

## [2010-0035]采用双重采样的移动机器人Monte Carlo定位方法

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### 摘要

移动机器人Monte Carlo定位效率受限于大量粒子的权值更新运算. 本文提出一种实现粒子集规模自适应调整的双重采样方法: 第一层基于粒子权重的固定粒子数重采样, 有效减轻粒子权值退化并保证预测阶段粒子多样性; 第二层粒子稀疏化聚合重采样, 基于粒子空间分布合理性将粒子加权聚合, 从而减少参与权值更新粒子数. 该方法通过提高粒子预测能力保证滤波精度, 通过减少权值更新运算提高了粒子滤波效率. 仿真实验表明, 双重采样方法能够有效实现粒子集规模自适应调整, 采用双重采样的移动机器人Monte Carlo 定位方法是高效、鲁棒的.

关键词 [Monte Carlo定位](#), [自适应粒子滤波](#), [双重采样](#), [移动机器人](#)

分类号

## Double-resampling Based Monte Carlo Localization for Mobile Robot

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### Abstract

The computational efficiency of Monte Carlo localization (MCL) for mobile robot mainly relies on the weight updating of particles. A double-resampling method which adapts the sample size in MCL is presented in this paper. The first resampling with fixed sample size mitigates the weight degeneracy and improves the diversity of particles for prediction. The second sparse resampling reduces the number of particle for updating using a particle merging technique based on the rational distribution of spatial particles. Decreasing the weight updating computation and enhancing the prediction capability of particles, the double-resampling method improves the efficiency of the filtering while guarantees the accuracy of the estimation. Simulation and experiment results show that the double-resampling approach can adapt the sample size efficiently and the double-resampling based MCL for mobile robot is high efficient and robust.

Key words [Monte Carlo localization \(MCL\)](#), [adaptive particle filter](#), [double-resampling mobile robot](#)

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