

ME 455 – Active Learning

Homework 4, due date: May 24, 2023.

Joris Chomarat, jorischomarat2024@u.northwestern.edu

Problem 1

Figure 1 shows the ergodic metric against different choices of b for a duration of $T = 100$ and $dt = 0.1$. The minimum of the metric is located at $b = 0.08$ (for increments of $\Delta b = 0.005$).

The parameter K stands for the maximum possible value entries of k_i may have. For example, for a choice of $K = 2$, the possible k_i 's are the following:

$$k = \{[0, 0], [0, 1], [0, 2], [1, 0], [1, 2], [2, 0], [2, 1], [2, 2]\}.$$

Figure 2 shows the ergodic metric against different choices of b and T , with the remaining parameters staying constant as in the first question of this problem. The minimum of the ergodic metric is located at $T = 70$ (increments of $\Delta T = 10$ in that region) and $b = 0.07$.

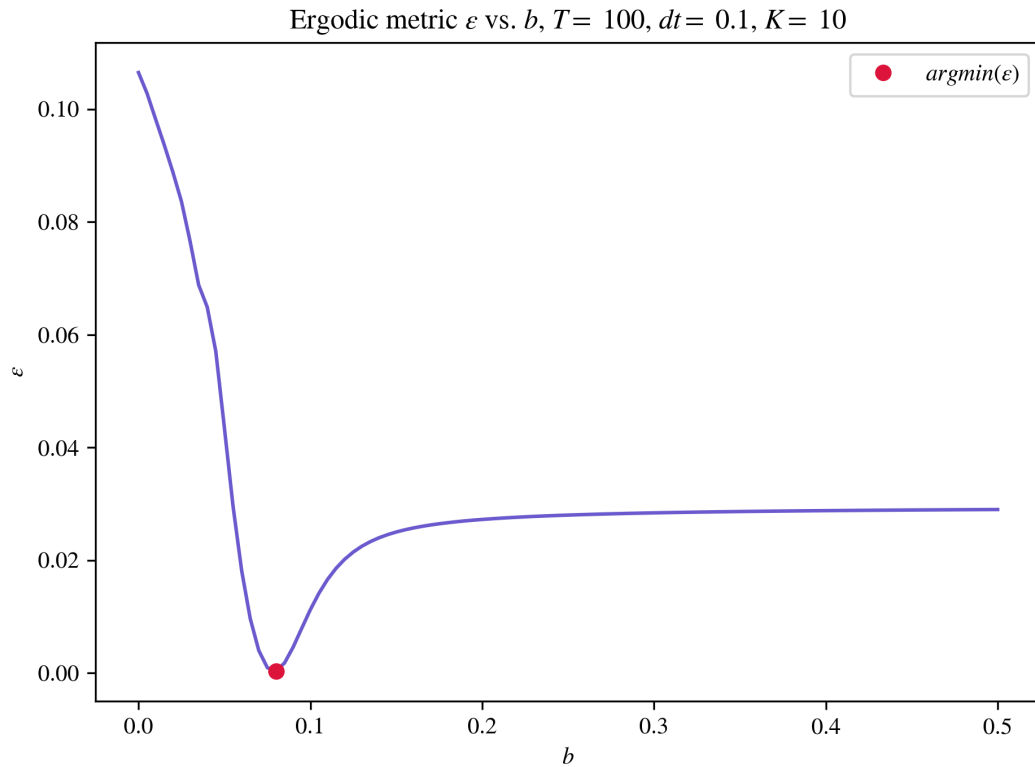


Figure 1

Ergodic metric ε vs. b vs. T , $dt = 0.1$, $K = 10$

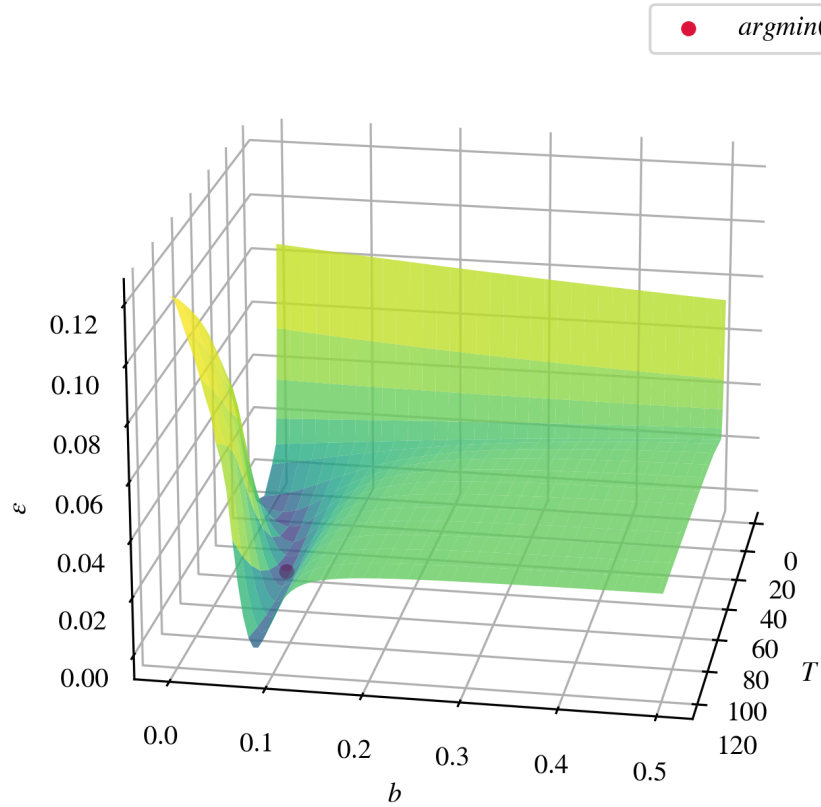


Figure 2

Problem 2

The following 4 plots in figure 3 show runs of the infotaxis algorithm on a 25×25 grid, with the likelihood of measurement being of hourglass shape as depicted in the problem statement. The algorithm runs until the door (depicted in green) is found.

Gifs of the door belief over algorithm iteration are uploaded at the following location: <https://polybox.ethz.ch/index.php/s/02PXjz0ha6UFCa4>.

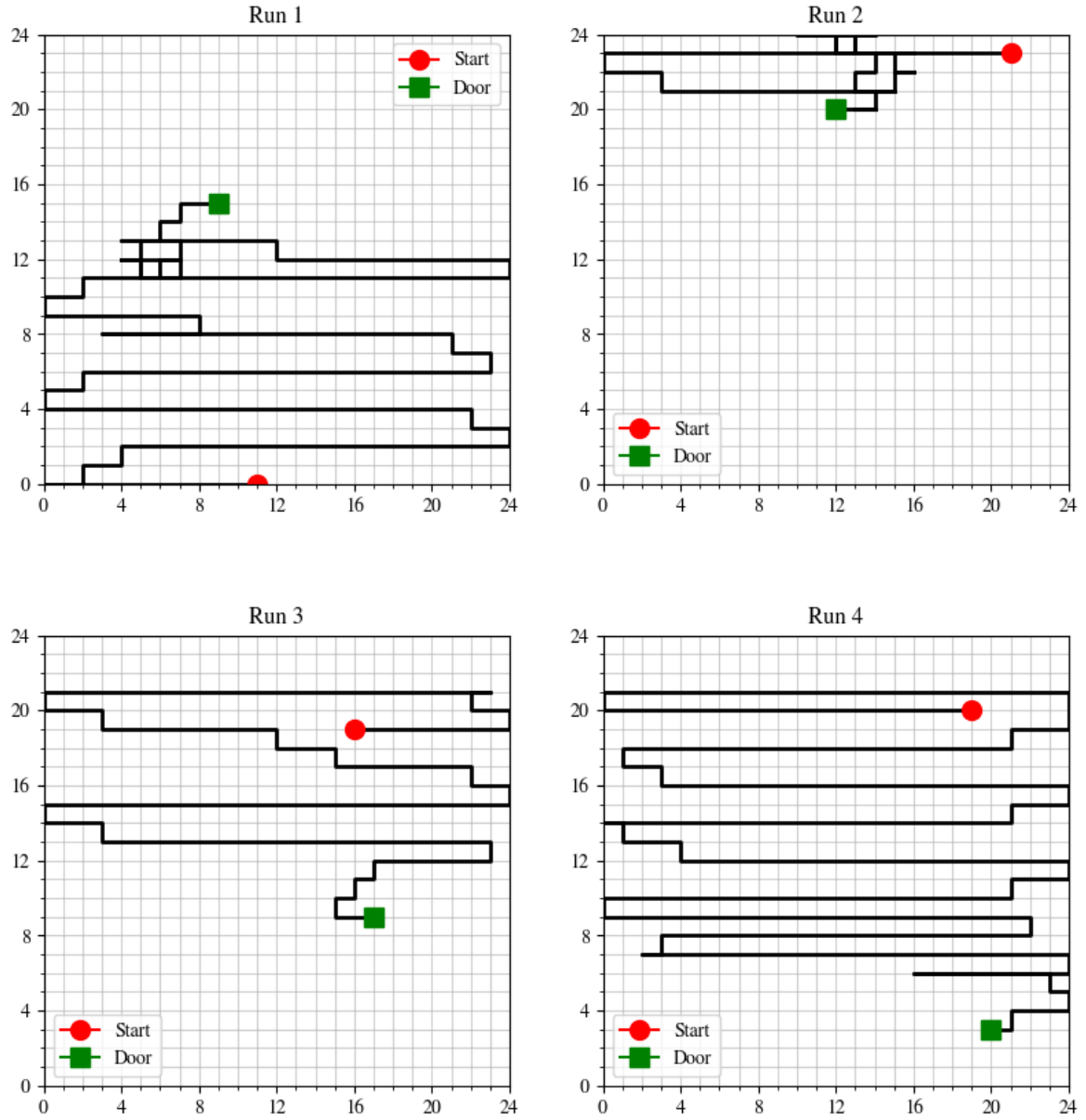


Figure 3: Trajectories of Infotaxis Door Search.