

对极几何约束下的粒子滤波目标协同跟踪算法

陈 滨, 赵建军, 姚 刚, 杨利斌

(海军航空工程学院 兵器科学与技术系, 山东 烟台 264001)

摘 要: 为了提高双视角条件下的粒子滤波目标跟踪算法的性能, 提出了对极约束下的粒子滤波目标协同跟踪算法. 利用对极几何约束, 一方面对协同跟踪过程中的目标检测区域进行限制, 减少检索空间; 另一方面对粒子滤波目标跟踪算法的状态转移模型进行改进, 减少目标在监控重叠区域时, 每个摄像头跟踪所需的粒子总数. 最后, 从帧率、中心误差及覆盖率上, 对算法的性能进行分析比较. 实验结果表明, 算法在时间性能上能满足实时性要求, 准确度上较之经典粒子滤波目标跟踪算法, 有了明显的提高.

关键词: 对极几何约束; 双视角; 粒子滤波; 目标协同跟踪

Cooperative Object Tracking Algorithm Based on Epipolar

Geometry Constrained Particle Filter

CHEN Bin, ZHAO Jian-jun, YAO Gang, YANG Li-bin

(Department of Weapon Science and Technology, NAEI, Yantai 264001, China)

Abstract: In order to improve the performance of particle filter object tracking algorithm based on two-view geometry, cooperative object tracking algorithm based on epipolar geometry constrained particle filter(EGCPF) is proposed. Using the epipolar geometry constraint, on one hand, the object detecting region is restricted during the tracking process to reduce the search space; on the other hand, the state transfer model of particle filtering algorithm is modified to decrease the total number of particles required for each camera with object in the overlap region. Finally, the frame rate, center error and coverage is introduced to measure the performance of the proposed algorithm. The experimental results showed that EGCPF algorithm met requirement in real-time performance, and the accuracy was improved obviously compared with the classical particle filter based object tracking algorithm.

Key words: epipolar geometry constraint; two-view; particle filter; cooperative object tracking

作者简介:

陈 滨 男, (1988-), 博士研究生.研究方向为计算机视觉.E-mail:cbsai1988@163.com.

赵建军 男, (1965-), 博士, 教授.研究方向为武器装备与作战指挥一体化技术.

姚 刚 男, (1985-), 博士, 讲师.研究方向为武器装备与作战指挥一体化技术.

杨利斌 男, (1978-), 硕士, 讲师.研究方向为武器装备与作战指挥一体化技术.