短文

多执行器-传感器网络协作环境监测和治理

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摘要

多执行器-传感器网络在环境监测、污染治理方面有着得天独厚的优势. 本文以大气污染为例, 讨论了其在搜寻污染源、释放中和剂方面的应用. 采用更简化的质心维诺分割方法使网络中信息不确定性总和达到局部最优, 同时设计了可与其线性叠加或切换的一致性算法, 以实现各执行器任务负载或载荷比的平均分配. 所引入了一致性算法对质心维诺分割所得到的节点配置产生扰动, 能够进一步降低网络中信息的不确定性. 在仿真实例中, 与单纯使用质心维诺分割配置节点位置的方法进行了比较.

关键词　维诺分割　网络节点配置　负载分配

分类号

扩展功能

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Cooperative Pollution Supervising and Neutralization with Multi-actuator-sensor Network

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Abstract

The present work considers a scenario that a multi-actuator-sensor network neutralizes poisonous gas and tracks the pollution sources in a bounded area. A novel algorithm is proposed to minimize the system information uncertainty while reaching balance on the workload of actuators. The method combines the centroidal Voronoi tessellations (CVT) with a consensus strategy. The CVT of the region insures a local optimal position configuration of the actuators, thus the sensing uncertainty can be minimized. The consensus algorithm utilizes the connection information among actuators, and helps them to reach a common workload. The consensus component will be terminated or suppressed when the workload is averaged. The consensus component may postpone the realization of CVT configuration. But it could be viewed as a perturbation that helps the actuators jump out of the local optimal CVT configuration. As a result, the information uncertainty may be further reduced. Comparison is drawn between the pure CVT algorithm and the method with consensus strategy. Simulations validated the proposed approach.

Key words　Voronoi tessellation　position configuration　workload assignment　multi-agent system

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