

Wumpus World Final AI Report

Team name GameFactory

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I. Minimal AI

I.A. Briefly describe your Minimal AI algorithm:

Minimal AI only attempts to walk through the first row and snatch the gold unless it senses any kind of danger (stench or breeze). If stench and/or breeze is in the starting tile, the agent will immediately climb.

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

Cave Size	Sample size	Mean Score	Standard Deviation	99% Confidence Interval
4x4	1,000	60.9	247.7	60.9 ± 20.2
5x5	1,000	38.3	204.7	38.3 ± 16.7
6x6	1,000	40.9	211.3	40.9 ± 17.2
7x7	1,000	24.8	173.1	24.8 ± 14.1
Total Summary	4,000	41.2	209.2	41.2 ± 17.1

II. Draft AI

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

Draft AI uses a completely different implementation of Minimal AI. However, if stench and/or breeze is in the starting tile, the agent will still immediately climb. Agent explores the whole map in a DFS fashion, however, BFS is also used to calculate the shortest path from current tile to another tile. When there is no new tile to explore, agent will attempt to solve the world to see if it can convert some tiles previously marked as dangerous to safe, and then explore these tiles.

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

Cave Size	Sample size	Mean Score	Standard Deviation	99% Confidence Interval
4x4	1,000	232.7	424.5	232.7 ± 34.6
5x5	1,000	190.2	397.6	190.2 ± 32.4
6x6	1,000	165.9	381.2	165.9 ± 31.1
7x7	1,000	140.1	362.7	140.1 ± 29.5
Total Summary	4,000	182.2	391.5	182.2 ± 31.9

III. Final AI

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

Final AI is written using the implementation of Draft AI, many utilities are encapsulated, debug / panic functions are added to ensure stability. Different with Draft AI, if Agent senses stench at start, it will shoot the arrow to know where the Wumpus is. In other cases, when there is no new tile to explore, along with pit re-calculation described in Draft AI, agent will also attempt to calculate Wumpus's location and the shortest path to a tile (shooting position) where it can safely kill Wumpus if it still has the arrow. If Wumpus can be killed, the shooting position will be the last tile to for the agent to move to. After Wumpus is successfully killed, agent will explore other tiles which are previously locked by the Wumpus, hence getting a higher score.

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

Cave Size	Sample size	Mean Score	Standard Deviation	99% Confidence Interval
4x4	1,000	290.9	455.8	290.9 ± 37.1
5x5	1,000	219.9	419.6	219.9 ± 34.2
6x6	1,000	185.1	399.3	185.1 ± 32.5
7x7	1,000	150.7	375.2	150.7 ± 30.6
Total Summary	4,000	211.7	412.5	211.7 ± 33.6

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

- (1) We are using Python throughout this project. The debugging process is somewhat confusing. For example, when MyAI.py returned with an exception in some world, there should at least be a warning indicating that agent failed in world_xx.txt instead of printing "[ERROR] Failure to open file". It would be better if more specific exception tracing information could be given;*
- (2) Also, there should be a severe penalty (like, a score of -2,000) if MyAI.py failed in some worlds, instead of failing the whole tournament set with an average score of "nan", since there exists some obscure bugs that will only occur once in 30,000 worlds. It will also help to reduce project re-submitting after scoring;*
- (3) Other than those mentioned above, this is a really fun project! The score requirements for Minimal / Draft / Final AI are elegantly chosen and we truly enjoyed ourselves. Thanks for reading!*