

一种压缩感知的无线传感器网络分簇算法

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摘 要: 当前 WSN 分簇算法, 主要从优化节点间拓扑关系的角度出发进行协议设计, 没有考虑通过减少网络中传输的数据量来延长 WSN 的生存时间. 新兴的压缩感知算法可以通过在前端进行简单的运算来大幅度地压缩原始数据. 由此提出一种压缩感知的 WSN 分簇算法 CSCA. 首先根据最优簇数目对 WSN 进行区域划分, 然后由基站根据节点参数选出簇头并成簇. WSN 在进行数据传输时, 簇中节点对监测数据在感知矩阵上投影之后发送给簇头, 簇头对各节点的数据做差之后再进行一次投影之后发送给基站. 仿真实验证明, CSCA 算法由于减少了网络内的数据流量从而有效地降低了节点的能耗, 延长了 WSN 的生存时间.

关键词: 无线传感器网络; 分簇; 压缩感知; 稀疏; 投影

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A Kind of Compressed Sensing Clustering Algorithm for Wireless Sensor Network

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Abstract: At present the emphasis of WSN's clustering algorithm is to optimize the topology of nodes in WSN, and it is not considered to prolong the WSN's lifetime by decreasing the data flow in network. New compressed sensing algorithm may compress original data in vast scale by simple operation at front-end. A kind of compressed sensing clustering algorithm named CSCA is put forward. Firstly the WSN's area is divided into several sections which number equals to the best cluster number. Secondly the base station selects cluster head according to related parameter and the cluster is made up. When transporting data node projects monitoring data on sensing matrix and sends projection data to cluster head. Then cluster head subtracts node's projection data and projects the difference. Lastly the cluster head's projection data is sent to base station. The emulation result proves that CSCA can decrease node's energy cost and prolong the WSN's lifetime obviously.

Key words: wireless sensor network; cluster; compressed sensing; sparse; projection

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