Assignment - 1   AIES

FAQ's

1. what is a heuristic function? what is the advantage of using heuristic function?

Ans - The heuristic function is a way to inform the search about the direction to a goal. It provides an informed way to guess which neighbor of a node will lead to a goal.

Advantage of Huristic function :-

- Attribute substitution :- At the place of more complex and difficult questions, one can also opt for a simpler question related to the original one. This technique of attribute substitution makes the method more beneficial.

- Effort Reduction :- The heuristic method reduces the mental efforts required to solve a problem by making different choices and decisions. It makes the method one of the most effective ways to find solutions to many time-consuming problems.

- Fast and frugal :- with the help of heuristic method, the problems can be solved within a limited time, and the best and accurate answer can be obtained.

2. Explain A* algorithm with example.

Ans - A* algorithm is one of the best and popular techniques used for path finding and graph traversals. A lot of games and web-based maps use this algorithm for finding the shortest path efficiently.

It is essentially a best first search algorithm.

working :-

- It maintains a tree of Paths originating at the start node.
- It extends those paths one edge at a time.
- It continues until its termination criterion is satisfied.

A* algorithm extends the Path that minimizes the following function :-

$$f(n) = g(n) + h(n)$$

- 'n' is the last node on the path.
- g(n) is the cost of the path from start node to node 'n'.
- h(n) is a heuristic function that estimates cost of the cheapest path from node 'n' to the goal node.

Example :- 8 Puzzle Problem.

1	2	3
4		6
7	5	8

1	2	3
4	5	6
7	8	

Initial State   Goal State

$$g=0, \quad h=3$$
$$f = h+g = 3$$

	2	3
7	4	6
	5	8

$g=1, h=4, f=5$

	2	3
1	4	6
7	5	8

$g=1, h=2, f=3$

1	2	3
4		6
7	5	8

$g=1, h=4, f=5$

1	2	3
7	4	6
	5	8

$g=2, h=1,$
$f=3$

1	2	3
4	5	6
7		8

$g=2, h=3, f=5$

1	2	3
4		6
7	5	8

$g=2, h=3$
$f=5$

1		3
4	2	6
7	5	8

1	2	3
4	5	6
	7	8

1	2	3
4	5	6
7	8	

$g=3$
$h=0$
$f=3$

$g=3, h=2$
$f=5$

3. Explain different heuristic functions that can be used for
    the eight puzzle problem.

Ans— A heuristic function for 8 puzzle problem :—
    $h(n) = $ no. of tiles out of position.

Assignment - 2   AIES

FAQ's

1. Compare informed Search and adversarial Search.

Ans- Informed Search : -

• It Contains information on a goal state. It helps search efficiently. The info is obtained by a function that helps estimate how close a current state is to the goal state.

• Examples of informed search include greedy search & graph search. It was the knowledge in process of searching.

Adversarial search : -

• It is used when there is an "enemy" or "opponent" changing the state of problem every step in direction you to not want.

• Examples :-   chess business, trading war

2   Explain Minimax Algorithm with example.

Ans - • The working of minimax algorithm can be easily described using an example.

• There are two players one is called maximizer and other is called minimizer.

• maximizer will try to get the maximum possible score & minimizer will try to get minimum possible score.

• The algorithm applies DFS so in this game tree, we have to go all the way through the leaves to reach the terminal node to whom terminal values are given. So we will compare these value and backtrack the tree until the initial state occurs.

3. Explain Alpha-Beta Pruning

Ans-. Alpha-beta pruning is a method that optimizes the minimax algorithm.

• The no. of states to be visited by minimax algorithm are exponential which shoots up the time complexity.

• Some of all branches of the decision tree are useless and the same result can be achieved if they were never visited.

• Therefore, Alpha-Beta Pruning cuts-off these useless branches and in best case cuts back the exponent to half.