Kendall Zettlmeier
CSC 480
Dots and Boxes Write-up

YouTube Link: https://youtu.be/gjCDRobr7QE

After playing with a number of permutations of the game with different plys and different board sizes, I found the game to be either easy or it took too long for the AI to make a move. I found with a board size of 2x2 I could go up to 5 plys before it became un-playable. At 5 plys I found the AI to start actually making strategic moves and didn't place lines where I could easily take ownership of a box. When I played a 3x3 board I couldn't go higher than 3 plys before the game was unplayable because the AI took so long to make a move. With 3 plys I found the AI to be very easy, it didn't make great moves at all. When I went to a 4x4 board I could only do 3 plys as well. With the larger board I found though that I needed to play smarter as the AI seemed to make more differentiated moves instead of going to the same usual spots. This could have been solely because of the larger move space though.

I would say there is definitely a trade-off between making the AI smarter and making the game enjoyable by not waiting forever for the AI to make a move. It is always fun to have a challenging opponent, but it definitely isn't fun waiting forever to have them take a move. Again the largest ply I was willing to wait for was 5 plys on 2x2, although I am very impatient and didn't wait more than 1 minute before quitting out on ply sizes that took longer.

Alpha-Beta pruning definitely allowed an improvement when the AI was actually making a move, I noticed it cutting out a lot of branches during larger boards where the game tree was very large. The numbers that I gave above were based upon my play through with alpha-beta pruning. I noticed that I was able to add 1-2 plys to my run-through with alpha-beta pruning but I still need to get improvement when actually building the game tree as I find that is what is taking the most of my time of the AI now instead of doing the search through the game tree.