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Sub. - A.I. (Midterm)

Sec - C

Ans. ① In this puzzle solution of the 8 puzzle problem, given a 3×3 board with 8 tiles and one empty space.
The objective is to place the number of the match the final configuration using the empty space.

We can slide four adjacent tiles into the empty space.

Initial configuration:

1	2	3
5	6	
7	8	4

and, final configuration:

1	2	3
5	8	6
	7	4

1) DFS (Brute-force) :-

We can perform a depth-first search on the state-space tree.

In this solution, successive moves can take us away from the goal rather than bringing us closer.

2). (Brute force) BFS :-

We can perform a Bredth-first search on the state space tree.

This always finds a goal state nearest to the root.

3). Branch and Bound :-

The search for an answer

node can often be speeded by using an "intelligent" ranking function, also called an exponential approximate cost function to avoid searching in sub-trees that do not contain an answer node.

There are basically three types of nodes involved in Branch and Bound.

1). Live node :- It is a node whose children are currently being explored. In other words, an live node being expanded.

2). E-node is a live node whose children are currently being explored. In other words, an E-node is a node currently being explored.

3). Dead node is a generated node that is not to be expanded or explored any further.

All children of dead node have

already been explored.

* Cost function :-

Each node X in the search tree is associated with a cost.

The useful function is for determining the next E-node.

The next E-node is the one with least cost.

$$C(X) = g(X) + h(X).$$

where,

$g(X)$ = cost of reaching the current node, from the root.

$h(X)$ = cost of reaching an answer node from X.

Ans (2). Understanding human language is considered a difficult task due to its complexity.

For example, there is an infinite number of different ways to arrange words in sentance.

Also, words can have several meanings and contexutal information is necessary to correctly interpret sentences.

Every language is more or less unique and ambiguous. Just take a look at the following newspaper headline

"The pope's baby steps on gays". This sentence clearly has two different interpretations, which is a pretty good example of the challenges in NLP.

Sntax is the grammatical structure of the text, where as semantics is the meaning being conveyed.

A sentence that is syntactically correct, however, is not

always sementically correct.

* Syntactic Analysis :- This, also referred to as syntax or parsing, is the process of analyzing natural language with rules of a formal grammer.

Grammatical rules are applied to categorical and groups of words, not individual words.

Syntatic analysis basically assigns a semantic structure to text.

* Semantic analysis :- The way we understand what someone said is an unconscious process relying on our intuition and knowledge about language itself.

In other words, the way understand language is heavily based on meaning and context.

(Sec-B)

Ans. (1) Searching Algorithms are designed to check for an element or retrieve an element from any data structure where it is stored.

Based on the type of search operation, these algorithms are generally classified into two categories:

1). Sequencial Search :- In this, the list or array is transversed sequencially and every element is checked. For example : Linear Search.

2). Interval Search :- These algorithms are specifically designed for searching in sorted data-structures.
These type of searching algorithms are much more efficient than Linear Search as they repeatly target the center of the searching structure and divide the search space in half.
For example : Binary Search.

Ans (4) Knowledge Representation and reasoning (KR, KRR) is the part of Artificial intelligent which concerned with AI agents thinking and how thinking contributes to intelligent behaviour of agents.

Knowledge is the awareness or familiarity gained by experiment of data, facts and situations.

* Types of Knowledge :-

(a) Declarative knowledge is to know about something.

(b) Procedural knowledge is responsible for knowing how to do something.

(c) Meta - knowledge is knowledge about other knowledge.

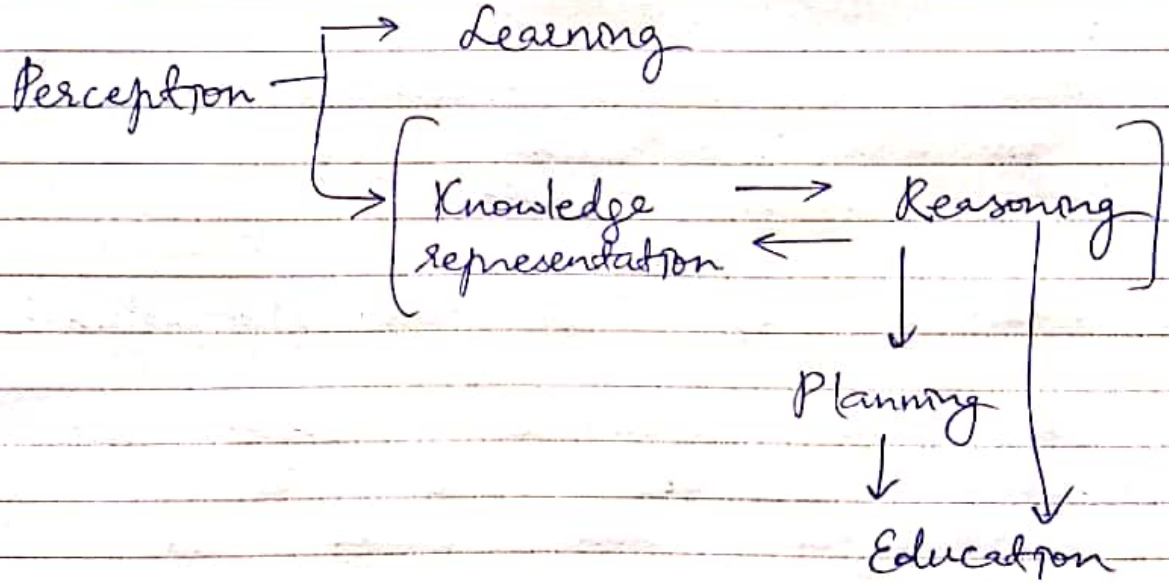
(d) Heuristic knowledge :- It is representing knowledge of some expert in a filed or subject.

(e) Structural knowledge is basic

knowledge to problem solving.

* AI knowledge cycle :-

(a) Perception
(b) Learning
(c) Knowledge Representation & Reasoning
(d) Planning
(e) Execution.



Ans (3). Mini - Max Algorithm in Artificial Intelligence :-

It is a recursive or backtracking algorithm which is used in decision making and game theory.

It uses recursion to search through the game-tree.

Min-max algorithm is mostly used for game playing in AI.

Such as Chess, Checkers, tic-tac-toe, go and various tow-player game.

This algorithm computes the minmax decision for ~~cor~~ corrent state.

* Working of Min-Max Algorithm :-

In this example, there are two players, one is Maximizer and other is called Minimizer.

Maximizer tries to get the Maximum possible score, and Minimizer will try to get the Minimum possible score.

We have to go all the way through the leaves to reach the terminals node.

Ans (2). There are two jugs of Volume A litre and B litre.

Neither has any measuring mark on it. There is a pump that can be used to fill the jugs with water.

The state space for this problem can be described as the set of ordered pairs of integer (x, y).

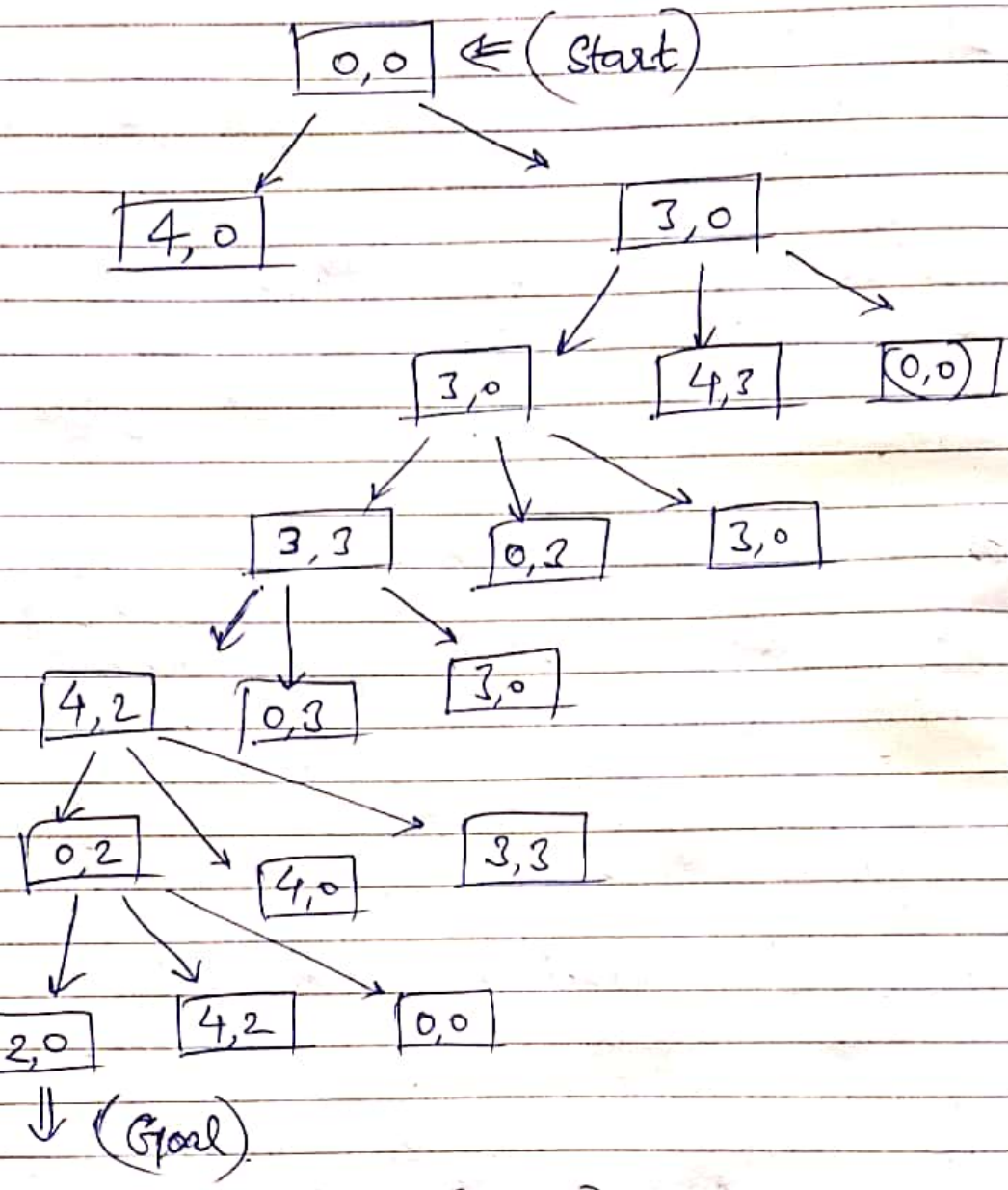
Start State : (0,0)
Goal State : (2,0)

Generate production rule for the water jug problem.

We basically perform three operation to achieve the goal.

(a) Fill water jug.
(b) Empty water jug.
(c) and, Transfer water jug.

* Water Jug Solution using DFS (Depth first Search).



(Sec-A)

Ans(1). An intelligent agent is a problem solving program that can make decisions or perform a service based on its environment, user

input. or and experiment.

Intelligent agents may also be refferred to as a bot, which is short for robot.

Ans (2) Difference between AI, ML and DL :-

* AI stands for Artificial Intelligence, and is basically the study / process which enables machines to mimic human behaviour through particular algorithm.

* ML stands for Machine Learning, and is the study that uses statistical methods enabling machines to improve with experiment.

* DL stands for Deep learning, and is the study that make use of Neural Networks to imitate functionality just like a human brain.

Ans (3). Applications of AI :-

(a) AI in E-commerce
   (i) Personalised Shopping
   (ii) AI - powered Assistance
   (iii) Fraud Detection.

(b) AI in Navigation

(c) AI in Robots.

(d) AI in Human Resource

(e) AI in Health Care

(f) AI in Agriculture

(g) AI in Gaming.

(h) AI in Automobiles.

(i) AI in Social Media.

(j) AI in Marketing.

Ans (4) State Space Tree :- It is a tree constructed from all transition of an algorithm or any design of your code from initial state

to final state.
Basically it is used for showing flow of recursive piece of code.

Ans (5): The heuristic function is a way to inform the search about the direction to goal.

It provides an informed way to guess which neighbour of a node to goal.

This h function is an underestimate because the h value is less than equal to exact cost of a lowest path from the node to goal.
