

基于模糊聚类和能量均衡的 WSN 路由算法

朱攀¹, 吴多龙¹, 吴艳杰¹, 苏成悦¹, 王勇²

(1 广东工业大学 物理与光电工程学院, 广东 广州 510006; 2 广东工业大学 计算机学院, 广东 广州 510006)

摘要: 针对无线传感器网络节点能量受限问题, 提出了两种不同网络规模下能量均衡的分簇路由算法. 在簇的形成阶段, 两种算法均采用了改进的模糊 C-均值聚类算法, 一次性将传感器节点分成预先指定数量的簇. 新一轮开始时, 两种算法的簇头选择是基于两个簇内节点能耗均衡的不同目标函数值. 在数据传输阶段, 簇内普通节点均直接传送数据到簇头, 簇头将融合好的数据分别通过单跳方式以及单跳和多跳相结合的混合路由方式发送到基站. 仿真结果表明, 提出的算法能够延长网络生命周期, 均衡网络的能量消耗, 同时有效地降低了网络节点的能量消耗.

关键词: 无线传感器网络; 模糊 C-均值; 能量均衡; 网络生命周期

中图分类号: TP393

文献标识码: A

文章编号: 1000-7180(2015)12-0031-05

Routing Algorithms for WSN Based on Fuzzy Clustering and Energy-Balance

ZHU Pan¹, WU Duo-long¹, WU Yan-jie¹,
SU Cheng-yue¹, WANG Yong²

(1 Faculty of Physics and Optoelectronic Engineering, Guangdong University of Technology, Guangzhou 510006, China; 2 Faculty of Computer, Guangdong University of Technology, Guangzhou 510006, China)

Abstract: For the problem of the energy of nodes in Wireless Sensor Network (WSN) is restricted, two energy-balance clustering routing algorithms which are based on different scale networks are proposed. In the cluster formation phase, both algorithms use an improved Fuzzy C-Means algorithm to allocate sensor nodes into clusters, which remains unchanged throughout the network's lifetime. When the new round begins, the election of cluster heads are based on two different objective function values considering the energy-balance of nodes in a cluster. During the data transmission phase, the sensing data are transferred from each sensor node to their respective cluster head directly, and cluster heads aggregate and send the sensed data to the base station through single-hop and a hybrid mode that combined single-hop and multi-hop. Simulation results demonstrate that the proposed algorithms can prolong the network lifetime, balance the energy dissipation of all nodes, and effectively lower energy consumption of the network.

Key words: wireless sensor network; fuzzy-C means; energy-balance; network lifetime

作者简介:

朱攀 男, (1990-), 硕士研究生. 研究方向为无线传感器网络. E-mail: eduzhupan7807@163.com.

吴多龙 男, (1964-), 博士, 副研究员. 研究方向为射频与天线、无线传感器网络、无线通信等.

收稿日期: 2015-02-17; 修回日期: 2015-04-03

基金项目: 广州市科学研究专项(2014J4100202); 2013 年广东省信息产业发展专项(广东省物联网芯片与系统应用技术工程中心)