Entropy-based High-Accuracy Distributed Faulty Sensor Detection Algorithm in Wireless Sensor Networks

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Abstract

Sensor node in wireless sensor networks, due to the unstable conditions they are exposed to, are usually prone to errors which cause the sensor readings to be faulty and usually pose problems on the reliability and security of the whole sensing systems. In this paper, we proposed a distributed faulty sensor detection algorithm using entropy. Besides, our method also corrects the faulty readings. To the best of our knowledge, we are the first one to propose a system entropy concept from thermodynamics and information theory to solve this problem. Our algorithm, compared with previously proposed works, accepts any scalar value as input and is faulty probability independent. It is distributed and localized and thus it is scalable. Our method can be applied to any wireless sensor network to help increasing the reliability of the whole system. Simulation results show that our algorithm can detect and recover above 98% of faulty readings when the fault probability is 0.2 which is much more efficient than previous results.

Keyword：Wireless Sensor Network, Fault Tolerance, Faulty Sensor Detection, Entropy