

Experiment No: 6

Name:- Winstar Pereira

Class:- TE COMPS – A

Roll No:- 9569

Title: Implementation of AO* algorithm

Postlab:

1. What is the difference between A* and AO* algorithm?

Ans: The main difference between the A* and AO* algorithms lies in the problem-solving approach:

a) A* Algorithm:

- A* is a single-agent path-finding algorithm used to find the shortest path between a starting point and a goal.
- It uses a heuristic function to estimate the cost from the current node to the goal node and selects the node with the lowest estimated total cost.
- A* algorithm explores a single path at a time, expanding the most promising node until it reaches the goal.

b) AO* Algorithm:

- AO* is a graph-search algorithm used to solve problems that can be decomposed into smaller subproblems.
- It builds an AND/OR search tree, where each node represents a subproblem, and the children nodes represent the subproblems that need to be solved to solve the parent problem.
- AO* algorithm explores multiple paths simultaneously, selecting the most promising ones and backtracking when necessary to find the optimal solution.
- AO* is useful for solving problems that can be broken down into smaller, interdependent subproblems, such as planning, decision-making, and problem-solving in artificial intelligence.

2. Why AO* algorithm only works when heuristic values are underestimated?

Ans: The AO* algorithm assumes that the heuristic function used to estimate the cost of reaching the goal is admissible, meaning it never overestimates the actual cost. This is because the AO* algorithm uses this heuristic value to guide the search and prune the search tree.

If the heuristic values are overestimated, the AO* algorithm may discard optimal paths that have a higher estimated cost but a lower actual cost, leading to a suboptimal solution. This is because the AO* algorithm will prioritize the paths with the lowest estimated cost, even if they are not the actual optimal solution.

On the other hand, if the heuristic values are underestimated, the AO* algorithm will still find the optimal solution, as it will explore all the necessary paths to ensure that the optimal

solution is found. The underestimated heuristic values will not cause the algorithm to discard optimal paths, but may result in a larger search tree and slower performance.

Therefore, the AO* algorithm is designed to work with admissible heuristic functions, which are guaranteed to never overestimate the actual cost, to ensure that the optimal solution is found.