Cluster head selection optimization in wireless sensor network via genetic-based evolutionary algorithm

ABSTRACT

Wireless sensor network (WSN) is an embedded system comprises of spatially distributed sensor nodes where an energy-efficient mechanism is needed to prolong the network lifetime. Existing approaches for this optimization problem have several drawbacks, including non-adaptive network configuration that may cause premature death of sensor nodes. Genetic-based evolutionary algorithms such as Genetic Algorithm (GA) and Differential Evolution (DE) have been popularly used to optimize cluster head selection in WSN to improve energy efficiency for the extension of network lifetime. Therefore, the performances of GA and DE are evaluated through comparative analysis to determine their efficiency in cluster head selection optimization. Simulation results show that GA outperforms DE with higher round number for first node dies (FND) but lower round number for last node dies (LND) in terms of network lifetime. Besides, GA also leads to a network with lower number of transmission failures than DE. On the other hand, fitness convergence of GA is slower but it has higher fitness value of population.