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

Batch No. :

**DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS**

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

**I Semester 2018-19**

**Programming Assignment-3**

**Coding Details**

**(October 20, 2018)**

*Instruction: Type the details precisely and neatly*

1. ID \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2015B4A70631P\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Akhil Agrawal\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Mention the names of Submitted files :
   1. <filename.ext>Driver.py
   2. <filename.ext>MinMax.py
   3. <filename.ext>Alpha\_Beta.py
   4. <filename.ext>
   5. <filename.ext>
   6. <filename.ext>
   7. <filename.ext>
2. Total number of submitted files: \_3\_\_\_\_\_\_\_\_\_\_
3. Name of the folder :\_\_\_\_\_\_\_\_\_\_\_2015B4A70631P\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Have you checked that all the files you are submitting have your name in the top?(yes/no) 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/no)Yes
6. Problem formulation
   1. State representation:

Matrix(list of lists)5X11

* 1. Pseudo code of your successor function

action\_list=state.action()

if len(action\_list)==0:

return []

statelist=[]

for action in action\_list:

statelist.append(state.next\_state(action))

return statelist

* 1. Terminal states generation process (manual/ automated) . Also describe if it is one time generation of terminal states or you are generating the terminal states every time you reach next state.

Automated(2nd option)

* 1. Data structure to store terminal states (hash table or any other?)

Function

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

Using State Representation

1. Minimax Technique details
   1. Node structure:

Matrix

Player

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

If all coins of any one player are wiped out(other condition is not required which can be proved mathematically by PigeonHole Principle)

* 1. Are you limiting the depth using any heuristic to evaluate the approximate value of the state? At which depth are you deciding to return back?

Yes 8

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

R1 = R2 = R3 =

R4 = R5=

* 1. Code status (implemented fully/ partially/ not done)implemented partially(backend is complete but Gui has some problems like Threading etc )

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

if v > maxi:

# print(v, ret, "test1 min")

v = maxi

ret = action

# v = min(v, maxi)

# ret = action

if v <= alpha:

# print(v, ret, "test2 min")

return v, ret, num\_nodes,depth

# if beta > v:

# beta = v

beta = min(beta, v)

if v < mini:

# print(v, ret, "test1 max")

v = mini

ret = action

# v = max(v, mini)

# ret = action

if v >= beta:

# print(v, ret, "test2 max")

return v, ret, num\_nodes,depth

# if alpha < v:

# alpha = v

alpha = max(alpha, v)

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

R6 = R7 = R8 =

1. Code status (implemented fully/ partially/ not done)implemented partially(backend is complete but gui has some problems)

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? tkinter
   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?
   2. How have you calibrated the board and accepted human input to play the game?

yes

* 1. How are you showing the board?

grid

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

Swapping out canvas and reforming canvas

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

Swapping out canvas and reforming canvas

1. Compilation Details:
   1. Code Compiles (Yes/ No):\_\_\_\_\_\_\_\_\_\_\_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)\_\_\_\_3.6.0(Please accept it, I don’t know about your policy regarding this)\_\_\_\_\_\_\_\_
   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)

#human\_action is feftet of initial and final position and length of jump

#assume human don't play faulty move

Eg-: 1 1 2 2 1

4 6 3 5 1

Format=(initialrow,initial column,final row,final column,type1/type2) to be entered in entry box ‘e’ (row no and column no start from top with 0)

1. Driver Details: Does it take care of the options specified earlier(yes/no):\_\_\_yes\_\_\_\_\_\_\_\_
2. Execution status (describe in maximum 2 lines)

Reaches terminal state or can be limited to 15 moves by uncommenting line 68 and line 135 in Driver.py

1. Declaration: I, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Akhil Agrawal\_\_\_\_\_\_\_\_\_ (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\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2015B4A70631P\_\_\_\_\_\_\_ Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Akhil Agrawal\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_20/10/2018\_\_

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Should not exceed four pages