

Optimizing task assignment for Teams of Robots Using Ant Colony Optimization

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The rapid advancements in robotics and artificial intelligence have driven the growth of Multi-Robot Systems (MRS) and Teams of Robots (TOR), where collaboration is critical in domains like manufacturing, search and rescue, and military operations. Effective task allocation remains a significant challenge, often addressed via optimization techniques like Ant Colony Optimization (ACO). However, current approaches primarily focus on real-time availability and computational efficiency, overlooking the historical performance of individual robots. This paper proposes an enhanced ACO-based method that integrates both the real-time factors and the past experiences of each robot, to optimize task assignment. The approach focuses on optimizing problem-solving using the ACO by selecting the most suitable candidate for a specific task from a given TOR while considering the agent's prior experience with similar tasks. The approach also addresses the possibility of using the ACO when transferring an assigned task to another robot in the TOR. The results validate the effectiveness of the approach in dynamically selecting the most suitable and available robot, offering a significant advancement in task allocation strategies for TOR.

Keywords: *ant colony optimization, task allocation, multi-robot systems, teams of robots, swarm intelligence, robot experience*