

Chess

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Why chess

- Relatively simple rules
- There exists a lot of good chess programs, but still interesting to do as an exercise
- It's easy to see intelligence or lack thereof, so changes in the program generates noticeable results



Layout

- Openings database
- Search
- Self learning
- Improvements



Openings database

- ICOfy database
- Pgn-notation
- 28992 games
- Choose a random game with the same opening as the current and choose the next move from there
- Continues until the current game can't be found in the database
- Faster to use the database than to use the search



Exemple of game in database

- [Event "1418"]
- [Site "?"]
- [Date "2014.??.??"]
- [Round "?"]
- [White "Carlsen, Magnus"]
- [Black "Mamedyarov, Shakhriyar"]
- [Result "1-0"]
- [WhiteElo "2881"]
- [BlackElo "2760"]
- [ECO "D52"]
- [EventDate "2014.??.??"]
- [PlyCount "93"]
-
- 1.d4 d5 2.c4 c6 3.Nf3 Nf6 4.Nc3 e6 5.Bg5 Nbd7 6.e3 Qa5 7.cxd5 Nxd5 8.Rc1
- Nxc3 9.bxc3 Ba3 10.Rc2 b6 11.Be2 Ba6 12.O-O Bxe2 13.Qxe2 O-O 14.e4 Rac8
- 15.e5 Qa4 16.c4 Rfe8 17.Rd1 c5 18.d5 exd5 19.Rxd5 Nf8 20.h4 h6 21.Be3 Ng6
- 22.Qd3 Re6 23.h5 Ne7 24.Rd6 Bb4 25.Rc1 Re8 26.Rxe6 fxe6 27.Nh4 Qc6 28.a3
- Ba5 29.Rd1 Qc7 30.Ng6 Nxe6 31.Qxe6 Qf7 32.Rd3 a6 33.a4 Rf8 34.g4 Qe8 35.
- Rd6 Qxa4 36.Qxe6+ Kh8 37.Bxe6 Qa1+ 38.Kg2 Rxf2+ 39.Kxf2 Qe1+ 40.Kg2 Qe4+
- 41.Kh3 Qh1+ 42.Kg3 Qe1+ 43.Kf4 Bd2+ 44.Rxd2 Qxd2+ 45.Kf5 gxh6 46.Qe8+ Kg7
- 47.Qe7+ 1-0

- Currently the program picks a random game to use
- Creates variation
- Alternative to take ranking and result into account.



Search

- Alfa/beta
- Evaluation function calculates the sum of the value of all pieces
- The king never gets captured, and hence the value is irrelevant.
- Integer.MAX_VALUE or Integer.MIN_VALUE is returned in case of check mate



Self learning

- Program has two settings: One for learning and one for applying the learned data
- When using learning the pieces values are randomly selected in a specific interval, and the game result together with the pieces values are saved
- The program can play against humans, itself and gnuchess (another chess program). This can be used to gather data in learning
- If the program should apply learned data, the piece values from wins and draws are used to calculate a mean value, this is the new piece value



Self learning - example

- Base values
 - pawn=10
 - bishop=30
 - knight=30
 - rook=50
 - queen=90
 - These values are standard values (there exists several different).
 - The values to the right are random +/- 25% of the base values.
- loss
 - pawn=10
 - bishop=31
 - knight=34
 - rook=61
 - queen=109
 - After each game these values and the result is saved (loss in this case)



Things to improve – Evaluation function

- Mobility – Number of possible moves
- Points for rokad, check
- pawn positions (avoid double pawns, isolated pawns etc)



Things to improve - other

- More heuristics
- Weight when choosing opening
- Learning, take into account previous values
- Gather more data while learning
- Add a clock



Questions?





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