HW 1 Due Jan 21, 12 Noon

In the class we looked at problem 2 (in Chapter 2 of the book Probabilistic Robots be Thrun et al – see attached images) and solved it using a finite state machine model. We also pointed out that solutions for some of the problems in the book exist on the following site

<https://github.com/pptacher/probabilistic_robotics>

2(b) Write up a general purpose simulator for the state transition matrix

(c) Use your simulator to determine the stationary distribution of this Markov chain. In particular I would like everyone to address (i) How you initialize the simulation (ii) How many transitions you consider before taking a result and (iii) How many simulation runs you conducted to arrive at the statistics for the stationary distribution.

NOTE: The answer for the stationary distribution is already available in the solutions (link above) but I would like you think about how fast you can converge on the results

(d) The solution is derived via a closed analytical form. Can you do the diagonalization of the state matrix A with python to come up with the same result.

3. This is similar to the example we did in class - dog’s location with a noisy sensor.

Please note – all your work and programming should be your own. However feel free to talk to your classmates, ask questions on Piazza etc. The idea is to learn the material (Homeworks are not tests but a chance for you to familiarize and clarify what we talked about in class).

After you are done please check in you code, results, and writeup ( a python notebook with all three would be perfect) into a gitlab account using the following conventions

your\_name/EECE7150/hw1

and invite me to be a developer at the level of EECE7150. My gitlab email address is ha.singh@northeastern.edu