COMP 417
Assignment 3
Posted: Tuesday, Nov 7, 2017
Due: Friday, Nov 17 at 12:00 pm, 2017

Monte Carlo Localization:

In this exercise you are going to implement Monte Carlo Localization (i.e. localization in a known occupancy grid map, using particle filters), as discussed in class. Your robot is going to start at the center of the environment, so particles are going to be spread out uniformly at random in the world. Then, after many measurements, its position is going to be constrained and the particles are going to converge to a small cluster. The main mechanism for survival of the fittest among particles will be: which particles are more likely to have generated the laser scans that the robot is observing now?

Starter Code:

The starter code is provided with the assignment in Assignment2.zip. Download the zip file and extract all the packages into comp417_ws/src directory as you did for Assignment 1. You will need all the packages that were provided for Assignment 1 along with new package provided in Assignment 2. Then compile the code using catkin_make command.

The functionality that you need to implement is marked using comments in the file **estimation_assignment/python/monte_carlo_localization_v2.py.** To run your code, **cd path/to/comp417/estimation_assignment/** and execute the following commands on three different terminals:

rosbag play -r 0.25 laser_controls_and_odometry.bag
roslaunch estimation_assignment monte_carlo_localization_v2.launch
rosrun rviz rviz

Note that the -r argument to rosbag reduces the playback rate by half, so that measurements are sent more slowly to your program. When rviz initializes, go to ***File > OpenConfig*** *and then load the configuration file in* ***estimation_assignment/resources/comp417.rviz*** *which is going to start the visualization of laser scan messages, frames of reference, and particles. Save this configuration file as the default in your* ***/home/username/.rviz/default.rviz****, so you won't have to do this every time you restart rviz. What you will see initially, before the robot makes any measurements is the following:*

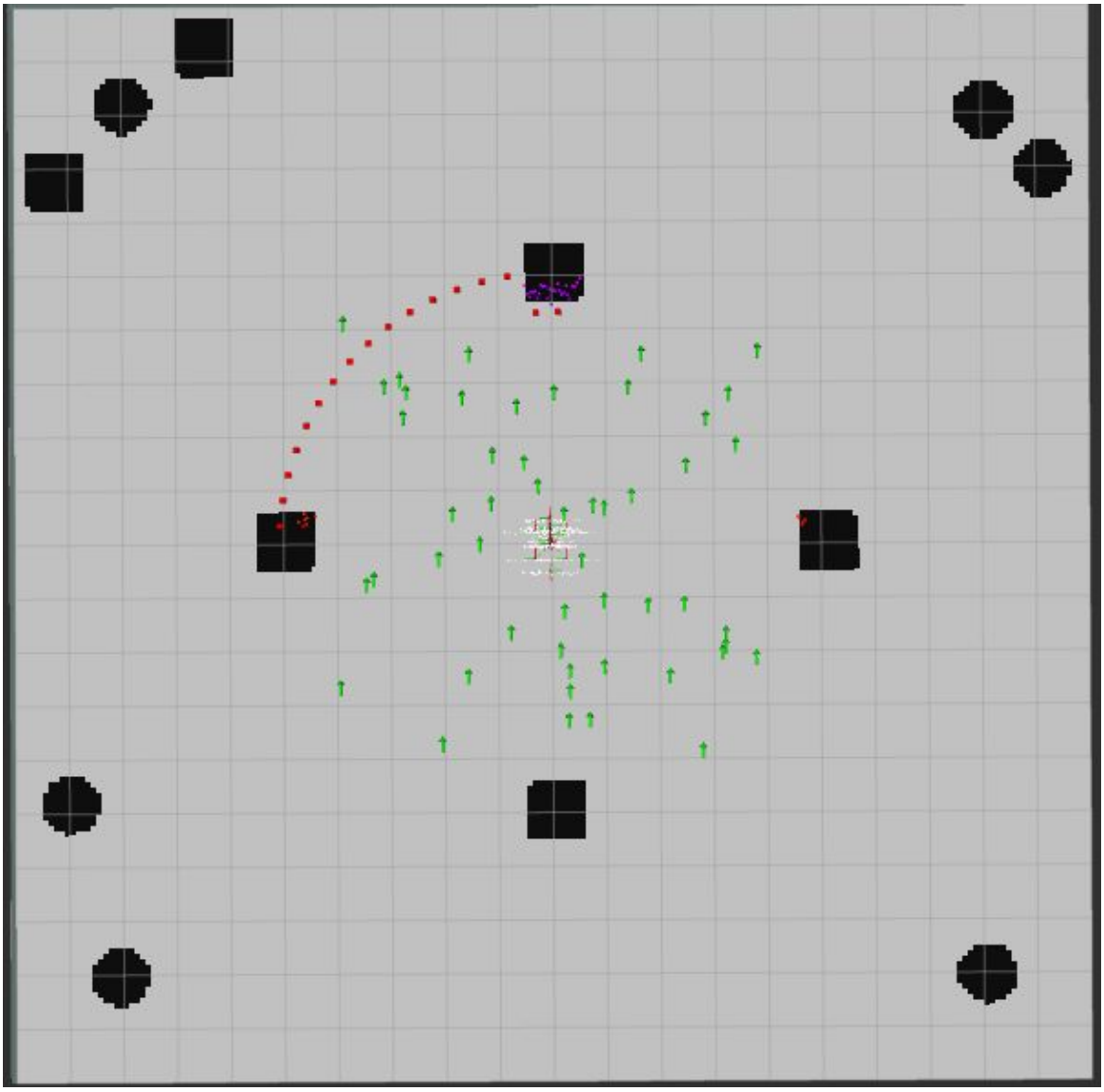

Figure 1: Initialization of particles in Monte Carlo Localization, within a small boundary around the robot in the workspace. Your task is to make the particles cluster around the robot, as the robot moves in the world.

It is not mandatory to stick to the starter code provided. You are free to implement any number of additional methods or features as you find necessary.

Things to submit:

- Your code *monte_carlo_localization_v2.py*
- A video recording of the rviz visualization demonstrating your particles converging from beginning to end. Your video should be named *mcl_firstname_lastname.mp4/avi*.
- Additional deliverables if any will be notified through myCourses Announcements.