

# CSL333 Homework 2

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## 1 Broad Idea

MinMax with Alpha-Beta Pruning and Cut-off.

## 2 Brief description

- Running a MinMax with just Alpha Beta Pruning isn't feasible on 8x9 AllConnect Game, so a depth limited approach is adopted with depth being decided on the time left for the player at each move.
- The evaluation function uses multiple features, with weights being assigned to them on the basis of intuition and statistical test on playing with other players.
- The features include:
  - The difference between the k-length sequences of the bot and the opponent's.
  - The difference between the unobstructed (k-1)-length sequences of the bot and the opponent's.
  - The difference between the unobstructed-from-both-side (k-1)-length sequences of the bot and the opponent's.
- Also, the Player essentially has three modes, Attack, defense and Neutral. At the start, it plays aggressively, turns neutral in the middle and at the end plays defensively.

## 3 Implementational Details

- The MinMax is implemented in a recursive way with its depth being controlled by a logarithmic function, which is again dependent on the time left for the bot.
- The Bot Play-mode is implemented by giving weights to the difference in the features of the bot and the opponent's sequences.

## 4 Running Time

- Random Restart =  $O(B \cdot R)$
- One iteration of beam search =  $O(B^2 + \min(B, R, C) \cdot B \cdot R)$

## 5 Why This?

We tried including more features like unobstructed (k-2), (k-2) length sequences but they deteriorated the performance of the player. So, we stuck with the configuration that is presented before you.