CS 4804
Chess, Revisited

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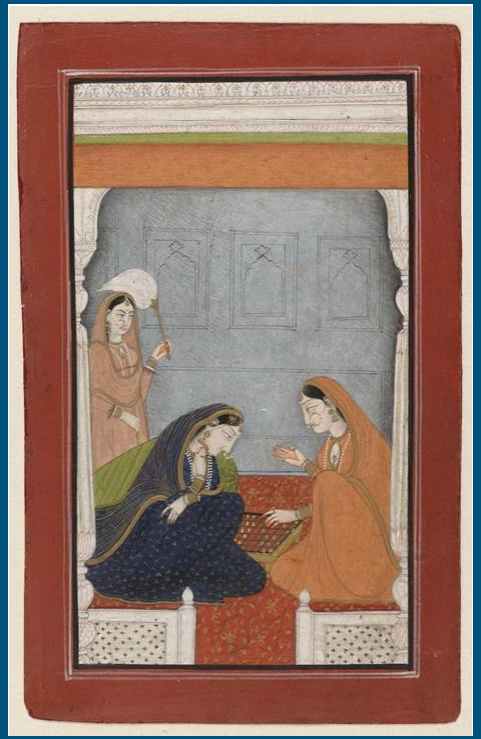
A Brief Overview of Chess

- Current iteration since 1475
  - Origins as far back as 6th century
- Strategy game between two players
- Goal is to trap the other person's king (i.e., a checkmate)
- Six types of pieces with different attributes

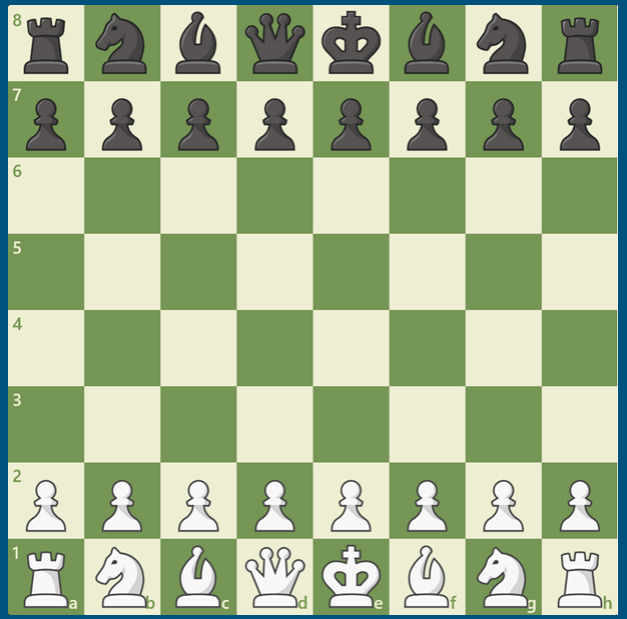


Problem Statement and Analysis

- Chess has been popular for ages
- Plenty of ways to play
  - e.g., in-person, GamePigeon, Chess.com
  - Some require another player, some don’t
  - Those that don’t make use of computer player
- Can we make our own chess AI?
- How good can we make it?

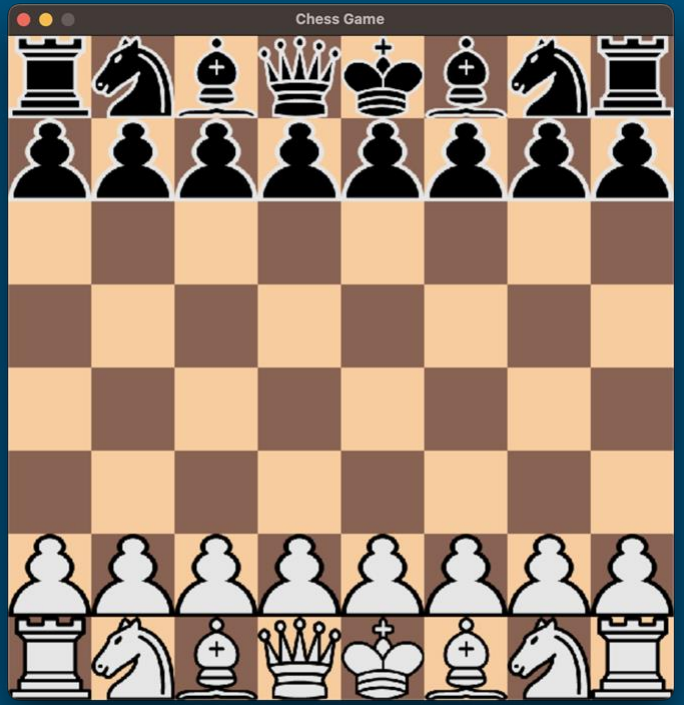
Use-Case Scenarios

- People may get the urge to play chess
  - Whether to learn, for fun, or to improve
- Other players may not be available
- The AI can fit that player’s need for an opponent



AI Algorithm and Model

- Python libraries
  - Python-chess (game engine) and Pygame (GUI)
- Heuristics
  - Material, Mobility, Pawn Structure (limited)
- Minimax Search with Alpha-Beta pruning
  - Default depth=4



Results and Demonstration

Lesson Learned

- Challenges
  - Minimax opening moves
    - Made repetitive or suboptimal moves when the board was balanced between players
  - Depth vs. Computational speed
    - Depth > 4 had better moves but very slow
- Future Improvements
  - Transpositional tables
  - Famous chess openings (Queen’s Gambit)
  - More complex heuristics

Questions?

Sources

- https://www.brown.edu/Departments/Joukowsky_Institute/courses/13things/7295.html
- https://www.chess.com/
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