
CSIS, BITS Pilani K. K. Birla Goa Campus
Artificial Intelligence (CS F407)

Programming Assignment 2

Total Marks: 15

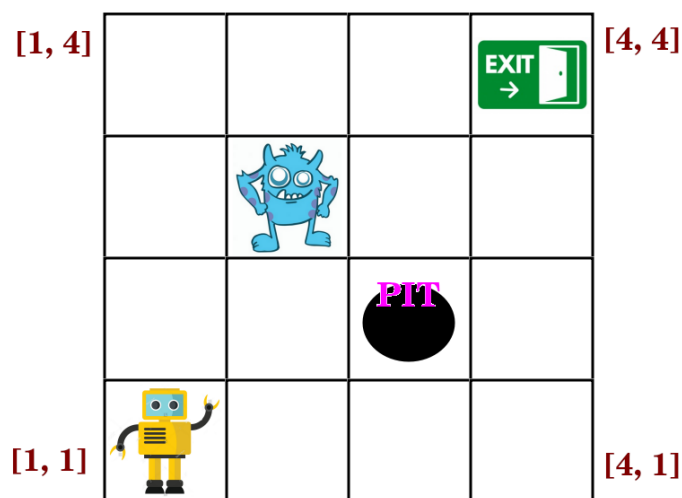
Submission Deadline: 9 PM on 06/11/2020 (Friday)

Each student must individually do this programming assignment. Your program must be written in Python and should run (without errors) on Python 3.6 or later. Contact the IC if you wish to use another programming language for this assignment.

Any form of plagiarism will result in -5 marks being awarded. Note that the deadline is **9 PM** and not midnight. Five marks per day will be deducted for submissions after the deadline. It will be your responsibility to submit the assignment well in advance and avoid unforeseen problems like power failures etc.

Question 1 (15 marks)

The figure below shows a Wumpus world containing one pit and one Wumpus. There is an agent in room [1,1]. The goal of the agent is to exit the Wumpus world alive. The agent can exit the Wumpus world by reaching room [4,4]. The wumpus world contains exactly one Wumpus and one pit. There will be a breeze in the rooms adjacent to the pit, and there will be a stench in the rooms adjacent to Wumpus.



Write a python program that uses propositional logic sentences to check which rooms are safe. The inference should be drawn using the DPLL algorithm. You may assume that there will always be a safe path that the agent can take to exit the Wumpus world. The logical agent can take four actions: Up, Down, Left and Right. These actions help the agent move from one room to an adjacent room. The agent can perceive two things: Breeze and Stench.

A sample program is given (“ROLLXYZ_FIRSTNAME.py”). Run the program and see the output. You must modify this program. Note: While evaluating your program, a different Wumpus world will be used. As mentioned, you may assume that there is exactly one pit and one Wumpus. Also, you may assume that there is a safe path that the agent can take to exit the Wumpus world.

- (a) (3 marks) Three marks will be awarded if you attempt the assignment and submit an original program.
- (b) (6 marks) Six marks will be awarded if the logical agent can successfully exit the Wumpus world using a propositional logic knowledge base. Show the sequence of rooms visited by the agent before it exits.
- (c) (6 marks) Six marks will be awarded for comparing the effectiveness of different heuristic techniques. The DPLL algorithm should use at least 3 heuristics. Count the total number of times DPLL function (see Fig. 7.17 in the textbook) is called as the agent finds a safe path to exit the Wumpus world. Compare how the number of calls to the DPLL function gets affected if we exclude one of the heuristics. You can put the results of your comparisons in the report that you will be submitting.

Option of easier assignment

In order to reduce stress, I may allow students to use SAT solver library for python. This would make the assignment a lot easier, because there will not be any need for implementing the DPLL algorithm. However, if you choose this option, a maximum of 7.5 marks will be awarded. You must first contact the IC if you wish to opt for the easier assignment.

Instructions for submission

- You must modify “ROLLXYZ_FIRSTNAME.py” file given.
- Don’t submit the Agent.py file. A different wumpus world will be used for evaluation.
- All your code must be written in the same program file (i.e. “ROLLXYZ_FIRSTNAME.py”).
- Run the given program (i.e. “ROLLXYZ_FIRSTNAME.py”) and see the output.
- Your submission should contain just two files : ROLLXYZ_FIRSTNAME.pdf (report) and ROLLXYZ_FIRSTNAME.py (program). You can zip the folder containing the two files. Name of the folder should again be ROLLXYZ_FIRSTNAME. Don’t submit any other file.
- You should modify the filenames to your own roll number and first name. Use capital letters in roll number.
- Run your program on another system (if available) to ensure that it does not give any error.
- Marks will be deducted if instructions are not followed.

- I recommend that first you implement the DPLL algorithm that uses at least three heuristics. Then use this program to draw inferences in the Wumpus world.
- Inform the IC if you notice any bug in Agent.py program.
- Contact the IC if you have a query. You may contact the IC if you are facing any difficulties. Don't postpone things for the last minute.