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<<三维模型分析与处理>>

图书基本信息

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前言

With the increasing popularization of the Internet, together with the rapiddevelopment of 3D scanning technologies and modeling tools, 3D modeldatabases have become more and more common in fields such as biology,chemistry, archaeology and geography. People can distribute their own 3D worksover the Internet, search and download 3D model data, and also carry outelectronic trade over the Internet. However, some serious issues are related to thisas follows: （1） How to efficiently transmit and store huge 3D model data withlimited bandwidth and storage capacity; （2） How to prevent 3D works from beingpirated and tampered with; （3） How to search for the desired 3D models in hugemultimedia databases. This book is devoted to partially solving the above issues.Compression is useful because it helps reduce the consumption of expensiveresources, such as hard disk space and transmission bandwidth. On the downside,compressed data must be decompressed to be used, and this extra processing maybe detrimental to some applications. 3D polygonal mesh （with geometry, color,normal vector and texture coordinate information）, as a common surfacerepresentation, is now heavily used in various multimedia applications such ascomputer games, animations and simulation applications. To maintain aconvincing level of realism, many applications require highly detailed meshmodels. However, such complex models demand broad network bandwidth andmuch storage capacity to transmit and store. To address these problems, 3D meshcompression is essential for reducing the size of 3D model representation.

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内容概要

Three-Dimensional Model Analysis and Processing focuses on five hot research directions in 3D model analysis and processing in computer science, i.e., on compression, feature extraction, content-based retrieval, irreversible watermarking and reversible watermarking. The book is based on a wide range of new content, systematic and theoretical, and fully reflects the state-of-the-art in 3D model analysis and processing technologies./his book is intended for researchers, engineers and graduate students working in 3D model analysis and processing.

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章节摘录

插图：Before the emergence of 3D models, multimedia technology experienced three waves: digital sound in the 1970s, digital images in the 1980s and digital videos in the 1990s. Human visual perception possesses the 3D stereo property. 3D model sand their corresponding 3D scenes can therefore afford more abundant visual perceptual details than 2D images. With the development of 3D data acquisition,3D graphics modeling and graphics hardware technologies, people have generated more and more 3D object databases for virtual reality, 3D games and industrial solid CAD models, and so on. Here, CAD, i.e., Computer Aided Design, means that designers carry out the design work with the aid of computers and their graphics devices. With the increasing popularization of 3D scanning technologie sand 3D modeling tools, 3D model databases have become more and more common in fields such as biology, chemistry, archaeology and geography. On the other hand, the dilatation of the Internet has enhanced the ability to retrieve 3Dmodels that are dispersedly stored, and has created favorable conditions to efficiently transmit high-quality 3D models. Currently, 3D models have been applied to various fields: In the medical field, 3D models are used to accurately describe the organs; in the movie industry, 3D models are utilized to represent the characters, objects and scenes; in the video game industry, 3D models are adopted as the game sources in computers and video games; in the science field, 3Dmodels can be used to show accurate structures of compounds; in the architecture industry, they are used to display the buildings and landscapes; in the engineering field, they are used to design new devices, vehicles, structures, and so on; in the geosciences, people start to construct 3D geologic models.3D models have been the fourth generation of multimedia data type following audios, images and videos, and the increasingly developing Internet and function-enhanced computers have provided conditions for 3D model processing and sharing. Thus, in the near future people can freely use 3D models just like 2Dimages. The former problem of "how to acquire 3D models" has been changed into the current problem of "how to search for 3D models we need", which has resulted in the increasing need for 3D model retrieval technologies. For example, it is a long laborious process to carry out high-fidelity 3D modeling.

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