V-REP Simulation Study

ACS6121, last updated on 07.02.2019

This assignment does NOT allow for group work. You must complete it on your own.

1 Overview

Your task is to design a control strategy for e-puck robots that do the following:

- explore the given environment to collect resources (*foraging*);
- while foraging, avoid collisions between robots and with the environment boundary.

For an object to be collected, a robot's centre must be within **5 cm** of the object's centre. There won't be any collisions between the robot and the object.

For the evaluation of this task, two foraging scenarios will be considered:

1. with a **single robot**;
2. with a **group of 5 robots** (all with an identical controller).

The controller used for both scenarios **MUST** be the same.

To assess the foraging performance of your strategy, you are expected to conduct **10 trials** per scenario. Each trial should last **60 seconds** of simulation time (note that the actual time that elapses on your watch/computer may be different.). Your report should include plots showing **the number of objects collected in total over time** (average and standard deviation over 10 trials). Include **one plot for each scenario**.

The simulation environment is shown in Figure 1. The simulations will be made using V-REP. An introduction to V-REP is provided in the Week 1 Tutorial. You must use the simulation project provided on MOLE (`scenes.zip`) as your starting point. Your are expected to design and implement a solution using the routines available in the software. **Important:**

- Do not use wheel speeds the e-puck cannot achieve. That is, when using function sim.setJointTargetVelocity(.,.), **make sure the velocity argument is bounded by [-6.24, 6.24]**.
- You should use the sensors available on the e-puck platform (e.g. camera, proximity). You may implement additional sensors, however, these must not provide any global information (e.g. absolute position or orientation) and you need to describe these in your report.

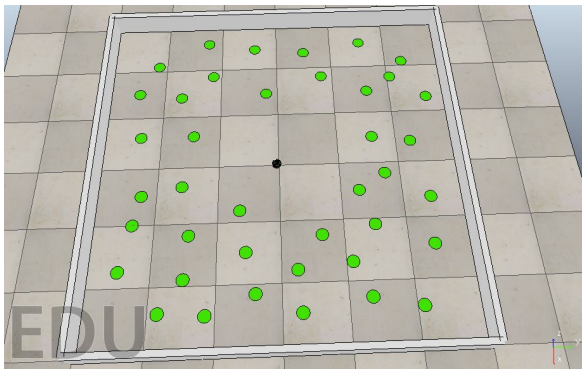

Figure 1. A snapshot taken from the V-REP simulation environment, showing 1 robot (in the centre) and 40 objects (green disks) to be collected. Once collected, an object changes its colour.