Utilization of Multi-Objective Immune Deployment Algorithm for Coverage Area Maximization with Limit Mobility in Wireless Sensors Networks

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Abstract:

Coverage is one of the most important performance metrics for wireless sensor network (WSN) since it reflects how well a sensor field is monitored. The coverage issue in WSNs depends on many factors, such as the network topology, sensor sensing model and the most important one is the deployment strategy. Random deployment of the sensor nodes can cause coverage holes formulation. This problem is non-deterministic polynomial-time hard problem. So in this study, a new centralised deployment algorithm based on the immune optimisation algorithm is proposed to relocate the mobile nodes after the initial configuration to maximise the coverage area. Moreover, the proposed algorithm limits the moving distance of the mobile nodes to reduce the dissipation energy in mobility and to ensure the connectivity among the sensor nodes. The performance of the proposed algorithm is compared with the previous algorithms using Matlab simulation. Simulation results clear that the proposed algorithm based on binary and probabilistic sensing models improves the network coverage and the redundant covered area with minimum moving consumption energy. Furthermore, the simulation results show that the proposed algorithm also works when obstacles appear in the sensing field.

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