected from 25 submissions. The papers feature advances made in the field of computational geometry and focus on emerging technologies, new methodology and applications, graph theory and dynamics.

Discrete and Computational Geometry - Jin Akiyama 2001-06-20
Spehner Geometric Transformations in Plane Triangulations 217 K. Kawarabayashi, A. Nakamoto, Y. Oda, and M. Watanabe Separation Sensitive Kinetic Separation Structures for Convex Polygons 222 D. Kirkpatrick and B. Speckmann On Acute Triangulations of Quadrilaterals 237 H. Maehara Intersecting Red and Blue Line Segments in Optimal Time and Precision 244 A. Mantler and J. Snoeyink Tight Error Bounds of Geometric Problems on Convex Objects with Imprecise Coordinates 252 T. Nagai and N. Tokura Triangle Contact Systems, Orthogonal Plane Partitions and their Hit Graphs 264 A. Nakamoto Note on Diagonal Flips and Chromatic Numbers of Quadrangulations on Closed Surfaces 274 A. Nakamoto and S. Negami An Extension of Cauchy's Arm Lemma with Application to Curve Development .

Lectures on Discrete Geometry - Jiri Matousek 2013-12-01
The main topics in this introductory text to discrete geometry include basics on convex sets, convex polytopes and hyperplane arrangements, combinatorial complexity of geometric configurations, intersection patterns and transversals of convex sets, geometric Ramsey-type results, and embeddings of finite metric spaces into normed spaces. In each area, the text explains several key results and methods.

Handbook of Discrete and Computational Geometry - Csaba D. Toth 2017-11-22
The Handbook of Discrete and Computational Geometry is intended as a reference book fully accessible to nonspecialists as well as specialists, covering all major aspects of both fields. The book offers the most important results and methods in discrete and computational geometry to those who use them in their work, both in the academic world—as researchers in mathematics and computer science—and in the professional world—as practitioners in fields as diverse as operations research, molecular biology, and robotics. Discrete geometry has contributed significantly to the growth of discrete mathematics in recent years. This has been fueled partly by the advent of powerful computers and by the recent explosion of activity in the relatively young field of computational geometry. This synthesis between discrete and computational geometry lies at the heart of this Handbook. A growing list of application fields includes combinatorial optimization, computer-aided design, computer graphics, crystallography, data analysis,

error-correcting codes, geographic information systems, motion planning, operations research, pattern recognition, robotics, solid modeling, and tomography.
Computational Geometry of Positive Definite Quadratic Forms - Achill Schurmann 2009-01-01
"Starting from classical arithmetical questions on quadratic forms, this book takes the reader step by step through the connections with lattice sphere packing and covering problems. As a model for polyhedral reduction theories of positive definite quadratic forms, Minkowski's classical theory is presented, including an application to multidimensional continued fraction expansions. The reduction theories of Voronoi are described in great detail, including full proofs, new views, and generalizations that cannot be found elsewhere. Based on Voronoi's second reduction theory, the local analysis of sphere coverings and several of its applications are presented. These include the classification of totally real thin number fields, connections to the Minkowski conjecture, and the discovery of new, sometimes surprising, properties of exceptional structures such as the Leech lattice or the root lattices." "Throughout this book, special attention is paid to algorithms and computability, allowing computer-assisted treatments. Although dealing with relatively classical topics that have been worked on extensively by numerous authors, this book is exemplary in showing how computers may help to gain new insights." --Book Jacket.

Handbook of Computational Geometry - J.R. Sack 1999-12-13
Computational Geometry is an area that provides solutions to geometric problems which arise in applications including Geographic Information Systems, Robotics and Computer Graphics. This Handbook provides an overview of key concepts and results in Computational Geometry. It may serve as a reference and study guide to the field. Not only the most advanced methods or solutions are described, but also many alternate ways of looking at problems and how to solve them.

Computational Geometry on Surfaces - Clara I. Grima 2013-06-29
In the last thirty years Computational Geometry has emerged as a new discipline from the field of design and analysis of algorithms. That discipline studies geometric problems from a computational point of view, and it has attracted enormous research interest. But that interest is mostly concerned with Euclidean Geometry (mainly the plane or Euclidean 3-dimensional space). Of course, there are some important reasons for this occurrence since the first applications and the bases of all developments are in the plane or in 3-dimensional space. But, we can find also some exceptions, and so Voronoi diagrams on the sphere, cylinder, the cone, and the torus have been considered previously, and there are many works on triangulations on the sphere and other surfaces. The exceptions mentioned in the last paragraph have appeared to try to answer some questions which arise in the growing list of areas in which the results of Computational Geometry are applicable, since, in practice, many situations in those areas lead to problems of Computational Geometry on surfaces (probably the sphere and the cylinder are the most common examples). We can mention here some specific areas in which these situations happen as engineering, computer aided design, manufacturing, geographic information systems, operations research, robotics, computer graphics, solid modeling, etc.

Parallel Computational Geometry - Selim G. Akl 1993
This is a unified, tutorial description of the most widely used models of parallel computation and their application to problems in computational geometry. Each chapter offers an in-depth analysis of a problem in computational geometry and presents parallel algorithms to solve them. Comparative tables summarize the various algorithms developed to solve each problem. A wide range of models of parallel computation to develop the algorithms - parallel random access machine (PRAM) - are considered, as well as several networks for interconnecting processors on a parallel computer.

Digital and Discrete Geometry - Li M. Chen 2014-12-12
This book provides comprehensive coverage of the modern methods for geometric problems in the computing sciences. It also covers concurrent topics in data sciences including geometric processing, manifold learning, Google search, cloud data, and R-tree for wireless networks and BigData. The author investigates digital geometry and its related constructive methods in discrete geometry, offering detailed methods and algorithms. The book is divided into five sections: basic geometry; digital curves, surfaces and manifolds; discretely represented objects; geometric computation and processing; and advanced topics. Chapters especially focus on the applications of these methods to other types of geometry, algebraic

topology, image processing, computer vision and computer graphics. *Digital and Discrete Geometry: Theory and Algorithms* targets researchers and professionals working in digital image processing analysis, medical imaging (such as CT and MRI) and informatics, computer graphics, computer vision, biometrics, and information theory. Advanced-level students in electrical engineering, mathematics, and computer science will also find this book useful as a secondary text book or reference. Praise for this book: This book does present a large collection of important concepts, of mathematical, geometrical, or algorithmical nature, that are frequently used in computer graphics and image processing. These concepts range from graphs through manifolds to homology. Of particular value are the sections dealing with discrete versions of classic continuous notions. The reader finds compact definitions and concise explanations that often appeal to intuition, avoiding finer, but then necessarily more complicated, arguments... As a first introduction, or as a reference for professionals working in computer graphics or image processing, this book should be of considerable value." - Prof. Dr. Rolf Klein, University of Bonn.

Handbook of Discrete and Computational Geometry, Third Edition - Csaba D. Toth 2017

While much information can be found on discrete and computational geometry, it is scattered among many sources. The *Handbook of Discrete and Computational Geometry, Third Edition* brings together all of the major results in both these fields into one volume. Thousands of results, theorems, algorithms, and tables definitively cover the field, while numerous applications from many different fields demonstrate practical usage. The material is readily accessible to the novice, but offers enough depth to appeal to the specialist. Every technical term is defined in an easy-to-use glossary. Over 200 figures illustrate the concepts presented and provide supporting examples.

Computational Discrete Mathematics - Helmut Alt 2003-06-30

This book is based on a graduate education program on computational discrete mathematics run for several years in Berlin, Germany, as a joint effort of theoretical computer scientists and mathematicians in order to support doctoral students and advanced ongoing education in the field of discrete mathematics and algorithmics. The 12 selected lectures by leading researchers presented in this book provide recent research results and advanced topics in a coherent and consolidated way. Among the areas covered are combinatorics, graph theory, coding theory, discrete and computational geometry, optimization, and algorithmic aspects of algebra.

Computational Geometry - Mark de Berg 2013-04-17

This introduction to computational geometry focuses on algorithms. Motivation is provided from the application areas as all techniques are related to particular applications in robotics, graphics, CAD/CAM, and geographic information systems. Modern insights in computational geometry are used to provide solutions that are both efficient and easy to understand and implement.

Computational Geometry and Graphs - Jin Akiyama 2013-11-19

This book constitutes the refereed proceedings of the Thailand-Japan Joint Conference on Computational Geometry and Graphs, TJJCCGG 2012, held in Bangkok, Thailand, in December 2012. The 15 original research papers presented were selected from among six plenary talks, one special public talk and 41 talks by participants from about 20 countries around the world. TJJCCGG 2012 provided a forum for researchers working in computational geometry, graph theory/algorithms and their applications.

Discrete Geometry and Optimization - Károly Bezdek 2013-07-09

Optimization has long been a source of both inspiration and applications for geometers, and conversely, discrete and convex geometry have provided the foundations for many optimization techniques, leading to a rich interplay between these subjects. The purpose of the Workshop on Discrete Geometry, the Conference on Discrete Geometry and Optimization, and the Workshop on Optimization, held in September 2011 at the Fields Institute, Toronto, was to further stimulate the interaction between geometers and optimizers. This volume reflects the interplay between these areas. The inspiring Fejes Tóth Lecture Series, delivered by Thomas Hales of the University of Pittsburgh, exemplified this approach. While these fields have recently witnessed a lot of activity and successes, many questions remain open. For example, Fields medalist Stephen Smale stated that the question of the existence of a strongly polynomial time algorithm for linear optimization is one of the most important unsolved problems at the beginning of the 21st century. The broad range of topics covered in this volume demonstrates the many recent and fruitful connections

between different approaches, and features novel results and state-of-the-art surveys as well as open problems.

Discrete and Computational Geometry - Jin Akiyama 2003-06-29

Computational Geometry and Computer Graphics in C++ - Michael Jay Laszlo 1996

This book provides an accessible introduction to methods in computational geometry and computer graphics. It emphasizes the efficient object-oriented implementation of geometric methods with useable C++ code for all methods discussed.

Computational Geometry in C - Joseph O'Rourke 1998-10-13

This is the revised and expanded 1998 edition of a popular introduction to the design and implementation of geometry algorithms arising in areas such as computer graphics, robotics, and engineering design. The basic techniques used in computational geometry are all covered: polygon triangulations, convex hulls, Voronoi diagrams, arrangements, geometric searching, and motion planning. The self-contained treatment presumes only an elementary knowledge of mathematics, but reaches topics on the frontier of current research, making it a useful reference for practitioners at all levels. The second edition contains material on several new topics, such as randomized algorithms for polygon triangulation, planar point location, 3D convex hull construction, intersection algorithms for ray-segment and ray-triangle, and point-in-polyhedron. The code in this edition is significantly improved from the first edition (more efficient and more robust), and four new routines are included. Java versions for this new edition are also available. All code is accessible from the book's Web site (<http://cs.smith.edu/~orourke/>) or by anonymous ftp.

Geometry and Topology for Mesh Generation - Herbert Edelsbrunner 2001-05-28

The book combines topics in mathematics (geometry and topology), computer science (algorithms), and engineering (mesh generation). The original motivation for these topics was the difficulty faced (both conceptually and in the technical execution) in any attempt to combine elements of combinatorial and of numerical algorithms. Mesh generation is a topic where a meaningful combination of these different approaches to problem solving is inevitable. The book develops methods from both areas that are amenable to combination, and explains recent breakthrough solutions to meshing that fit into this category. The book should be an ideal graduate text for courses on mesh generation. The specific material is selected giving preference to topics that are elementary, attractive, lend themselves to teaching, useful, and interesting.

Combinatorial and Computational Geometry - Jacob E. Goodman 2005-08-08

This 2005 book deals with interest topics in Discrete and Algorithmic aspects of Geometry.

Computational Discrete Mathematics - Helmut Alt 2001-10-24

This book is based on a graduate education program on computational discrete mathematics run for several years in Berlin, Germany, as a joint effort of theoretical computer scientists and mathematicians in order to support doctoral students and advanced ongoing education in the field of discrete mathematics and algorithmics. The 12 selected lectures by leading researchers presented in this book provide recent research results and advanced topics in a coherent and consolidated way. Among the areas covered are combinatorics, graph theory, coding theory, discrete and computational geometry, optimization, and algorithmic aspects of algebra.

Surveys on Discrete and Computational Geometry - Jacob E. Goodman 2008

This volume contains nineteen survey papers describing the state of current research in discrete and computational geometry as well as a set of open problems presented at the 2006 AMS-IMS-SIAM Summer Research Conference Discrete and Computational Geometry--Twenty Years Later, held in Snowbird, Utah, in June 2006. Topics surveyed include metric graph theory, lattice polytopes, the combinatorial complexity of unions of geometric objects, line and pseudoline arrangements, algorithmic semialgebraic geometry, persistent homology, unfolding polyhedra, pseudo-triangulations, nonlinear computational geometry, sets, and the computational complexity of convex bodies.

Discrete and Computational Geometry - Satyan L. Devadoss 2011-04-11

Discrete geometry is a relatively new development in pure mathematics, while computational geometry is an emerging area in applications-driven computer science. Their intermingling has yielded exciting advances in recent years, yet what has been lacking until now is an undergraduate textbook that bridges

the gap between the two. Discrete and Computational Geometry offers a comprehensive yet accessible introduction to this cutting-edge frontier of mathematics and computer science. This book covers traditional topics such as convex hulls, triangulations, and Voronoi diagrams, as well as more recent subjects like pseudotriangulations, curve reconstruction, and locked chains. It also touches on more advanced material, including Dehn invariants, associahedra, quasigeodesics, Morse theory, and the recent resolution of the Poincaré conjecture. Connections to real-world applications are made throughout, and algorithms are presented independently of any programming language. This richly illustrated textbook also features numerous exercises and unsolved problems. The essential introduction to discrete and computational geometry Covers traditional topics as well as new and advanced material Features numerous full-color illustrations, exercises, and unsolved problems Suitable for sophomores in mathematics, computer science, engineering, or physics Rigorous but accessible An online solutions manual is available (for teachers only). To obtain access, please e-mail: Vickie_Kearn@press.princeton.edu

The Discrete Mathematical Charms of Paul Erdős - Vašek Chvátal 2021-05-31

Paul Erdős published more papers during his lifetime than any other mathematician, especially in discrete mathematics. He had a nose for beautiful, simply-stated problems with solutions that have far-reaching consequences across mathematics. This captivating book, written for students, provides an easy-to-understand introduction to discrete mathematics by presenting questions that intrigued Erdős, along with his brilliant ways of working toward their answers. It includes young Erdős's proof of Bertrand's postulate, the Erdős-Szekeres Happy End Theorem, De Bruijn-Erdős theorem, Erdős-Rado delta-systems, Erdős-Ko-Rado theorem, Erdős-Stone theorem, the Erdős-Rényi-Sós Friendship Theorem, Erdős-Rényi random graphs, the Chvátal-Erdős theorem on Hamilton cycles, and other results of Erdős, as well as results related to his work, such as Ramsey's theorem or Deza's theorem on weak delta-systems. Its appendix covers topics normally missing from introductory courses. Filled with personal anecdotes about Erdős, this book offers a behind-the-scenes look at interactions with the legendary collaborator.

Discrete and Computational Geometry - Jin Akiyama 2003-12-16

This book constitutes the thoroughly refereed post-proceedings of the Japanese Conference on Discrete Computational Geometry, JCDCG 2002, held in Tokyo, Japan, in December 2002. The 29 revised full papers presented were carefully selected during two rounds of reviewing and improvement. All current issues in discrete algorithmic geometry are addressed.

Discrete and Computational Geometry - Boris Aronov 2003-06-23

An impressive collection of original research papers in discrete and computational geometry, contributed by many leading researchers in these fields, as a tribute to Jacob E. Goodman and Richard Pollack, two of the 'founding fathers' of the area, on the occasion of their 2/3 x 100 birthdays. The topics covered by the 41 papers provide professionals and graduate students with a comprehensive presentation of the state of the art in most aspects of discrete and computational geometry, including geometric algorithms, study of arrangements, geometric graph theory, quantitative and algorithmic real algebraic geometry, with important connections to algebraic geometry, convexity, polyhedral combinatorics, the theory of packing, covering, and tiling. The book serves as an invaluable source of reference in this discipline.

Volumetric Discrete Geometry - Karoly Bezdek 2019-04-24

Volume of geometric objects plays an important role in applied and theoretical mathematics. This is particularly true in the relatively new branch of discrete geometry, where volume is often used to find new topics for research. Volumetric Discrete Geometry demonstrates the recent aspects of volume, introduces problems related to it, and presents methods to apply it to other geometric problems. Part I of the text consists of survey chapters of selected topics on volume and is suitable for advanced undergraduate students. Part II has chapters of selected proofs of theorems stated in Part I and is oriented for graduate level students wishing to learn about the latest research on the topic. Chapters can be studied independently from each other. Provides a list of 30 open problems to promote research Features more than 60 research exercises Ideally suited for researchers and students of combinatorics, geometry and

discrete mathematics

Curve and Surface Reconstruction - Tamal K. Dey 2006-10-16

Many applications in science and engineering require a digital model of a real physical object. Advanced scanning technology has made it possible to scan such objects and generate point samples on their boundaries. This book, first published in 2007, shows how to compute a digital model from this point sample. After developing the basics of sampling theory and its connections to various geometric and topological properties, the author describes a suite of algorithms that have been designed for the reconstruction problem, including algorithms for surface reconstruction from dense samples, from samples that are not adequately dense and from noisy samples. Voronoi- and Delaunay-based techniques, implicit surface-based methods and Morse theory-based methods are covered. Scientists and engineers working in drug design, medical imaging, CAD, GIS, and many other areas will benefit from this first book on the subject.

Convex and Discrete Geometry - Peter M. Gruber 2007-05-17

Convex and Discrete Geometry is an area of mathematics situated between analysis, geometry and discrete mathematics with numerous relations to other subdisciplines. This book provides a comprehensive overview of major results, methods and ideas of convex and discrete geometry and its applications. Besides being a graduate-level introduction to the field, it is a practical source of information and orientation for convex geometers, and useful to people working in the applied fields.

New Trends in Discrete and Computational Geometry - Janos Pach 2012-12-06

Discrete and computational geometry are two fields which in recent years have benefitted from the interaction between mathematics and computer science. The results are applicable in areas such as motion planning, robotics, scene analysis, and computer aided design. The book consists of twelve chapters summarizing the most recent results and methods in discrete and computational geometry. All authors are well-known experts in these fields. They give concise and self-contained surveys of the most efficient combinatorial, probabilistic and topological methods that can be used to design effective geometric algorithms for the applications mentioned above. Most of the methods and results discussed in the book have not appeared in any previously published monograph. In particular, this book contains the first systematic treatment of epsilon-nets, geometric transversal theory, partitions of Euclidean spaces and a general method for the analysis of randomized geometric algorithms. Apart from mathematicians working in discrete and computational geometry this book will also be of great use to computer scientists and engineers, who would like to learn about the most recent results.

Discrete and Computational Geometry and Graphs - Jin Akiyama 2014-12-03

This book constitutes the thoroughly refereed post-conference proceedings of the 16th Japanese Conference on Discrete and computational Geometry and Graphs, JCDGG 2013, held in Tokyo, Japan, in September 2013. The total of 16 papers included in this volume was carefully reviewed and selected from 58 submissions. The papers feature advances made in the field of computational geometry and focus on emerging technologies, new methodology and applications, graph theory and dynamics.

Handbook of Discrete and Combinatorial Mathematics - Kenneth H. Rosen 2017-10-19

Handbook of Discrete and Combinatorial Mathematics provides a comprehensive reference volume for mathematicians, computer scientists, engineers, as well as students and reference librarians. The material is presented so that key information can be located and used quickly and easily. Each chapter includes a glossary. Individual topics are covered in sections and subsections within chapters, each of which is organized into clearly identifiable parts: definitions, facts, and examples. Examples are provided to illustrate some of the key definitions, facts, and algorithms. Some curious and entertaining facts and puzzles are also included. Readers will also find an extensive collection of biographies. This second edition is a major revision. It includes extensive additions and updates. Since the first edition appeared in 1999, many new discoveries have been made and new areas have grown in importance, which are covered in this edition.