Local Search

8-Queens problem as an optimization problem

Neighborhood / Successor function :- Moving a single queen anywhere in the same column.

Objective function :- No. of pairs of queens attacking each other.

Trivial Algorithms

1. Random sampling :- Generate a state randomly.

2. Random walk :- Randomly pick a neighbor of the current state.

Both algorithms are asymptotically complete.

Hill Climbing   Max $f(n)$

Ls also known as Greedy Local Search.

→ continuously moves in the direction of increasing objective function value.

function hill-climbing

current node ← initial state

loop.

neighbor ← higher value successor of current
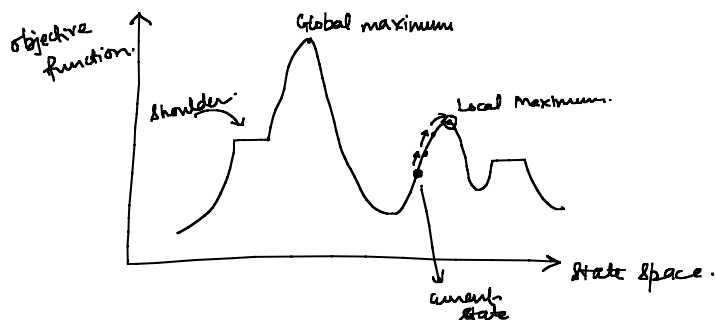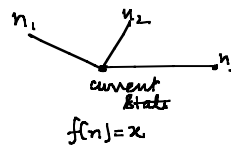
If value [neighbor] ≤ value [current]

return state (current node)

current node ← neighbor.

End. Loop

End.

Hill Climbing gets stuck in local minima.

Hill-Climbing on 8-Queens

ⓐ Randomly generated 8-queens starting state.

14% times, it solves the problem.

86% times, it gets stuck in local optimum.

ⓑ Takes only 4 steps on average when it succeeds

"   "   3   "   "   " when it gets stuck.