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MLBC: - MULTI OBJECTIVE LOAD BALANCING CLUSTERING TECHNIQUE IN WIRELESS SENSOR NETWORK

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ABSTRACT

In Wireless Sensor Networks (WSN) there are scenarios with conflicting objectives. This needs to be modeled as multi-objective optimization formulation. The optimization problem changes with the nature of application, network scenario and input/output parameters. Depending upon the underlying application requirements, there is a need of an appropriate Multi-Objective Optimization technique to manage these multiple conflicting objectives simultaneously and to yield an overall optimal solution. In this paper, a novel Multi-objective Load Balancing Clustering (MLBC) technique is proposed by utilizing Multi Objective Particle Swarm Optimization (MOPSO). Two objective functions are defined: Energy Efficiency and Reliability. The energy efficiency is based on the average residual energy of Cluster Heads (CHs), whereas the reliability is based on the communication cost of inter-cluster routing. The nodes transmit their information to Cluster Head or Base Station in single-hop or multi-hop manner. A healing function is utilized to avoid loops in the generated path. The load balancing is performed by shuffling the roles of next hop node and Cluster Head in each iteration. The best compromise solution is selected through the fuzzy decision-based approach. The performance of the proposed and existing approaches has been evaluated in terms of energy efficiency, network lifetime, packet delivery ratio, data accuracy and number of active nodes. Apart from these parameters, coverage and scalability are also considered to evaluate the quality of solutions provided by multi-objective optimization approach.