

基于目标跟踪的风驱动优化粒子滤波算法研究

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摘要: 针对基本粒子滤波在重采样阶段存在粒子退化和粒子匮乏缺点, 提出了一种基于风驱动优化的改进粒子滤波算法. 算法将风驱动优化(WDO)思想引进粒子滤波, 在粒子滤波重采样过程前, 首先利用风驱动优化算法进行优化. 风驱动优化算法将最新观测值融合到粒子进化公式中, 经过风驱动优化后的大部分粒子朝着后验概率分布比较密集的区域运动, 分布在最优粒子附近, 从而减少了重采样过程中权值高的粒子被舍弃的概率, 缓解样本贫化问题. 通过非线性目标跟踪模型对改进的粒子滤波算法进行误差值分析, 并与基本粒子滤波算法、粒子群优化粒子滤波算法比较. 仿真结果证明改进后的粒子滤波算法降低了变量误差, 从而提高了粒子滤波的跟踪能力.

关键词: 风驱动优化; 粒子滤波; 算法改进; 仿真

Research on Wind Driven Optimization Particle Filter Algorithm Based on Target Tracking

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Abstract: For the particle degradation and particle scarcity of the resampling process of traditional Particle Filter Algorithm, a wind driven optimization particle filter algorithm was proposed in this paper. The ideology of wind driven optimization was introduced in this algorithm, before resampling, the particle is optimized by wind driven optimization firstly. Due to wind driven optimization algorithm incorporated the latest observation into the particle evolution formulas, most of the particles after wind driven optimization optimized moved to the dense area of posterior probability distribution and gathered in the vicinity of the optimal particle. Thus decrease the probability of abandoning high weight particles, and alleviate the sample impoverishment problem. Through the analysis of using improved particle filter algorithm onto nonlinear target tracking model, and compared with traditional filter algorithm and particle swarm particle filter algorithm. The simulation result proves that the improved algorithm decreases variable error. Thereby, this improved particle filter algorithm has better filtering performance.

Key words: wind driven optimization; particle filter algorithm; improved algorithm; simulation

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