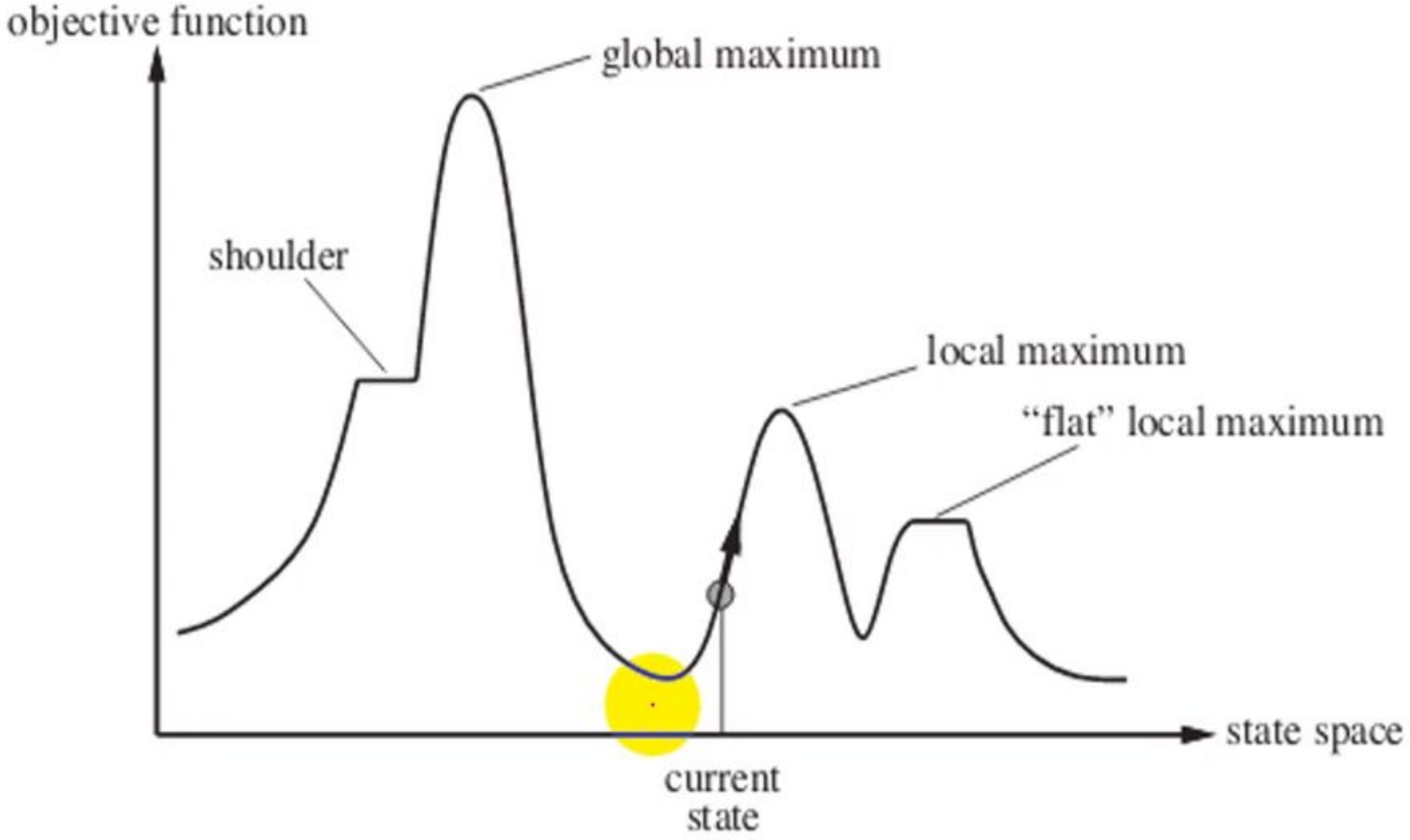
Artificial Intelligence

HILL CLIMBING

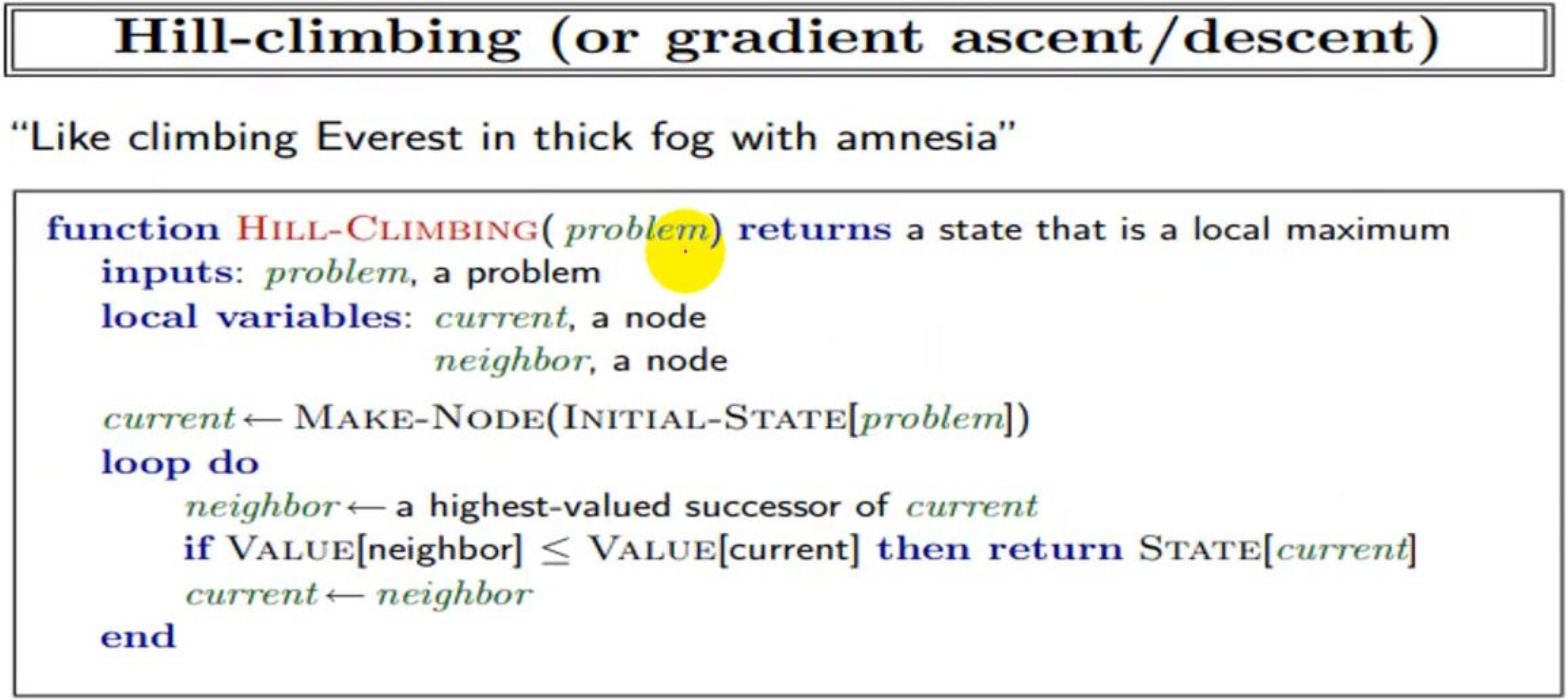
Hill Climbing



Hill Climbing Problems

- HLocal maxima = no uphill step
- Algorithms on previous slide fail (not complete)
- Allow "random restart" which is complete, but might take a very long time
- Plateau = all steps equal (flat or shoulder)
- Must move to equal state to make progress, but no indication of the correctdirection
- Ridge = narrow path of maxima, but might have to go down to go up

Hill Climbing



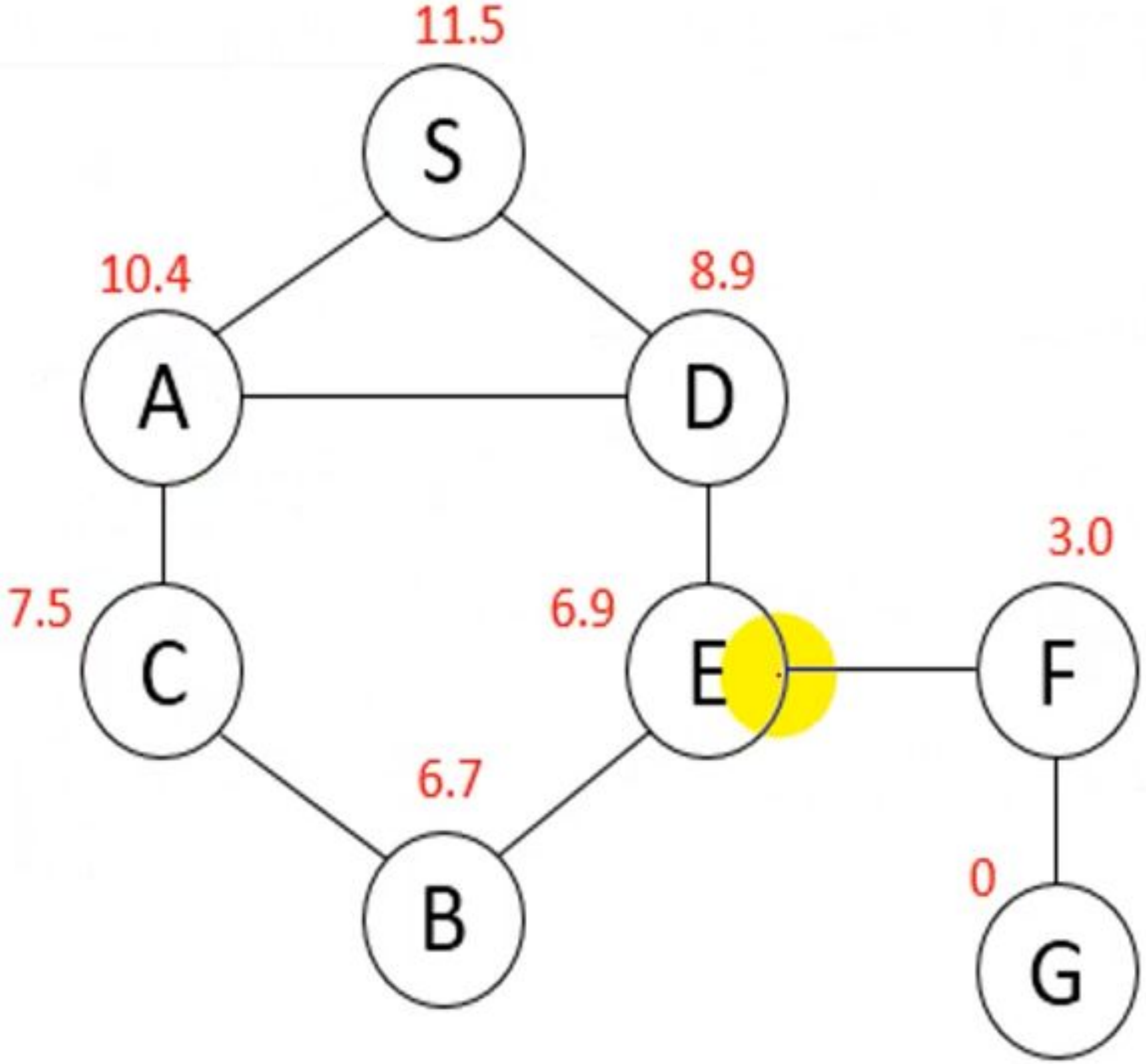
Hill-climbing (or gradient ascent/descent)

“Like climbing Everest in thick fog with amnesia”

```
function HILL-CLIMBING( problem) returns a state that is a local maximum
    inputs: problem, a problem
    local variables: current, a node
                     neighbor, a node

    current ← MAKE-NODE(INITIAL-STATE[problem])
    loop do
        neighbor ← a highest-valued successor of current
        if VALUE[neighbor] ≤ VALUE[current] then return STATE[current]
        current ← neighbor
    end
```

Hill Climbing Example:



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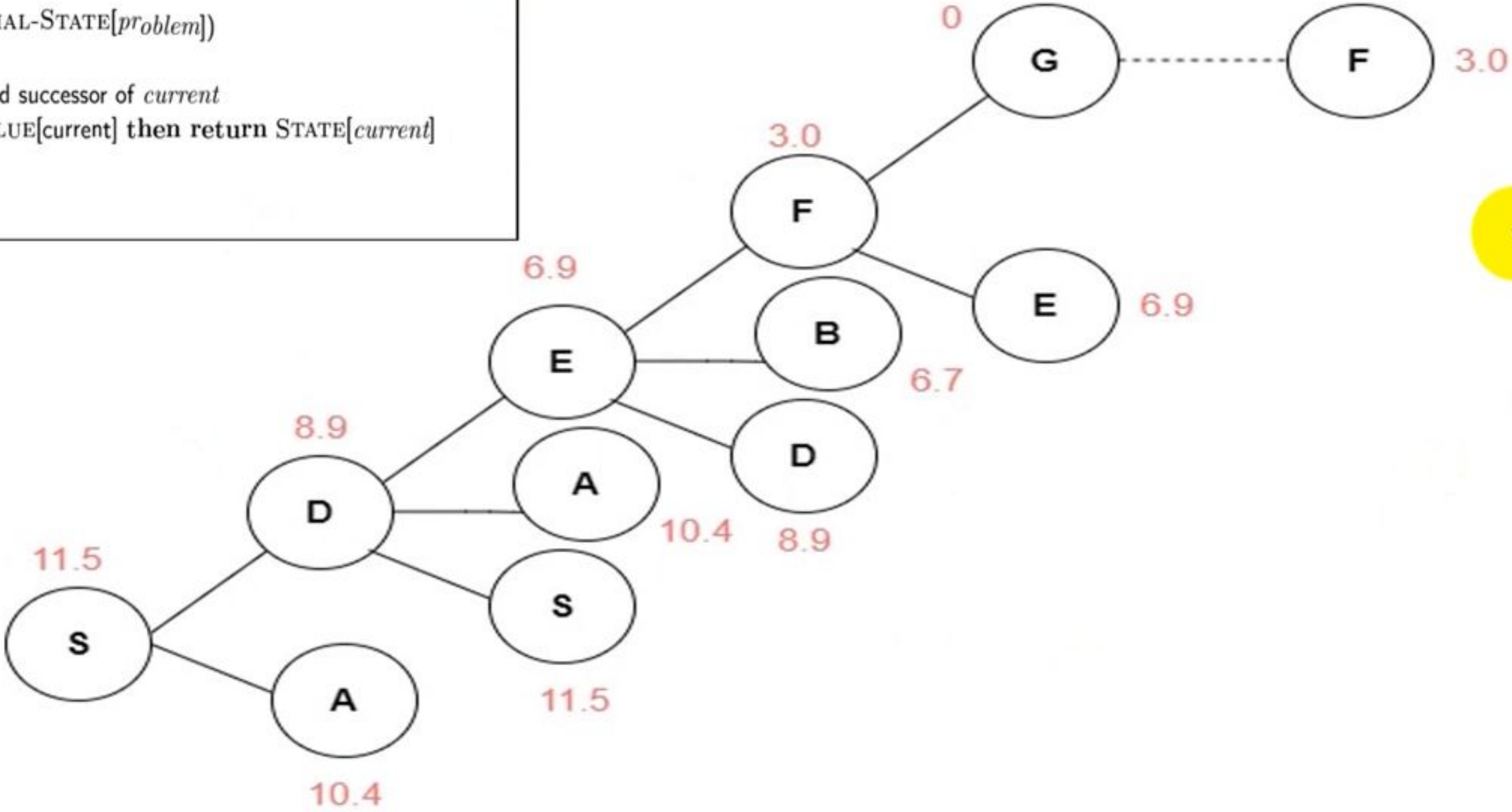

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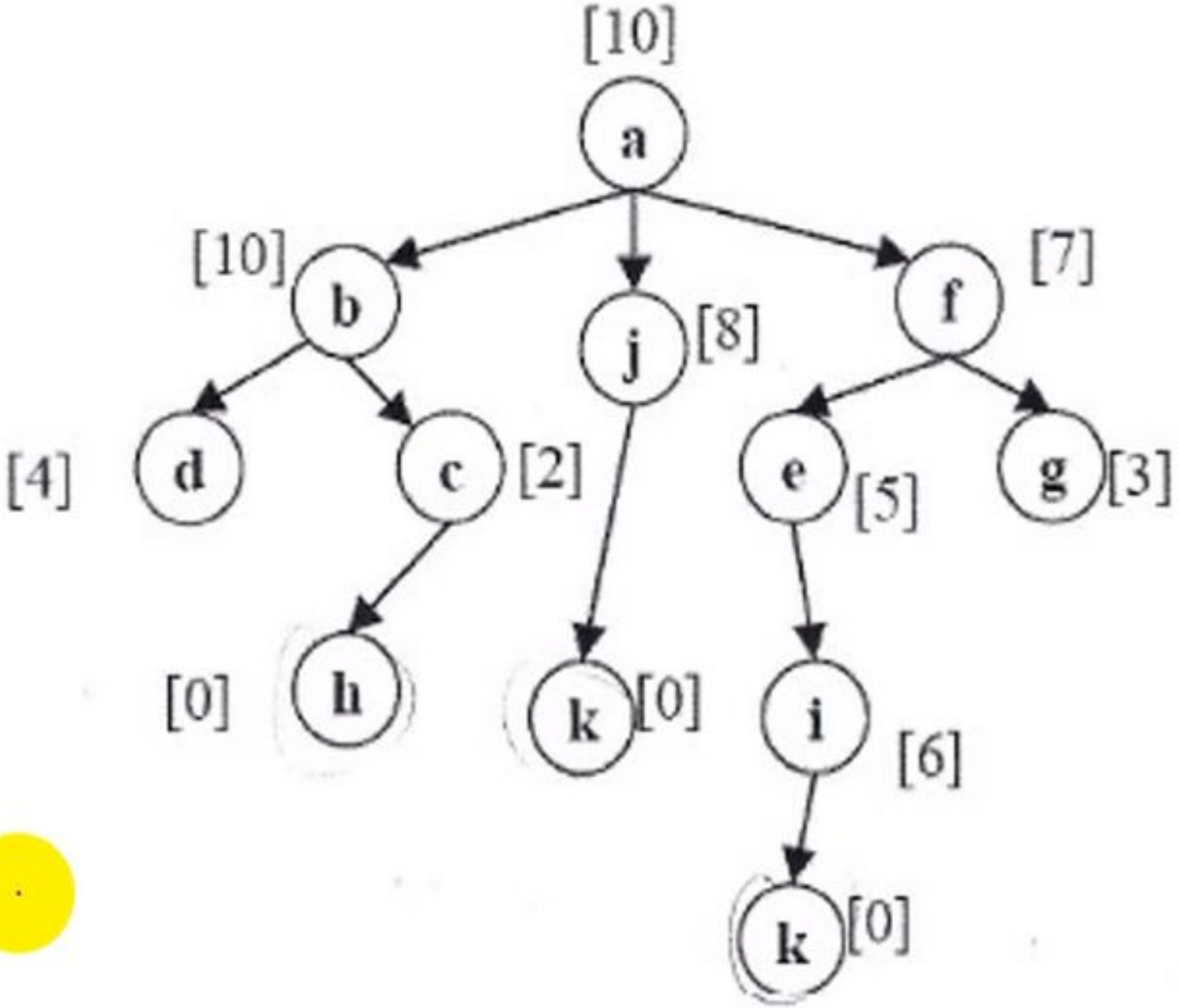
[10]
a
[10]
b
j
[8]
f
[7]
[4]
d
c
[2]
e
[5]
g
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[0]
h
k
[0]
i
[6]
k
[0]