Lab3: Connect Four

Heuristic

So basically, we have checked conditions in four directions namely horizontal, vertical, diagonally left to right (“\”) and diagonally right to left (“/”). In each direction we are checking following conditions and assigning some values to it accordingly.

Conditions:

(Assumption: E=empty i.e. blank and ▉ = filled with player)

(values written will contribute to the total cost of evaluation function)

1)4 blocks:

a) Checking if there are continuously 4 blocks of same colour in the state so assigning max value (100).

b) ((▉▉ E ▉) or (▉ E ▉▉)) We have considered this case also as then ai should colour on empty spot by assigning it a significant good value(integer) which will increase its wining probability(100).

2)3 blocks:

a) checking if there are continuously 3 blocks of same colour in the state so assigning max value.

b) ((▉▉▉ E) or (E ▉▉▉) ➔ (E ▉▉▉ E)) assigned this a good

value and considered this situation as if these state occurs the ai should play at empty spot only.(increasing value by 1)

3)2 blocks:

a) checking if there are continuously 2 blocks of same colour in upcoming state.
b) (E ▌▌ E) considered this situation as then ai will focus on making its move connecting 3 blocks.(0.01)

4)1 block:

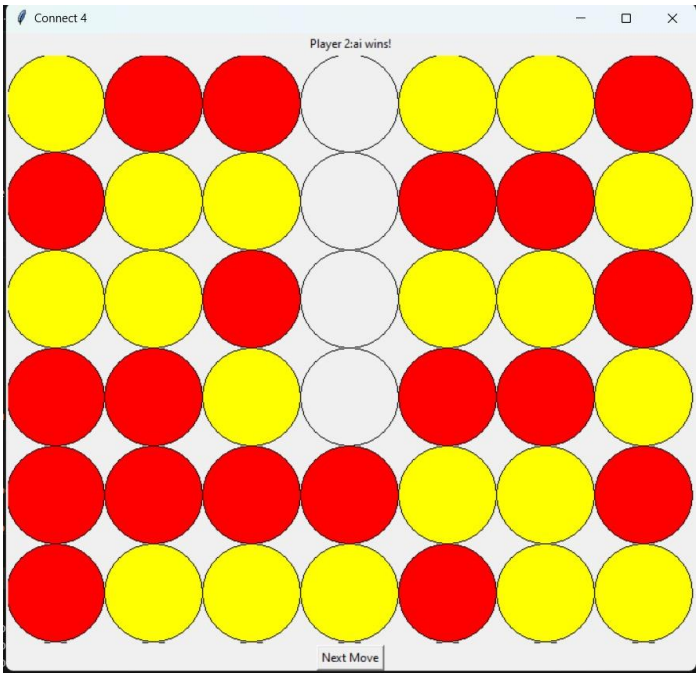
a) checking if there is1 blocks of same colour in upcoming state and assigning a small value as compared to 3 and 4 blocks considered. (0.0001)

Time Constraint

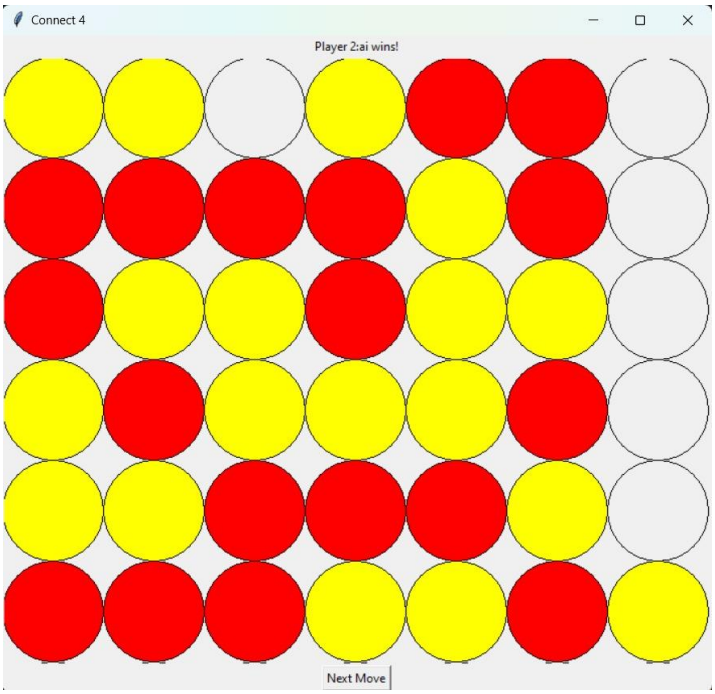
	Alpha-Beta Pruning	Expectimax
Depth 3	Less than1sec	Less than 1sec
Depth 4	Less than 1sec	Less than 1sec
Depth 5	(1.5 to 2) sec	5 sec
Depth 6	7sec	Between 25 to 30 sec

Alpha Beta Pruning:

Depth 5: player 2 ai wins



Depth 6: player 2 ai wins



AI vs AI

In AI vs AI, player 2 Ai is winning. So, the player ai which plays first does worst in general. For e.g. in below shown photo player 1 ai plays first and then player 2 ai plays