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短文与研究通讯

适用于SfM点云的未标定摄像机注册方法

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摘要：

无标注册是增强现实技术（AR）领域的研究热点，本文提出并实现了一种对未标定摄像机进行内外参数估计的完整方法。该方法采用单幅图像作为输入，三维物体的SfM重建点云作为数据表，进行匹配并采用RANSAC方法去除误匹配得到单应矩阵，结合Kruppa方程得到焦距估计值，并采用PnP问题的Levenberg Marquardt最优化法得到外参矩阵的非线性最小二乘解。为便于观察结果，另建立基于显卡计算的粒子系统进行验证。实验结果表明，该方法对于摄像机的内外参数估计具有较好的效果。

关键词： 注册；未标定摄像机；Kruppa方程；SfM；PnP问题

Registration method of uncalibrated camera applied to SfM point cloud

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Abstract：

As a research focus of Augmented Reality, functional technology with respect to markerless registration has few implementations. In order to enrich the development of markerless registration and broaden the scope of application, a novel method based on SfM point clouds is presented to have both calibration and registration done, by which taking a single query image from an uncalibrated camera. A set of SfM point clouds is to match with the features of query image, and directly returns homographic matrix with wrong matches removed by RANSAC, focal length is to be acknowledged by Kruppa equation afterwards. Levenberg Marquardt algorithm of PnP problem then is employed to calculate the rotation and translation of camera. Also we build a particle system based on GPU to observe our conclusion directly. Experimental results demonstrate the validity of estimation with this method.

Keywords: calibration uncalibrated camera Kruppa equation SfM PnP problem

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