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AI Games
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Not Tic Tac Toe (Mancala)

1. Estimated Branching Factor. Because of mancala's nature of having 6 set positions per player, the branching factor remains fairly constant at an estimated 4-5 branches. The very first moves, the branching factor is always 6, because there are six choices of moves. Once a player chooses a move, that pit becomes empty, and unless it is refilled by the opponent immediately, the next turn will have 5 choices. It is fairly common for the opponent to fill the player's wells, and will keep the choices near 5-6 for most of the game. However as more stones are placed in the stores, it becomes harder to refill wells and the number of choices per player diminishes near the end of the game. So, the majority of the game will involve about 5-6 branches, which diminishes rapidly near the end game, for an estimated average of 4-5. Using 5 as the average branching factor d, and a capped depth of 5 (the default ply in this game), the time complexity will be O(b^d) or an average of 5^5 = 3125 per move.
2. Estimated Search Space Size. The space complexity of the minimax algorithm is O(bm) or in this case, 5*5 = 25. Increasing the ply will drastically increase time complexity, but only linearly increase space complexity. Both of these could be improved by implementing alpha-beta pruning, which would reduce the branch factor by one half on average.