CS 4600 Project Specification

By Barton T. Stander

Fall, 2012

Overview - I intend to make a web page that helps a chess player evaluate and study end games involving 5 or fewer pieces. It turns out that the “minimum moves to checkmate with 6 or less pieces” has already been solved, and I have personally already written a solver for various combinations of 3 and 4 pieces. My project consists of two parts:

1. Enhance my solver as much as possible
2. Package my solver with a web page that allows the user to graphically and interactively do several tasks, as described below.

Part 1 – Enhance my solver. Note that my solver takes as input a description of where various pieces are on an 8 by 8 chess board, as well as who’s turn it is. It outputs who can force a win (if anyone can), and the minimum number of moves to checkmate, assuming both players make optimal moves. It also reports if the pieces are in an illegal position.

My solver currently works for these combinations of pieces:

- Black King versus White King and Queen
- Black King versus White King and Rook
- Black King versus White King and two Bishops

Core Tasks this semester:

- Add Black King versus White King and Pawn, completing all sets of 3 pieces that can force a mate.
- Add Black King versus White King, Bishop, and Knight
- Add Black King and Rook versus White King and Queen

Hope Tasks:

- Generalize so the above combinations work when Black has the material to mate White
- Support all combinations of 4 pieces

Dream Tasks:

- Support all combinations of 5 pieces
Part 2 – Create a graphical, interactive web page that hooks to my solver.

Core Tasks:

- The web page will display an 8 by 8 board (two dimensional), and a switch to indicate and change whose turn it is.
- In SETUP mode (which may be the only mode), the web page will allow the user to place pieces on any of the 64 squares.
- As the user drags pieces around, a text message will live update with messages such as “White can force a win in 7 moves” or “Neither player can force a win” or “Stalemate” or “Illegal position” or “The current set of pieces is not supported.”
- These messages can be toggled ON or OFF.

Hope Tasks:

- Allow multiple modes, with a switch to indicate and to change the current mode between SETUP and PLAY
- PLAY mode allows the user to practice, for example, mating the computer with two Bishops.
- In PLAY mode, the user can specify whether White is to be played by human or computer, and whether Black is to be played by human or computer – in any combination.
- The computer makes an optimal move after about 2 seconds (maybe determined by a slider)
- The user makes a move by clicking on a FROM square, then on a TO square. If illegal, provide some kind of feedback, and restore the previous position.
- The messages still work as explained above, if toggled ON.

Dream Tasks:

- Add a LEARN mode that displays more information such as all squares the FROM piece can legally move to, all optimal squares, all squares that are currently covered by “check”, etc.
- Multiple Undo and Redo
- Save and Load
- Print
- Make a 3D board and 3D pieces, viewable from any angle or position

(Pretend like there is a meaningful picture here)