Artificial Intelligence
AI-2002
Types of Hill Climb

Mahzaib Younas

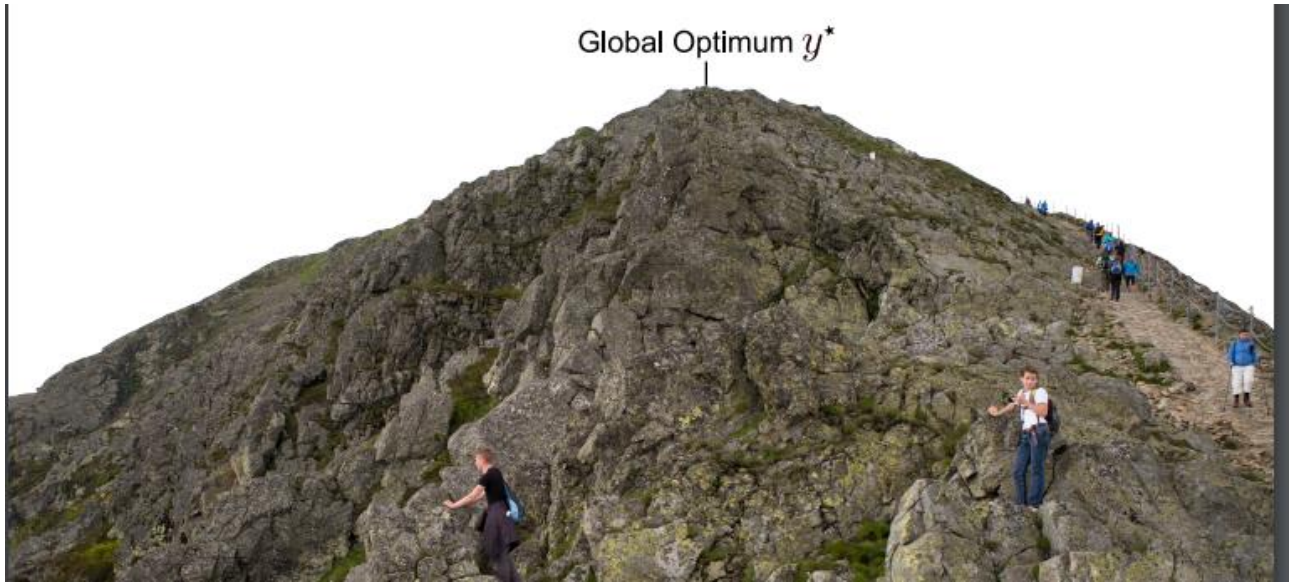
Lecturer Department of Computer Science

FAST NUCES CFD

Hill Climb Algorithm

- It examines the neighboring nodes **one by one** and selects the first neighboring node which optimizes the current cost as the next node.

- Types of Hill Climb Algorithm
  - Steepest Hill Climb
  - Stochastic Hill Climb
  - Random Start
  - First Choice

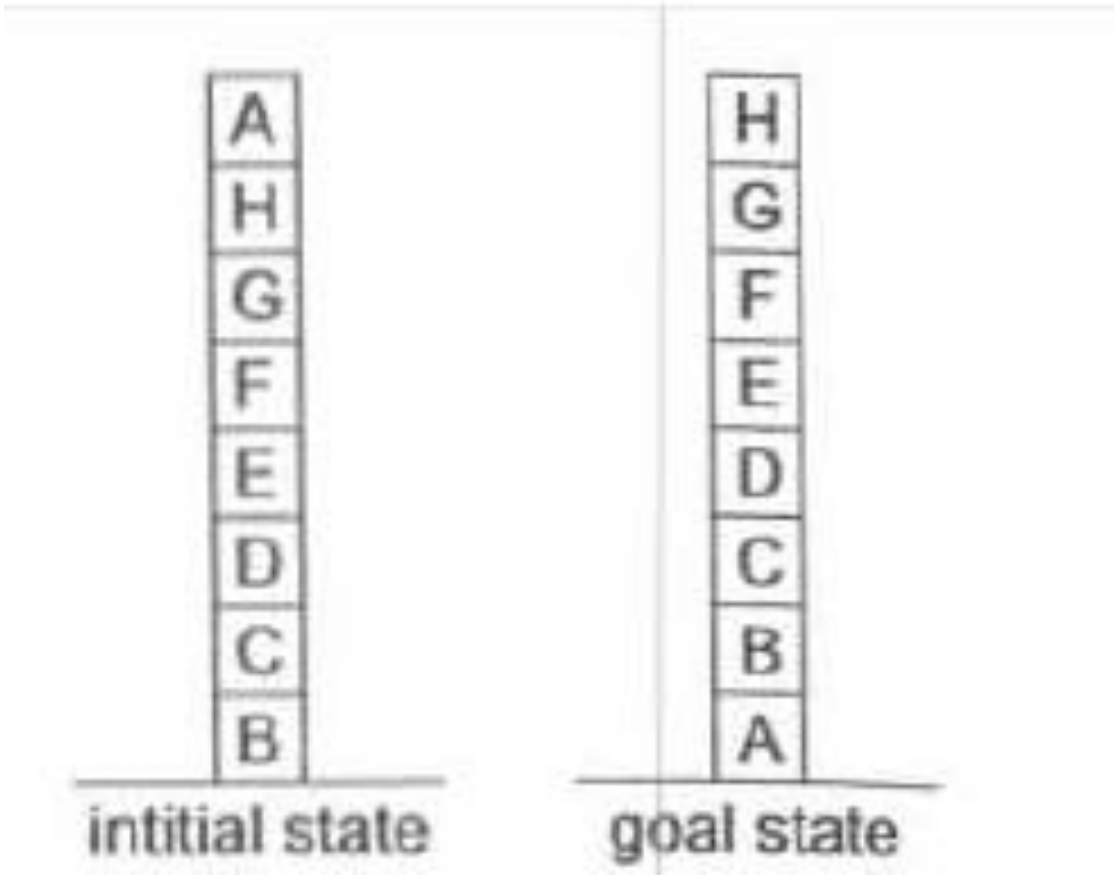


Steepest Hill Climb

- It first examines **all the neighboring nodes** and then **selects the node closest to the solution state** as of the next node.

In the case of hill climbing technique we picked any state as a successor which was closer to the goal than the current state whereas, in Steepest-Ascent Hill Climbing algorithm, we choose the best successor among all possible successors and then update the current state.

Example:



Solution:

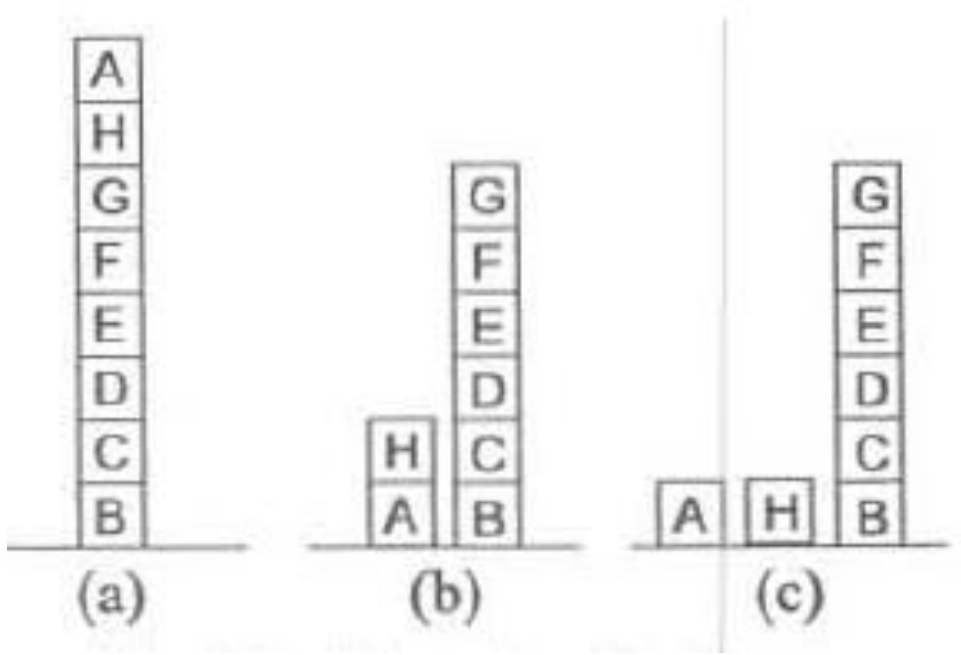
- Firstly we calculate the actual cost of Goal State

- Cost = variable placing location
- Total Cost = 7+6+5+4+3+2+1+0
  = 28

Final State	Cost
H	7
G	6
F	5
E	4
D	3
C	2
B	1
A	0

Solution:

- Firstly we make three possible moves inst

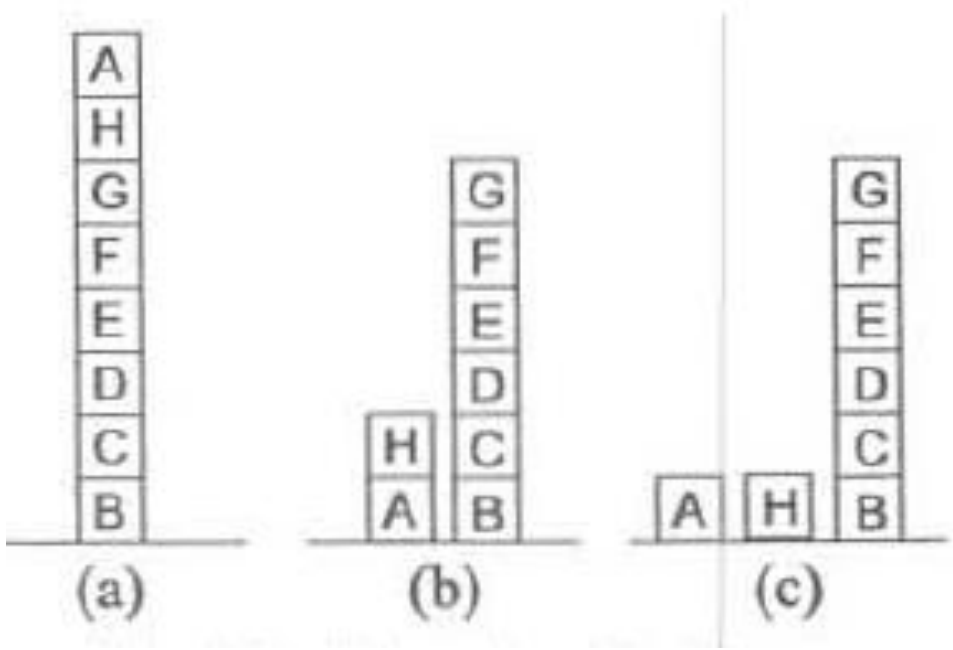


Possible Choice

Estimated/Heuristic Cost of Choice **A = -28**

Estimated/Heuristic Cost of Choice **B = -16**

Estimated/Heuristic Cost of Choice **C = -15**



This time, steepest-ascent hill climbing will choose move (c), which is the correct one. Because minimum value is C

Stochastic Hill Climb

- Stochastic hill climbing **does not examine for all its neighbor** before moving.
- this search algorithm **selects one neighbor node at random** and decides whether to choose it as a current state or examine another state.

Stochastic Hill Climb

In Simple Way

1. create random initial solution

2. make a modified copy of best-so-far solution

3. if it is better, it becomes the new best-so-far solution (if it is not better, discard it).

4. go back to 2. (until the time is up)

Example:

- Here we are the number of list, we work with objective function, so our goal is to find the maximum value from list

- Given list

Numbers = { 1, 3, 7, 12, 9, 5}

Working Difference in simple, steepest and stochastic

Simple

- Start from the first number of list
- Compare it with next one
- Repeat until, we find a number that is not smaller than the next one

Steepest

- Starts from the first number as the current maximum
- iterates through the list and updating the current maximum whenever it find the a larger value.
- Largest number find after checking all the element and then return.

Stochastic

- Start from random position from list
- Then randomly selected the next number from the list
- If number is greater then it become the current state otherwise find some explore some other numbers