

Research on dynamic ACO routing technique according to quality of service requirements for traffic networks

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Abstract: This study proposes a dynamic Ant Colony Optimization (ACO) routing technique tailored to Quality of Service (QoS) requirements in traffic networks. Traditional routing protocols often struggle with the dynamic and congested nature of urban traffic, leading to suboptimal travel times and resource utilization. The proposed algorithm enhances the standard ACO by incorporating real-time traffic data and multi-constraint QoS parameters, including travel time, path reliability, and congestion levels. Pheromone update rules are dynamically adjusted based on current network conditions, allowing ants to explore alternative routes and avoid local optima. Simulation results demonstrate that the dynamic ACO approach significantly reduces average travel delays and improves path stability compared to static routing and basic ACO methods. By adapting to fluctuating traffic flows, the technique effectively balances network load and satisfies diverse user QoS demands. This research provides a scalable and responsive solution for intelligent transportation systems, contributing to more efficient and reliable urban mobility management.

Keywords: ACO, dynamic routing, quality of service, traffic network