

Name: SOLUTIONS

Static Evaluation Functions Exercise

Examine the game tree below. The tree has height 2, but part of it is not shown, due to space limitations. The maximizing player “Max” is X. It is Max’s turn to play. Each leaf node shown may or may not need evaluation; if needed, assume the provided number gives the static value of the node.

Compute the static value of each of the eight leaf nodes shown. Compute the backed-up value of each of the two internal nodes for which enough data is available. Use the following static evaluation function. $e(n) = f_1(n) + 10 f_2(n) + 100 f_3(n)$. Here $f_1(n)$ counts the number times that there is a line containing an X alone minus the number of times there is a line containing an O alone. Also, $f_2(n)$ counts the number of unblocked instances of two Xs in a row, minus the number of unblocked instances of two Os in a row. Finally, $f_3(n)$ is the number of 3-in-a-row instances of Xs, minus the similar number of Os. Usually $f_3(n)$ is either 0, 1 or -1. As an example, $f_1(\text{root}) = 3$, $f_2(\text{root}) = -1$, $f_3(\text{root}) = 0$, and therefore $e(\text{root}) = -7$.

