Developments in chess engines

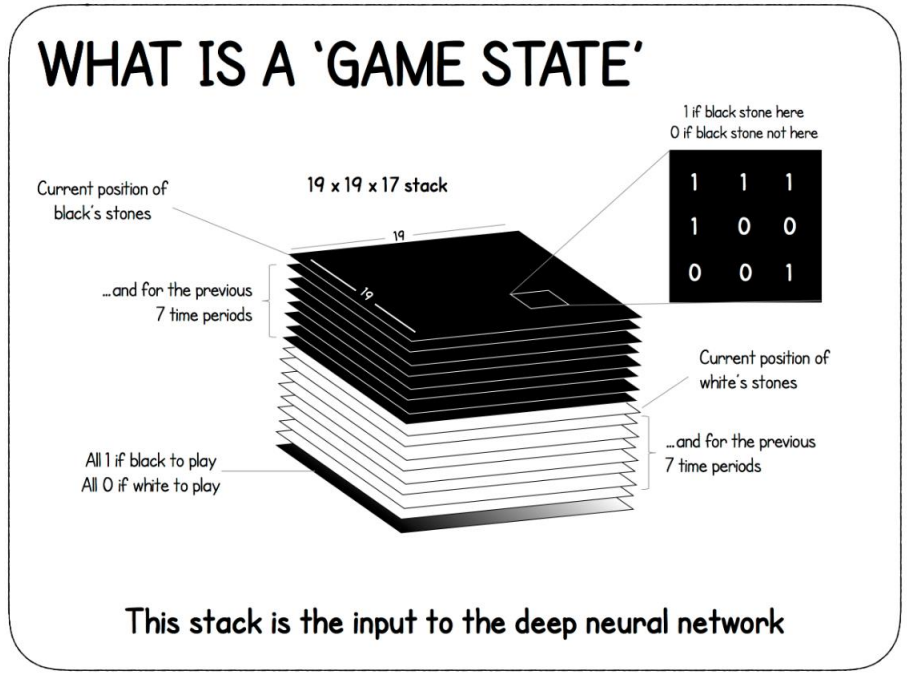
HLML 2021-05-07

Overview

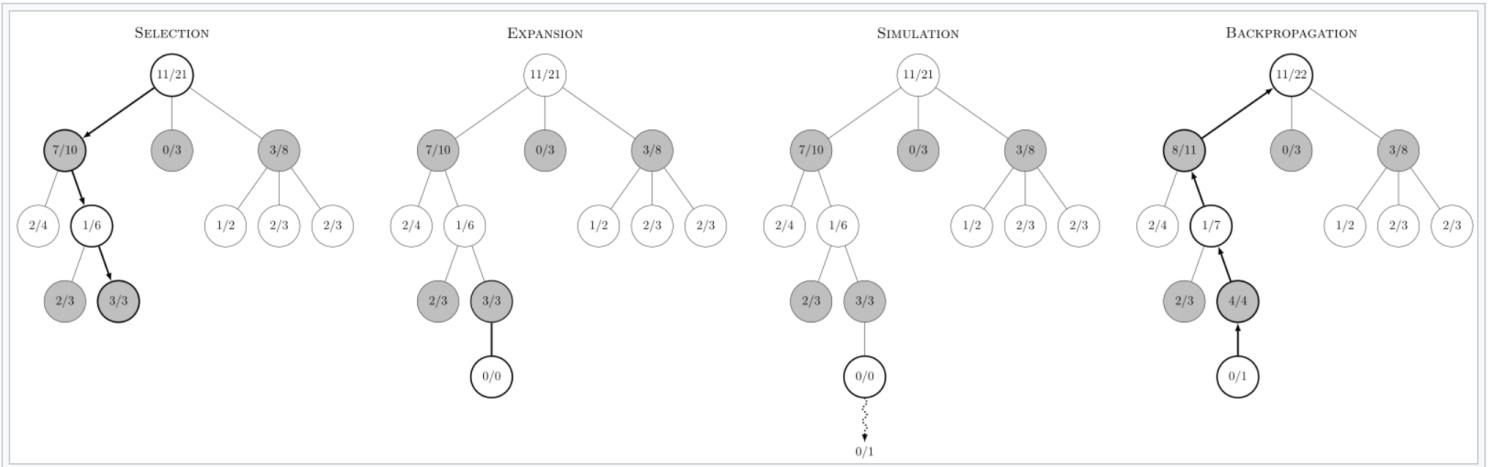
+ Review of ML for chess engines
+ NNUE for Stockfish
+ Style transfer for RL: Maia
+ Designing chess variants
+ Using chess to test ML models

ML for chess engines

- Classical chess engines use *alpha-beta pruning* to deterministically expand the game tree and apply a hand-crafted function to assess positions
- AlphaZero uses *Monte Carlo tree search* with a neural net that is trained to evaluate how 'good' a position is



- Stockfish evaluates about 10^8 positions per second
- Leela Chess evaluates 40 000 positions per second



Step of Monte Carlo tree search.

NNUE for Stockfish

Style transfer for RL: Maia

Designing chess variants

Designing chess variants

Using chess to test ML models

Sources

NNUE

- https://github.com/glinscott/nnue-pytorch/blob/master/docs/nnue.md
- https://cp4space.hatsya.com/2021/01/08/the-neural-network-of-the-stockfish-chess-engine/

Maia

- https://maiachess.com/
- https://arxiv.org/pdf/2006.01855.pdf
- https://arxiv.org/pdf/2008.10086.pdf

Chess Variants

- https://arxiv.org/abs/2009.04374
- https://www.chess.com/news/view/new-alphazero-paper-explores-chess-variants

Testing ML with chess

- https://arxiv.org/abs/2102.13249