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Othello Random Strategy

AI Strategy:

The strategy is a basic alpha beta pruning minimax that uses an elaborate scoring method to rate different board situations. Within the scoring method, there are 6 categories, each with their own methods that contribute to a board’s holistic score: mobility (m), count (c), territory (t), shots (s), frontier (f), and border (b).

* Mobility is simply the difference between the number of moves the player and their opponent can make. This is valued highly in the beginning of the game, but less later.
* Count is the difference between the number of tokens the player and their opponent have. This is valued very low (negative) initially, but is one of the biggest contributors to the score later on.
* Territory is the value of the board spots under the player’s control, scored by a weighting table that assigns each spot a value. This is weighted highly throughout the entirety of the game.
* Shots is the term I used for edge building from a corner (because the lines shoot down the borders). This counts how many tokens there are in a row are starting from a captured corner. This is weighted moderately high in the beginning, and less towards the end.
* Frontier is how many tokens you have on the frontline of the expansion. This was determined by counting how many tokens are next to blank spots, and ideally more of your tokens are on the inside than on the frontier. This is weighted very high initially, and fairly low (but not negative) in the end.
* Borders is how many tokens you have on the middle 4 spots on each border edge. I’ve found for my strategy that having tokens here is not ideal in the beginning of the game, as it makes capturing corners easier for the opponent, and it also makes sweeping up an entire edge easier if they do somehow get a corner. I weight this very high for the first half of the game, but it doesn't matter much towards the end (as the borders are inevitable conquered anyway towards the end)

The minimax method also checks the state of a game when the game is over (no more moves for either player) and ranks them extremely high when there are no opponents on the board, very high when 75%+ is taken, high when 50%+ is taken, and extremely low when less than 50% is taken.

One strategy that I tried implementing was a running log of all of the boards that I’ve scored (with their scores of course) throughout all of my games that could be transferred between games so that scoring would over time be mostly just looking in my dictionary of boards and their scores and less of doing complicated scoring algorithms, but given the sheer number of boards that were scored each game, storing and accessing them proved to be too much of a hassle, so I compromised and kept a dictionary of boards I had scored in the current game only, which was wiped at the end of each game (because I didn't implement any storage system for them).

I also had a few extra heuristics that I used for a while and then got rid of because they didn't help my performance much and took valuable time away from going deeper. One example of this was a heuristic that counted the number of full lines (rows of columns) I had and boosted the score accordingly. This seemed like a good idea, but lines not along the edges aren’t very stable so going for them often times ended up hurting me, and for any situations where a move to secure a whole line would be beneficial, the move was already scored highly by the other comprehensive scoring methods.