

Washington State University
School of Electrical Engineering and Computer Science
Fall 2020

CptS 440/540 Artificial Intelligence

Homework 9

Due: October 12, 2020 (11:59pm pacific time)

General Instructions: Submit your files as an attachment under Content → Homework 9 for the course CptS 440 Pullman (all sections of CptS 440 and 540 are merged under the CptS 440 Pullman section) on the Blackboard Learn system by the above deadline. Note that you may submit multiple times, but we will only grade the most recent entry submitted before the deadline.

For this homework, you will improve the agent from HW5 to handle additional challenges in the Wumpus world. I have posted my solution to HW5 (C++ and Python versions) on Blackboard Learn. You can start with my HW5 solution or your own. Specifically, your agent will need to handle worlds where there will always be a safe path to the gold, but that safe path may require killing the Wumpus and/or moving to a potential pit location. Your agent should do the following:

1. The agent should still implement the requirements from HW5.
2. In addition to the information maintained by the HW5 agent, the agent should also **maintain information about breeze and pit locations**.
3. If the agent does **not have the gold**, and there are **no remaining safe unvisited locations**, then the agent should do the following:
 - a. If the agent **knows the location of the live Wumpus**, and there is a safe location facing the Wumpus, then the agent should move there and **shoot the Wumpus**.
 - b. If the Wumpus is **dead or cannot be killed**, then the agent should **move to an unvisited location** that is not known to be unsafe.
4. You are encouraged to implement uncertainty reasoning so that the agent can determine the probability of a pit in a location. That way, if the agent has to move to a possible pit location, the agent can choose the location with the lowest probability of having a pit. This uncertainty reasoning capability is optional, but your agent's grade will be based on its average score on test worlds, and an agent that can reason about probability of pits given breezes will score better. At a minimum, if the agent dies from falling into a pit, it should avoid the pit in subsequent tries on the world.

Your agent should be implemented entirely in the Agent.h and Agent.cc files (for C++ implementations) or the Agent.py file (for Python implementations). You may also include an optional readme.txt file with any extra instructions for compiling and running your agent. Your agent should not require any user input. Your agent will be tested by copying only your Agent.h and Agent.cc files, or Agent.py file, into a fresh copy of the simulator code (that includes the search engine files from HW5), and compiling and running it on several test worlds. The size of the test worlds will range from 3x3 to 9x9, and your agent will have 10 tries on each world. Your grade will be based on satisfying the above requirements, good programming style, and your agent's average score on the test worlds.