

CS/ENGRI 172, Fall 2002

9/16/02: Lecture Eight Handout

Topics: Wrap-up of game-playing; introduction to machine learning.

More on pruning

As a self-check, see that you can verify for yourself the following. “Pseudo-minimax” refers to values calculated in a minimax fashion from an evaluation function’s approximation of the leaves’ true minimax values.

1. The alpha-beta pruning constraints for a given node should always be consistent with the node’s actual (pseudo-)minimax value. (This gives you a way to check your work, by the way.)
2. Applying (our dfs-style) alpha-beta pruning to the game tree on the Lecture Six handout should result in having to look at only the values of leaves 1.1.1.1, 1.1.2.1, 1.2.1, 1.3.1, 2.1.1.1, 2.1.2.1, 3.1.1.1, 3.1.2.1, 4.1.1.1, and 4.1.2.1.
3. Assume the full game tree is accessible, and that player 1 adopts the “minimax strategy”, always choosing the operator that yields maximum minimax value. Player 2 cannot, via suboptimal play, cause player 1 to get benefit less than the minimax value of the root. However, if player 2 plays suboptimally, player 1 may get lower benefit via the minimax strategy than would have been possible if they had known player 2’s strategy ahead of time and incorporated it into their choice of moves.

Some opinions on computer chess-playing

- Chess is the *Drosophila* [fruit fly] of artificial intelligence. — Alexander Kronrod, 1965
- The Brain’s Last Stand. — *Newsweek* May 5, 1997 cover on the Kasparov/Deep Blue rematch
- Deep Blue [had] ingenious counterattacks I.B.M.’s master plotter played the strongest purely positional game ever produced by computer....Deep Blue’s defensive power was once more extraordinary: with great virtuosity, it fought through Deep Blue [engaged in] original play in the opening Deep Blue played as though virtuosity in difficult endgames was second nature. No one had foreseen its scintillating method of certifying the draw. – Robert Byrne (Grandmaster and NYT chess columnist), *New York Times*, May 13, 1997.
- The truth of the matter is that Deep Blue isn’t so smart. It does not for a moment function in the manner of a human brain. It is just a brute-force computational device. Deep Blue is unaware that it is playing the game of chess. It is unconscious, unaware, literally thoughtless. It is not even stupid....¹

Machines aren’t nearly as flexible and crafty as humans.

[Computers] never learn....

Deep Blue plays chess better ... but only because human beings have carefully programmed Deep Blue to play chess. Left on its own, Deep Blue wouldn’t even know to come in out of the rain. — Joel Achenbach, *Washington Post*, May 10, 1997.

- The “skin-of-an-onion” analogy is also helpful. In considering the functions of the mind or the brain we find certain operations which we can explain in purely mechanical terms. This we say does not correspond to the real mind: it is a sort of skin which we must strip off if we are to find the real mind. But then in what remains we find a further skin to be stripped off, and so on. Proceeding in this way do we ever come to the “real” mind, or do we eventually come to the skin which has nothing in it? — Alan M. Turing, Computing machinery and intelligence. *Mind* (59), pp. 433–460, 1950.

¹Colby Cosh remarked that “the media exuded a hysterical self-reassurance” (“Computer Bytes Man”, *Alberta Report*, 1996).