Wumpus World Final AI Report

Team name ATCG

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Write a brief description of the algorithms used for your Minimal, Draft, and Final AI, together with a table of each AI's performance on random caves in {4x4, 5x5, 6x6, 7x7}.

The minimal version uses a simple one right-side move to check whether the right-side position exists gold or not. Using a trigger of turn back, when the agent observes that there is no unexplored position, and it is not worth to go to the risk area which estimating value by function of hazard rate do not exceed the threshold, turn back would be triggered. Using BFS to optimize the and next move and turn back routing, it can save lot of move step compared without optimization.

I. Minimal AI

I.A. Briefly describe your Minimal AI algorithm:

It just goes right-side direction. If percept glitter, grab the gold and turn back to origin. Otherwise, do nothing and turn back.

I.B. Describe your Minimal AI algorithm's performance:

Cave Size	Sample size	Mean Score	Standard Deviation	99% Confidence Interval
4x4	2500	38.8	200.0	38.8±10.3
5x5	2500	19.0	147.6	19.0±7.6
6x6	2500	10.6	117.2	10.6±6.0
7x7	2500	13.0	126.7	13.0±6.5
Total Summary	10000	20.4	147.9	20.4±7.6

II. Draft AI

II.A. Briefly describe your Draft AI algorithm, focusing mainly on the changes since Minimal AI:

We have implemented the four status map to record position status. The first one is the map which map status is unknown, safe or danger. The second one records stench status. The third one records breeze status. The forth one records explored status of the map. According to the map status, it discovers the unexplored position iteratively and then label it to explored status.

Using a trigger of turn back, when the agent observes that there is no unexplored position, and it is not worth to go to the risk area which estimating value by function of hazard rate do not exceed the threshold, turn back would be triggered.

Turn back routing is to estimate values by function of hazard rate which means the occurrence rate of pit or wumpus when positioning at breeze or stench. Turn back evaluate the risk of dead between x-1 and y-1 in order to turn back to origin, so it would select a lower risk way.

II.B. Describe your Draft AI algorithm's performance:

Cave Size	Sample size	Mean Score	Standard Deviation	99% Confidence Interval
4x4	2500	214.1	454.2	214.1±23.4
5x5	2500	157.3	435.9	157.3±22.5
6x6	2500	129.0	433.2	129.0±22.4
7x7	2500	84.0	438.7	84.0±22.6
Total Summary	10000	146.1	435.8	146.1±22.7

III. Final AI

III.A. Briefly describe your Final AI algorithm, focusing mainly on the changes since Draft AI:

Using BFS to optimize the and next move and turn back routing, it can save lot of move step compared without optimization.

III.B. Describe your Final AI algorithm's performance:

Cave Size	Sample size	Mean Score	Standard Deviation	99% Confidence Interval
4x4	1,000	253.3	15.9	253.3 ± 1.3
5x5				
6x6				
7x7				
Total Summary				

IV. In about 1/4 page of text or less, provide suggestions for improving this project.

1. **More sophisticated scenario to kill wumpus**: This is when the agent has no safe places to go but agent already went through the stencil cells. Then, one thing we can do is to go the the stencil cell and find a good direction to shoot. That means, it may create new safe places for agent continuing.
2. **A better way to do the BFS search**: In our approach, we just consider the first order distance. To utilize it, we can consider more about the cost of turning.