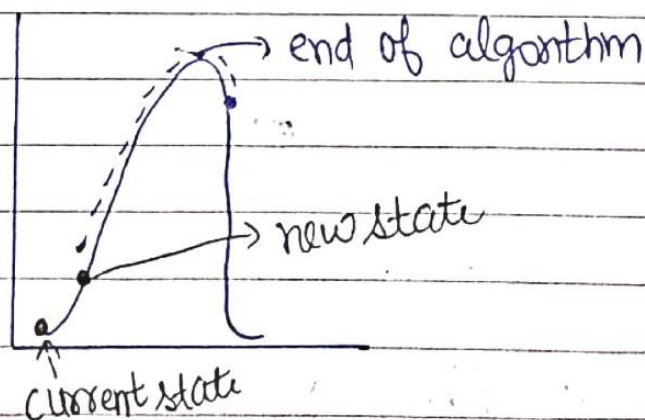


* Hill Climbing :-

- Hill climbing algorithm is a technique which is used for optimizing the mathematical problems.
- Hill Climbing is an example of a heuristic search technique.
- It uses a heuristic function which provides an estimate of how close a given state is to goal state.
- This algorithm continuously moves in the direction of increasing elevation to find the peak of the mountain or best solution to the problem.
- It always moves in single direction.



If new state is better than current state then
 $\text{new state} > \text{current state}$

➤ Different regions in algorithm:-

- Local Maximum:- It is state which is better than its neighbour state.
- Global Maximum:- It is best possible state.
- Current state :- Where an agent is currently present.
- Flat local maximum:- Where all the neighbour states of current state have the same value.

➤ For Example:- (Starting state)

1	2	4
5		7
3	6	8

1	4	7
2	5	8
3	6	

h=4

1	2	4
	5	7
3	6	8

(Less heuristic value is 4, So choose 4) (Stop).

h=5

1	2	4
5	7	
3	6	8

h=6

1	2	4
3	6	4
3		8

h=5

	2	4
1	5	7
3	6	8

h=5

1	2	4
3	5	7
	6	8

Current state = 4
 next state = 5
 because h-value increase
 its stops

Types of Hill Climbing Algorithm :-

1. Simple Hill Climbing
2. Steepest-Ascent Hill Climbing
3. Stochastic Hill Climbing.

1. Simple Hill Climbing :-

→ It is the simplest way to implement a Hill Climbing Algorithm.

→ It only check it's one successor state and if its finds better than the current state its move else be in the same state.

features:-

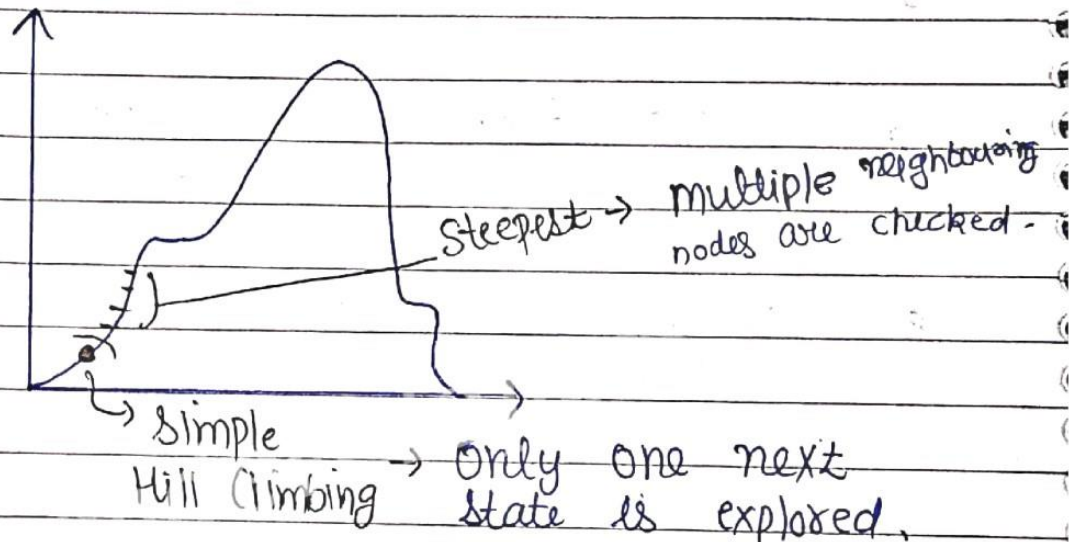
- Less time Consuming.

2. Steepest - Ascent Hill Climbing :-

→ It is the variation of simple Hill Climbing algorithm.

_ / _ / _

→ This algorithm examines all the neighboring nodes of current state and selects one which is closest to the goal state.



(3) Stochastic Hill Climbing :-

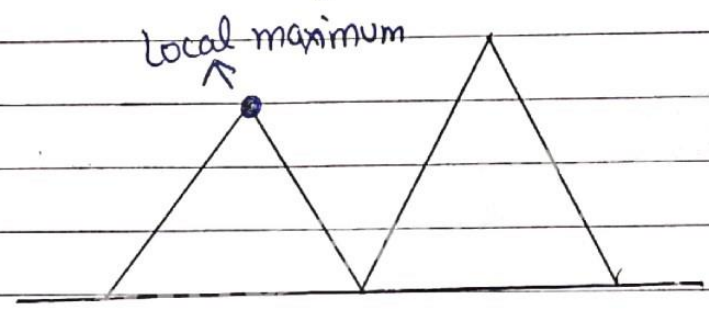
→ Stochastic Hill Climbing does not examine for all its neighbours before moving.

→ This algorithm selects one neighbour node at random and decides whether to choose it as a current state or examine another state.

➤ Problems in Hill Climbing:-

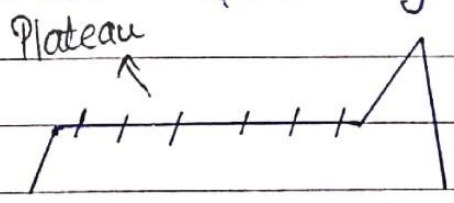
(i) Local Maximum:- At a local maximum, all neighbouring states have a value which is worse than current state.

Solution:- Backtracking technique can be solution of the local maximum.



(ii) Plateau:- On plateau all neighbors have same value. Hence it is not possible to select the best direction.

Solution:- To take big steps or very little steps while searching to solve the problem.



(iii) Ridge:- It has an area which is higher than its surrounding areas, but it has a slope and cannot be reached in a single move.

