

基于混合签名的三维模型匹配算法

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摘要: 基于传统的 Reeb 图 (RG) 表示方法, 提出一种新的 Reeb 图描述法, 对 RG 进行参数化表示, 加强了 RG 表示中的拓扑一致性, 突出了模型的几何结构特征. 构建 RG 后, 将其分割为多个 Reeb 图表, 再经过拓扑化映射形成标准平面域, 分别计算面积变化与角度变化, 作为描述三维形状的特征的混合签名. 并利用该方法进行三维模型检索, 提高模型间相似性估计的准确性, 首先根据相应签名的最小差异, 创建相应的 Reeb 图表对, 然后通过匹配 Reeb 图表对, 量化模型间全局相似度. 实验表明, 相比较于其他方法, 该检索方法更加高效、准确.

关键词: 三维模型; Reeb 图; Reeb 图表; 表面参数化; 混合签名

3D Model Matching Algorithm Based on Hybrid Signatures

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Abstract: This study presents a new local feature matching approach based Reeb graph (RG). The central contribution is to reinforce the topological consistency of the graph-based description. the RGs are enriched with geometry signatures based on parameterisation approaches. After RG construction, the shape is segmented into Reeb charts of controlled topology mapped to its canonical planar domain. Then, two stretching signatures, corresponding to the area and angle distortion, are taken as three-dimensional-shape descriptor. The similarity estimation is performed in two steps. The first is forming the pairs of similar Reeb charts, according to the minimal distance between their corresponding signatures. Then to measure the global similarity which quantifies the similitude degree between all the matched Reeb charts. Retrieval experiments have shown that the proposed matching scheme provides an overall retrieval efficiency gain compared to recent advanced methods.

Key words: 3D model; Reeb graph; Reeb chart; surface parameterization; hybrid signatures

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