Zachary Johnson

John Margis

481-04 Team 8

CPSC 481 Assignment 5

Our project was to implement an AI opponent within a game of checkers. We wrote the code for this project in Python due to Python’s AI libraries we can utilize.We ended up using the Minimax algorithm for the AI and using Tkinter for our GUI. We currently have a fully functioning AI that will attempt to beat a player at checkers. The game is fully playable through a GUI built with Tkinter.

We store the states of our board in a 2D array with values corresponding to each piece. A 1 or -1 for a regular piece and a 2 or -2 for a king. Using the minimax algorithm we generate a tree of every future state based on the current moves available for the player and the AI. The weight of each state is calculated by determining the weight of each piece on the board. We decided to make regular pieces worth 1, pieces on the edge worth 2, kings worth 3, and kings on the edge worth 4. Pieces on the edge are worth more because they cannot be jumped over and captured by the opponent. Kings are worth more because they are able to move backwards. The total weight is calculated by added up the values of each of the AI’s pieces and subtracting the value of each of the player’s pieces. The minimax algorithm will then traverse the tree in a breadth first manner and check the total values of each of the states and pick the most optimal one. We decided to limit the amount of layers of the tree to 3 to reduce runtime and let the game run in an acceptable time frame. However, the game will still slow down as the game progresses.

All of the code is our contribution except for the tree structure implementation (lines 5-18 of the code), and the code to set up and draw the board section of the GUI. The tree implementation is found at <https://stackoverflow.com/a/28015122>. The board implementation is found at <https://stackoverflow.com/a/15148476>. The programming of the game’s rules and the implementation of the algorithm including calculation of values, storing of board states, and tree traversal is our original contribution. We would estimate our baseline to be around 95.

Zachary contributed 50% to the project and John contributed 50% to the project.