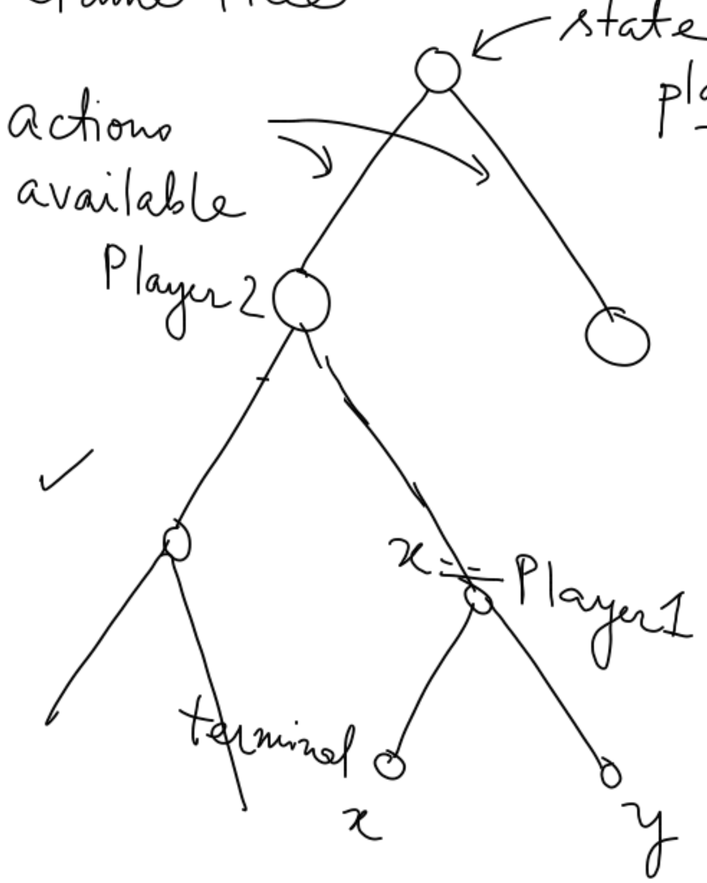
Multi Agent AI (Lec 2)

Lecture materials available at cse.iitb.ac.in/~swaprava/cs217240_2024.html

Week 10 (lecs 19, 20)

Game tree



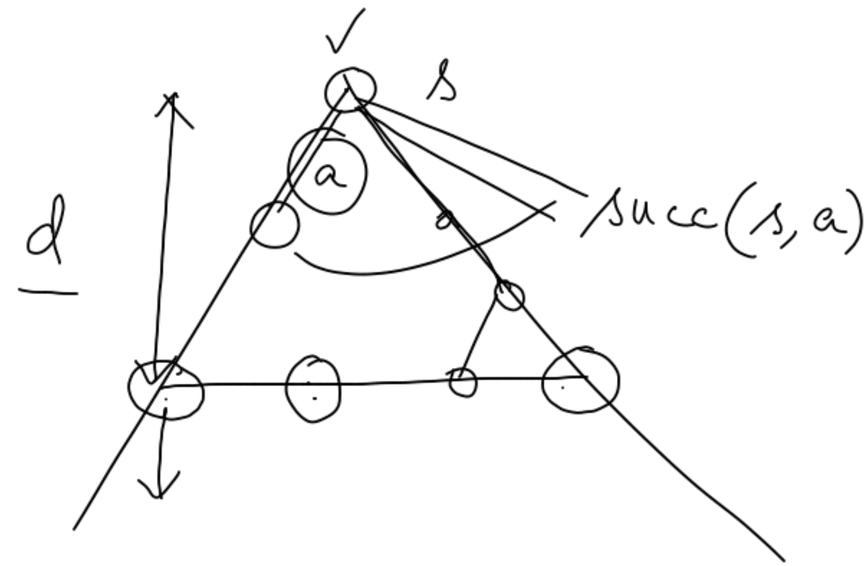
Backward induction →

Large number of states in the game tree stops us from executing B.I.

Two approaches for speed up

① Depth limited search →

② Pruning



Utility structure for an agent

$$u_{Ag}(s,d) = \begin{cases} utility(s), & \text{if } isEnd(s) = TRUE \\ \underline{eval}(s), & \text{if } d = 0 \\ \max_{a \in actions(s)} u_{Ag}(succ(s,a), \underline{d-1}), & \text{if } player(s) = agent \\ \min_{a \in actions(s)} u_{Ag}(succ(s,a), d-1), & \text{if } player(s) = opp \end{cases}$$

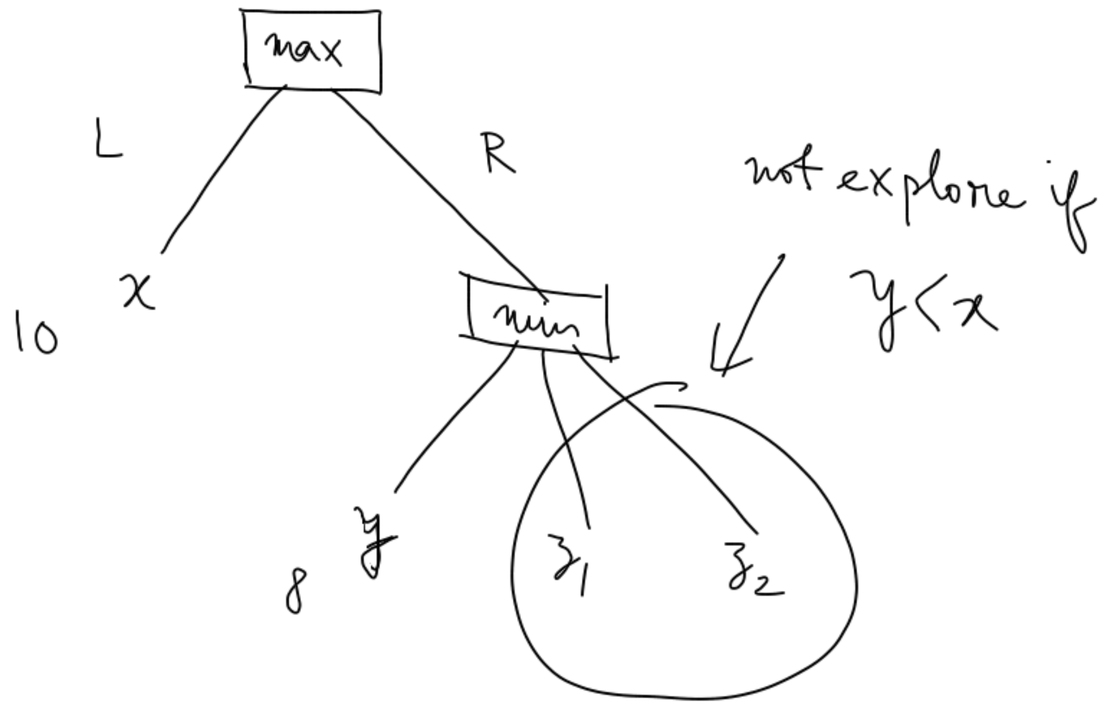
Heuristic approach

For chess

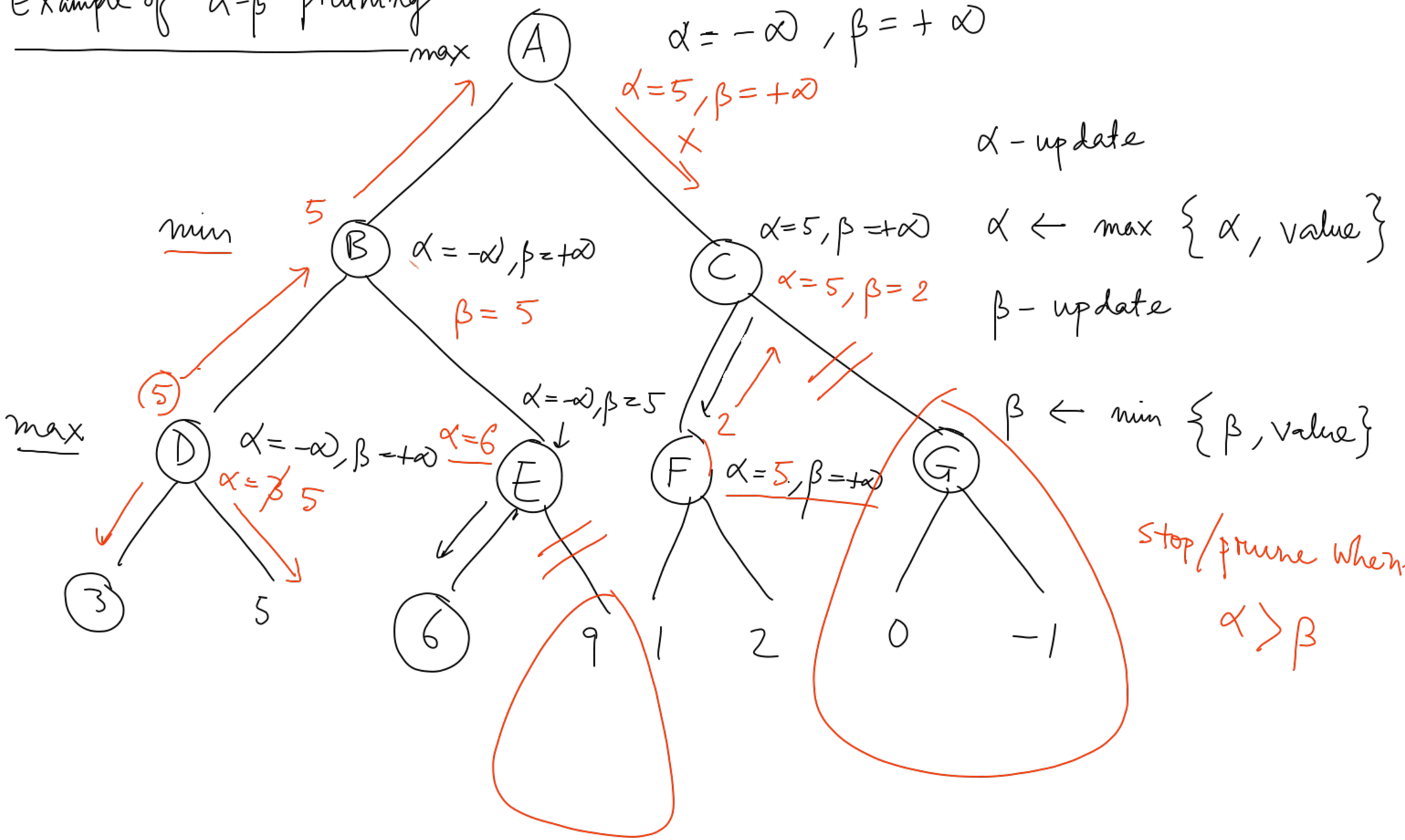
eval(s) = army + mobility + king safety + . .

$$\text{Army} = 10^{100}(K - K') + \dots$$

(2) Pruning — remove the subgame that is not relevant.
(α-β pruning)



Example of α-β pruning



Sequential move games — chess, Go, . Card games

Simultaneous move games — sealed-bid auction

Player 1 \ Player 2	A	W
A	5, 5	0, 6
W	6, 0	1, 1

Two competing nations

CS6001

equilibrium outcome