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Fast Iterative 3D Mesh Segmentation Using Part-Salience

Hun-Kuang Chen* and Yu-Dai He
Electronic Engineering Department,
National Chin-Yi University of Technology,
*hankchentw@gmail.com

Abstract

As the graphics hardwares and associate technology greatly improved in these year, the related applications such as the computer games, the computer animation, 3D vision, virtual reality, etc., showed an explosive growth. As an important 3D mesh analyzing technique, mesh segmentation is intensively studied.

We propose a novel hierarchical part-type mesh segmentation technique that utilizes salient features and iterative cut to derive a hierarchical part-type segmented model from a 3D mesh. By means of the concept of part salience borrowed from cognition science, the extent of protrusion, the strength of boundary, and the relative size of the parts are jointly considered by our work. Where in our work, we have proposed a new formula for the estimation of protrusion to help us finding initial features from the input mesh. By applying region growing from the farthest two features and the calculation of boundary strength, a proper cut maximizing the boundary strength is applied to a part from each iteration.

Furthermore, most former studies applied shortest path algorithm in finding farthest features and only a few recent works have considered part salience. Since the calculation in finding the shortest path among feature points is time consuming, we have proposed a simple metric for the estimation of farthest features to eliminated the need of the shortest path calculations. To prevent from overly segmented, a threshold to the segmented parts considers both the relative size and part salience is given. According to our experimental results, the new approach is successful.