

CS-171 Wumpus World Final AI Report

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I. In about 1/2 page of text, describe what you did to make your Final AI agent “smart.”

There are many factors that would classify our Final AI as smart. One important skill that we nailed down right away was the ability to return to the starting spot no matter where or how far the AI, itself, traveled. To do that, we made our AI keep track of which directions it had moved in so that, when the time came, it could retrace its steps back to the beginning. Another important quality of our AI's performance was its ability to react to its environment based on the precepts being fed to it. We made sure to program our AI in such a way that it would err on the side of caution when it came to proceeding forward in the game. With free, or open, spots (didn't return any precepts such as breeze, bump, stench) it was always designated to move forward. When given either a single or a combination of true precepts, we programmed it to turn around and try other roots, thus staying safe and keeping the overall score up. Another crucial detail we built into our AI was the fact that it kept track of whether the Wumpus was alive or not. Knowing the whereabouts of the Wumpus allowed our AI to make better decisions when coming across a spot with a stench. For example, if our AI came across a spot with a stench and the Wumpus was still alive (and we had already shot the arrow), it would turn around and head back in the direction it came, to search for another root around the potential Wumpus spot. However, if the situation was the same except the Wumpus was dead, our AI would know to proceed forward knowing full well there was no threat to it. Our AI knew how to turn around, try other routes, it knew when it was an inefficient time to fire arrow, and it knew when to give up searching for the gold and return to the start. When it came to searching, we implemented a depth-first search style of searching into our AI. However we made some behavioral tweaks here and there to account for certain situations. During the end of our build, we were able to modify our AI to return by using more efficient routes to get back to the beginning, thus cutting the amount of moves it took to return and increasing our overall score.

II. In about 1/4 page of text, describe problems you encountered and how you solved them.

We did encounter a number of problems throughout our experimentation with our AI. One of our biggest problems at the beginning was trying to find out when the AI should give up the search for the gold and return to the start. To solve this we tested different thresholds and kept track of the score while the game was going, and made it so that if the score ever got below the threshold, the AI would give up the search and make its way back to the start of the cave. Another problem we ran into was finding out when it was efficient to fire our arrow. In this game, you don't get any points for killing the Wumpus. In fact, your score gets lower for firing the arrow in general, so we wanted to limit firing our arrow until it was deemed necessary. We were able to rule out when to not shoot the arrow (such as when the Wumpus was in a pit) and came to the conclusion that it was only necessary to shoot the arrow once we came across a spot that ONLY returned True for having a stench.

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

There are many ways we believe that we could have improved our AI. One in particular would be to implement a better way of tracking the Wumpus. For now, we aren't keeping track of where we come across spots with stench, and we believe that if we do that, we can better gauge where the Wumpus is and where our AI can go in the game. We also believe, to improve this project as a whole, that when we run our AI on a full tournament set, we should be able to see which worlds we scored the lowest on, so that we can explore why we did bad in those worlds. I hated having to test each individual world on my own, when going through the tournament set, to see which of the worlds our AI actually did bad on. Overall, this was a fun project that we learned a lot from.