



航空学报 » 2013, Vol. 34 » Issue (9) : 2194-2201 DOI: 10.7527/S1000-6893.2013.0309

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基于控制线方法的机载SAR和可见光图像匹配应用研究

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Applied Research on Airborne SAR and Optical Image Registration Based on Control Line Method

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摘要

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摘要

根据无人机(UAV)景象匹配导航的现实需求,对具有典型人造场景的机载合成孔径雷达(SAR)图像与可见光图像,提出一种基于直线特征的SAR图像与可见光图像配准方法。首先,利用改进的直线段检测(LSD)方法提取图像直线特征;其次,构造控制线并设计了一种基于控制线的图像配准方法;最后,依据仿射变换模型实现了待配准图像的精确自动配准。实验表明,在SAR和可见光图像存在较大灰度差异、旋转和平移的情况下,该算法仍能精确配准图像,且运算时间大幅减少,能够满足一些实时性较强的应用。

关键词: 图像配准 直线特征 机载SAR图像 机载可见光图像 仿射变换

Abstract:

According to the realistic needs of the unmanned aerial vehicle (UAV) scene matching navigation, image registration method is proposed, based on linear features of the airborne synthetic aperture radar (SAR) and optical images containing typical man-made objects. Firstly, improved line segment detection (LSD) method is proposed to extract linear features of the image; Secondly, we construct the control lines and design an image registration method. Finally, precise automatic image registration is achieved based on the affine transformation model. The experimental results show that the proposed method has high registration accuracy for the SAR image and optical image, which is different in intensive, rotation and translation. The computation time is substantially reduced, and it is possible to meet some of the real-time applications.

Keywords: image registration linear features airborne SAR image airborne optical image affine transformation

Received 2013-03-29; published 2013-06-20

Fund:

国家自然科学基金(61203170);航空科学基金(20110752005);江苏省普通高校研究生科研创新计划;中央高校基本科研业务费专项资金(CXLX12_0160);中国博士后基金特别资助(2013T60539)

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