

无线多跳传感器网络下基于粒子滤波的信道容错的目标跟踪方法

杨小军, 邢科义

1. 长安大学信息工程学院 西安 710064
2. 机械制造系统工程国家重点实验室 西安 710049
3. 西安交通大学系统工程研究所 西安 710049

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摘要

对信道衰落的无线多跳传感器网络下的目标跟踪问题, 提出一种新的信道容错的粒子滤波方法. 传感器观测数据被量化成二元信号, 经非理想无线信道多跳中继通讯到达融合中心. 中继节点采用一种二元中继策略, 中继输出是信道污染的中继信号的估计值. 在粒子滤波器下, 考虑实际的物理信道, 计算粒子的似然度函数. 将信道衰落结合进跟踪算法, 在已知信道衰落包络和信道统计分布下, 分别设计信道容错的粒子滤波算法. 仿真结果表明信道容错的粒子滤波器提高了目标跟踪的精度, 对非完美信道具有鲁棒性.

关键词 [无线传感器网络](#) [无线通讯信道](#) [粒子滤波器](#) [目标跟踪](#) [统计信号处理](#)

分类号

Channel Fault Tolerant Target Tracking in Multi-hop Wireless Sensor Networks Based on Particle Filtering

YANG Xiao-Jun, XING Ke-Yi

1. School of Information Engineering, Chang'an University, Xi'an 710064
2. State Key Laboratory for Manufacturing Systems Engineering, Xi'an 710049
3. Systems Engineering Institute, Xi'an Jiaotong University, Xi'an 710049

Abstract

In this paper, a novel channel fault tolerant particle filtering is proposed for target tracking in a fading multi-hop wireless sensor network. The quantized binary data from local sensors need to be relayed through multi-hop transmission in order to reach a fusion center. Each relay node employs a binary relay scheme where the relay output is inferred from the channel impaired observation received from its source node. The observation likelihood function of each particle is deduced with the consideration of physical channel. The fading channels between sensors and the fusion center are incorporated in the tracking algorithm under particle filtering framework. Assuming that the fusion center has knowledge of the fading channel gains and has only the fading channel statistics, we propose respectively the channel fault tolerant target tracking algorithms. The improved tracking accuracy and robustness to channel imperfection of the proposed channel fault tolerant filtering are shown through extensive computer simulations.

Key words [Wireless sensor networks \(WSN\)](#) [wireless communication channel](#) [particle filtering](#) [target tracking](#) [statistical signal processing](#)

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通讯作者 杨小军 xjyang@chd.edu.cn

作者个人主页 杨小军; 邢科义

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