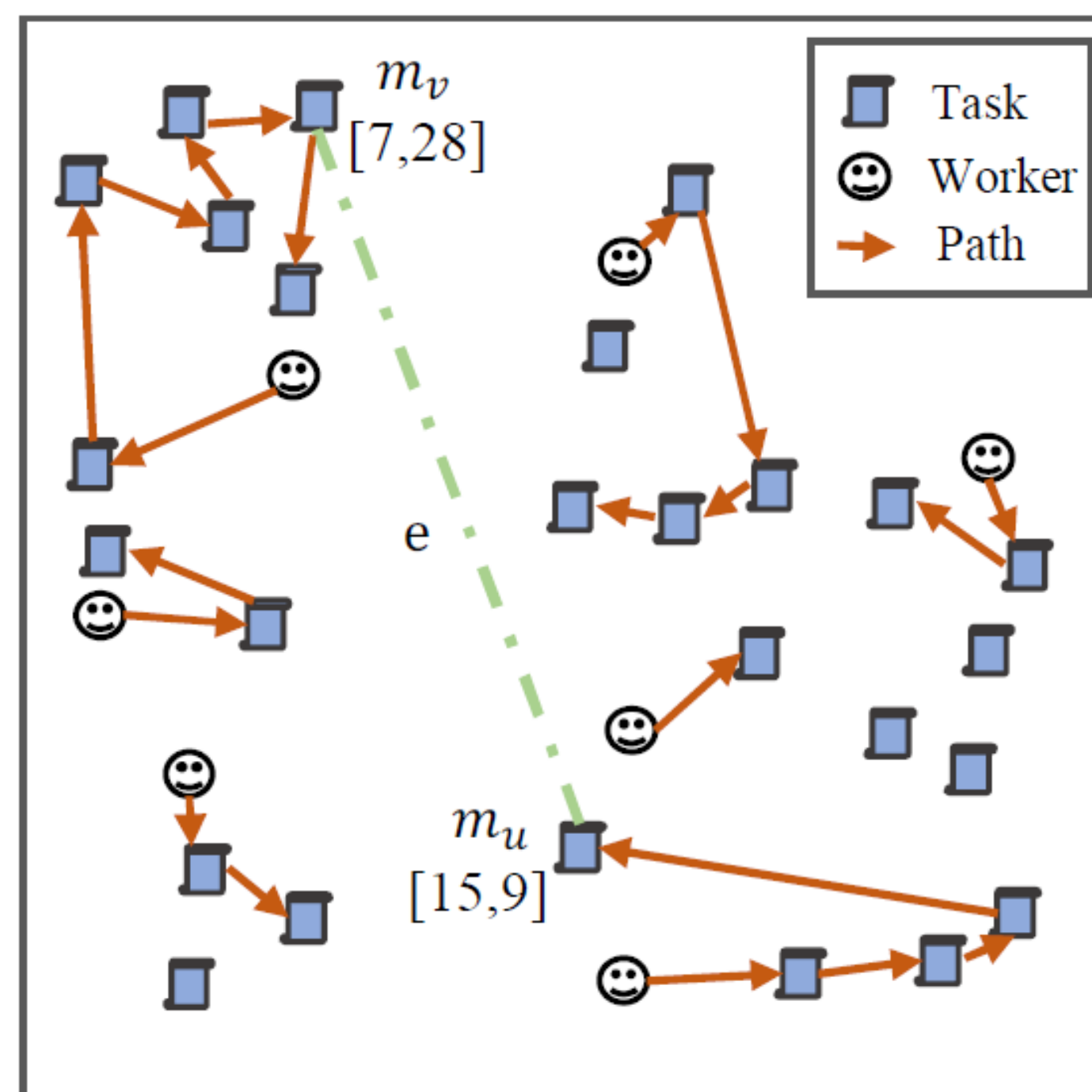# Intelligent Mobile Crowdsensing with Deep Reinforcement Learning

Chenghao Xu and Wei Song

Task Allocation Problem for Mobile Crowdsensing

System Model: *A task allocation problem aims to plan paths for a group of workers (denoted by U) to complete a set of data collection tasks (denoted by V) in a cost-effective manner.*

Each worker $u \in U$:
- Initial location $l_{u,0}$
- Travel capacity $f_{u,0}$
- Unit travel cost c_u
- Unit travel time q_u

Each task v $\in V$:
- Location l_v
- Budget b_v
- Expiry time τ_v

Objective: *Maximize the total profit from the gap between the total compensation for workers' sensing effort and the total budget from completed tasks by planning path P_u for each worker $u \in U$.*

1) Total travel distance of worker u over path P_u should be less than his/her travel capacity $f_{u,0}$.

2) For each unit of travel distance, the worker spends time q_u and requires incentive payment c_u.

3) Task v can only be completed when a worker reaches location l_v of the task before its sensing deadline τ_v.
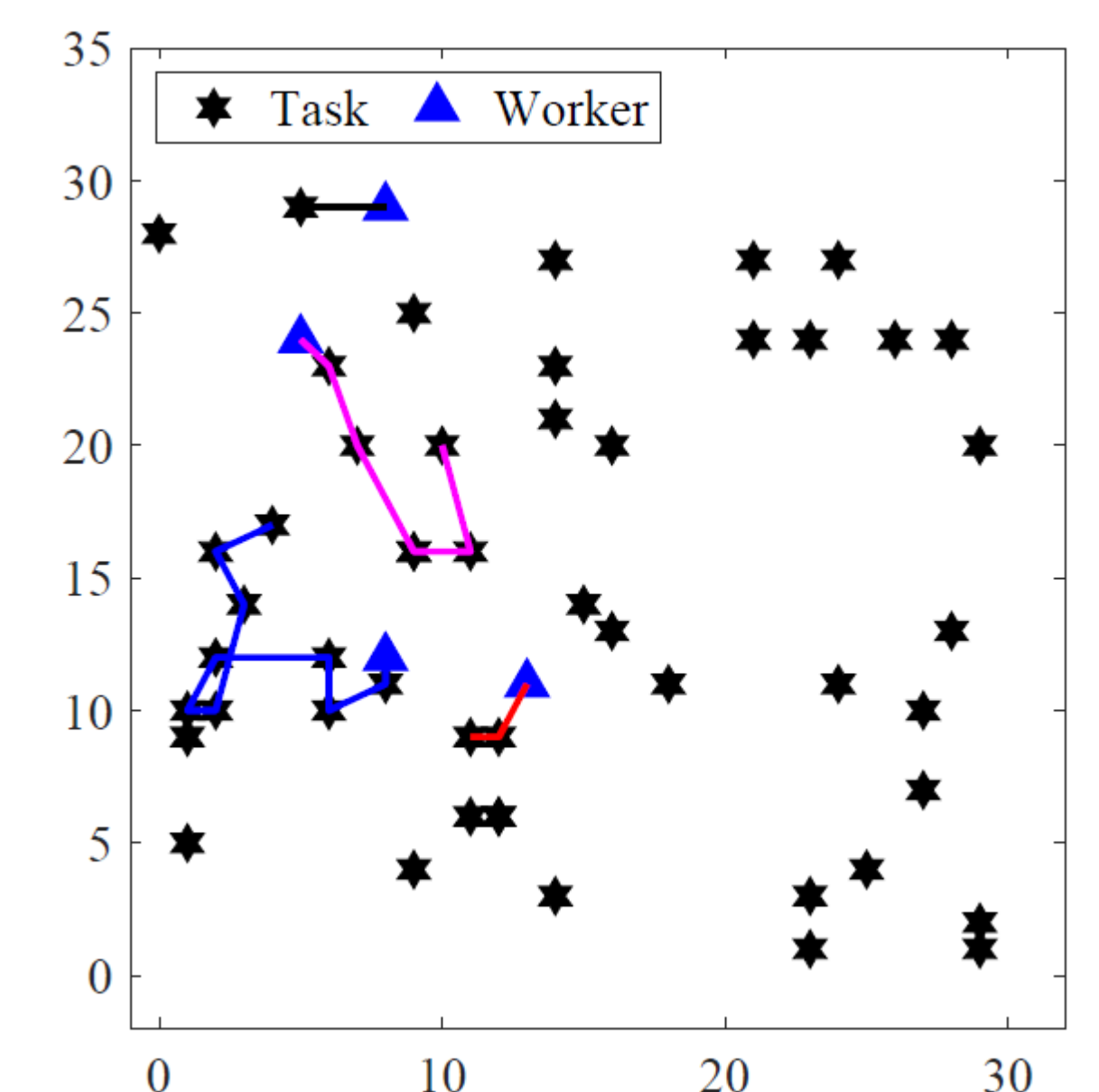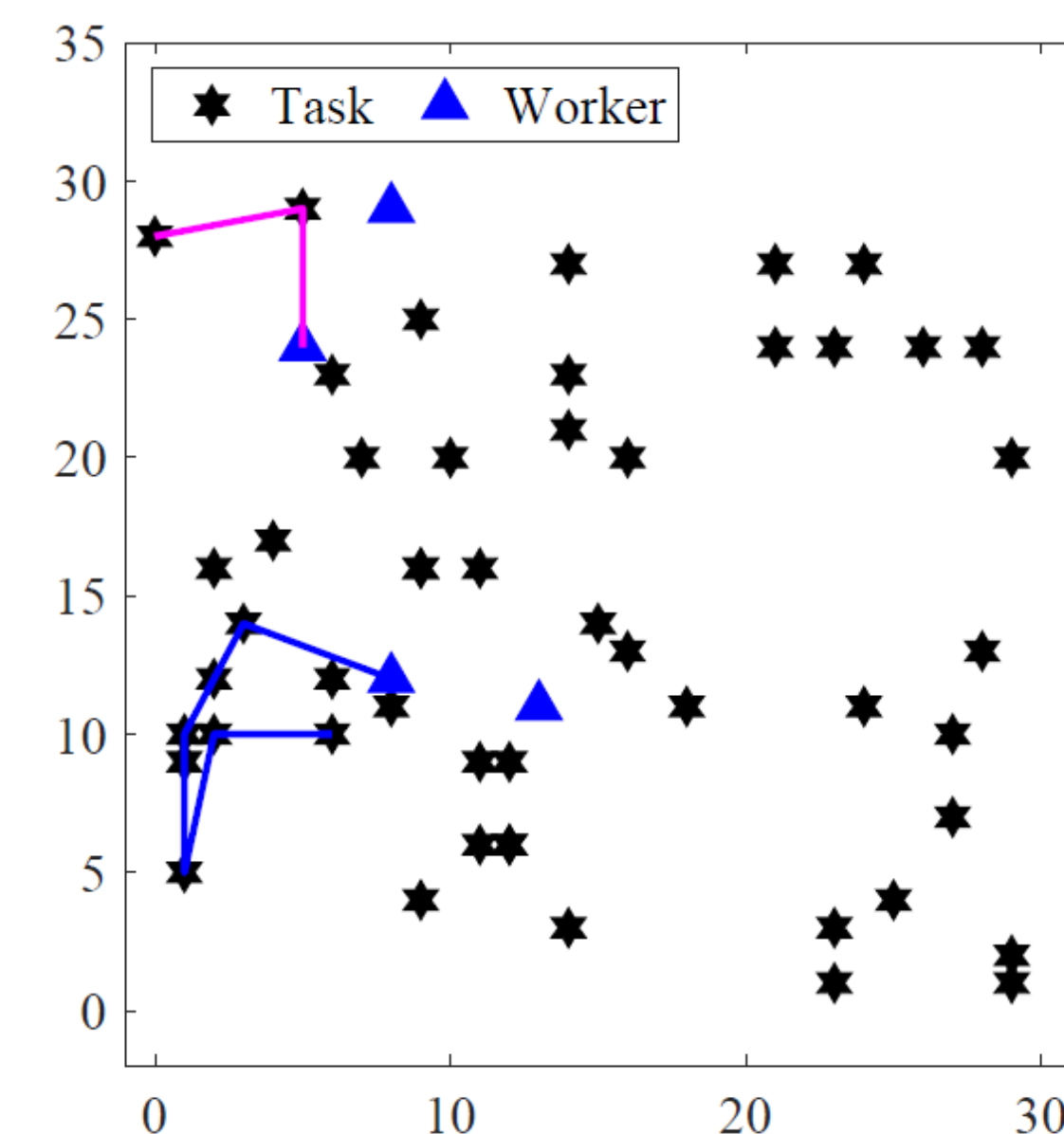
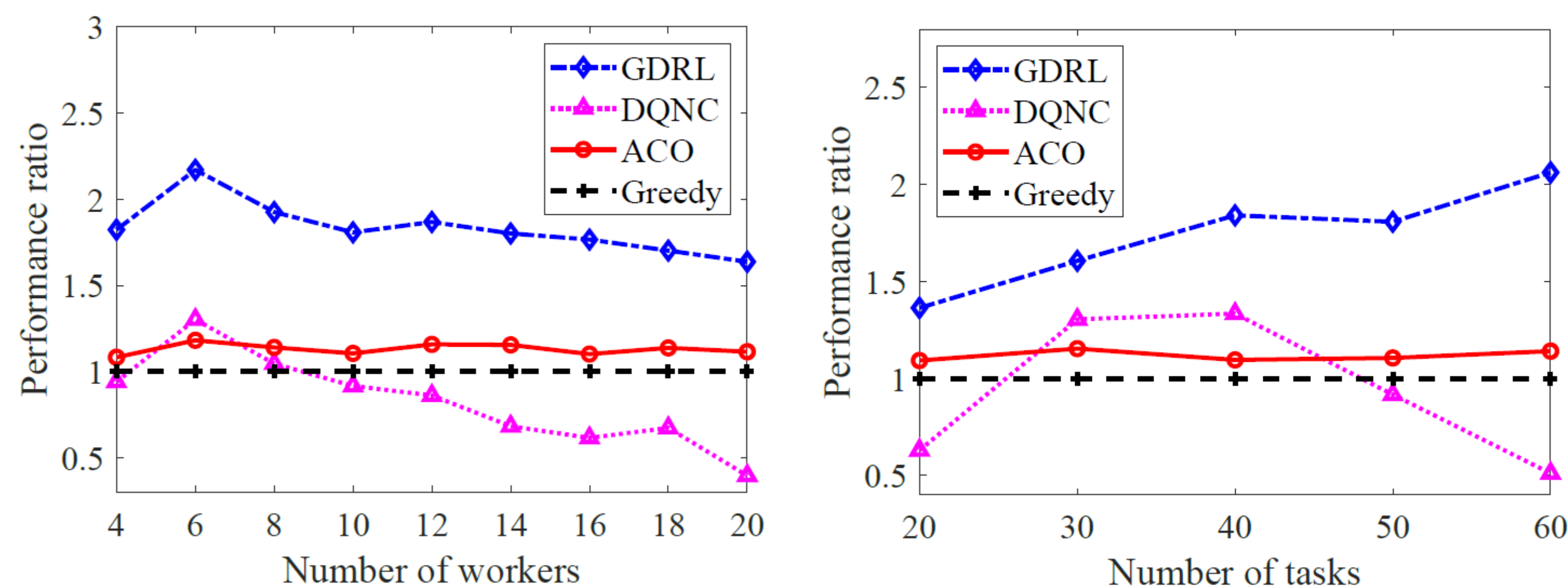## Solution with Deep Reinforcement Learning (DRL)

DRL Approach:
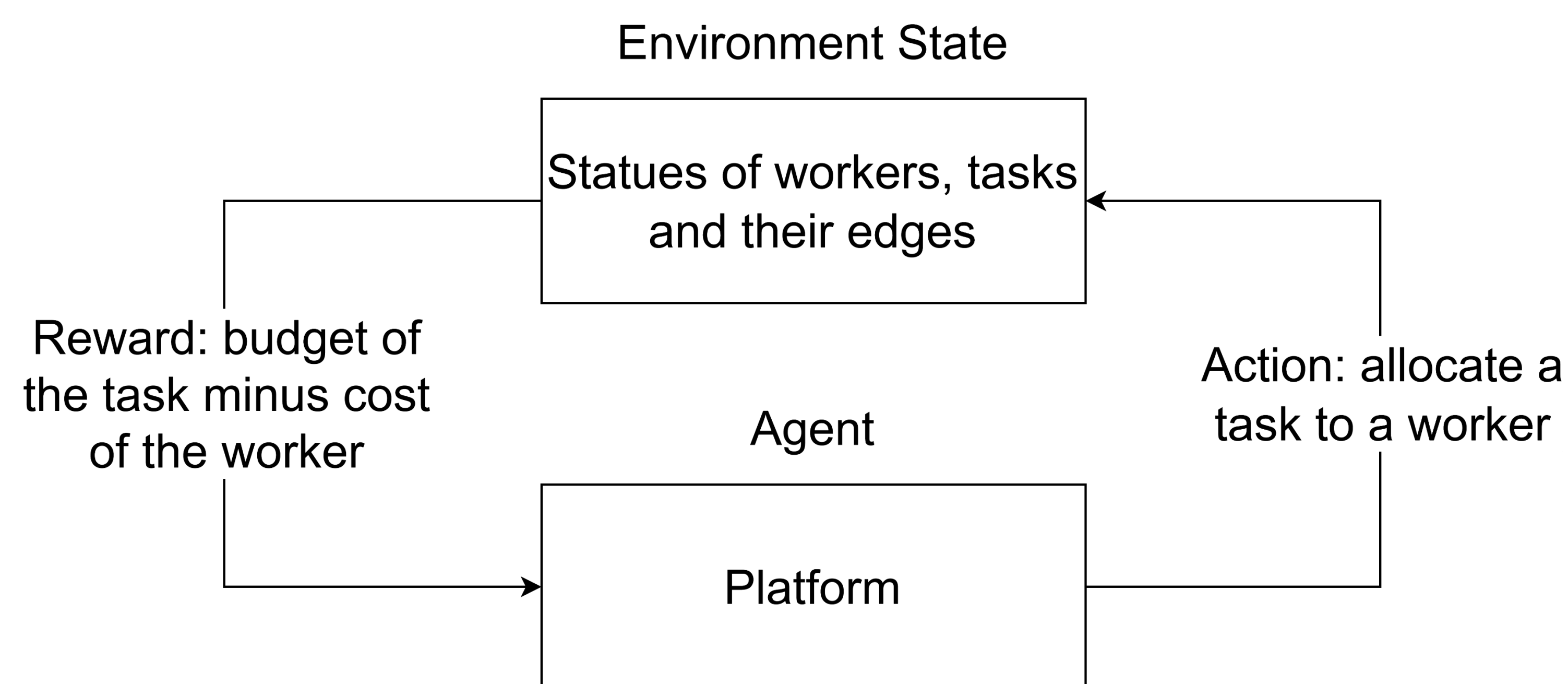
Examples:

The greedy method hires 2 workers to complete 9 tasks and earn a profit of 31.

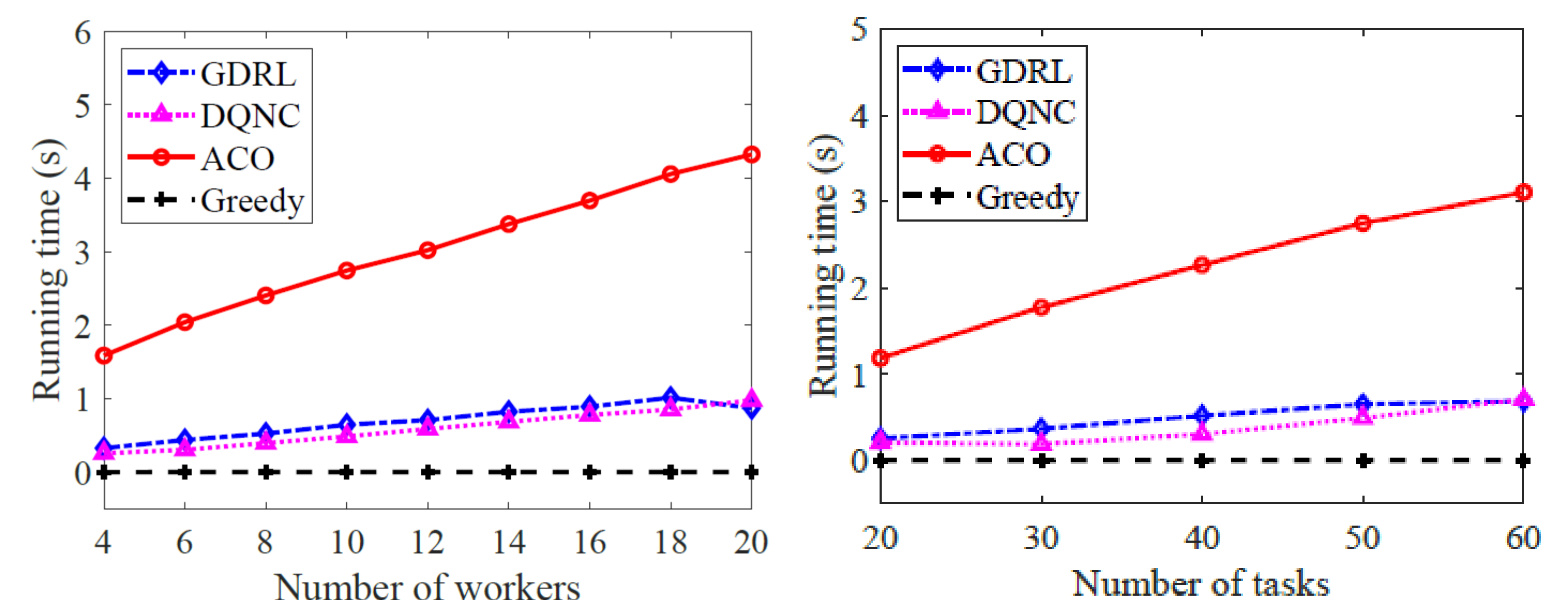The GDRL method hires 4 workers to complete 18 tasks and earn a profit of 81.

Performance of DRL, Heuristic, and Metaheuristic Methods

Performance Ratio:

Running Time: