

CSC7426 : Intro to Software & Data Engineering

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Teaching/CSC7426/`

MinMaxAlgorithm
`.../CSC7426/MinMaxAlgorithm.pdf`

Alpha-beta pruning: a classic algorithm in AI (arising from minmax theorem)

Von Neumann, John, and Oskar Morgenstern. "Theory of games and economic behavior." *Bull. Amer. Math. Soc* 51 (1945): 498-504.

Fuller, Samuel H., and John G. Gaschnig. "Analysis of the alpha-beta pruning algorithm." (1973).

Knuth, Donald E., and Ronald W. Moore. "An analysis of alpha-beta pruning." *Artificial intelligence* 6.4 (1976): 293-326.

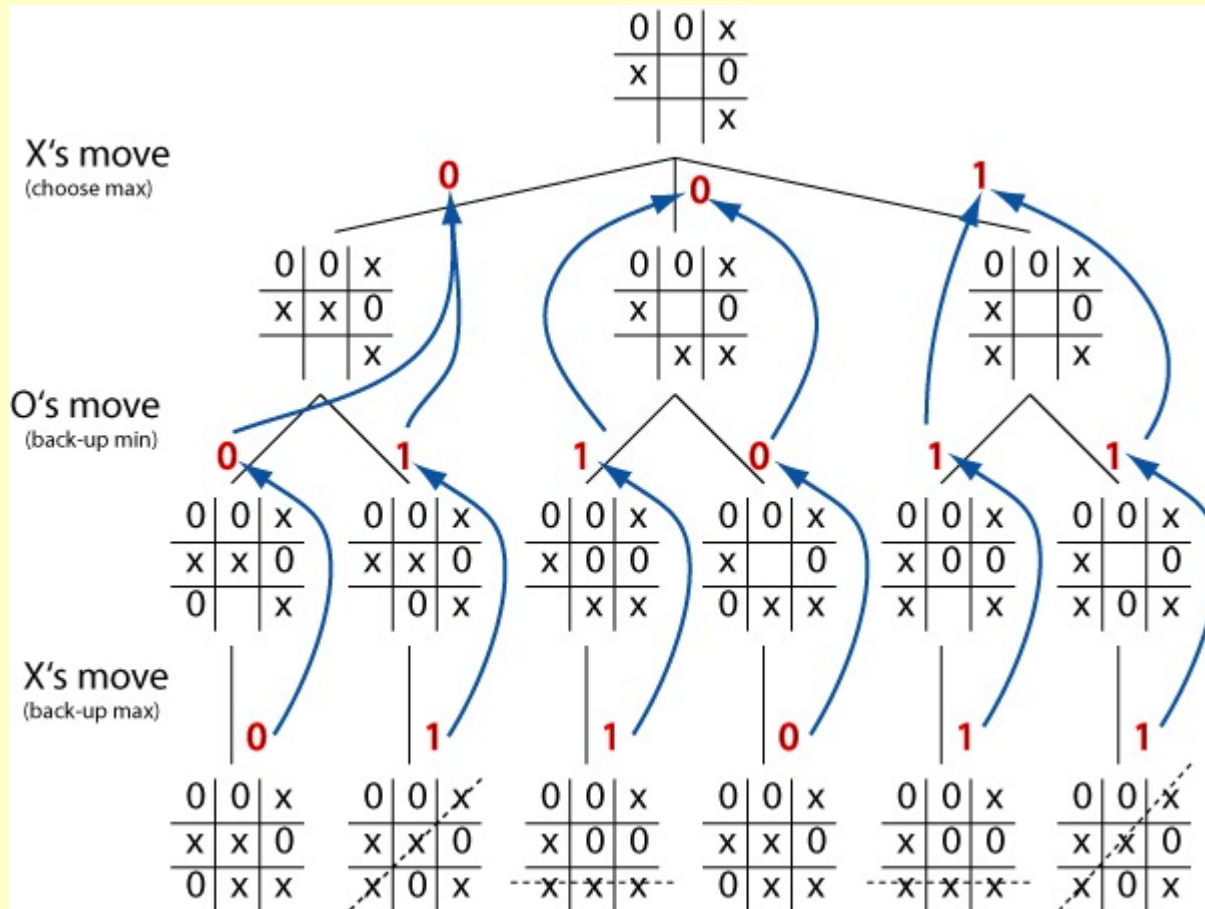
Noughts and Crosses

0	0	x
x		0
		x

X to play - how could a machine/algorithm know that it should play the bottom-left in order to win?

KR-IST - Lecture 5a Game playing with **Minimax** and Pruning, *Chris Thornton*

<http://www.sussex.ac.uk/Users/christ//crs/kr-ist/lec05a.html>

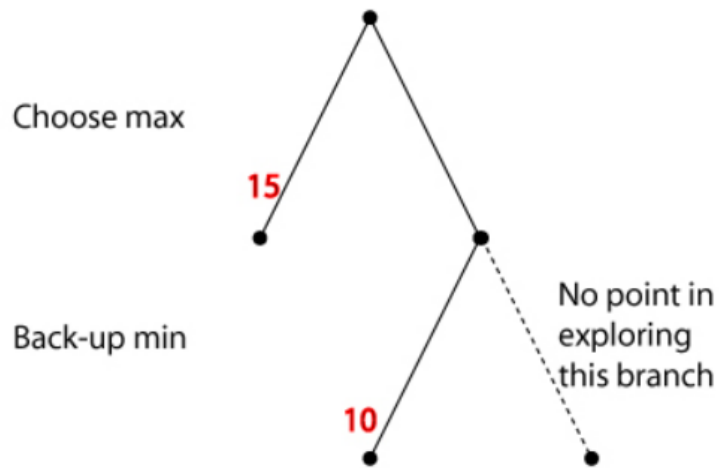


X win +1
Draw 0
O win -1

KR-IST - Lecture 5a Game playing with Minimax and Pruning, Chris Thornton

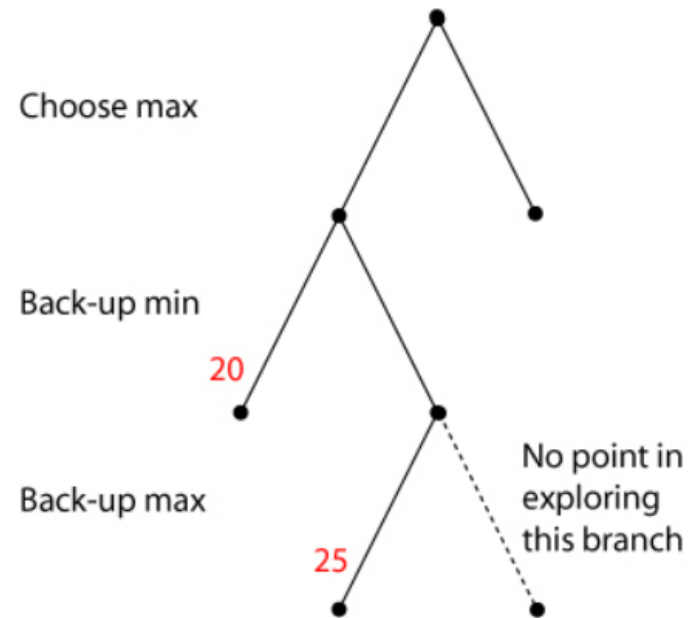
<http://www.sussex.ac.uk/Users/christ//crs/kr-ist/lec05a.html>

Alpha-beta pruning



if (possible_min < current_max)
prune

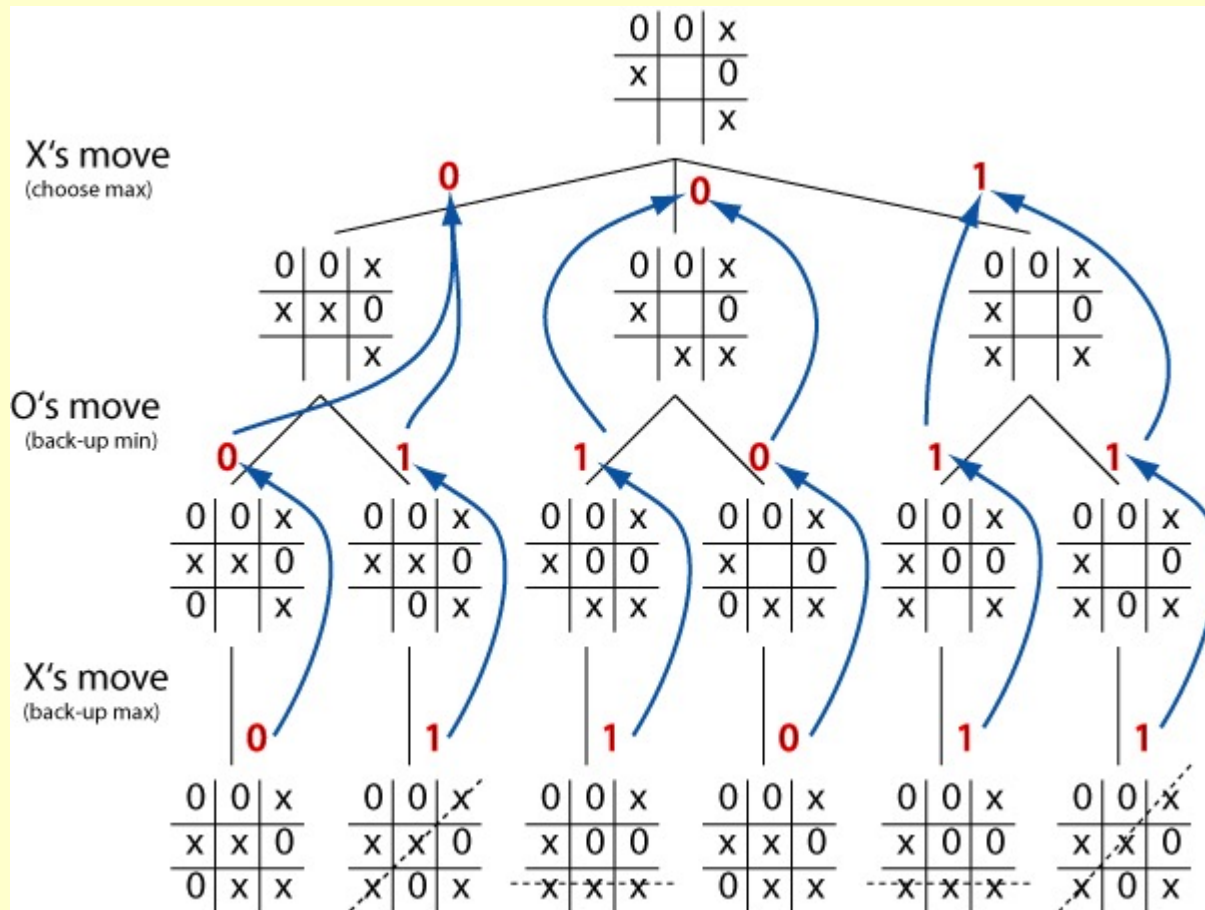
Alpha-cutoff



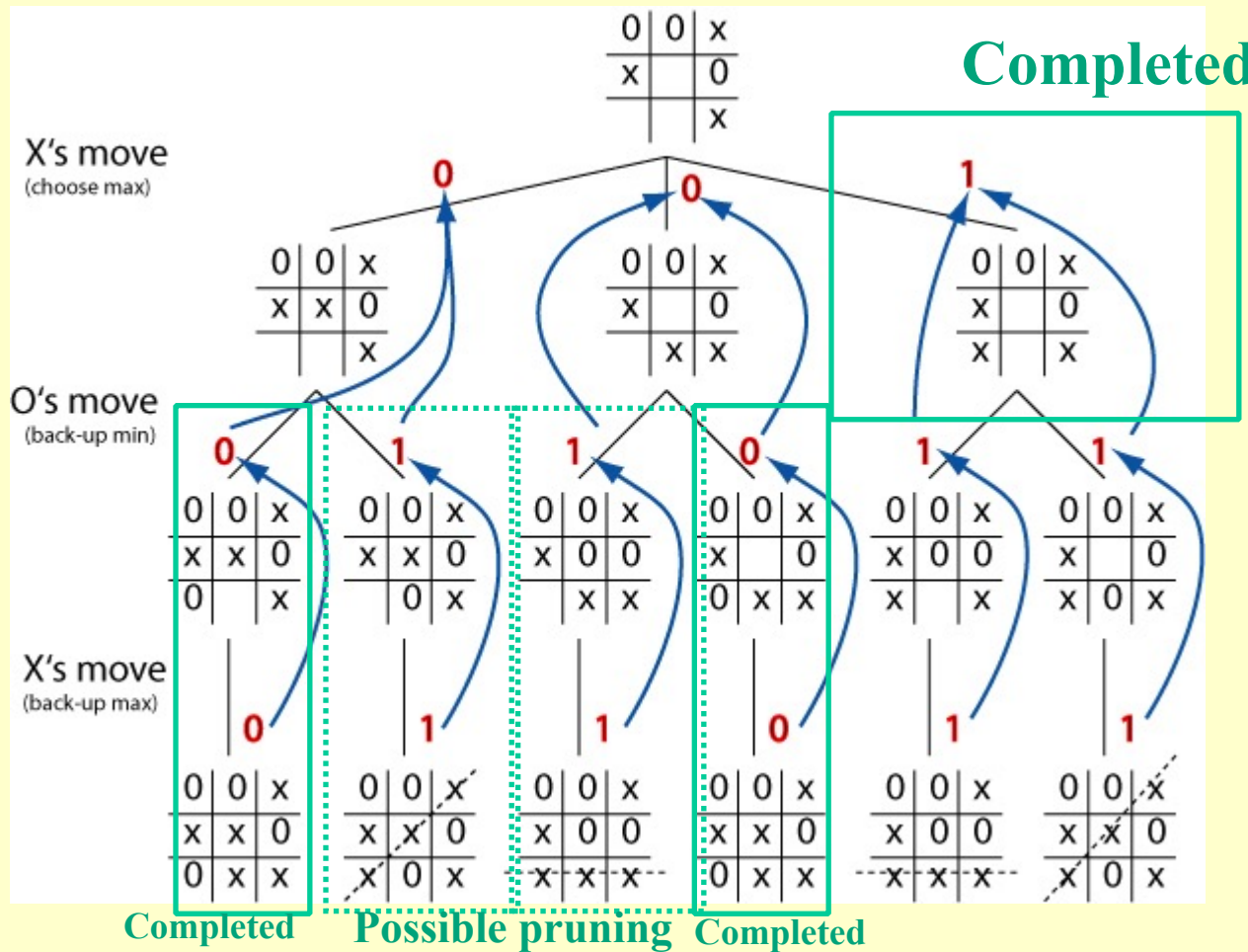
if (possible_max > current_min)
prune

Beta-cutoff

QUESTION: where could pruning be applied here?



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Minmax pruning for perfect XO player

Implement a perfect XO player:

- 1) Using min-max without pruning
- 2) Using min-max with alpha-beta pruning
- 3) Compare the performance of the players against each other