AI

Theory Assignment - 01

Q1] List the different types of agent. Explain goal based agents in detail.

Ans : Artifical Intelligence is defined as a study of rational agents An AI is composed of an agent and its environments.

Types of Agents :-

i. Simple Reflex Agents.
ii. Model - Based Reflex Agents..
iii. Goal - Based Agents
iv. Utility - Based Agents.
v. Learning Agents.

A goal-based agent operates based on a goal in front of it and makes decisions based on how best to reach that goal. They operates as a search and planning function meaning it targets the goal ahead and finds the right action in order to reach it. They expand on the concept of model-based agents because of the presence of goal itself. Unlike a simple reflex agent that makes decisions solely on the current environment, a goal based agent is capable of thinking beyond the present moment to decide the best actions in order to achieve its goal.

Q2] What are informed search methods? Explain any one informed search method in detail.

Ans :- The informed search algorithm is more usefull for large search space. Informed search algorithm uses the idea of heuris, so it is also called Heuristic search. This type of search uses domain knowledge.

The basic informed search strategies are :-

• Greedy search.
• A+ search
• Graph search

In greedy search, we expand the node closet to the goal mode. The closeness is estimated by a heuristic $h(x)$.

A heuristic h is defined as -

$h(x)$ = Estimate of distance of node x from goal no. lower the value of $h(x)$ closer is node from the goal.

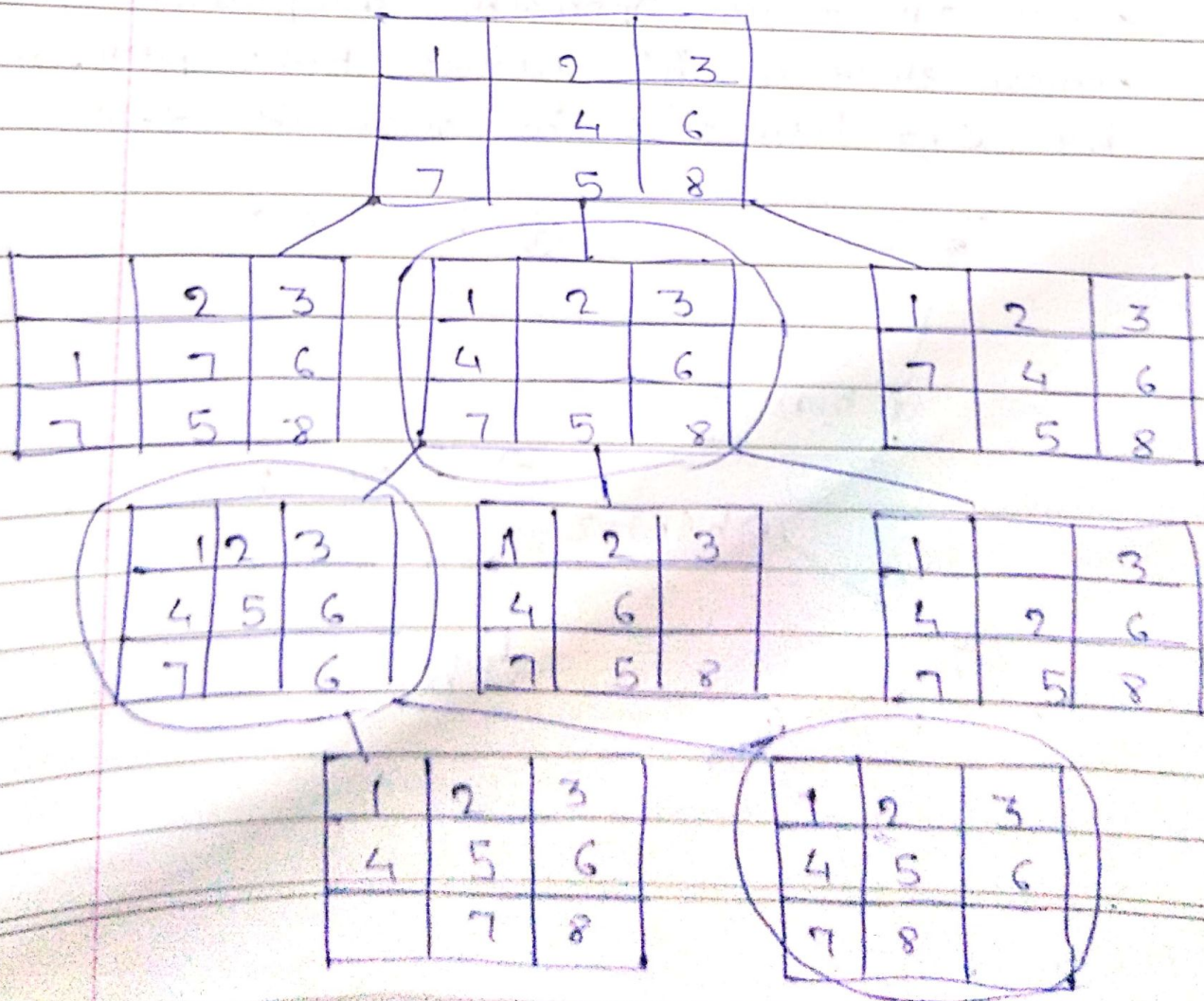The strategy is to expand the node closest to the goal state i.e, expand the node with lower h value.

$f(a) = 1.5 + 9$

$f(d) = 2 + 4.5$

$f(b) = 3.9 + 2$

$f(d) = 2 + 4.5$

$f(e) = 6.5 + 4$

$f(d) = 2 + 4.5$

$f(c) = 6.5 + 4$

$f(c) = 5 + 2$

Key : green → start ; blue : goal ; orange : visited

A* Solves the 8 - Puzzle Problem.

Advantage :- Works well with informed search
problems, with fewer steps to reach a
goal.

Disadvantage :- Can turn into unguided DFs
in the worst case

Q2] Explain the A* algorithm with example, write
any two heuristic functions for solving
8 puzzle program.

Ans   A* is a graph traversal and path search
algorithm which is often used in computer
science due to its optimality, completeness and
optimal efficiency. A* achieves better performance
by using Heuristics to guide its search

orange

ⓐ h(a) = 4

ⓓ h(d) = 4.3

ⓔ h(e) = 2

ⓑ h(b) = 2

3

ⓒ

h(c) = 4

○ blue
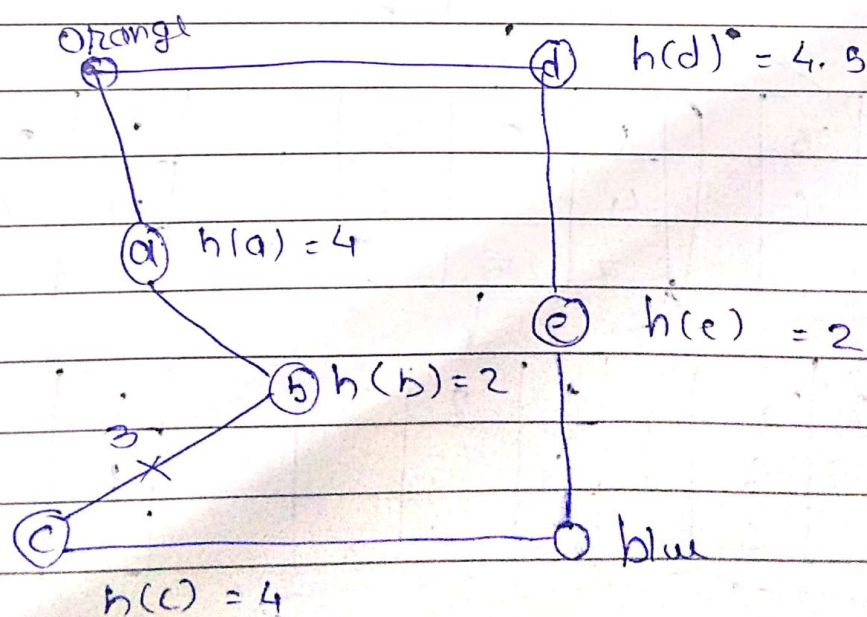
8 Puzzle problem using Branch and Bound

Given a 3×3 board with 8 tiles and one empty space. The objective is to place the number on tiles to match final configuration using the empty space. We can slide four adjacent (left, right, above and below) tiles into the empty space.