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Fault Tolerant Localization and Tracking of Multiple Sources in WSNs Using Binary Data

Abstract:

This paper investigates the use of a Wireless Sensor Network for localizing and tracking multiple event sources (targets) using only binary data. Due to the simple nature of the sensor nodes, sensing can be tampered (accidentally or maliciously), resulting in a significant number of sensor nodes reporting erroneous observations. Therefore, it is essential that any event tracking algorithm used in Wireless Sensor Networks (WSNs) exhibits fault tolerant behavior in order to tolerate misbehaving nodes. The main contribution of this paper is the development and analysis of a low-complexity, distributed, real-time algorithm that uses the binary observations of the sensors for identifying, localizing, and tracking multiple targets in a fault tolerant way. Specifically, our results indicate that the proposed algorithm retains its performance in tracking accuracy in the presence of noise and faults, even when a large percentage of sensor nodes (25 percent) report erroneous observations.