

Project 1 Report

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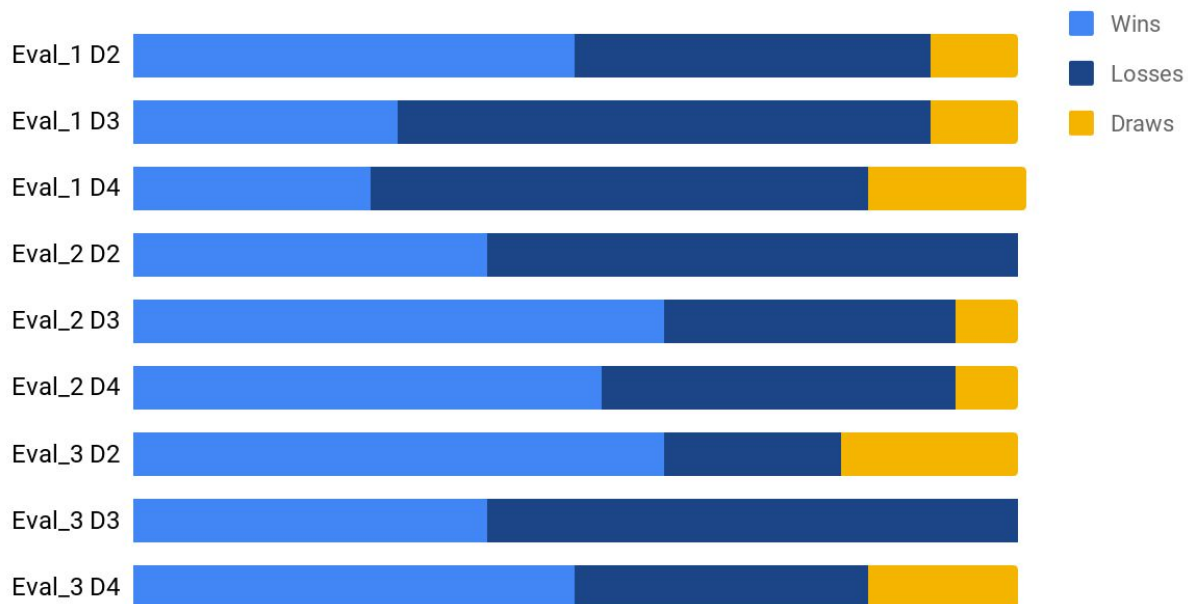
Eval 3 Implementation:

For Eval 3, I added incentives to a. develop center pawns and b. develop knights in addition to eval 2. This is done by adding bonus points to your board if you have center pawns or developing knights, but not subtracting extra points if an opponent also develops or occupies center with pawns.

I added these heuristics knowing that they are early game strategies and may ultimately hurt the AI in the late game (overfitting). I wanted to also implement a guard mechanic which gave bonus points for pieces protecting each other, but realized that this mechanic will probably make the AI more rigid and unable to make maneuvers such as sacrifice. I think that these heuristics are enough to make a change in the AI's win rate, whether it's gaining an early advantage, or throwing the game later with a bad knight move.

Data:

AI Win Rate



The amount of games played by each AI varies. I decided to play each AI against their higher depth counterparts, and then each-other at the same depth. Here are the individual matchups, each determined by a best of 5. Eval_3 D2 vs Eval_3 D4 went to 6 games due to a draw.

Match	Score (P1-P2-Draw)
Eval1 D2 vs Eval1 D3	4-1
Eval2 D2 vs Eval2 D3	0-4-1
Eval3 D2 vs Eval3 D3	1-3-1
Eval1 D3 vs Eval3 D3	2-3
Eval1 D3 vs Eval2 D3	3-2
Eval2 D3 vs Eval3 D3	3-2
Eval1 D2 vs Eval1 D4	1-3-1
Eval2 D2 vs Eval2 D4	3-2
Eval3 D2 vs Eval3 D4	2-3-1

The original tally is 'Win Tally.txt' and is included in the file.

Analysis:

Looking at the matches, AI running a larger depth level has a higher overall win rate, winning 4 of the 6 matches against lower depth counterparts. However, a 40% upset rate is nothing to scoff at. This leads me to suspect that there is a min/max flipped somewhere in the code. The matchups in the same-depth games supports my inclination and are fairly 50/50. In fact, the overall win-rates of all the AI's are fairly chaotic and random. Although Eval 2 and Eval 3 clearly outperformed Eval 1, the best depth for each eval function was not always the largest value. This outcome makes it difficult to tell whether there is an improvement between Eval 2 and Eval 3, however there is a small sign that Eval 3 is worse than Eval 2. I mentioned why this is in my implementation section, and while observing the Eval 3 AI I notice that it would move knights towards the 6th and 3rd row during the late and mid game. This would sometimes cause the AI to lose the knight and the ultimately game.