Inteligência Artificial

9 Men's Morris / Trilha

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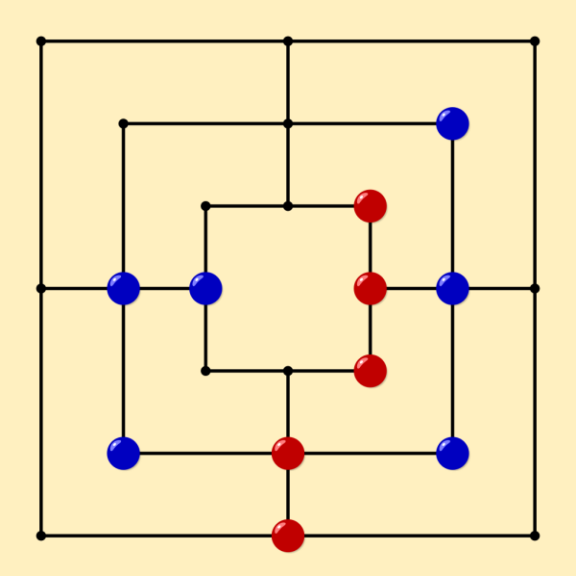
9 men's morris / Trilha

- That neglegted game that comes in the back of checkers' boards



Rules (1/2)

- Game begins with empty board
- Each player has 9 pieces (men)
- 3 stages:
  1. Placement: place a piece in an intersection
  2. Movement: move a piece between adjacent intersections
  3. Flying: move a piece to any vacant intersection (when a player has 3 pieces)

Rules (2/2)

- End of game:
  - A player loses when it has 2 pieces or has no moves
  - Draw: when a board position is repeated

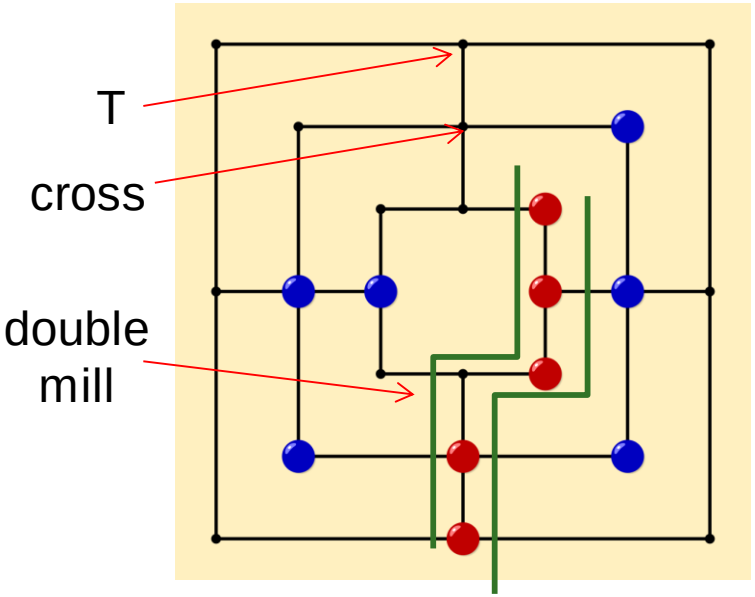
- Removing opponent pieces:
  - Form mills: 3 aligned pieces. Then you can remove a non-mill oppnent piece
  - If opponent has only mills, then you can remove one from a mill

Practice!

- **Online (easy)**
  - http://www.mathplayground.com/logic_nine_mens_morris.html
- **Android (adjustable AI level)**
  - https://play.google.com/store/apps/details?id=org.doublemill.client
- **Iphone?**

Basic strategy

- Stage 1: gain mobility for stage 2
  - Prioritize "crosses", then "Ts". Corners have less mobility
- Stage 2:
  - block opponent mills
  - try to form 'double mills'
  - reduce opponent mobility
- Stage 3:
  - try to form mills every 2 turns, blocking opponent in-between



Your task

- Build a 9 men's morris bot
  - Implement alpha-beta pruning
  - Define evaluation function
  - Play against humans (for you to test it)
  - Play against other bots (following a tournament protocol)

Additional information

- Game complexity:
  https://en.wikipedia.org/wiki/Game_complexity#Complexities_of_some_well-known_games

- 9 men's morris is solved
  - It is a proven draw
  - You can't exploit the game database!

References

- https://en.wikipedia.org/wiki/Nine_Men's_Morris
- https://pt.wikipedia.org/wiki/Trilha_(jogo)
- **GASSER, Ralph. Solving nine men's morris. Computational Intelligence**, v. 12, n. 1, p. 24-41, 1996. Available at: http://library.msri.org/books/Book29/files/gasser.pdf