Cooperative Multi Agent RL in Robot Warehouse

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MULTI ROBOT WAREHOUSE

Problem Statement:

Multiple robots must collaborate to efficiently move items between various locations, optimizing space usage and minimizing time and collisions in a 2D world.

Objective:

To implement algorithms that allow agents to pick and deliver items to a specific point efficiently without collisions and with minimal time.

Environment

We are using the open-source robotic warehouse environment, which models a warehouse as a 2D grid where agents navigate to pick up and deliver items and avoiding obstacles.

Grid Features:

- Agents (robots)
- Obstructions (warehouse shelves)
- Pickup and drop-off locations
- Tasks: Delivery of items to specific points
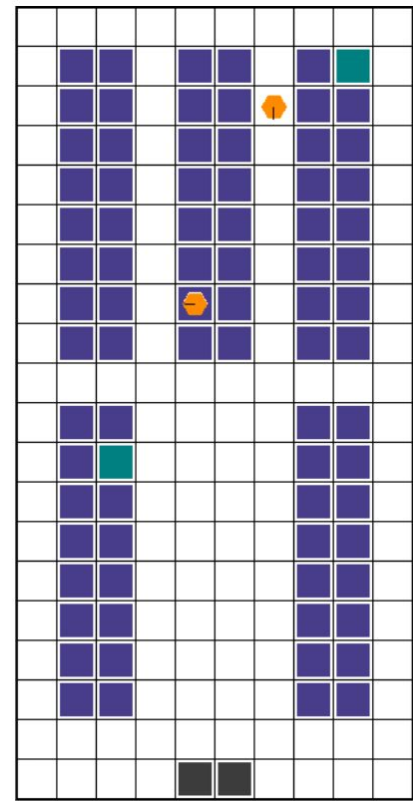
Goal locations

Requested shelf

Shelf

Agent

Agent carrying a shelf

Credits : Autonomous agents Research Group (RWARE)

Possible Approaches

1. **State Representation:** 3*3 grid centred around each agent, positions of other agents and item locations.

2. **Reward:** Negative reward after each step, high negative reward after each collision, positive reward after collecting the item, positive reward after delivering item to waypoint.

3. **Algorithm selection:** To be decided. However, possible ones include Centralized Training with Decentralized Execution with use of CNN for collecting state information (in case of large grid only)