

CSL333
Assignment 5 (Allconnect(n, m, k))

To solve the problem, we implemented basic minimax tree with alpha beta pruning. Every node of the tree represents a particular state of the board and contains information like the configuration of the board, alpha value, beta value and the value which is backed up from its children nodes.

Utility function chosen for the tree is as follows:

It basically calculates the difference between how many times I have connected 'K' and how many times the opponent has connected 'K' and the goal is to maximize this function by also taking care of the turn number in which the player has connected K. So if a board is passed as an argument to this function it will essentially return the difference of the scores of the two players at that state of the board. Later this function was improved to also incorporate the states of the board in which the opponent has not yet connected K but has connected less than K. In these cases weights are given to these states, for e.g., if only K-2 are connected (and the remaining 2 in that line are empty) then it has a weight of 2, if K-1 are connected (and the remaining 1 in that line is empty) then it has a weight of 4 and if K are connected the the weight is 8 so the total value of this utility function would be as follows:

$$(n1 * 8) + (n2 * 4) + (n3 * 2)$$

where,

n1 is the number of times K have been connected together

n2 is the number of times K-1 have been connected together and next place is empty

n3 is the number of times K-2 have been connected together and the next two places are empty

When K have been connected together it has to get the highest weight because as a point has already been made now, while is K-1 have been connected then it has a relatively lower weight because the opponent is less likely to make a point here because we can block it by placing a move in the place next to the connected K-1 which is empty and similarly when K-2 are connected the opponent has still a lower chance of making a point.

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