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Artificial Intelligence

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Final Project: Mini Camelot

Runtime instructions:

In order to run my project, you must use Xcode to open up the “Camelot\_cmd.xcodeproj” file, then hit “Run”. It is a command-line based tool that will prompt the user and print the board all on the console. First, you must pick a difficulty (from 1-3), then you pick if you want to go first or not (by typing “Y” or “N” into the console). After that, each time you have to make a move, you first enter the alphanumeric coordinates of the piece you want to move, followed by the coordinates of the tile you want to move it to. When the game is over, the winner is printed onto the screen and the program exits.

Design:

My algorithm design is an alpha-beta pruning algorithm that uses a cutoff test for a predefined maximum depth (determined by the user picking a difficulty). If a state has reached the maximum depth, then it returns the utility value of its current board setup; this value is calculated by the function , where blackPiecesLeft is the number of black pawns left on the board, whitePiecesLeft is the number of white pawns left on the board, blackDist is the minimum distance of a black pawn from the castle, and whiteDist is the minimum distance of a white pawn from the castle. In this way, I am able to factor both the ways a user can win Mini-Camelot into one function. The distance is weighted slightly more (0.6 in total vs. 0.4), because in my experience of playing the game I saw that playing aggressively and trying to capture pieces usually just ended up in a zero-sum gain for both players.

I made different difficulties for the game by letting the difficulty the user selected correspond to a different maximum depth for the cutoff test; if the user picked ‘1’, the depth was 2, if they picked ‘2’, the depth was 3, and if they picked ‘3’ then the depth was 4. This works as a difficulty test because if the computer is able to see farther into the future it is able to better evaluate moves as it is forced to make them.