

Experiment No: 7

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Title: Block world problem solving by Hill Climbing method

Postlab:

1. What are the advantages and disadvantages of state space search?

Ans: The Advantages and disadvantages of state space search:

a) Advantages:

- Systematic exploration of all possible solutions
- Guaranteed to find a solution if one exists
- Can find optimal solutions

b) Disadvantages:

- Computationally expensive, especially for large or complex problems
- May get stuck in local maxima/minima
- Requires a lot of memory to store all possible states

2. What are the advantages and disadvantages of the Hill Climbing approach?

Ans: The Advantages and disadvantages of the Hill Climbing approach:

a) Advantages:

- Simple to implement
- Computationally efficient
- Can quickly find a local optimum

b) Disadvantages:

- Can get stuck in local maxima/minima
- Does not guarantee finding the global optimum
- Sensitive to the initial starting state

3. Describe variations of Hill Climbing approach

Ans: The Variations of Hill Climbing approach:

- a) Steepest Ascent Hill Climbing: Evaluates all possible successor states and selects the one with the highest score.
- b) Random-Restart Hill Climbing: Restarts the search from a randomly selected initial state if the algorithm gets stuck in a local maximum.
- c) Stochastic Hill Climbing: Probabilistically accepts worse states to avoid getting stuck in local maxima.
- d) Gradient Descent Hill Climbing: Uses the gradient of the objective function to determine the direction to move.

4. Solve the Block World problem by using the STRIPS method.

Ans: The STRIPS (Stanford Research Institute Problem Solver) method is a planning algorithm that can be used to solve the Block World problem. The key steps are:

1. Define the initial state and the goal state.
2. Define the available operators (actions) that can be performed, such as pick up a block and put it on the table, or pick up a block and put it on another block.
3. Represent the preconditions and effects of each operator.
4. Use a forward-chaining search algorithm to find a sequence of operators that transforms the initial state into the goal state.

The STRIPS method can guarantee a solution if one exists, unlike the Hill Climbing approach, which can get stuck in local maxima. However, the STRIPS method can be computationally more expensive, especially for larger or more complex problems.