# AI Final Project Report Winter 2022

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# 1 Motivation

## 1.1 Approach

**March 25th 2022** Today, we played a few games against each other in order to understand the fundamentals of the game as well as to develop a few basic strategies. Our first instinct is to avoid corners as we can easily get boxed in if we are near corners. This means that we would like to move towards the center.

We also discussed about strategies to inplement our code. First, we need a heuristic function for our agent to evaluate the current position. Given the maximum steps allowed and the heuristic function, the agent will compute an evaluation for each of the reachable squares. The agent will then pick the best square and make its move. Our heuristic function will be based on the following ideas:

1. At every turn, agent checks if we can win in 1 (or 2 if allowed) move(s).
2. In case our heuristic function of a tie between two squares, our agent will prefer to move towards the center.
3. check how many walls are around our agent with a radius of 1 step. If our agent has many walls next to it, it should try and escape.
4. Use minimax and alpha-beta pruning near end-game so that we can search at a deeper depth.
5. Use BFS when evaluating minimax so that we can maximize the depth computed given a time limit.

6. Trying to box in the opponent as much as possible.
7. Use our agent as a wall to limit the opponent's movement.
8. If the opponent is surround by two walls, try to box the opponent towards the edge of the chess board
9. A heuristic based on the number of squares you control (i.e. the squares you can get to with your moves). The squares that both players control don't count.
10. Opening as player A:
    (a) Move towards the middle, and do NOT put a wall towards the opponent. The idea is to move towards the center and control the oppoenent's "territory".
11. Opening as player B:
12. Middle game:
13. End game:
    (a) if there exist a wall in the board that we can place to completely divide the two players, then we're in an end-game.
    (b) (Total number of possible walls in the areas that the players can go to) - constant
    (c) NEED QUANTIFIER TO CHECK HOW MANY SQUARES WE'RE LOSING
    (d) Want to go towards the closing area.

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Balance between
1) centralization
2) not getting trapped
3) aggressive (blocking opponent's moves)