The Blondie25 Chess Program Competes Against Fritz 8.0 and a Human Chess Master

By Mats Svardal Gunnerød
Introduction

• Blondie25 is a self-learning evolutionary chess program
• First evolved chess program to defeat a world-class chess program (three times).
• Implemented heuristics for time management (time used on each move)
• Played against Fritz 8.0 and James Quon.
Blondie25

• Result of 7462 generations of evolution in self-play
• Evolved using material and positional values
• Three object neural networks (front, back and center of chessboard)
• Uses minimax with alpha-beta pruning to select moves
• Has not evolved a way to decide the use of time per move.
Heuristics for Time Management

• Has 120 minutes allocated for first 40 moves, 60 minutes for next 20 moves and 30 minutes for all remaining moves.
• Blondie25 uses by default exactly 3 minutes on each move
• Won 13 out of 16 games against the program Pocket Fritz 2.0
• Poor performance against the world 5th machine Fritz 8.0 with constant time per move
Heuristics for Time Management (1)

• Better time management is needed to perform well against advanced chess programs.

• Played 153 games to develop two different heuristics for time management as black or white.

• Takes into account whether or not a move made by the opponent was anticipated, as well as the time used by the opponent (in this case, Fritz 8.0)
Heuristics for Time Management (2)

- If Fritz 8.0’s was anticipated, Blondie25 will use less time.
- An anticipated move suggests that prior searching was effective, and Blondie25 can save more time for the more deeper required searches.
- The black algorithm is more advanced than the white. Reason for this is unknown.
- The algorithms are only the result of experimentation and do not claim to be optimal.
- An example from the algorithm is:
  If Fritz 8.0's move was unanticipated, then if:
  a. $F_t < 3$ minutes, $x = F_t + 1$ minute
  b. $3 < F_t < 5$ minutes, $x = F_t + 2$ minutes
  c. $F_t > 5$ minutes, $x = F_t + 4$ minutes
Results

• Blondie25 used the explained heuristics for time management when playing 24 games (12 as white and 12 as black) against Fritz 8.0
• Resulted in 1 win, 4 losses and 7 draws as black.
• 2 wins 6 losses and 4 draws as white.
• Given Fritz 8.0’s rating of 2752, this resulted in a rating of 2635 for Blondie25.
• First chess program that was optimized by evolutionary algorithms to defeat a top-5 chess program.
• Against the nationally ranked chess master James Quon, Blondie25 won three out of four games.
Discussion

• James Quon analyzed all the 24 games between Blondie25 and Fritz 8.0
• His assessment is that the programs were more closely matched than the scores suggest.
• Many of the losses happened mainly due to Blondie25’s poor opening quality.
• The opening phase is the weakest point, and some of the openings were mysterious and extremely bad.
• On the other hand, Blondie25’s endgame appeared to be superior in many games. Would have won more games if it only had knowledge of how to convert the advantage of poor play by the opponent into a win.
Conclusion

• The results show that introducing heuristics for time management provide a significant advantage over constant time per move.
• The weak point of the program is the opening play.
• The program can be further improved by finding more optimal heuristics for time management, as well as incorporating a more meaningful opening book.
• To allow this, future work will be to offer additional object neural networks to Blondie25.
• Even though the score against Fritz 8.0 may seem bad at first, Blondie25 is the first evolutionary chess program to defeat a world class program. It’s also the first to defeat a human world class master.
Thank you!

• Any questions?