

# Minimax

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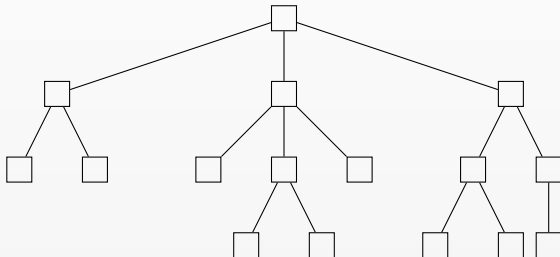
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# Setup

- Say we are playing a two-player, turn-based, deterministic, finite game of perfect information that ends with a winner (the details of which don't matter).

# Game tree

- ▶ Then we can draw the state of the game as we progress in a game tree.
  - ▶ Moving from top to bottom indicates moves being taken.
  - ▶ Lines indicate a game state can be moved to this position.
  - ▶ Alternate rows of the tree represent each player's possible moves.



# Scoring

- ▶ Suppose further that the end state of the game can be scored, such that one player is trying to get a high score and the other is trying to get a low score.

# Max

- ▶ Start with the top of the game tree, which represents the current game position.
- ▶ The moves available to the next player are represented by the nodes connected to this one.
- ▶ The player wants to choose the *maximum* score from the available options.

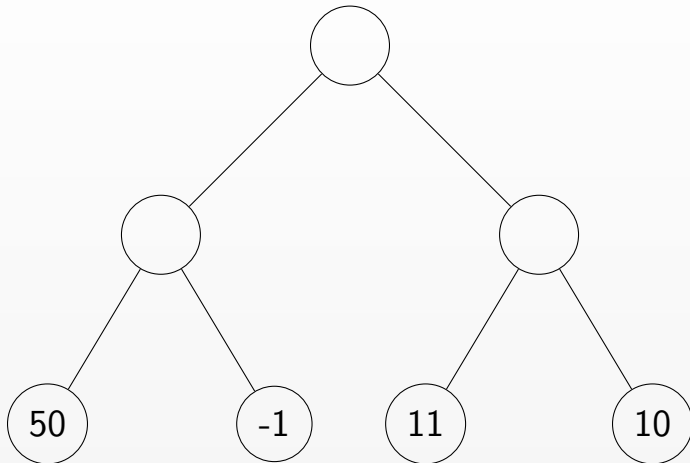
# Min

- ▶ The positions under the top node are potential game states.
- ▶ These are positions from which the opponent will play.
- ▶ The opponent is trying to get the *minimum* score from the available options.

# Minimax

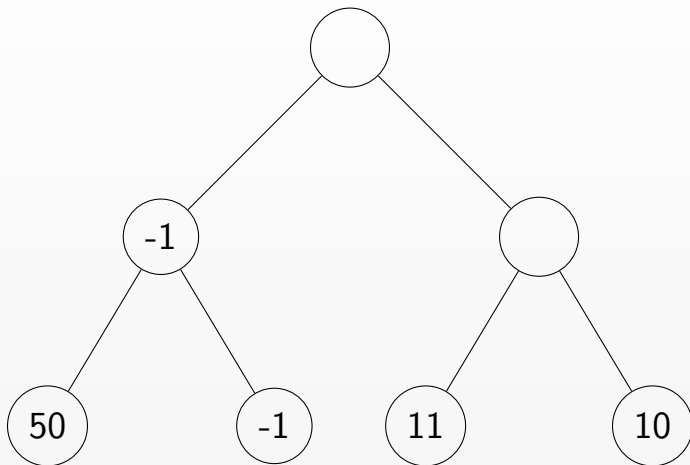
- ▶ We work from the bottom of the tree, scoring the end states, then choosing the maximum or minimum value at each level of the tree depending on whose go it is.

# Example game tree

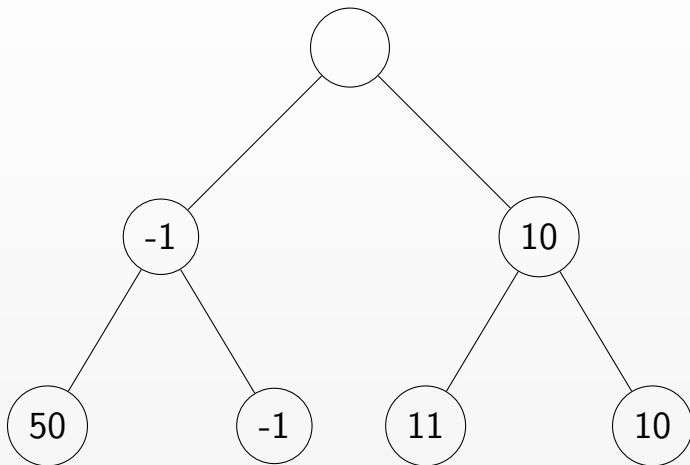




# Example game tree



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