論文の内容の要旨

Abstract of Dissertation

Mesh Segmentation Methods based on Graph Cut
（グラフカット法に基づくメッシュセグメンテーション手法）

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This dissertation presents methods for automatic segmentation optimization of 3D models, efficient sealed segmentation of surface mesh as well as powerful segmentation of tetrahedral mesh. Mesh segmentation and its optimization are research problems in geometrical modeling and computer graphics, which are widely applied in fields including modeling, reverse engineering systems, skeleton extraction, collision detection, 3D shape retrieval, simplification and remeshing.

In this thesis, shape segmentation optimization is firstly studied. A novel graph cut method is presented to smooth the irregular segment boundary curves between two adjacent segments. To further straighten these boundaries, we implement virtual triangle subdivision and the graph cut approach to add points and edges on these curves. We also rectify these boundaries with simple straightest geodesics.

Then we study sealed mesh segmentation problems. A novel method is provided for clustering a closed 2-manifold triangular mesh into a set of sub-components, which are sealed as well as whose surfaces are smoothed by the Laplacian smoothing.

Finally tetrahedral (triangular) shape segmentation method is presented. We generate segmented isotropic tetrahedral (triangular) meshes while taking 2D image (3D volumetric image) without segmentation as the input. A technique based on centroidal Voronoi tessellation is used to construct isotropic triangular (tetrahedral) meshes where considerably more vertices concentrate on boundaries between patches (objects). These meshes are segmented into patches (objects) by a graph cut method.