Practical part of exercise 9

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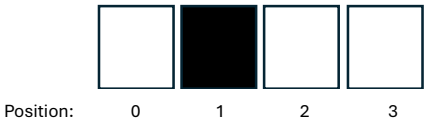
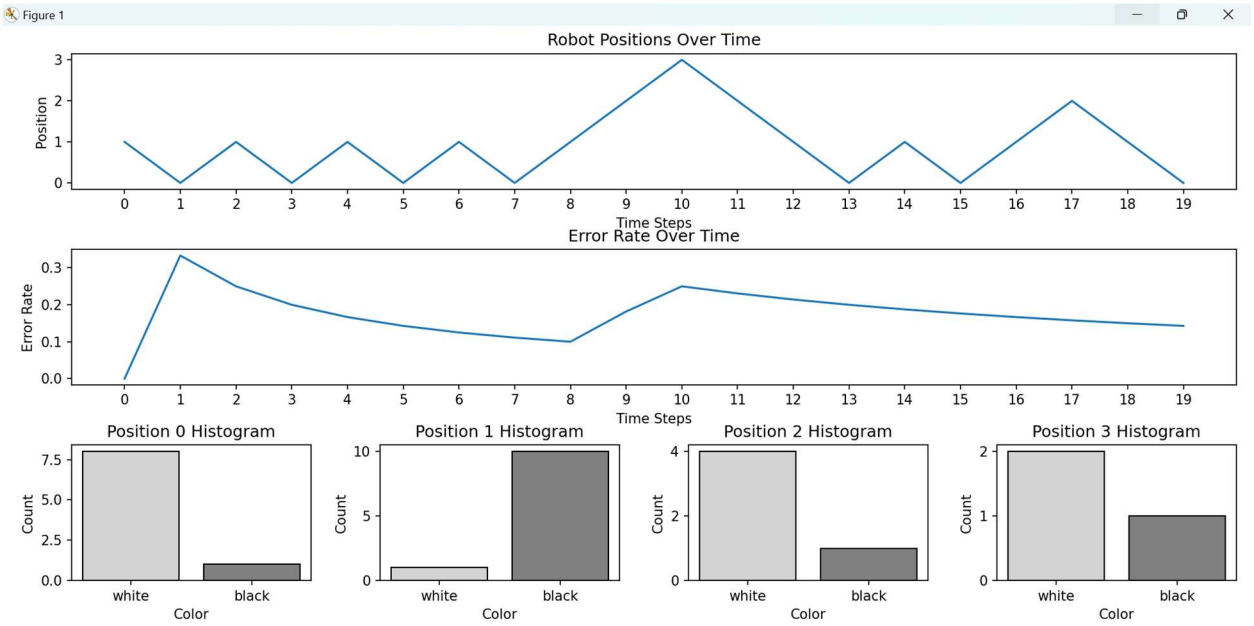
In our code, the 1D world is composed of 4 tiles:



We run the robot for 20 steps in each exercise. There is a different file for each exercise submitted. This document shows the visualizations from the data, but if you would like to see the console data, run the code and it will be displayed step by step.

9.2a)

We see two peaks for error rate that corresponds to the very first steps and predicting knowing very little of the world and the 2nd peak is when the robot moved to position 3, that is had not explored yet.



9.2b)

In this exercise we observe two different robot strategies: cautious and adventurous. In these two examples we see that the adventurous explores more of the world and visits all positions which also leads to a higher error rate than the cautious robot strategy that sticks mainly between positions 0 and 1. We are also using a 10% noisy extraction and perception probability.

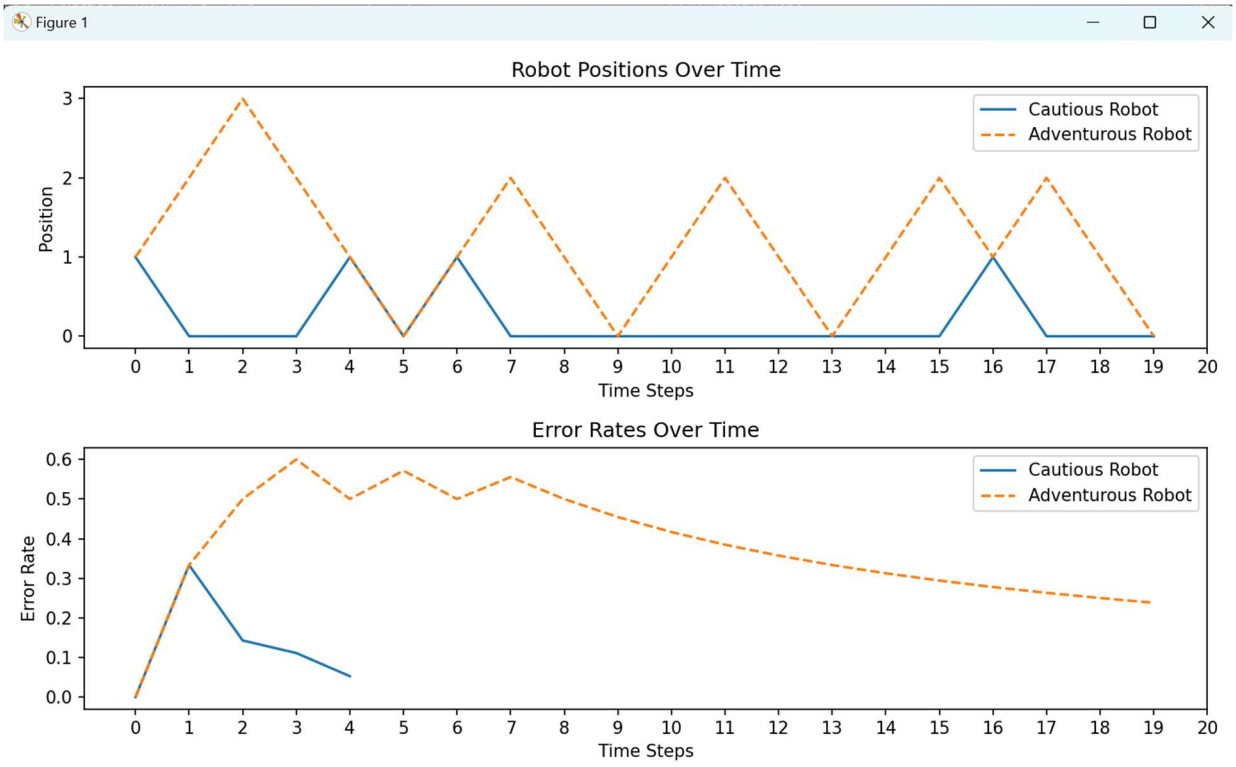


Figure 1
Robot Positions Over Time
Cautious Robot
Adventurous Robot
Position
Time Steps
Error Rates Over Time
Cautious Robot
Adventurous Robot
Error Rate
Time Steps

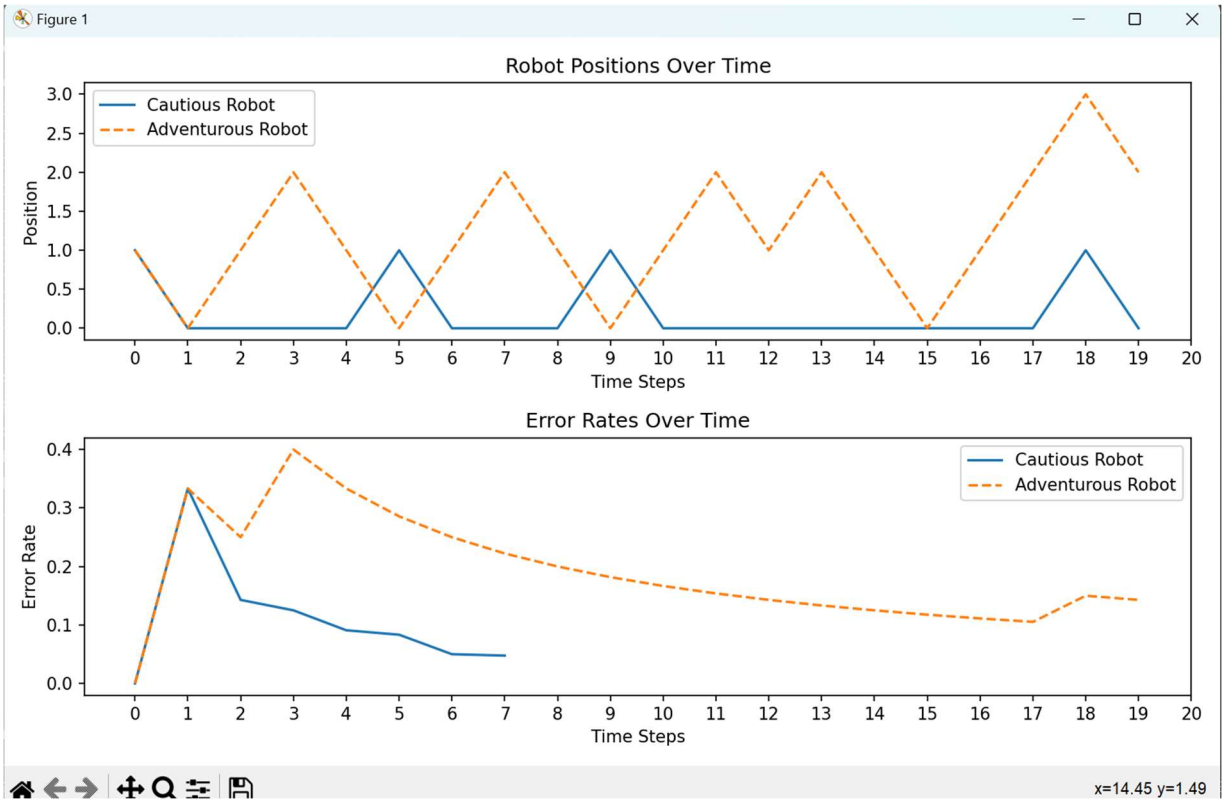


Figure 1
Robot Positions Over Time
Cautious Robot
Adventurous Robot
Position
Time Steps
Error Rates Over Time
Cautious Robot
Adventurous Robot
Error Rate
Time Steps
x=14.45 y=1.49

9.2c)

In this exercise, we are using the beta distributions for each position with noise of 0%, 10% and 40% and we see that with the added noise, the cautious strategy robot also explores more positions than before. With 0% noise, only two positions were explored, while with 40% all 4 were visited.

In the graph, alpha is for 'black', beta is for 'white' tiles. For e.g. Position 1(α=11, β=1) shows the blue beta distribution and a high probability of the position being the color black.

For the adventurous robot strategy, we see that after introducing 40% noise it is exploring rather less than before with no noise.