The goal of connect four is to win by placing four consecutive pieces of the same color. Being that the gameboard is 7x6, we can traverse through four planes (horizontal, vertical, left and right diagonal) and count the number of consecutive pieces with the game color. By giving different weights to larger consecutive rows (-infinity for losing, and +infinity for winning), we prioritize longer rows to shorter ones (Placing a piece and forming 2 rows of 3 is better than placing a piece and only forming 1 row of 3). However, blindly placing values to consecutive pieces ignores the “threat” of a victory. For example, if our opponent has a diagonal 3-in a row, and the winning column has no pieces than its a lower threat than if it were a single move away. The function must also keep track of the opponents possible moves, noting if they are in a better state to win. By subtracting our values from that of the opponents, we can generate an overall score, prioritizing moves that place our AI at a lower risk of losing. This function could also be readily optimized by limiting the search window, and caching pieces.

Keys to perfect checkers (assuming both parties are perfect):

* Must start in middle (starting on either side of the middle results in a draw and the outer edges a loss)
* Should never play under an opponent winning positions

A simple way to view this is as weighted sum of various factors that influence the state of the game:

f(P) = 9(A-A') + 3(B-B') + 1(C-C') + 81(D-D’) - 3(E-E’) - (A-A’+); weights currently estimates(^3), will finetune

in which:

* A,B,C are respectively the number of 3-in-a-row, 2-in-a-row, and single.
* D is the sum of directly playable winning positions
* E is the sum of rows that cannot win
* M is

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In this example it is red’s turn and the evaluation function is:

f(P) = 9(1-1) + 3(6-6)+1(7-7)+9(0-0)-3(1-1) = 0