

CS152 COURSE PROJECT – SPRING 2012

Group Members:

1. Pratyush Nalam, 110050045
2. Rohan Prinja, 110050011
3. Kandarp S. Khandwala, 110050005

Title of Project:

Chinese Checkers

Brief Description of the Problem:

Introduction

Chinese checkers is a turn-based game played on a hexagram-shaped board and can be played by two, three, four or six people, playing individually or in teams.

The board basically is a large set of slots or spaces in which the “pieces” can fit. Each player starts with ten pieces of his chosen colour and places it at a corner of the star. The objective of the game is to be the first to race one’s pieces across the hexagram-shaped board into “home” – the corner of the star opposite one’s starting corner. The game involves strategizing one’s moves and each game is different. There is an element of surprise and unpredictability in every game.

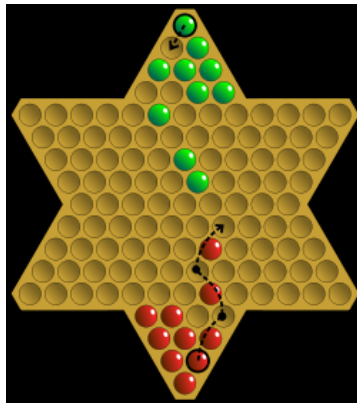
In our project, two, four or six humans can play with each other or one human can play with the computer.



**A typical Chinese checkers board with six players.
Players place ten pieces of a chosen colour on each
corner of the star**

Gameplay

Players take turns moving a single piece, either by moving one step to an adjacent unoccupied space in any direction, or by jumping in one or any number of available consecutive hops over other single (friendly or enemy) pieces. Hopping cannot be combined with single step moves – a move is either of the two. Moreover, it is not mandatory to make the maximum number of hops possible. There is no capturing so all pieces remain active on the game board till the end of play.



This diagram illustrates the two types of moves

- a. Single step (green)**
- b. Multiple hops (red)**

Strategy

A basic strategy is to find the longest “hopping” path that will lead to the opposite corner of the star before the opponent does so while simultaneously ensuring that the pieces do not get too “scattered” out all over the board, with some remaining far behind and some close to the “home” zone. Advanced strategy involves hindering the opponent in addition to helping oneself finding hops across the board.



Bad strategy by isolating pieces

Basic idea of the solution:

The game involving a human and the computer is our main area of interest. Our project will mainly focus on writing the algorithm so that the computer wins against the human. The computer has to strategize and find the longest “hopping” path to reach “home” and also block the opponent’s path in order to help itself.

Hence, we will need to implement a heuristic approach to the problem in order to decide the next move based on the current board conditions. Moreover, to ensure timely moves are made, pruning the tree of possible moves will be done based on certain principles. Lastly, a layered approach (i.e. keeping the various possible move-making functions separately useful) will be required to split the coding between the group members appropriately.

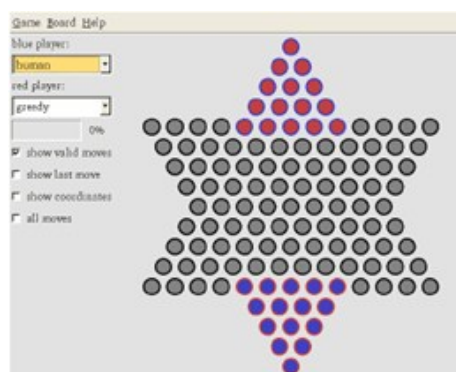
Sample input/output:

Input

First, the user chooses whether he will play against humans or against the computer. If it is against humans, an option to choose the number of players will also be provided. In the case of the computer, it is always a two-player game (human v computer). After this is done, the user(s) will choose their colour with which to play the game and also a difficulty level for the AI. Subsequently, the game board will appear and play will commence. Furthermore, a “Pause” feature will be provided to pause the game or abort and return to the starting screen.

Output

Result stating who has won the game (and second, third etc.). Additionally, the user will be prompted whether he wants to start a new game or quit.



A sample GUI which can be taken as a starting point

Resources:

The racket/gui/base library will be required. Facility for capturing the mouse and keyboard input will be done using functions of the gui/base module itself.

Discussion:

To limit complexity of the project to reasonable levels, it was decided that a game in which the computer is playing will involve only two players. However, there is scope to extend the level of complexity. Further versions of the game can involve multiple players playing against the computer or even multiple computer opponents for the player(s). Also, more number of pieces can be included in a two-player game (typically, two player games are played with 15 or 21 pieces).