COMP 4900 Assignment 4

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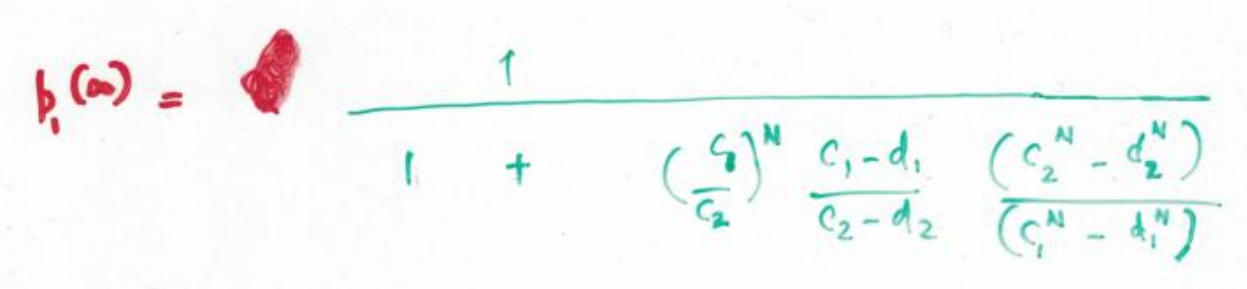
1.

Here are the results of the simulation:

Number of states required was found using binary search for an accuracy of 95%

Exact accuracy was found using the following formula.



Simulated accuracy was found using time and ensemble average, I ran 100 experiments, for every experiment I assumed convergence after 10,000 iterations, and counter 1000 actions after convergence.

c=[0.05, 0.7] Number of states required: 2 Exact accuracy: 0.9949 Simulated: 0.9951

c=[0.15, 0.7] Number of states required: 2 Exact accuracy: 0.9560 Simulated: 0.9583

c=[0.25, 0.7] Number of states required: 3 Exact accuracy: 0.9575 Simulated: 0.9570

c=[0.35, 0.7] Number of states required: 5 Exact accuracy: 0.9661 Simulated: 0.9647

c=[0.45, 0.7] Number of states required: 9 Exact accuracy: 0.9531 Simulated: 0.9535

c=[0.55, 0.7] Number of states required: ∞ Exact accuracy: 0.7999 Simulated: 0.8049

c=[0.65, 0.7] Number of states required: ∞ Exact accuracy: 0.57142 Simulated: 0.5775

For the last two cases, since c_{min} isn't ≤ 0.5 , reaching 95% accuracy is impossible even with infinite states.

2.

Using environment n=6 c=[0.98,0.99] for Krylov, and c=[0.49, 0.495] for Tsetlin, these are the results:

Exact accuracy using formula from question 1: 0.5154

Tsetlin with c= [0.49, 0.495] Simulated: 0.51974

Krylov with c= [0.98, 0.99] Simulated: 0.51704

We can see that Krylov with c_1,c_2 is the same as Tsetlin dealing with $c_1/2$ and $c_2/2$

3.

Here are the results of the simulation:

λ_R was found using binary search for an accuracy of 95%

Accuracy was found by simulating 1000 experiments and counting number of times P converges to action 1/2

c=[0.05, 0.7]	λ_R = 0.3928	steps: 13.262
c=[0.15, 0.7]	λ_R = 0.3622	steps: 17.251
c=[0.25, 0.7]	λ_R = 0.3163	steps: 23.326
c=[0.35, 0.7]	λ_R = 0.255	steps: 36.228
c=[0.45, 0.7]	λ_R = 0.2014	steps: 61.636
c=[0.55, 0.7]	λ_R = 0.1325	steps: 151.883
c=[0.65, 0.7]	λ_R = 0.0559	steps: 904.821