

Chess AI improvement through an evolutionary approach

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CHESS

To win: don't play

Plan

- 1 Introduction
- 2 Implementation / Strategy
 - Tools
 - Architecture
 - Board evaluation / parameters evaluation
- 3 Results
 - Set-up
 - Evolved AI
- 4 Future work

Chess AI history

- 1951 - Alan Turing develops on paper the first program capable of playing a full game of chess
- 1956 - John McCarthy invents the alpha-beta search algorithm
- 1957 - First practical chess program, Alex Bernstein and a team of Russian programmers
- 1981 - Cray Blitz becomes the first computer to gain a master rating (2200 ELO)
- 1997 - Deep Blue wins a six-game match against Garry Kasparov
- Today - Computers have reached 3250 ELO ratings

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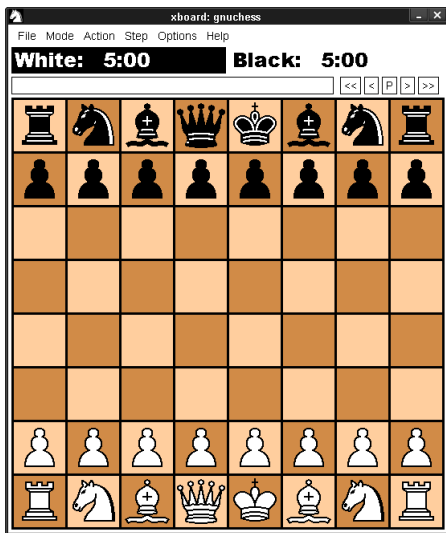
- Set-up
- Evolved AI

4 Future work

Tom Kerrigan's Simple Chess Program (TSCP)

- Chess engine used for playing all the games
- Written in 1997
- Negamax algorithm for the AI

GUI: GNU Xboard



Architecture

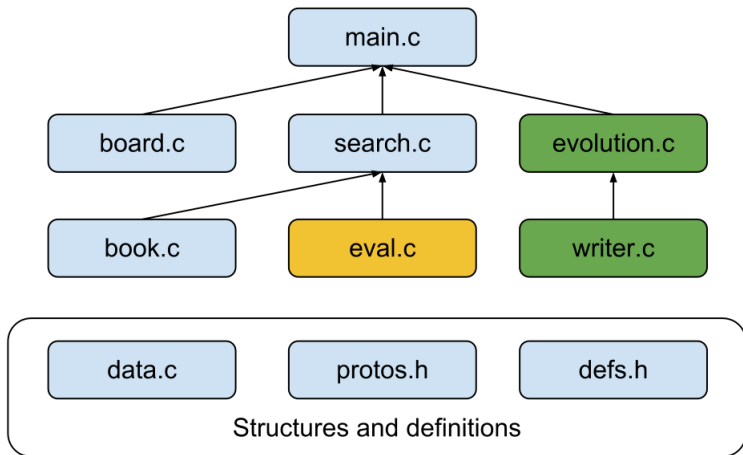


Figure: TSCP and evolution algorithm plugin architecture

Board evaluation / parameters evaluation

- Board evaluated at each move during the game, using the pieces values
- Individuals of the same generation compete against each other
 - $\frac{n(n-1)}{2}$ games per generation
 - one game as white, one as black
- Point system: 0 for loss, 3 for win, 1 for stalemate or draw

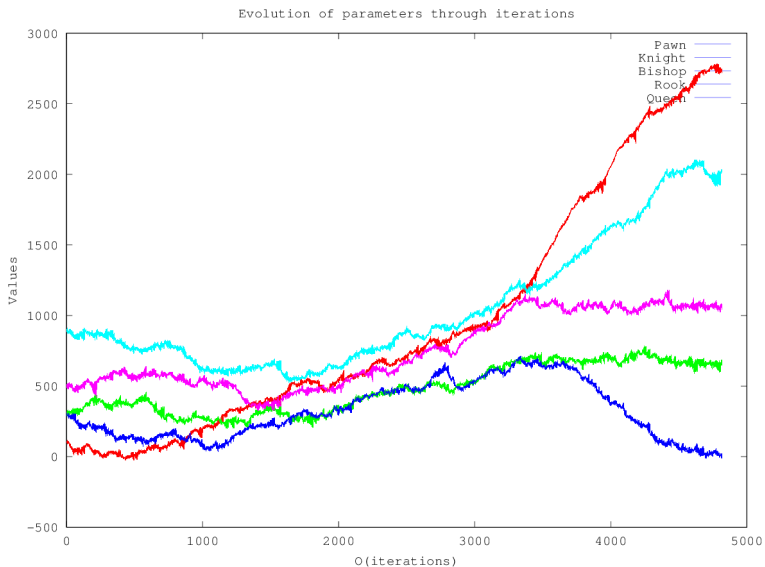
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Set-up

- Search depth: $n = 1$
- One day and a half running on a standard laptop
- Optimized parameters: pawn(100), knight(300), bishop(300), rook(500) and queen(900) values
- Evolution strategy parameters: $\mu = \frac{1}{2}\lambda = 4$
- Static strategy parameters: RAND(-15, 15)

Evolved AI

- Initial AI human
- Evolved AI VS human
- Evolved AI VS initial AI



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Future work

- Stabilize the algorithm
 - Boundaries for values
- Evolving strategy parameters

References

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Questions

Any questions or suggestions?