

Pyramid Algorithms A Dynamic Programming Approach To Curves And Surfaces For Geometric Modeling The Morgan Kaufmann Series In Computer Graphics

Today truly useful and interactive graphics are available on affordable computers. While hardware progress has been impressive, widespread gains in software expertise have come more slowly. Information about advanced techniques—beyond those learned in introductory computer graphics texts—is not as easy to come by as inexpensive hardware. This book brings the graphics programmer beyond the basics and introduces them to advanced knowledge that is hard to obtain outside of an intensive CG work environment. The book is about graphics techniques—such as those that don't require esoteric hardware or custom graphics libraries—that are written in a comprehensive style and do useful things. It covers graphics that are not covered well in your old graphics textbook. But it also goes further, teaching you how to apply those techniques in real world applications, filling real world needs. Emphasizes the algorithmic side of computer graphics, with a practical application focus, and provides usable techniques for real world problems. Serves as an introduction to the techniques that are hard to obtain outside of an intensive computer graphics work environment. Sophisticated and novel programming techniques are implemented in C using the OpenGL library, including coverage of color and lighting; texture mapping; blending and compositing; antialiasing; image processing; special effects; natural phenomena, artistic and non-photorealistic techniques, and many others.

High dynamic range imaging produces images with a much greater range of light and color than conventional imaging. The effect is stunning, as great as the difference between black-and-white and color television. High Dynamic Range Imaging is the first book to describe this exciting new field that is transforming the media and entertainment industries. Written by the foremost researchers in HDR, it will explain and define this new technology for anyone who works with images, whether it is for computer graphics, film, video, photography, or lighting design. * Written by the leading researchers in HDR! * Covers all the areas of high dynamic range imaging including capture devices, display devices, file formats, dynamic range reduction, and image-based lighting * Includes a DVD with over 4 GB of HDR images as well as source code and binaries for numerous tone reproduction operators for Windows, Linux, and Mac OS X

The free, open-source Processing programming language environment was created at MIT for people who want to develop images, animation, and sound. Based on the ubiquitous Java, it provides an alternative to daunting languages and expensive proprietary software. This book gives graphic designers, artists and illustrators of all stripes a jump start to working with processing by providing detailed information on the basic principles of programming with the language, followed by careful, step-by-step explanations of select advanced techniques. The author teaches computer graphics at NYU's Tisch School of the Arts, and his book has been developed with a supportive learning experience at its core. From algorithms and data mining to rendering and debugging, it teaches object-oriented programming from the ground up within the fascinating context of interactive visual media. Previously announced as "Pixels, Patterns, and Processing" A guided journey from the very basics of computer programming through to creating custom interactive 3D graphics *Step-by-step examples, approachable language, exercises, and LOTS of sample code support the reader's learning curve *Includes lessons on how to program live video, animated images and interactive sound

This text covers topics in algebraic geometry and commutative algebra with a strong perspective toward practical and computational aspects. The first four chapters form the core of the book. A comprehensive chart in the Preface illustrates a variety of ways to proceed with the material once these chapters are covered. In addition to the fundamentals of algebraic geometry—the elimination theorem, the extension theorem, the closure theorem and the Nullstellensatz—this new edition incorporates several substantial changes, all of which are listed in the Preface. The largest revision incorporates a new Chapter (ten), which presents some of the essentials of progress made over the last decades in computing Gröbner bases. The book also includes current computer algebra material in Appendix C and updated independent projects (Appendix D). The book may serve as a first or second course in undergraduate abstract algebra and with some supplementation perhaps, for beginning graduate level courses in algebraic geometry or computational algebra. Prerequisites for the reader include linear algebra and a proof-oriented course. It is assumed that the reader has access to a computer algebra system. C describes features of MapleTM, Mathematica® and Sage, as well as other systems that are most relevant to the text. Pseudocode is used in the text. Appendix B carefully describes the pseudocode used. Readers who are teaching from Ideals, Varieties, and Algorithms, or are studying the book on their own, may obtain a copy of the solutions manual by sending an email to jrittle@hycross.sdu. From the reviews of previous editions: "... The book gives an introduction to Buchberger's algorithm with applications to syzygies, Hilbert polynomials, primary decompositions. There is an introduction to classical algebraic geometry with applications to the ideal membership problem, solving polynomial equations and elimination theory. ... The book is well-written. ... The reviewer is sure that it will be an excellent guide to introduce further undergraduates in the algorithmic aspect of commutative algebra and algebraic geometry." —Peter Schenzel, zbMATH, 2007 "I consider the book to be wonderful. ... The exposition is very clear, there are many helpful pictures and there are a great many instructive exercises, some quite challenging ... offers the heart and soul of modern commutative and algebraic geometry." —The American Mathematical Monthly

This proceedings consists of 162 selected papers presented at the 2nd Annual International Conference on Mechanics and Mechanical Engineering (MME2015), which was successfully held in Chengdu, China between December 25–27, 2015. MME2015 is one of the key international conferences in the fields of mechanics, mechanical engineering. It offers a great opportunity to bring together researchers and scholars around the globe to deliver the latest innovative research and the most recent developments in the field of Mechanics and Mechanical Engineering. MME2015 received over 400 submissions from about 600 laboratories, colleges and famous institutes. All the submissions have undergone double blind reviewed to assure the quality, reliability and validity of the results presented. These papers are arranged into 6 main chapters according to their research fields. These are: 1) Applied Mechanics 2) Mechanical Engineering and Manufacturing Technology 3) Material Science and Material Engineering 4) Automation and Control Engineering 5) Electrical Engineering 6) System Modelling and Simulation. This proceedings will be invaluable to academics and professionals interested in Mechanics and Mechanical Engineering. Contents:Applied MechanicsMechanical Engineering and Manufacturing TechnologyMaterial Science and Material EngineeringAutomation and Control EngineeringElectrical EngineeringSystem Modeling and Simulation Readership: Researchers and academic.

Workshop on Algebraic Geometry and Geometric Modeling, July 29-August 2, 2002, Vilnius University, Lithuania

Computational Geometry and Graph Theory

Algorithms and Computation

International Conference, ICAIC 2011, Xi'an, China, August 20-21, 2011, Proceedings, Part I

Algorithms and Interfaces

Digital Video and HDTV

Curves and Surfaces

Visualization in Medicine is the first book on visualization and its application to problems in medical diagnosis, education, and treatment. The book describes the algorithms, the applications and their validation (how reliable are the results?), and the clinical evaluation of the applications (are the techniques useful?). It discusses visualization techniques from research literature as well as the compromises required to solve practical clinical problems. The book covers image acquisition, image analysis, and interaction techniques designed to explore and analyze the data. The final chapter shows how visualization is used for planning liver surgery, one of the most demanding surgical disciplines. The book is based on several years of the authors' teaching and research experience. Both authors have initiated and lead a variety of interdisciplinary projects involving computer scientists and medical doctors, primarily radiologists and surgeons. * A core field of visualization and graphics missing a dedicated book until now * Written by pioneers in the field and illustrated in full color * Covers theory as well as practice

Topics in Contemporary Mathematical Analysis and Applications encompasses several contemporary topics in the field of mathematical analysis, their applications, and relevancies in other areas of research and study. The readers will find developments concerning the topics presented to a reasonable extent with various new problems for further study. Each chapter carefully presents the related problems and solutions, and their possible applications or relevancies in other scientific areas. Aims at enriching the understanding of methods, problems, and applications Offers an understanding of research problems by presenting the necessary developments in reasonable details Discusses applications and uses of operator theory, fixed-point theory, inequalities, bi-univalent functions, functional equations, and scalar-optimal programming, and presents various abstracted problems and ways to solve such problems This book is written for individual researchers, educators, students, and department libraries.

This book constitutes the thoroughly refereed post-conference proceedings of the Kyoto Conference on Computational Geometry and Graph Theory, KYOCOTCG'07, held in Kyoto, Japan, in June 2007, in honor of Jin Akiyama and Vašek Chvátal, on the occasion of their 60th birthdays. The 19 revised full papers, presented together with 5 invited papers, were carefully selected during two rounds of reviewing and improvement from more than 60 talks at the conference. All aspects of Computational Geometry and Graph Theory are covered, including tilings, polygons, impossible objects, coloring of graphs, Hamilton cycles, and factors of graphs.

From household appliances to applications in robotics, engineered systems involving complex dynamics can only be as effective as the algorithms that control them. While Dynamic Programming (DP) has provided researchers with a way to optimally solve decision and control problems involving complex dynamic systems, its practical value was limited by algorithms that lacked the capacity to scale up to realistic problems. However, in recent years, dramatic developments in Reinforcement Learning (RL), the model-free counterpart of DP, changed our understanding of what is possible. Those developments led to the creation of reliable methods that can be applied even when a mathematical model of the system is unavailable, allowing researchers to solve challenging control problems in engineering, as well as in a variety of other disciplines, including economics, medicine, and artificial intelligence. Reinforcement Learning and Dynamic Programming Using Function Approximators provides a comprehensive and unparalleled exploration of the field of RL and DP. With a focus on continuous-variable problems, this seminal text details essential developments that have substantially altered the field over the past decade. In its pages, pioneering experts provide a concise introduction to classical RL and DP, followed by an extensive presentation of the state-of-the-art and novel methods in RL and DP with approximation. Combining algorithm development with theoretical guarantees, they elaborate on their work with illustrative examples and insightful comparisons. Three individual chapters are dedicated to representative algorithms from each of the major classes of techniques: value iteration, policy iteration, and policy search. The features and performance of these algorithms are highlighted in extensive experimental studies on a range of control applications. The recent development of applications involving complex systems has led to a surge of interest in RL and DP methods and the subsequent need for a quality resource on the subject. For graduate students and others new to the field, this book offers a thorough introduction to both the basics and emerging methods. And for those researchers and practitioners working in the fields of optimal and adaptive control, machine learning, artificial intelligence, and operations research, this resource offers a combination of practical algorithms, theoretical analysis, and comprehensive examples that they will be able to adapt and apply to their own work. Access the authors' website at www.ocst.udeft.nl/nlr/book/ for additional material, including computer code used in the studies and information concerning new developments.

This third edition has been thoroughly updated to ensure it continues to meet the needs of 3D graphics professionals and students. Included are all new chapters devoted to the latest issues in the field, real-time procedural shading, texture atlases, and procedural geometric instancing.

NETWORKING 2012

Algorithms—Advances in Research and Application: 2012 Edition

Pyramid Algorithms

A Procedural Approach

Texturing & Modeling

Visualization in Medicine

8th Asian Symposium, ASCM 2007, Singapore, December 15-17, 2007, Revised and Invited Papers

David Gould's acclaimed *First book, Complete Maya Programming: An Extensive Guide to MEL and the C++ API*, provides artists and programmers with a deep understanding of the way Maya works and how it can be enhanced and customized through programming. In his new book David offers a gentle, intuitive introduction to the core ideas of computer graphics. Each concept is explained progressively and is fully implemented in both MEL and C++ so that an artist or programmer can use the source code directly in their own programs. Geometry and modeling are covered in detail with progressively more complex examples demonstrating all of Maya's possible programming features. David Gould's first volume is widely regarded as the most authoritative reference on Maya programming. Volume II continues this tradition and provides an unmatched guide for the artist and programmer tackling complex tasks. Covers a spectrum of topics in computer graphics including points and vectors, rotations, transformations, curves and surfaces (polygonal, NURBS, subdivision), and modeling Offers insights to Maya's inner workings so that an artist or programmer can design and develop customized tools and solutions Discusses problem solving with MEL (Maya's scripting language) and the more powerful and versatile C++ API, with plenty of code examples for each

This volume constitutes the thoroughly refereed post-conference proceedings of the 8th International Conference on Curves and Surfaces, held in Paris, France, in June 2014. The conference had the overall theme: "Representation and Approximation of Curves and Surfaces and Applications". The 32 revised full papers presented were carefully reviewed and selected from 39 submissions. The scope of the conference was on following topics: approximation theory, computer-aided geometric design, computer graphics and visualization, computational geometry and topology, geometry processing, image and signal processing, interpolation and smoothing, mesh generation, finite elements and splines, scattered data processing and learning theory, sparse and high-dimensional approximation, subdivision, wavelets and multi-resolution method. The two-volume set LNCS 7289 and 7290 constitutes the refereed proceedings of the 11th International IFIP TC 6 Networking Conference held in Prague, Czech Republic, in May 2012. The 64 revised full papers presented were carefully reviewed and selected from a total of 225 submissions. The papers feature innovative research in the areas of network architecture, applications and services, next generation Internet, wireless and sensor networks, and network science. The second volume includes 32 papers and is organized in topical sections on video streaming, peer to peer, interdomain, security, cooperation and collaboration, DTN and wireless sensor networks, and wireless networks.

This book constitutes the refereed proceedings of the 14th International Symposium on Algorithms and Computation, ISAAC 2003, held in Kyoto, Japan, in December 2003. The 73 revised full papers presented were carefully reviewed and selected from 207 submissions. The papers are organized in topical sections on computational geometry, graph and combinatorial algorithms, computational complexity, quantum computing, combinatorial optimization, computational biology, distributed and parallel algorithms, data structures, combinatorial and network optimization, computational complexity and cryptography, game theory and randomized algorithms, and algebraic and arithmetic computation.

Understanding Virtual Reality arrives at a time when the technologies behind virtual reality have advanced to the point that it is possible to develop and deploy meaningful, productive virtual reality applications. The aim of this thorough, accessible exploration is to help you take advantage of this moment, equipping you with the understanding needed to identify[] and prepare for ways VR can be used in your field, whatever your field may be. By approaching VR as a communications medium, the authors have created a resource that will remain relevant even as the underlying technologies evolve. You get a history of VR, along with a good look at systems currently in use. However, the focus remains squarely on the application of VR and the many issues that arise in the application design and implementation, including hardware requirements, system integration, interaction techniques, and usability. This book also counters both exaggerated claims for VR and the view that would reduce it to entertainment, citing dozens of real-world examples from many different fields and presenting (in a series of appendices) four in-depth application case studies. * Substantive, illuminating coverage designed for technical and business readers and well-suited to the classroom. * Examines VR's constituent technologies, drawn from visualization, representation, graphics, human-computer interaction, and other fields, and explains how they are being united in cohesive VR systems. * Via a companion Web site, provides additional case studies, tutorials, instructional materials, and a link to an open-source VR programming system.

Generalized Barycentric Coordinates in Computer Graphics and Computational Mechanics

Advanced Graphics Programming Using OpenGL

Modeling, Rendering, and Animation

Real-time Shader Programming

2nd Workshop, WADS '91, Ottawa, Canada, August 14-16, 1991, Proceedings

Jim Blinn's Corner: Notation, Notation, Notation

Algorithms and Data Structures

This volume constitutes the proceedings of the 5th International Conference on Computer Analysis of Images and Patterns (CAIP'93), held in Budapest, Hungary, in September 1993. Formerly, the events in this biennial conference series were thought as a forum where East European researchers and professionals from academia and industry had an opportunity to discuss their results and ideas with Western colleagues active in image processing and pattern recognition. Now, CAIP'93 has a much more international scope, and in the future these conferences will not any longer take place only in East European countries, but roam throughout whole Europe. Besides invited talks by Belkova, Gimel'farb, Haralick and Roska, the volume contains 114 contributions, either presented in lectures or posters and carefully selected by a highly competent international program committee from a total of some 230 submissions; thus the book gives a thorough survey on recent research results and their applications in image processing and pattern recognition. The proceedings is organized in 20 sections, for example on image data structures, image processing, edges and contours, Hough transforms and related methods, shape, motion, 3-D vision, character recognition and document processing, biomedical applications, industrial applications, and neural networks. Publisher Description

Beginning with the mathematical basics of vertex and pixel shaders, and building to detailed accounts of programmable shader operations, this title provides the foundation and techniques necessary for replicating popular cinema-style 3D graphics as well as creating your own real-time procedural shaders.

This volume presents the proceedings of the Second Workshop on Algorithms and Data Structures (WADS '91), held in Carleton University, Canada. The workshop alternates with the Scandinavian Workshop on Algorithm Theory (SWAT).

This book spans the distance between algebraic descriptions of geometric objects and the rendering of digital geometric shapes based on algebraic models. These contrasting points of view insure a thorough analysis of the key challenges and how they are met. The articles focus on important classes of problems: implicitization, classification, and intersection. Combining illustrative graphics, computations and review articles this book helps the reader gain a firm practical grasp of these subjects.

Non-Photorealistic Computer Graphics

Topics in Contemporary Mathematical Analysis and Applications

Geometric Tools for Computer Graphics

A Beginner's Guide to Programming Images, Animation, and Interaction

Advances in Geometric Modeling and Processing

Topics in Algebraic Geometry and Geometric Modeling

Point-Based Graphics

Trying to learn Maya programming from the documentation can be daunting whether or not you are a programmer. The first edition of MEL Scripting for Maya Animators earned the reputation as the best introductory book on MEL, Maya's scripting language. Now fully revised and updated, the second edition also includes new features, such as a discussion of global procedures, new chapters on fixing programming bottlenecks, advanced user interface techniques, and optimizing character rigs. New chapters on utility nodes and Maya's Web Panel feature provide new ideas on how to use MEL in applications. This new edition has kept the popular style of the first edition that offered very clear explanations of programming concepts to those without programming experience. A generous collection of code examples and Maya scene files is included on the companion Web site. This is a book for animators, artists, game developers, visual effects developers, and technical directors who want to learn the fundamentals of Maya, how to automate tasks, personalize user interfaces, build custom tools, and solve problems with MEL. Fully updated with several new chapters. Profusely illustrated and includes a companion Web site with numerous code examples and scene files. The authors bring their extensive experience in professional production studios to provide expert guidance.

Do you spend too much time creating the building blocks of your graphics applications or finding and correcting errors? Geometric Tools for Computer Graphics is an extensive, conveniently organized collection of proven solutions to fundamental problems that you'd rather not solve over and over again, including building primitives, distance calculation, approximation, containment, decomposition, intersection determination, separation, and more. If you have a mathematics degree, this book will save you time and trouble. If you don't, it will help you achieve things you may feel are out of your reach. Inside, each problem is clearly stated and diagrammed, and the fully detailed solutions are presented in easy-to-understand pseudocode. You also get the mathematics and geometry background needed to make optimal use of the solutions, as well as an abundance of reference material contained in a series of appendices. Features Filled with robust, thoroughly tested solutions that will save you time and help you avoid costly errors. Covers problems relevant for both 2D and 3D graphics programming. Presents each problem and solution in stand-alone form allowing you the option of reading only those entries that matter to you. * Provides the math and geometry background you need to understand the solutions and put them to work. * Clearly diagrams each problem and presents solutions in easy-to-understand pseudocode. * Resources associated with the book are available at the companion Web site www.mpk.com/gtc/. * Filled with robust, thoroughly tested solutions that will save you time and help you avoid costly errors. * Covers problems relevant for both 2D and 3D graphics programming. * Presents each problem and solution in stand-alone form allowing you the option of reading only those entries that matter to you. * Provides the math and geometry background you need to understand the solutions and put them to work. * Clearly diagrams each problem and presents solutions in easy-to-understand pseudocode. * Resources associated with the book are available at the companion Web site www.mpk.com/gtc/.

Written by recognized LOD leaders, this is a coherent, state-of-the-art account of cutting-edge LOD research and development. This complete resource enables programmers to incorporate LOD technology into their own systems.

Rapidly evolving computer and communications technologies have achieved data transmission rates and data storage capacities high enough for digital video. But video involves much more than just pushing bits! Achieving the best possible image quality, accurate color, and smooth motion requires understanding many aspects of image acquisition, coding, processing, and display that are outside the usual realm of computer graphics. At the same time, video system designers are facing new demands to interface with film and computer system that require techniques outside conventional video engineering. Charles Poynton's 1996 book A Technical Introduction to Digital Video became an industry favorite for its succinct, accurate, and accessible treatment of standard definition television (SDTV). In Digital Video and HDTV, Poynton augments that book with coverage of high definition television (HDTV) and compression systems. For more information on HDTV Retail markets, go to: <http://www.insightmedia.info/newsletters.php#dvtr> With the help of hundreds of high quality technical illustrations, this book presents the following topics: * Basic concepts of digitization, sampling, quantization, gamma, and filtering * Principles of color science as applied to image capture and display * Scanning and coding of SDTV and HDTV * Video color coding: luma, chroma (4:2:2 component video, 4:1:1 composite video) * Analog NTSC and PAL * Studio systems and interfaces * Compression technology, including M-JPEG and MPEG-2 * Broadcast standards and consumer video equipment

Pyramid AlgorithmsA Dynamic Programming Approach To Curves and Surfaces For Geometric ModelingElsevier

9th International EAI Conference, Broadnets 2018, Faro, Portugal, September 19–20, 2018, Proceedings

Covering DirectX 9.0

A Dynamic Programming Approach to Curves and Surfaces For Geometric Modeling

An Integrated Introduction to Computer Graphics and Geometric Modeling

Complete Maya Programming

Acquisition, Display, and Image-Based Lighting

An Extensive Guide to MEL and C++ API

In Generalized Barycentric Coordinates in Computer Graphics and Computational Mechanics, eminent computer graphics and computational mechanics researchers provide a state-of-the-art overview of generalized barycentric coordinates. Commonly used in cutting-edge applications such as mesh parametrization, image warping, mesh deformation, and finite as well as boundary element methods, the theory of barycentric coordinates is also fundamental for use in animation and in simulating the deformation of solid continua. Generalized Barycentric Coordinates is divided into three sections, with five chapters each, covering the theoretical background, as well as their use in computer graphics and computational mechanics. A vivid 16-page insert helps illustrating the stunning applications of this fascinating research area. Key Features: Provides an overview of the many different types of barycentric coordinates and their properties. Discusses diverse applications of barycentric coordinates in computer graphics and computational mechanics. The first book-length treatment on this topic. Pyramid Algorithms presents a unique approach to understanding, analyzing, and computing the most common polynomial and spline curve and surface schemes used in computer-aided geometric design, employing a dynamic programming method based on recursive pyramids. The recursive pyramid approach offers the distinct advantage of revealing the entire structure of algorithms, as well as relationships between them, at a glance. This book-the only one built around this approach-is certain to change the way you think about CAGD and the way you perform it, and all it requires is a basic background in calculus and linear algebra, and simple programming skills. * Written by one of the world's most eminent CAGD researchers * Designed for use as both a professional reference and a textbook, and addressed to computer scientists, engineers, mathematicians, theoreticians, and students alike * Includes chapters on Bezier curves and surfaces, B-splines, blossoming, and multi-sided Bezier patches * Relies on an easily understood notation, and concludes each section with both practical and theoretical exercises that enhance and elaborate upon the discussion in the text * Foreword by Professor Helmut Pottmann, Vienna University of Technology

Quantum Computing in Research and Application: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Algorithms. The editors have built Algorithms—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Algorithms in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Algorithms—Advances in Research and Application: 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

This book constitutes the refereed post-conference proceedings of the 9th International Conference on Broadband Communications, Networks, and Systems, Broadnets 2018, which took place in Faro, Portugal, in September 2018. The 30 revised full and 16 workshop papers were carefully reviewed and selected from 68 submissions. The papers are thematically grouped as follows: Advanced Techniques for IoT and WSNs; SDN and Network Virtualization; eHealth and Telemedicine Mobile Applications; Security and Privacy Preservation; Communication Reliability and Protocols; Spatial Modulation Techniques; Hardware Implementation and Antenna Design.

Quaternions are used to refer to the rotation in computer graphics, quaternions have three principal applications: to increase speed and reduce storage for calculations involving rotations, to avoid distortions arising from numerical inaccuracies caused by floating point computations with rotations, and to interpolate between two rotations for key frame animation. Yet while the formal algebra of quaternions is well-known in the graphics community, the derivations of the formulas for this algebra and the geometric principles underlying this algebra are not well understood. The goals of this monograph are to provide a fresh, geometric interpretation for quaternions, appropriate for contemporary computer graphics, based on mass-points; to present better ways to visualize quaternions; and the effect of quaternion multiplication on points and vectors in three dimensions using insights from the algebra and geometry of multiplication in the complex plane; to derive the formula for quaternion multiplication from first principles; to develop simple, intuitive proofs of the sandwiching formulas for rotation and reflection; to show how to apply sandwiching to compute perspective projections. In addition to these theoretical issues, we also address some computational questions. We develop straightforward formulas for converting back and forth between quaternion and matrix representations for rotations, reflections, and perspective projections, and we discuss the relative advantages and disadvantages of the quaternion and matrix representations for these transformations. Moreover, we show how to avoid distortions due to floating point computations with rotations by using unit quaternions to represent rotations. We also derive the formula for spherical linear interpolation, and we explain how to apply this formula to interpolate between two rotations for key frame animation. Finally, we explain the role of quaternions in low-dimensional Clifford algebras and computational mechanics. The first book-length treatment on this topic.

Pyramid Algorithms presents a unique approach to understanding, analyzing, and computing the most common polynomial and spline curve and surface schemes used in computer-aided geometric design, employing a dynamic programming method based on recursive pyramids. The recursive pyramid approach offers the distinct advantage of revealing the entire structure of algorithms, as well as relationships between them, at a glance. This book-the only one built around this approach-is certain to change the way you think about CAGD and the way you perform it, and all it requires is a basic background in calculus and linear algebra, and simple programming skills. * Written by one of the world's most eminent CAGD researchers * Designed for use as both a professional reference and a textbook, and addressed to computer scientists, engineers, mathematicians, theoreticians, and students alike * Includes chapters on Bezier curves and surfaces, B-splines, blossoming, and multi-sided Bezier patches * Relies on an easily understood notation, and concludes each section with both practical and theoretical exercises that enhance and elaborate upon the discussion in the text * Foreword by Professor Helmut Pottmann, Vienna University of Technology

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Contents: Preface / Theory / Implementation / Rethinking Quaternions and Cliff Ford Algebras / References / Further Reading / Author Biography

14th International Symposium, ISAAC 2003, Kyoto, Japan, December 15-17, 2003, Proceedings

11th International IFIP TC 6 Networking Conference, Prague, Czech Republic, May 21-25, 2012, Proceedings, Part II

Complete Maya Programming Volume II

Understanding Virtual Reality

Quantum Computing in Research and Application: 2012 Edition

Applied Informatics and Communication, Part 1

Theory, Algorithms, and Applications

The five volume set CCIS 224-228 constitutes the refereed proceedings of the International conference on Applied Informatics and Communication, ICAIC 2011, held in Xi'an, China in August 2011. The 446 revised papers presented were carefully reviewed and selected from numerous submissions. The papers cover a broad range of topics in computer science and interdisciplinary applications including control, hardware and software systems, neural computing, wireless networks, information systems, and image processing.

This book constitutes thoroughly refereed post-conference proceedings of the 8th Asian Symposium on Computer Mathematics, ASCM 2007, held in Singapore in December 2007. The 22 revised full papers and 5 revised poster papers presented together with 3 invited lectures were carefully selected during two rounds of reviewing and improvement from 65 submissions. The papers are organized in topical sections on algorithms and implementations, numerical methods and applications, cryptography, and computational logic.

Algebraic geometry and geometric modeling both deal with curves and surfaces generated by polynomial equations. Algebraic geometry investigates the theoretical properties of polynomial curves and surfaces; geometric modeling uses polynomial, piecewise polynomial, and rational curves and surfaces to build computer models of mechanical components and assemblies for industrial design and manufacture. The NSF sponsored the four-day "Vilnius Workshop on Algebraic Geometry and Geometric Modeling", which brought together some of the top experts in the two research communities to examine a wide range of topics of interest to both fields. This volume is an outgrowth of that workshop. Included are surveys, tutorials, and research papers. In addition, the editors have included a translation of Minding's 1841 paper, "On the determination of the degree of an equation obtained by elimination", which foreshadows the modern application of mixed volumes in algebraic geometry. The volume is suitable for mathematicians, computer scientists, and engineers interested in applications of algebraic geometry to geometric modeling.

Even as developments in photorealistic computer graphics continue to affect our work and leisure activities, practitioners and researchers are devoting more and more attention to non-photorealistic (NPR) techniques for generating images that appear to have been created by hand. These efforts benefit every field in which illustrations—thanks to their ability to clarify, emphasize, and convey very precise meanings—offer advantages over photographs. These fields include medicine, architecture, entertainment, education, geography, publishing, and visualization. Non-Photorealistic Computer Graphics is the first and only resource to examine non-photorealistic efforts in depth, providing detailed accounts of the major algorithms, as well as the background information and implementation advice readers need to make headway with these increasingly important techniques. Already, an estimated 10% of computer graphics users require some form of non-photorealism. Strothotte and Schlechtweg's important new book is designed and destined to be the standard NPR reference for this large, diverse, and growing group of professionals. Hard-to-find information needed by a wide range and growing number of computer graphics programmers and applications users.

Traces NPR principles and techniques back to their origins in human vision and perception. Focuses on areas that stand to benefit most from advances in NPR, including medical and architectural illustration, cartography, and data visualization. Presents algorithms for two and three-dimensional effects, using pseudo-projection in which readers can apply the book's concepts and algorithms.

GeometricModelingandProcessing(GMP)isabiennialinternationalconferenceon geometric modeling, simulation and computing, which provides researchers and practitioners with a forum for exchanging new ideas, discussing new app- cations, and presenting new solutions. Previous GMP conferences were held in Pittsburgh (2006), Beijing (2004), Tokyo (2002), and Hong Kong (2000). This, the 5th GMP conference, was held in Hangzhou, one of the most beautiful cities in China. GMP 2008 received 113 paper submissions, covering a wide spectrum of -ometric modeling and processing, such as curves and surfaces, digital geometry processing, geometric feature modeling and recognition, geometric constraint solving, geometric optimization, multiresolution modeling, and applications in computer vision, image processing, scientific visualization, robotics and reverse engineering. Each paper was reviewed by at least three members of the program committee andexternalreviewers.Basedontherecommendationsofthe reviewers, 34 regular papers were selected for oral presentation, and 17 short papers were selected for poster presentation. All selected papers are included in these proceedings. We thank all authors, external reviewers and program committee members for their great effort and contributions, which made this conference a success.

Foundations of Multidimensional and Metric Data Structures

Computer Mathematics

Computer Analysis of Images and Patterns

Rethinking Quaternions

Mathematical Optimization in Computer Graphics and Vision

5th International Conference, GMP 2008, Hangzhou, China, April 23-25, 2008, Proceedings

Interface, Application, and Design

The third entry in the Jim Blinn's Corner series, this is, like the others, a handy compilation of selected installments of his influential column. But here, for the first time, you get the "Director's Cut" of the articles: revised, expanded, and enhanced versions of the originals. What's changed? Improved mathematical notation, more diagrams, new solutions. What remains the same? All the things you've come to rely on: straight answers, irreverent style, and innovative thinking. This is Jim Blinn at his best - now even better. Features 21 expanded and updated installments of "Jim Blinn's Corner," dating from 1995 to 2001, and never before published in book form Includes "deleted scenes"—tangential explorations that didn't make it into the original columns How Blinn represented planets in his famous JPL flyby animations Explores a wide variety of other topics, from the concrete to the theoretical: assembly language optimization for parallel processors, exotic usage of C++ template instantiation, algebraic geometry, a graphical notation for tensor contraction, and his hopes for a future World

Mathematical optimization is used in nearly all computer graphics applications, from computer vision to animation. This book teaches readers the core set of techniques that every computer graphics professional should understand in order to envision and expand the boundaries of what is possible in their work. Study of this authoritative reference will help readers develop a very powerful tool- the ability to create and decipher mathematical models that can better realize solutions to even the toughest problems confronting computer graphics community today. *Distills down a vast and complex world of information on optimization into one short, self-contained volume especially for computer graphics *Helps CG professionals identify the best technique for solving particular problems quickly, by categorizing the most effective algorithms by application *Keeps readers current by supplementing the focus on key, classic methods with special end-of-chapter sections on cutting-edge developments

Taking a novel, more appealing approach than current texts, An Integrated Introduction to Computer Graphics and Geometric Modeling focuses on graphics, modeling, and mathematical methods, including ray tracing, polygon shading, radiosity, fractals, freeform curves and surfaces, vector methods, and transformation techniques. The author begins with fractals, rather than the typical line-drawing algorithms found in many standard texts. He also brings the turtle back from obscurity to introduce several major concepts in computer graphics. Supplying the mathematical foundations, the book covers linear algebra topics, such as vector geometry and algebra, affine and projective spaces, affine maps, projective transformations, matrices, and quaternions. The main graphics areas explored include reflection and refraction, recursive ray tracing, radiosity, illumination models, polygon shading, and hidden surface procedures. The book also discusses geometric modeling, including planes, polygons, spheres, quadrics, algebraic and parametric curves and surfaces, constructive solid geometry, boundary files, octrees, interpolation, approximation, Bezier and B-spline methods, fractal algorithms, and subdivision techniques. Making the material accessible and relevant for years to come, the text avoids descriptions of current graphics hardware and special programming languages. Instead, it

pioneers in the field Shows how 3D images can be manipulated as easily as 2D images are with Photoshop
Ideals, Varieties, and Algorithms
Reinforcement Learning and Dynamic Programming Using Function Approximators

High Dynamic Range Imaging
Digital Modeling of Material Appearance
An Introduction to Computational Algebraic Geometry and Commutative Algebra
Broadband Communications, Networks, and Systems

*Learning Maya, the world's leading 3D animation and effects package, is a challenge, especially for those who want to master Maya's versatile programming features in addition to its built-in tools. Finally, here is a practical, step-by-step guide that shows how to use Maya to its fullest potential, beginning with the basics. Readers of Complete Maya Programming will first gain a thorough understanding of Maya's inner workings, and then learn how to customize and extend Maya with scripts and plugins that take control and productivity to new levels. Users new to programming can apply Maya's easy scripting language MEL (Maya Embedded Language), while more advanced users can work with the C++ API (Application Programming Interface). Both a fundamental tutorial for Maya beginners and a solid reference for experienced developers, Complete Maya Programming is every user's guide to Maya mastery. * Provides a multitude of real-world examples illustrating applications of Maya programming. * Demonstrates how to use MEL to control Maya, customize its interface, automate procedures, and more * Details how to use the C++ API to modify Maya functionality and develop tools and features to meet any need * Explains when to use MEL, when to use the C++ API, and how to use them together * Ideal for technical directors, developers, or anyone wishing to master Maya * Provides a storehouse of MEL scripts and C++ source code, glossary, and list of resources. available at www.davidgould.com*

Mechanics and Mechanical Engineering
8th International Conference, Paris, France, June 12-18, 2014, Revised Selected Papers
Proceedings of the 2015 International Conference (MME2015)
Algebraic Geometry and Geometric Modeling
International Conference, KyotoCGGT 2007, Kyoto, Japan, June 11-15, 2007. Revised Selected Papers
Learning Processing
MEL Scripting for Maya Animators