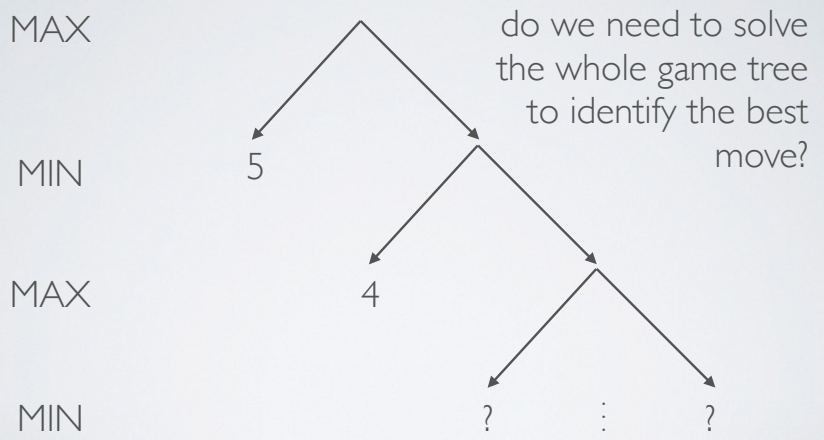
ALPHA-BETA SEARCH

CSE 511A: Introduction to Artificial Intelligence

Some content and images are from slides created by Dan Klein and Pieter Abbeel for CS188 Intro to AI at UC Berkeley.
All CS188 materials are available at http://ai.berkeley.edu.

ALPHA-BETA SEARCH



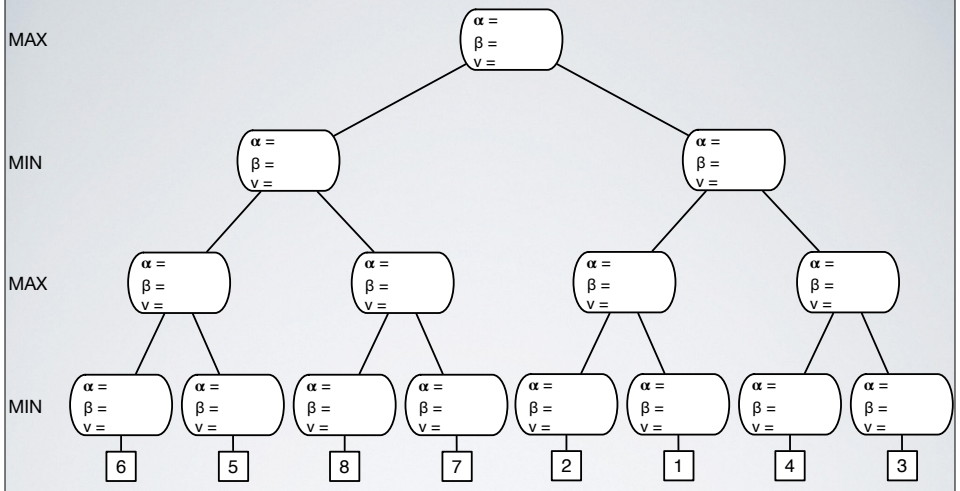
do we need to solve the whole game tree to identify the best move?

ALPHA-BETA SEARCH

α: MAX's best option on path to root, initialized to -∞ at root
β: MIN's best option on path to root, initialized to ∞ at root

```
def max-value(state, α, β):
  initialize v = -∞
  for each successor of state:
    v = max(v, min-value(successor, α, β))
    α = max(α, v)
    if α ≥ β return v
  return v
```

```
def min-value(state, α, β):
  initialize v = +∞
  for each successor of state:
    v = min(v, max-value(successor, α, β))
    β = min(β, v)
    if α ≥ β return v
  return v
```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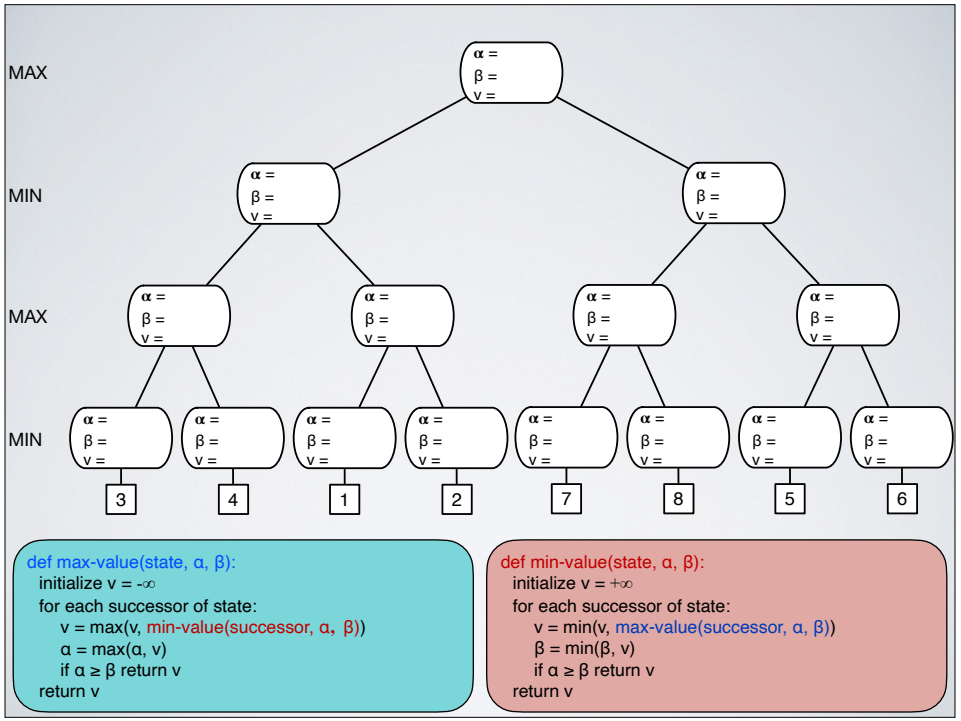

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ALPHA-BETA SEARCH

	Minimax	alpha-beta
Correct the solution it finds is optimal	Yes	Yes
Complete it terminates	Yes	Yes
Space Complexity max nodes in memory	$O(bm)$	$O(bm)$
Time Complexity max nodes generated	$O(b^m)$	$O(b^m)$

branching factor b
depth of the goal d
depth of tree m

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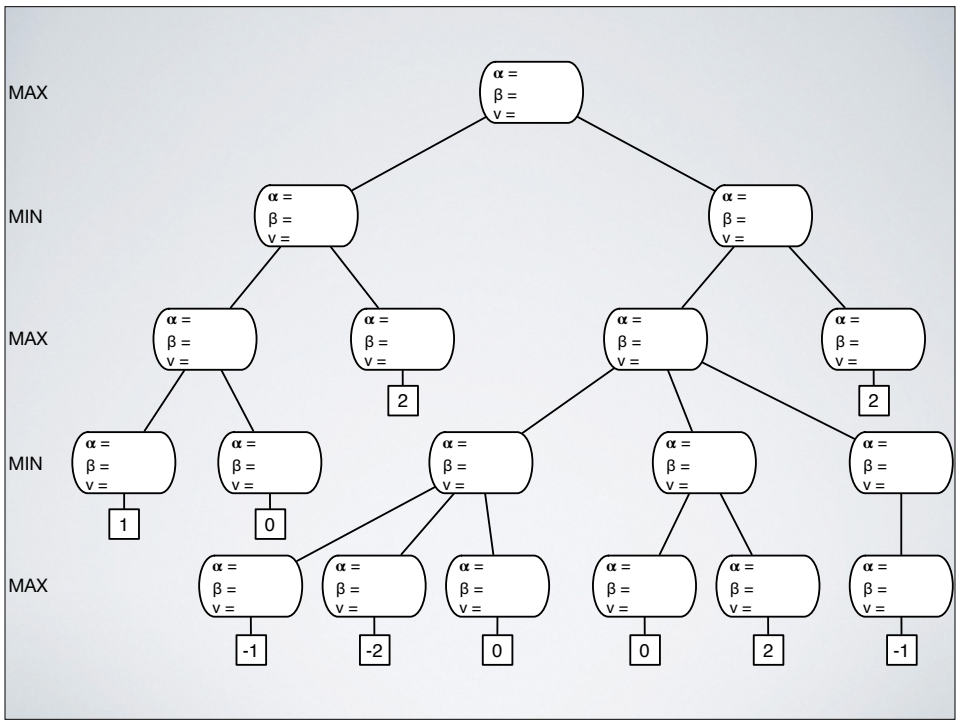

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Key assumption in minimax and alpha-beta search:
Opponent will always take optimal actions

What if the opponent some times make mistakes?

branching factor b
depth of the goal d
depth of tree m

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