

基于重采样技术改进的粒子滤波算法

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摘要: 基于传统重采样技术的粒子滤波算法存在着计算量大、粒子枯竭现象严重、估计精度较差的缺陷, 针对这些问题, 提出一种基于重采样技术改进的粒子滤波算法(Improved Resample Particle Filter, IRPF). 该算法首先在重采样时对粒子进行处理, 得到新粒子集; 然后对所有的粒子进行分类, 得到两类粒子集, 对中等权值粒子集不进行重采样; 最后对大权值粒子和小权值粒子组成的粒子集先进行判断, 若符合重采样条件, 则对其使用线性组合方式进行重采样得到新粒子. 仿真结果表明, 提出的算法是可行的.

关键词: 粒子滤波; 重采样; 粒子多样性; 粒子枯竭

The Particle Filter Algorithm Based on Improved Resampling Technology

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Abstract: There exists some defects in Particle Filter algorithm based on the traditional resampling technology such as large calculation, severe particle impoverishment, low estimation accuracy and so on. To solve these problems, this paper proposes an improved Particle Filter algorithm based on resampling technology. First, the initial particles need to be processed before resampling to get a new set of particles. Then all the particles are divided into two types: one is medium weight particle collection, the other one is large weight and small weight particle collection. The medium weight particle collection remain unchanged without resampling. However, the other one collection first has to be judged whether it can satisfy the condition for resampling. Finally, a linear combination of large weight and small weight particles will be used to get new particles if it meets the resampling requisites. Results of simulation shows that the proposed improved Particle Filter algorithm is feasible.

Key words: particle filter; resampling; particle diversity; particle impoverishment

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