Algorithmic Geometry

Computational GeometryAlgorithmic GeometryComputational GeometryComputational GeometryGeometric Folding AlgorithmsFlexing the Power of Algorithmic GeometryHandbook of Computational GeometryComputational GeometryDiscrete and Computational GeometryComputational Geometry and Its ApplicationsAlgorithms in Real Algebraic GeometryComputational GeometryComputational Geometry in CAlgorithms in Real Algebraic GeometryPolyhedral and Algebraic Methods in Computational GeometryComputational Geometry for Design and Manufacture. (2.ed.).Computational Geometry - Methods, Algorithms and ApplicationsAlgorithmic Geometry Via Graphics HardwareTowards Dynamic Randomized Algorithms in Computational GeometryComputational Geometry: An Introduction Jean-Daniel Boissonnat Franco P. Preparata Erik D. Demaine Pierre Bierre J.R. Sack Mark de Berg Jin Akiyama Hartmut Noltemeier Saugata Basu Mark de Berg Joseph O'Rourke Saugata Basu Michael Joswig I. D. Faux Hanspeter Bieri Markus Oswald Denny Monique Teillaud Preparata Franco Et.Al

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the design and analysis of geometric algorithms have seen remarkable growth in recent years due to their application in for example computer vision graphics medical imaging and cad the goals of this book are twofold first to provide a coherent and systematic treatment of the foundations secondly to present algorithmic solutions that are amenable to rigorous analysis and are efficient in practical situations when possible the algorithms are presented in their most general

d dimensional setting specific developments are given for the 2 or 3 dimensional cases when this results in significant improvements the presentation is confined to euclidean affine geometry though the authors indicate whenever the treatment can be extended to curves and surfaces the prerequisites for using the book are few which will make it ideal for teaching advanced undergraduate or beginning graduate courses in computational geometry

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 clever 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

did you know that any straight line drawing on paper can be folded so that the complete drawing can be cut out with one straight scissors cut that there is a planar linkage that can trace out any algebraic curve or even sign your name or that a latin cross unfolding of a cube can be refolded to 23 different convex polyhedra over the past decade there has been a surge of interest in such problems with applications ranging from robotics to protein folding with an emphasis on algorithmic or computational aspects this treatment gives hundreds of results and over 60 unsolved open problems to inspire further research the authors cover one dimensional 1d objects linkages 2d objects paper and 3d objects polyhedra aimed at advanced undergraduate and graduate students in mathematics or computer science this lavishly illustrated book will fascinate a broad audience from school students to researchers

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 emerged from the field of algorithms design and anal ysis in the late 1970s it has grown into a recognized discipline with its own journals conferences and a large community of active researchers the suc cess of the field as a research discipline can on the one hand be explained from the beauty of the problems studied and the solutions obtained and on the other hand by the many application domains computer graphics geographic in formation systems gis robotics and others in which geometric algorithms playafundamental role for many geometric problems the early algorithmic solutions were either slow or difficult to understand and implement in recent years a number of new algorithmic techniques have been developed that improved and simplified many of the previous approaches in this textbook we have tried to make these modem algorithmic solutions accessible to a large audience the book has been written as a textbook for a course in computational geometry but it can also be used for self study

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

the basic techniques used in computational geometry polygon triangulations convex hulls voronoi diagrams arrangements are all covered in the first textbook to appropriately introduce undergraduate students to the design of geometry algorithms

the algorithmic problems of real algebraic geometry such as real root counting deciding the existence of solutions of systems of polynomial equations and inequalities finding global maxima or deciding whether two points belong in the same connected component of a semi algebraic set appear frequently in many areas of science and engineering in this textbook the main ideas and techniques presented form a coherent and rich body of knowledge mathematicians will find relevant information about the algorithmic aspects researchers in computer science and engineering will find the required mathematical background being self contained the book is accessible to graduate students and even for invaluable parts of it to undergraduate students this second edition contains several recent results on discriminants of symmetric matrices real root isolation global optimization quantitative results on semi algebraic sets and the first single exponential algorithm computing their first betti number

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

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