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# A Maximum Lifetime Data Gathering Algorithm for Wireless Sensor Networks

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## Abstract

This paper investigates the maximum lifetime data gathering problem theoretically. Specifically, (1) the simplified static routing scheme where only one routing tree is used to gather data during the lifetime of network is analyzed, (2) the actual dynamic routing scheme where a series of routing trees are used to gather data is analyzed, (3) a near optimal maximum lifetime data gathering and aggregation algorithm MLDGA is proposed, which tries to minimize the total energy consumption in each round and maximize the lifetime of a routing tree used in the round, (4) the MLDGA algorithm is simulated in Java programming language. Comparing with the existing algorithms that are only efficient in some specified conditions, the simulation results show that MLDGA performs well regardless of base station location and initial battery energy levels of sensors.

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## 摘要

从理论上分析了最大化网络生命周期的数据收集问题.主要做了以下4项工作: (1) 分析了简化的静态路由模式,其中只有一棵路由树用于收集数据. (2) 分析了真实的动态路由模式,其中有一系列的路由树用于收集数据. (3) 提出了一种近似最优的最大化网络生命周期的数据收集和聚集算法MLDGA,MLDGA一方面试图最小化每轮数据收集中所消耗的总能量,另一方面试图最大化每轮数据收集中所使用的路由树的生命周期. (4) 用Java语言实验模拟了MLDGA算法,并与现有的算法进行比较.实验结果表明,无论基站的位置还是传感器的初始能量发生变化,MLDGA都取得良

好的性能,而现有的数据收集算法只适应于特定的变化.

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