

P.O.Box 8718, Beijing 100080, China	Journal of Software, Nov 2005,16(11):2014-2020
E-mail: jos@iscas.ac.cn	ISSN 1000-9825, CODEN RUXUEW, CN 11-2560/TP
http://www.jos.org.cn	Copyright © 2005 by The Editorial Department of <i>Journal of Software</i>

基于多幅实拍照片为真实景物模型添加纹理

刘 钢, 彭群生, 鲍虎军

[Full-Text PDF](#) [Submission](#) [Back](#)

刘 钢^{1,2}, 彭群生^{1,2}, 鲍虎军¹

¹(浙江大学 CAD&CG国家重点实验室, 浙江 杭州 310027)

²(浙江大学 数学系, 浙江 杭州 310027)

作者简介: 刘钢(1975—), 男, 辽宁铁岭人, 博士, 主要研究领域为基于图像的建模和绘制, 计算机图形学, 计算机视觉与可视化; 彭群生(1947—), 男, 博士, 教授, 博士生导师, CCF高级会员, 主要研究领域为计算机图形学, 虚拟现实, 红外仿真成像技术; 鲍虎军(1966—), 男, 博士, 研究员, 博士生导师, 主要研究领域为计算机图形学, 虚拟现实, 几何造型.

联系人: 刘 钢 Phn: +86-571-88206681, E-mail: gliu@cad.zju.edu.cn, <http://www.cad.zju.edu.cn>

Received 2003-12-08; Accepted 2005-02-03

Abstract

The approach of mapping photographic images on 3D geometries that have been created from real world objects is attracting wide attentions. The registration of the images to the 3D geometries is the key technique. Since previous work used either 3D-2D point matching or silhouette matching for registration, it makes some special demands on the surface features or silhouette shapes of the geometries. In this paper, a new method is presented to overcome this problem. By matching the 3D points reconstructed from the images and the known geometric model in space, the topology and curvature information of the model surface can be fully utilized and all the images to the 3D model stitched at the same time. Experimental results show this method can account for some cases that are intractable for the traditional methods, and the results are quite satisfactory when the distribution of the reconstructed points is relatively symmetrical around the model surface.

Liu G, Peng QS, Bao HJ. Texture mapping on real world models from multiple photographic images. *Journal of Software*, 2005,16(11):2014-2020.

DOI: 10.1360/jos162014

<http://www.jos.org.cn/1000-9825/16/2014.htm>

摘要

利用实拍照片为基于真实景物创建的几何模型添加纹理的方法正在受到广泛的关注. 实拍照片与几何模型的配准是这项技术的关键. 以往方法采用3D-2D特征点匹配或侧影轮廓线匹配的方法进行配准, 因此对空间物体的表面特征或轮廓线形状有特殊的要求. 提出了一种新的配准方法来解决这一问题, 由于采用了基于图像重建的采样点模型与已知几何模型在空间中匹配的方法实现配准, 因而充分利用了物体几何形状本身的拓扑和曲率等信息, 并可以一次性地实现所有图像与空间物体的配准. 实验结果表明, 该方法可以解决一部分用以往的方法尚无法处理的实际问题, 且在重建空间采样点分布较为合理的情形下, 纹理映射效果非常理想.

基金项目: Supported by the National Natural Science Foundation of China under Grant No.60033010 (国家自然科学基金); the National Grand Fundamental Research 973 Program of China under Grant No.2002CB312101 (国家重点基础研究发展规划(973))

References:

[1] Rocchini C, Cignoni P, Montani C, Scopigno R. Multiple textures stitching and blending on 3D objects. In: Ward G, Lischinsky D, eds. Proc. of the 10th Eurographics Workshop on Rendering. Granada: Springer-Verlag, 1999. 173-180.

[2] Yu Y, Ferencz A, Malik J. Extracting objects from range and radiance images. *IEEE Trans. on Visualization and Computer Graphics*, 2001,7(4):351-364.

- [3] Zha H, Wang P. Realistic face modeling by registration of a 3-D mesh model and multi-view color images. In: Wu EH, et al., eds. Proc. of the 8th Int'l Conf. on CAD/Graphics. Macao: Welfare Printing Limited, 2003. 217-222.
- [4] Neugebauer PJ, Klein K. Texturing 3D models of real world objects from multiple unregistered photographic views. Computer Graphics Forum, 1999,18(3):245-256.
- [5] Matsushita K, Kaneko T. Efficient and handy texture mapping on 3D surfaces. Computer Graphics Forum, 1999,18(3):349-358.
- [6] Lensch H, Heidrich W, Seidel HP. Automated texture registration and stitching for real world models. In: Barsky BA, Shinagawa Y, Wang W, eds. IEEE Proc. of the 8th Pacific Graphics. Hong Kong: IEEE Computer Society Press, 2000. 317-326.
- [7] Zhang Z. A flexible new technique for camera calibration. IEEE Trans. on Pattern Analysis and Machine Intelligence, 2000,22(11): 1330-1334.
- [8] Hartley R. In defense of the eight-point algorithm. IEEE Trans. on Pattern Analysis and Machine Intelligence, 1997,19(6):580-593.
- [9] Zhang Z. Determining the epipolar geometry and its uncertainty: A review. Int'l Journal of Computer Vision, 1998,27(2):161-198.
- [10] Press W, Teukolsky S, Vetterling W, Flannery B. Numerical Recipes in C: The Art of Scientific Computing. 2nd ed., Cambridge: Cambridge University Press, 2002.