

Games

Dr. Mattox Beckman

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
DEPARTMENT OF COMPUTER SCIENCE

Objectives

Your Objectives:

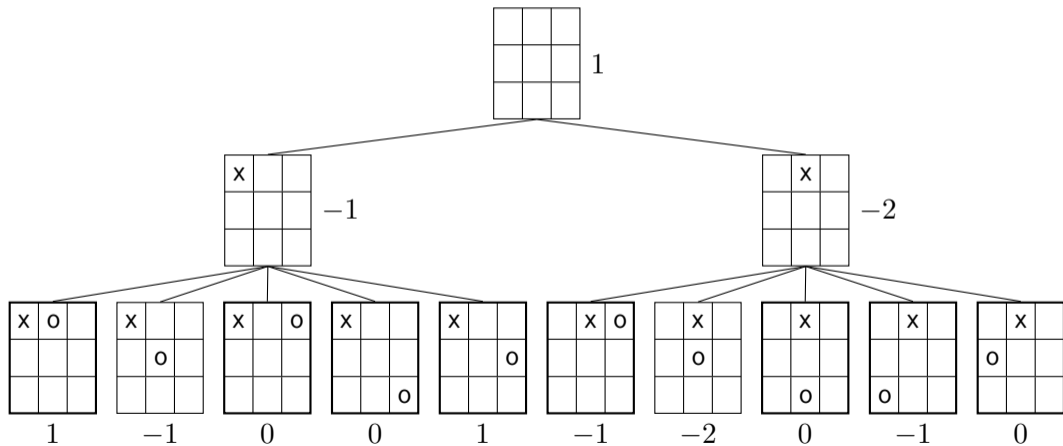
- ▶ Model a game state
- ▶ Use the minimax method
- ▶ Solve the NIM game

Modeling Games

- ▶ The *state* of a game is a model of the current configuration (e.g., the board) and whose turn it is.
- ▶ E.g., tic-tac-toe, chess, NIM.
- ▶ You need an evaluation function to determine how “good” a board position is.
- ▶ Use minimax to find best move.

Tic Tac Toe

Source: stackoverflow user Qrrbrbirlbel



Using Mathematical Tricks

- ▶ Consider the properties of the game.
- ▶ Sometimes simulating the game is not necessary!
- ▶ Try UVa 847 for an example.

NIM

- ▶ There are k piles, with $\{n_1, n_2, \dots, n_k\}$ items in the piles.
- ▶ Each player takes turns removing $1 \leq x \leq n_i$ items from a non-empty pile i .
- ▶ If $n_1 \oplus n_2 \oplus \dots \oplus n_k = 0$ then player 1 always wins.