Fall 2021 **COSC 3P71 Introduction to Artificial Intelligence: Final Project**

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Term Project: Implementing a Chess program, with a game tree-based AI
Assigned on: Thursday, September 30th, 2021
Due Date: NOON, December 17th, 2021 (NO LATES)

Your Task:
(ATTENTION: If you are taking COSC 3P98, you should not be paired with another student taking COSC 3P98 for this project. The names on the class list for 3P98 and COSC 3P71 will be compared, and a zero mark will be awarded if both are taking COSC 3P98)

Working alone or in a group of two implement a chess-playing program whose system requirements are as follows:

- The program should respect the rules of chess, for example,
  - the movement of pieces (including castling and *en-passant*),
  - piece promotion, check
  - checkmate
  - stalemate

  Please review the rules of chess to verify your understanding of the game!

- You can implement your system on any platform and language you want as long as it is available in our labs (within reason). You may have to show me/TA it works in some cases.

- The program must use a game tree search scheme with *alpha-beta pruning*. Furthermore, the program should permit user-supplied control parameters, for example, the depth of search.

- *Put effort towards designing an effective board evaluation function.* You should research the literature on computer chess to find strategies used by other systems. You can borrow ideas from the literature (properly acknowledged in your report). I also encourage you to try your own ideas!

- The program should interact with a human player. Both human vs human and human vs ai options should be available. Moves should be given via board coordinates. At the minimum, the program should dump out the current board as an ASCII table (e.g., upper case = black, lower case = white, space = "-",). Although a graphical user interface is not required, an effective GUI will be positively considered during evaluation.

- Your program should permit any board setup to be used initially (This is good for testing purposes).

- An option is that your program should dump out the game in terms of a standard chess output text file.

Along with your program, you will also create a 6-8 page document that clearly describes the use and design of your system. This document does not need to be formal, and LaTeX formatting is not required. At a minimum, the following content should be present in your report:

- A brief introduction into what you have done for the project.
- Detailed instructions for how to compile, run and operate your program.
- An overview of your implemented system (feel free to point on anything about your design that may not be obvious to a marker/user)
- A detailed description of any implemented heuristics you used, as well as any other design choices implemented to improve AI performance.

Your submission will be done electronically through Sakai. Include all source code, an executable version of your program, and your project write-up. Detailed instructions for compiling and executing your program should be included in either the write-up or in a separate README file with your submission (failure to include sufficient operating instructions will result in a loss of marks). Be sure to include any references you used during your research in your write-up.

Note: If there is interest, we could set up a 3P71 Chess Tournament for all the programs implemented. Prizes for the winner!