AI Report

Heuristic or The Evaluation Function -

Just for now, the evaluation function we made is working on an idea which is simple but fast. It keeps a count of how many contiguous series of cells are in the player's favour. And put separate weights for the series. A series of 4 is having a very high value, the series of 3 is having lower value and similarly going lower for series of 2 and 1. But the series of 4 is much much higher than the rest. Similarly we are keeping the count of serieses of the opponent. And the player who's making the move, its utility is the weighted sum of the serieses with its frequency, minus lambda times weighted sum of the serieses with its frequency of its opponent. And here's a catch. After trying and testing, we found that the lambda should be big enough for the ai to work properly. As its motive is not just winning, but also not letting the opponent win. But still how much should the lambda be? At Least it should be 1 more than the depth the algorithm is traversing. This can be explained by taking an example. Let's take lambda to be 1. That is, it's just doing a weighted sum of serieses of player's minus its opponent's. Now if a situation comes where the algorithm going till a depth D finds that a move can lead it to make 2 or 3 contiguous series of 4 and the opponent just 1 series of four. It will return this move assuming the player will be winning. But what if the opponent is able to do this series before the player is able to. If the opponent makes the series of four before the player, it doesn't matter if the player made how many series it made, the opponent will win.

Max depth explored as function of time -

For alpha-beta-move -

time(s)	1	4	12
Max_depth	5	6	7

For expectimax-algorithm -

time(s)	1	2	12
Max_depth	4	5	6

Thus we can see the advantage of applying alpha-beta pruning. In alpha-beta-move, time taken to explore the tree upto depth 6 is 4 sec while that in expectimax is 12 sec as we are exploring all nodes to compute weighted average.

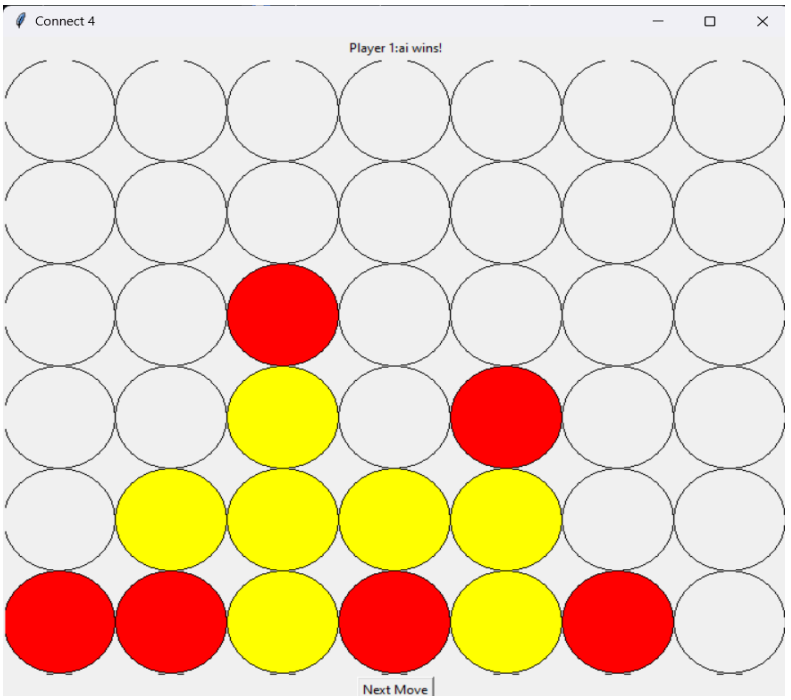
See next page

AI vs AI -

If the AI player plays against itself, the player who goes first does better always.

For example -

Result of AI vs AI for depth limit 5 (run on my machine) :



Result of AI vs AI for depth limit 7 (run on my machine) :