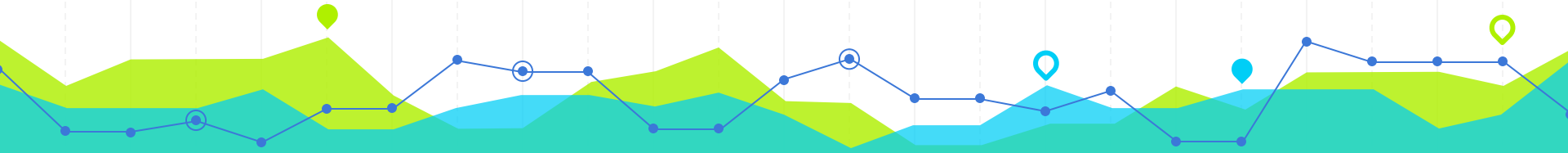
November 10, 2015



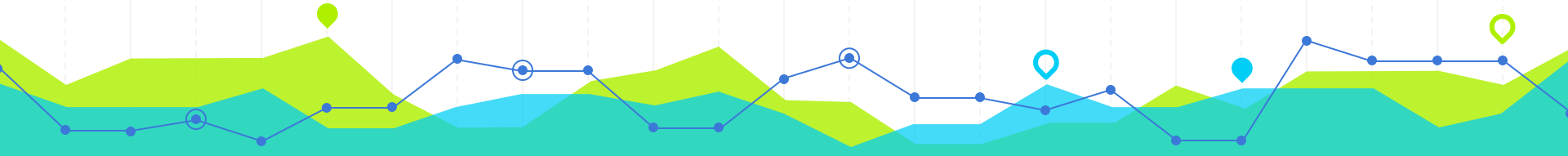
A Swift* ChessAI

*Speed may vary.

Liam Cain & Zack Meath

You can choose to make whatever game that you want. But no chess.

- *Ron Coleman*



Rules of the Game

Chessboard: 64 squares**. 2 players:** Black vs. White.

Each player has **16 pieces:** King (x1), Queen (x1), Rook (x2), Knight (x2), Bishop (x2), Pawn (x8)

OBJECTIVE

Capture the other player's King.

MOVES

King: 1 space in any direction (h, v, d)

Queen: *n* spaces in any direction (h, v, d)

Rook: *n* spaces horizontal or vertical

Knight: L-shaped. 2 pieces by 1 piece.

Bishop: n spaces diagonally

Pawn: 1 space forward. Captures diagonally.

CAPTURES

Move your piece onto a boardspace with the opponent's piece on it.

SPECIAL RULES

"In check"

En passant

Pawn openings

Castling

Problem Description

Chess is a turn-based strategy game. Moves in chess are not isolated instances: a player must take into account the current board state and all possible next moves for both himself and his opponent.

KEY PROBLEM

For the AI to mimic how a human plays chess, it must create a large complex decision tree of all possible moves. The best move is determined based on a variety of important factors:

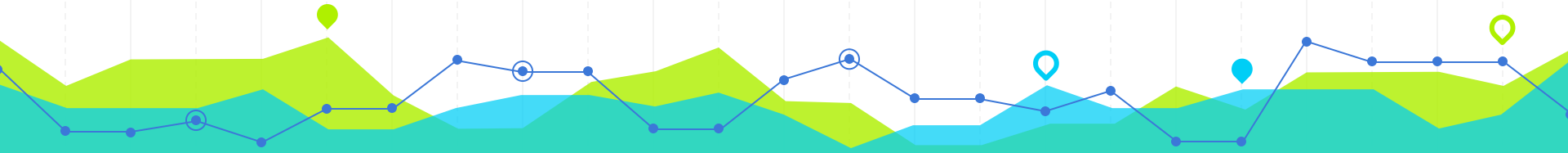
- Material
- Center Control
- King Safety
- Pawn Structure
- Game phase
- Mobility

DOES IT LEARN?

No, but it gets better. It will always follow the same logic. However, as it plays, it stores boardstates. This will allow it to spend less time calculating moves and more time to calculate subsequent moves. More moves proves more data for the AI to choose the best move.

UI 1

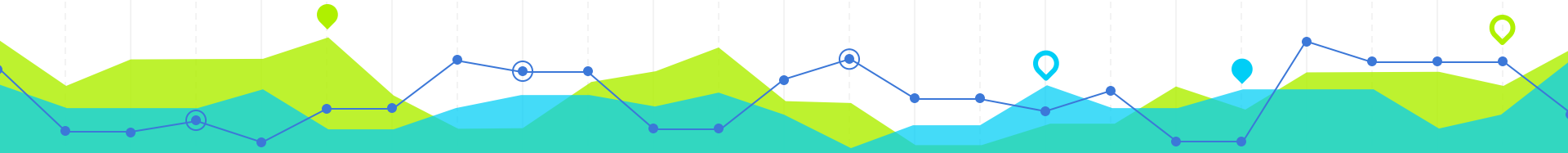
Getting the board to show up.



Game Logic

2

Which way does the horsey piece move?



Artificial Intelligence

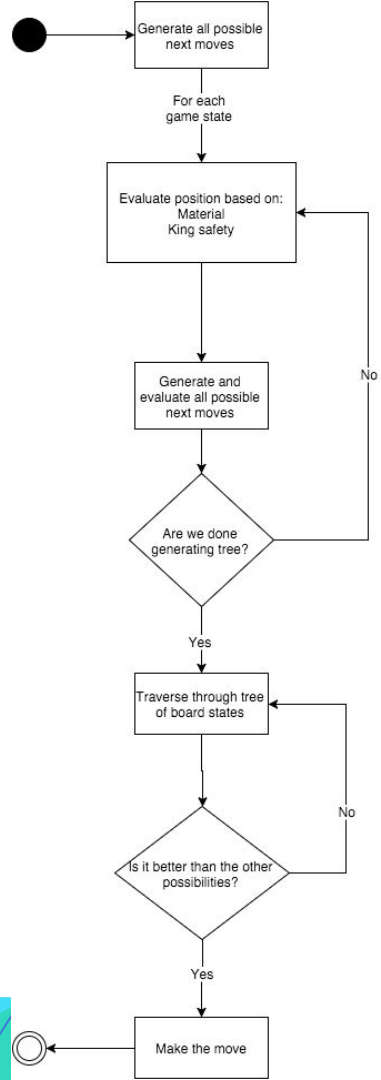
3

I hope we don’t have to use recursion… Shit.

Basic Strategy

- STEP 1: Generate **all** possible next moves.
- STEP 2: For each **game state**:
  - Evaluate position base on:
    - Material
    - King safety
  - Generate and evaluate all possible next moves.
  - GOTO STEP 2.
- STEP 3: Choose **best move**.

Repeat until **Checkmate**.



Open Issues

LIMITATIONS

The biggest limitation stems from ranking and prioritizing moves. Should the AI emphasize king safety or board position? Is it better to have a strong pawn structure or greater piece mobility?

DEMO

Any questions?