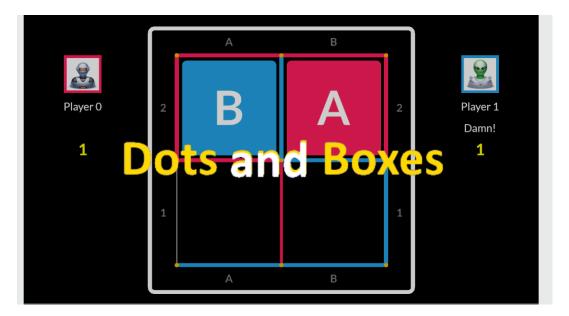Yuyan Ke
yk2822
COMS 4995: Parallel Functional Programming
Fall 2021
Project Proposal

Dots and Boxes Minimax Algorithm

Background:
Dots and Boxes is a classic two player game on a 2*2 square grid with empty boxes. (Note the size of the grid could change to increase difficulty.) Each player takes turns in drawing one side of a free box. The player that draws the last free side of the box owns that box, and if the last side is shared between two boxes, then that player takes both boxes and has a score of 2. At the end of the game, the player with more boxes wins.

Algorithm:
This game is like the two-player zero sum problem using the minimax algorithm and modeled as a tree include every possible state of the board. A score will be attached to each game strategy for evaluation purposes. If two subtrees result in the same score, then the first subtree will be considered. In order to fully evaluate all possible conditions that could happen in a game with breath-first search, the algorithm will enumerate all possible steps by the opponent from start to end of the game in a depth-first search. The evaluation of each subtree could be parallelized to improve efficiency. Additionally, alpha-beta pruning is another optimization that could be considered.