**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**

**DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS**

**Artificial Intelligence (BITS F444/ CS F407)**

**I Semester 2017-18**

**Programming Assignment-2**

**Coding Details**

**(October 3, 2017)**

*Instruction: Type the details precisely and neatly*

1. ID \_\_\_2014B5A70717P \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name *\_\_\_\_Vishal Golcha\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

1. Mention the names of Submitted files :
   1. align3.py
   2. driver.py
   3. out12.gif
   4. 2014B5A70717P.html
   5. 2014B5A70717P.docx
2. Total number of submitted files: \_5\_\_\_\_\_\_\_\_\_\_
3. Name of the folder :\_\_\_\_\_\_\_\_2014B5A70717P\_\_\_\_\_\_\_\_\_\_
4. Have you checked that all the files you are submitting have your name in the top?(yes)
5. Have you checked that all the files you are submitting are in the folder as specified in 4 (and no subfolder exists)?(yes)
6. Problem formulation
   1. State representation:

States have been represented using a 4x4 grid along with a 4x1 list for column moves.

* 1. Pseudo code of your successor function

At any point in time the the colm list has 4 values ranging from 0 to 4 .

Incrementing these columns gives my my successor state .

* 1. Terminal states generation process

checking terminal states using brute force as described by the assignment .

* 1. Data structure to store terminal states

There is no need to store terminal states , Storing them consumes unnecessary amount of memory , since after every move we have to consume the minimax tree

or alpha beta tree again we don't have to store the terminal states .

* 1. Method to access terminal states and corresponding utility values

A method util has been provided which checks the utility of the node based on it's depth in the minimax tree.

1. Minimax Technique details
   1. Node structure:

a class has been created which has a 4x4 grid that can be accessed by any class member . The node structure here is a class scoped 4x4 grid along with a 4x1 clom list.

* 1. Method to ensure the correctness of terminal test (describe in maximum 4 lines)

Brute Force .

* 1. Total number of nodes generated to play one game:
  2. Write the statistics here as asked

R1 = 1,62,349 R2 = 6289120 R3 = 16

R4 = 45.5321s R5= 50165.8880

* 1. Code status (implemented fully/ partially/ not done)

implemented fully .

1. Alpha Beta technique details:
   1. Explain the logic used for pruning (in maximum four lines)

If alpha exceeds beta at any point in time int the current state we do not access children further .

* 1. Total number of nodes generated to play one game

~21000

* 1. Write the statistics here as asked

R6 = 21719, R7 = 0.9723726053883532 R8 = 0.4452061653137207

1. Code status (implemented fully)

1. Comparative analysis

Fill in the following information based of 10 independent games

|  |  |  |
| --- | --- | --- |
|  | Minimax Algorithm | Alpha Beta Pruning |
| Average number of nodes created |  |  |
| Average time taken |  |  |
| Number of times machine wins (player M) |  |  |

1. GUI details
   1. Created the GUI (yes/ No):yes
   2. Have created it according to the specifications?(yes/No)yes
   3. Which module of Python is used for creating graphics? turtle
   4. Is this under the standard Python library or not?yes
   5. If not, why?
2. Graphics details:
   1. Is turtle graphics working fine for displaying the board and coins?

yes

* 1. How have you calibrated the board and accepted human input to play the game?

Using the cooridnate system and onscreenclick()

* 1. How are you showing the base line?

Not shown

* 1. How are you showing the move of the machine?

Blue square

* 1. How are you showing the move of the human player?

Yellow square

1. Compilation Details:
   1. Code Compiles (Yes):Yes\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Mention the .py files that do not compile:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Any specific function that does not compile:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Ensured the compatibility of your code with the specified Python version(yes/no)\_yes\_\_\_\_\_\_\_\_\_\_\_
   5. Instructions for compilation of your files mentioning the multi file compilation process used by you (We may use the replica of these for compiling your files while evaluating your code) just execute driver.py
2. Driver Details: Does it take care of the options specified earlier(yes/no):\_\_yes\_\_\_\_\_\_\_\_\_
3. Execution status (describe in maximum 2 lines) Working

1. Declaration: I, \_\_\_\_Vishal Golcha\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (name) declare that I have put my genuine efforts in creating the python code for the given programming assignment and have submitted only the code developed by me. I have not copied any piece of code from any source. If the code is found plagiarized in any form or degree, I understand that a disciplinary action as per the institute rules will be taken against me and I will accept the penalty as decided by the department of Computer Science and Information Systems, BITS, Pilani.

ID\_ 2014B5A70717P\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name:\_\_\_\_\_\_\_\_\_\_\_\_\_Vishal Golcha\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_3/10/17\_\_\_\_\_\_\_\_\_\_\_\_\_

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