CS5346: Fall 2018

Project 2: Kalah

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Table of Contents

1. Introduction:

Mancala is one of the oldest known games. It and its many variations are still played in many parts of the world. It is conceptually and materially very simply. However, the strategy can still be very challenging. This makes it very well suited to the exploration of of two-player searches implementing intelligent evaluation functions.

Kalah is a variation of Mancala which was developed in the mid-20th century for American audiences. The Kalah game board gives each player a certain number of holes (or houses) and starts with a certain number of stones (or seeds) in each hole. A standard notation was introduced to describe versions of Kalah with varying numbers of holes and stones. Generally Kalah(m, n) describes a game being played with m holes per player and n stones per hole. This project has chosen to focus on Kalah(6, 6), meaning that all games described in this project are being played with with 2 players, 12 holes, 72 stones, and 2 kalahs (or stores). The use of each of these will be described in the following section.

Kalah(6,6) has been solved by computer systems. This means that a player who has the first move can guarantee a when if they play an optimal strategy. However this optimal strategy depends on the existence of a full game database. Any turn of Kalah can have up to 6 legal moves, turns can repeat, and the game can last for more than a dozen turns. This means that the full tree generated by Kalah can be extremely large. In order to avoid the large expenditures of space and time which are required by full game databases, this project will attempt to use smart searching algorithms which can limit their search depth to a manageable level while still producing a near optimal result. In order to allow the system to judge the optimality of an unfinished game, a pair of evaluation functions have also been developed.