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Metaheuristics for IoT Network Security Optimization in Urban Smart City Environments

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Abstract:

The proliferation of Internet of Things (IoT) devices in urban smart city environments introduces significant security challenges, including data privacy risks, unauthorized access, and network vulnerabilities. This study explores the application of metaheuristic algorithms to optimize IoT network security in smart cities. By leveraging algorithms such as Genetic Algorithms (GA), Particle Swarm Optimization (PSO), and Ant Colony Optimization (ACO), the research focuses on developing an adaptive security framework that dynamically adjusts to evolving threats in real-time. The proposed system employs metaheuristics to optimize security protocols, enhance encryption methods, and detect anomalous activities within IoT networks. Simulation results demonstrate the effectiveness of these algorithms in improving intrusion detection, minimizing energy consumption, and ensuring the robustness of IoT systems against cyberattacks. This research highlights the potential of metaheuristic optimization techniques in addressing the growing security concerns of IoT networks in smart cities, providing a scalable and efficient solution for safeguarding urban infrastructure and public data.

Keywords:

IoT network security, metaheuristics, smart cities, optimization, cyberattack prevention, adaptive security.

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