

CSCI 4341: Autonomous Mobile Robots and Programming

Assignment 5 (100 pts)

In this program, a robot searches for food items (black circles) and delivers them to the nest. There are three states, resting, exploring, and returning to the nest. The robot starts from the exploring state for searching items. If it finds an item, it picks up it and returns to the nest. It takes a rest for 50 steps, then it backs to explore items.

When the robot collects an item, it receives a reward and the probability of switching from exploration to rest (ExploreToRestProb) decreases and the probability of switching from rest to exploration (RestToExploreProb) increases. On the other hand, if it does not find an item at a certain time, it gives up the search and returns to the nest. The probability ExploreToRestProb increases and the probability RestToExploreProb decreases.

The robot adapts to the environment based on the probabilities. The robot may not go out to search for food items if it does not find an item. However, we should force the robot to find food items even there are not so much food in the environment. So, we will modify the program and let the robot keep searching for food items.

Goal 1: Observe the foraging behavior of the single robot until it stops the searching in the nest. Then, check the code and understand why the robot stops and take the rest in the nest.

Goal 2: Modify the function Explore() {} for letting the robot to search for food items even there are not too much food in the environment. (50 pts)

Goal 3: Set the number of food items to be 20 in the environment. (25 pts)

Goal 4: Set the number of robots to be 5 in the environment. (25 pts)

Note: The exact locations of the modifications are not specified in this assignment. You can use the following statement to show the values of some variables for debugging purpose, e.g., LOG << "the value of the variable X =" << X << std::endl;