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论文

基于二进制比特串描述符的惯性组合导航高速景象匹配算法

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摘要:

针对景象匹配辅助惯性组合导航系统需要快速准确获取飞行器位置、航向偏差的要求,提出了一种基于二进制比特串描述符的高速景象匹配算法,尤其适合于计算资源有限的景象匹配场合.算法首先提取环绕中心极值局部特征,然后计算特征点的二进制比特串描述符,接着利用描述符之间的汉明距离进行快速特征匹配.最后,利用分组采样一致算法和最小二乘算法获取高准确度的航向和位置偏差信息.景象匹配性能评价实验表明:在匹配适应性、匹配速度、准确度和鲁棒性方面,算法都很优越,在参考图为250×250 pixels,实测图为160×160 pixels情况下,整个算法的计算约为40 ms,可以满足景象匹配导航系统高速匹配修正的要求,优于传统的景象匹配算法.

关键词: 导航系统 景象匹配辅助导航 二进制比特串描述符 图像匹配

High-speed Scene Matching Algorithm Based on BRIEF Descriptor for INS Integrated Navigation System

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Abstract:

For the scene matching aided inertial integrated navigation system needs to get both the aircraft position errors and the course deviation relative to the present flight path simultaneously,a high-speed scene matching algorithm based on BRIEF descriptor is proposed,especially for device with the limited computing resources.First,center surround extremas is extracted.Then,feature points’s binary robust independent elementary features descriptor and match features are calculated by computing hamming distance between descriptors.Finally,group sampling consensus is adopted to remove the false matching points and the least square algorithm for getting the high accurate aircraft position and course deviation.Performance evaluation experiments for scene matching show that the proposed method is superior,better than traditional algorithm in matching adaptability,speed,accuracy and robustness.In the reference image with 250×250 pixels and real image with 160×160 pixels,the total computing time of algorithm is about 40ms.Therefore,the proposed algorithm can meet the high performance needs for matching navigation in the INS integrated navigation system.

Keywords: Navigation system Scene matching aided navigation BRIEF descriptor Image matching

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