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多目标跟踪的核粒子概率假设密度滤波算法

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A Kernel Particle Probability Hypothesis Density Filter for Multi-target Tracking

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摘要 提出一种新的多目标跟踪算法:核粒子概率假设密度滤波算法(KP-PHDF)。算法的创新点在概率假设密度滤波算法(PHDF)的目标状态提取步骤,以粒子概率假设密度滤波算法为框架,并运用结合了mean-shift算法的核密度估计(KDE)理论进行概率假设密度(PHD)分布的二次估计、提取PHD峰值位置作为目标状态估计值。分析与多目标跟踪(MTT)仿真的结果表明,与现有序列蒙特卡罗概率假设密度滤波算法(SMC-PHDF)相比,在相同仿真条件下新算法的估计精度提高30.5%。

关键词: 信号处理 粒子概率假设密度滤波算法 核密度估计 仿真 多目标跟踪

Abstract: A new multi-target tracking (MTT) algorithm called the kernel particle probability hypothesis density filter (KP-PHDF) is proposed for MTT applications. Based on the particle probability hypothesis density filter framework, the algorithm utilizes the kernel density estimation (KDE) theory and the mean shift algorithm to further estimate the probability hypothesis density (PHD) and then to extract target state estimates. The simulation results of the proposed method show that, compared with the sequential Monte Carlo probability hypothesis density filter (SMC-PHDF), the tracking accuracy of the proposed method is increased by 30.5% in terms of miss distance.

Keywords: signal processing particle probability hypothesis density filter kernel density estimation simulation multi-target tracking

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