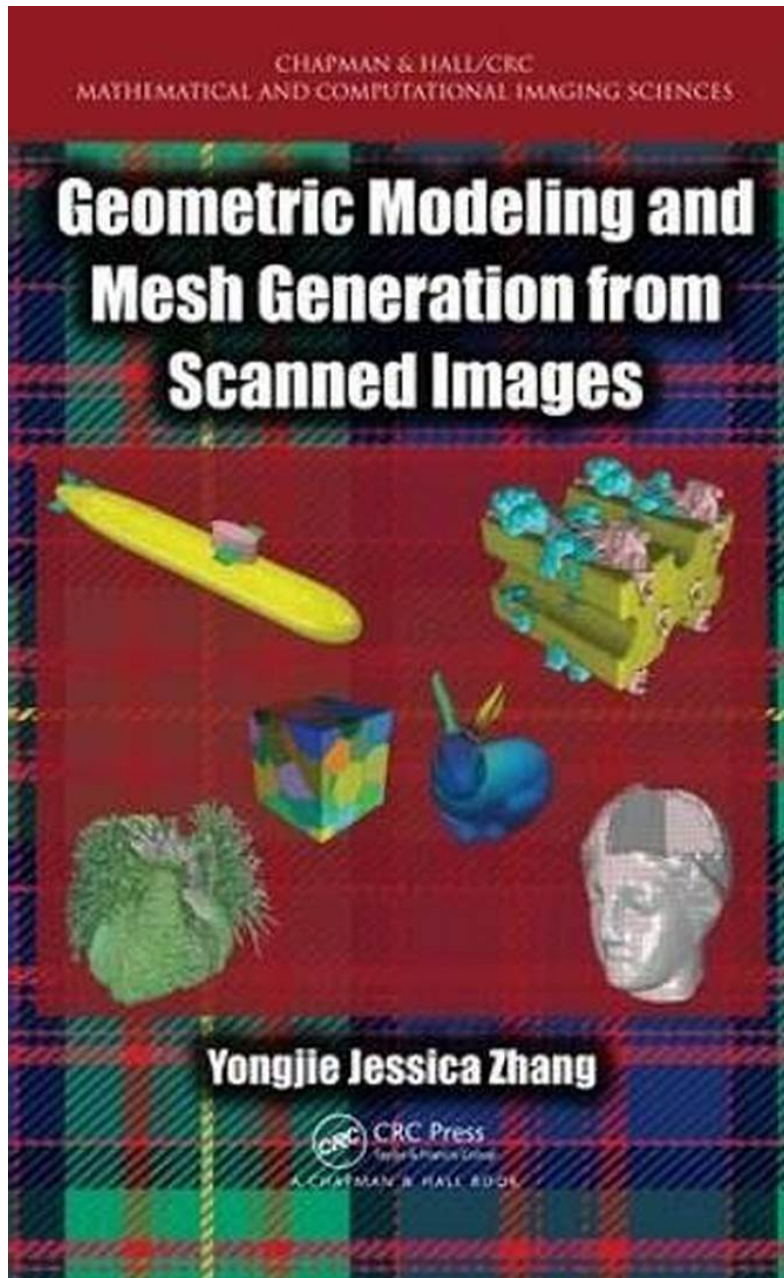
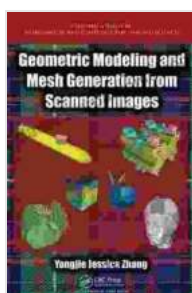


Geometric Modeling and Mesh Generation from Scanned Images: Unlock the Power of 3D Digitalization with Chapman & Hall/CRC's Latest Masterpiece



: Embark on a Journey of 3D Digital Reconstruction and Creation

In the realm of computer graphics and engineering, the ability to accurately model and visualize objects from real-world data has become increasingly crucial. Geometric Modeling and Mesh Generation from Scanned Images, a comprehensive guide by Chapman & Hall/CRC, empowers readers with the knowledge and tools to master this challenging but transformative field. This book is an invaluable resource for professionals, researchers, and students alike, unlocking the gateway to creating realistic 3D digital models from scanned point cloud data.



Geometric Modeling and Mesh Generation from Scanned Images (Chapman & Hall/CRC Mathematical and Computational Imaging Sciences Series Book 6)

by Andrea Debbink

★★★★☆ 4.6 out of 5

Language : English

File size : 226007 KB

Screen Reader: Supported

Print length : 364 pages



Chapter 1: Laying the Foundation: to 3D Scanning and Geometric Modeling

The book commences with an in-depth overview of 3D scanning technologies, including laser scanning, structured light scanning, and photogrammetry. Readers will gain a thorough understanding of the principles behind these techniques, empowering them to make informed decisions when selecting the most appropriate scanning method for their specific application. This foundation sets the stage for exploring the fundamental concepts of geometric modeling, providing a comprehensive

framework for understanding the representation and manipulation of 3D objects.

Chapter 2: Delving into the Heart of Mesh Generation: Surface Reconstruction and Mesh Optimization

Mesh generation is the process of creating a digital surface that accurately represents the scanned object. This chapter delves into various surface reconstruction algorithms, such as point cloud triangulation, alpha shapes, and Poisson surface reconstruction. Readers will learn how to select the most suitable algorithm for a given dataset, ensuring optimal results. Furthermore, the chapter explores techniques for mesh optimization, including mesh simplification, hole filling, and smoothing. By mastering these techniques, readers can refine their 3D models to meet specific requirements, such as reducing file size while preserving geometric integrity.

Chapter 3: Embracing Complexity: Modeling Free-Form Surfaces and Curves

The book progresses into the realm of free-form surface modeling, a key technique for representing intricate and organic shapes. Readers will explore B-splines, NURBS, and subdivision surfaces, gaining the ability to create smooth and aesthetically pleasing 3D models. Additionally, the chapter delves into curve modeling, covering techniques for creating and manipulating curves, which are essential for defining the boundaries of surfaces and adding detail to models.

Chapter 4: Unlocking the Potential of Feature Extraction and Segmentation

Feature extraction and segmentation are crucial steps in many 3D modeling applications. This chapter provides a comprehensive overview of these techniques, guiding readers through the process of identifying and extracting meaningful features from scanned data. Readers will learn various segmentation algorithms, enabling them to decompose complex objects into individual components, facilitating subsequent analysis and modeling tasks.

Chapter 5: Exploring Advanced Topics: Topological Analysis and Mesh Matching

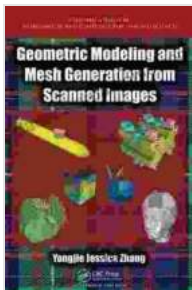
The book culminates in exploring advanced topics, including topological analysis and mesh matching. Topological analysis provides insights into the connectivity and relationships between different parts of a 3D model. Readers will learn techniques for extracting topological features, such as genus, Euler characteristic, and homology groups. Mesh matching, on the other hand, involves aligning two or more meshes to establish correspondences between them. This chapter covers various mesh matching algorithms, enabling readers to tackle complex registration problems.

: Unleashing the Transformative Power of Geometric Modeling

Geometric Modeling and Mesh Generation from Scanned Images concludes with a comprehensive summary of the key concepts and techniques covered throughout the book. Readers will emerge with a profound understanding of the theory and practice of geometric modeling, equipped to tackle a wide range of real-world challenges. The book serves as a stepping stone for further research and development, inspiring readers to push the boundaries of 3D digital reconstruction and creation.

About the Author: Dr. Michael Kazhdan, a Luminary in Geometric Modeling

Dr. Michael Kazhdan, the esteemed author of Geometric Modeling and Mesh Generation from Scanned Images, is a renowned expert in geometric modeling and computer graphics. His pioneering research has significantly advanced the field, particularly in the areas of surface reconstruction, mesh processing, and 3D shape analysis. Dr. Kazhdan's expertise shines through in this book, as he shares his deep knowledge and practical insights, empowering readers to harness the transformative power of geometric modeling.



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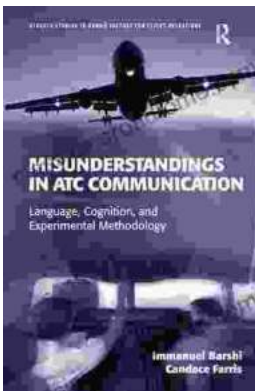
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