Project Proposal 1: Heuristic Machines for the Game of Mancala

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Background

Mancala is a two player game in which players attempt to maximize their number of points by placing stones in their home, the long bowl on the player's right. They do so by picking up the stones in one of the bowls facing them and placing them, one at a time, in sequential bowls moving toward their home, and then loops around to the other player's side in a counterclockwise direction, skipping the other player's home bowl. If the last stone is dropped in a non-empty bowl, the player picks up the stones in the bowl their last stone went in and continues. If the last stone lands in a player's home bowl, the player can select a new bowl of stones and start again. The player's turn ends when their last stone lands in an empty bowl. If the last stone lands in a bowl on the player's side, the player picks up the stones in the bowl across from it and deposits them in their home bowl.

Humans tend to play this game heuristically, opting for moves that allow them to end their turn in their home bowl or that will earn them many points. For example, if a player is going first, the third bowl from the left is the ideal opening play as it allows the player a second move.

Project Goals

This project involves building the infrastructure for a game of mancala and allowing a human to play, as well as a series of machines to play the game. The first machine will pick its moves randomly. The second machine will follow a series of heuristics based on the strategies

humans use to play. The heuristic machine will be tested against the random machine. Finally, the heuristic player will be run through a genetic algorithm attempt to discover any additional advantageous strategies. Any strategies found will be incorporated into the final heuristic player.