Artificial Intelligence and Knowledge Engineering Laboratory

Task 3. Game Playing Algorithm

Authors: M.Przewoźniczek, M. Paradowski, P.Myszkowski, M. Piasecki

Task Objectives

Getting familiar with min-max algorithm and its extension called alpha-beta pruning in practice through individual implementation of a two player board game. The implementation has to focus on human versus computer play.

Subtasks

- Get familiar with min-max algorithm
- Get familiar with game board evaluation techniques
- Choose one simple, two player board game (suggestion: choose a game you already know)
- Build min-max algorithm:
    - build game board representation
    - build game board evaluation function (one or two)
    - build available move generation function
    - build min-max algorithm in a recursive way
- Build simple user interface for the game (text or GUI)
- Expand the solution with alpha-beta pruning algorithm.
- Play against the computer!

Additional information

Suggested games (choose one):
Reversi: http://en.wikipedia.org/wiki/Reversi
Gomoku (Five in a row): http://en.wikipedia.org/wiki/Gomoku
Draughts (Checkers): https://en.wikipedia.org/wiki/Draughts

Other choices are also possible after discussion with your tutor.

Important: Tic-Tac-Toe is too simple and thus forbidden.

Task rating

2 points – building min-max algorithm
2 points – building evaluation function
3 points – alpha-beta pruning algorithm
2 points – building simple user interface (text or GUI)
Extra 3 points: implementation of selected heuristics for improving the efficiency of the alpha-beta pruning algorithm implementation

Bibliography

1. Stuart J. Russell, Peter Norvig, John F. Candy, Jitendra M. Malik, and Douglas D. Edwards. 1996. Artificial Intelligence: A Modern Approach. Prentice-Hall, Inc., Upper Saddle River, NJ, USA

2. J. Schaeffer et al.: Checkers Is Solved, Science (14), September 2007
3. http://en.wikipedia.org/wiki/Reversi
4. http://en.wikipedia.org/wiki/Gomoku
5. https://en.wikipedia.org/wiki/Draughts