基于混合免疫粒子群算法的 WSN 移动 sink 路径研究

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摘要： 在无线传感网中为了减少能量空洞，使用规划移动 sink 最短路径的方式来收集节点数据.将该问题看成带邻域的旅行商问题(TSPN)的特例.由于该问题没有多项式时间的解，将免疫算法和模拟退火粒子群算法相结合，提出混合免疫粒子群算法(HIPSO)来进行路由规划，求解该问题的近似解.在该算法中，将无线传感网建模成通信范围为大小不等的圆形区域，sink 节点移动到传感器节点通信范围内进行数据采集，建立能耗和移动路径模型，通过 HIPSO 算法求解优化模型，获得能耗最小的 sink 节点移动路径.仿真结果表明，该算法求得的近似解相较于其他算法能够减少能耗，延长网络生命周期.

关键词： 移动 sink；无线传感网；带邻域的旅行商问题；混合免疫粒子群算法

Research on Path Planning of WSN Mobile Sink Using Hybrid Immune Particle Swarm Optimization

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Abstract： In wireless sensor networks, in order to reduce energy holes, the node data is collected by planning the shortest path of mobile sink. This problem is considered as a special case of traveling salesman problem (TSPN) with neighborhood. Since the problem has no polynomial time solution, a hybrid immune particle swarm optimization (HIPSO) algorithm is proposed by combining the immune algorithm with the simulated annealing particle swarm algorithm to solve the approximate solution of the problem. In this algorithm, the wireless sensor network is modeled as a communication range for the size of the circular area, sink network and mobile sensor nodes within the range of the data acquisition, the establishment of energy and moving path model, using HIPSO algorithm to solve the optimization model, the sink node moving path of the minimum energy consumption obtained. Simulation results show that the approximate solution obtained by this algorithm can reduce energy consumption and prolong the network life cycle compared with other algorithms.

Key words： mobile sink; Wireless sensor network; traveling salesman problem with neighborhood; hybrid immune particle swarm optimization algorithm

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