论文与报告

利用空间几何信息的改进PMVS算法

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摘要
基于多视图像的立体重建是计算机视觉的核心问题之一. 由Furukawa提出的PMVS算法是目前为止表现最好的多视立体重建算法之一. 但该算法仍存在一些不足. 一方面, PMVS不能保证重建表面的几何形状与重建 面片法向保持好的一致性, 特别是在一些特定拍摄角度下, 如大场景重建经常 碰到的俯仰拍摄, 情况尤为严重. 另外, PMVS算法时间和空间复杂度高, 特别是在 利用高分辨率图像重建时, 往往要付出巨大的时间和空间代价. 针对这些不足, 本文提出了一种基于空间几何信息的面片调整和多分辨率分层扩散重建的改进 策略, 一方面提高了重建精度和表面的光滑性, 另一方面, 在尽量保持场景细节 的同时, 提高了重建效率. 文中的实验证实了改进策略的有效性和实用性.

关键词   多视重建   三维重建   法线   主曲率
分类号

An Improved PMVS through Scene Geometric Information

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Abstract
Multi-view based reconstruction is one of the central problems in computer vision. In recent years, many excellent algorithms have been reported, such as the PMVS by Furukawa. However, we observed that the following two aspects of the PMVS need further improvements. The first one is that the obtained normal of reconstructed point is not well consistent with its local geometry, and the problem becomes more pronounced under certain image capturing configuration such as downward-shooting or upward-shooting, a frequent practice in large scene reconstruction. The second is its inherent space and time complexity. Especially with high resolution images, its space and time loads become unaffordable. In this work, two remedies are proposed. We propose a patch adjusting trick through the scene geometric information to enhance the patch's normal estimation, and a multi-resolution expanding tactic to well balance the computational cost and the reconstruction accuracy. The experiments demonstrate the effectiveness and practicability of our improved algorithm.

Key words   Multi-view reconstruction   3D reconstruction   normal   principal curvatures

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