

## ECS 170 Winter 2017

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4. The successor function that we are using for the alpha beta pruning minimax is the same as the one that we used for the regular minimax. Restating the successor function: for each branch (possible move), we are going to go through all possible “line of 4” (69 of those) and see how many of the player’s coin and opponent’s coin in each of those “line of 4”. The more the player’s coin in the line of 4, the greater the value, and if a “line of 4” contains both the player’s and the opponent’s coin, the value of that line would be zero because it’s blocked hence has no potential to be a four in a row.

To maximize the cut in alpha-beta pruning, we specify the index ordering of the children to be explored as

**3, 2, 4, 1, 5, 0, 6**

This means that the closer the index to the middle column, the higher probability that the dropping point will have a better value (from both min and max player perspective), and the middle index being the one who has the most probability to be the have the best evaluation value.

The reason why the middle column is better is because it **generally** has the greatest capability in building a “line of 4” in all orientations, i.e. horizontally, vertically, right-diagonally ( $\backslash$ ), and left-diagonally ( $/$ ). As a result, the value of the whole board will generally be better than the other.

And the reason why we consider the leftmost and rightmost column (index 0 and 6) as the worst because they do not cover the right-diagonal ( $\backslash$ ) and left-diagonal ( $/$ ) win conditions at all. Therefore, the value of the board will generally be less than the other.