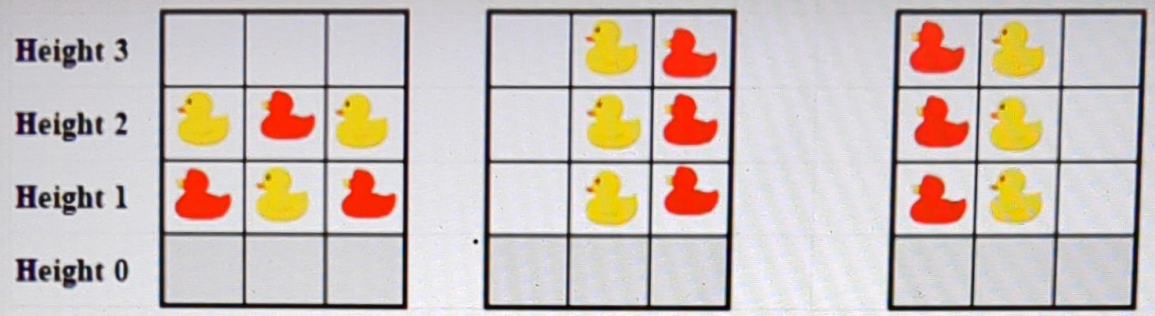

a. Depict the search tree for up to exactly 4 levels and find the heuristic values of all the generated nodes. (Given initial state can be assumed to be on level-0.)

b. Among the below two defined heuristics (H1 and H2), if you are restricted to choose only one of them, which one would you choose and why? Tile in the below definition does not include the empty tiles. Justify your choice with brief answer with appropriate numerical illustration w.r.t to the given problem.

$h_1(n)$ = Goal orientation with respect to positioning of yellow ducks +

Goal orientation with respect to positioning of red ducks

$h_2(n)$ = No.of. legal moves possible with respect to red and yellow ducks.

Note for Calculation:

For Goal orientation, If at least two yellow ducks are placed in same column add a cost of +5 else add a cost of +10. Similarly, If at least two red ducks are placed in same column add a cost of +5 else add a cost of +10.

Here h_1 (Initial state) = 10+10 =20

In initial state. The no.of.legal moves for yellow ducks are 2 and for red duck is 0.

Here the h_2 (Initial State) = 2+0 = 2

c. Use the following heuristic function H(n) = h1(n)+h2(n) for the results obtained in part a., and then apply A* search algorithm till first 5 closed list updates. Show the status of OPEN and CLOSE list at each level.

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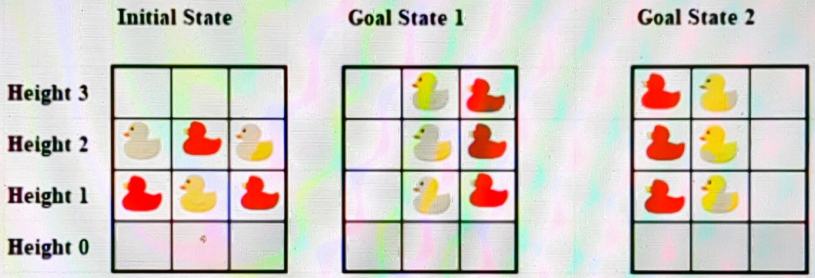
Qtext:-

Consider the below initial and goal states (Two equally acceptable goals are given) for a formation problem and answer the following questions. The agent can move the red duck on top of the other red duck in this problem as well as the yellow ducks on top of the other yellow ducks. and no ducks are allowed to be placed above Height 3 of any column. An agent should find a path ie., series to legal moves from the Initial state to achieve the Goal state [3+2+5 = 10 Marks]



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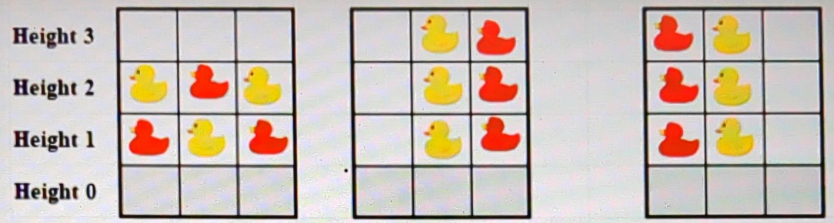

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c. Use the following heuristic function H(n) = h1(n)+h2(n) for the results obtained in part a., and then apply A* search algorithm till first 5 closed list updates. Show the status of OPEN and CLOSE list at each level.

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Test Submitted Successfully.

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Question 1

Question 2

Question 3

Question 4

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Qtext:-

You have been asked to solve below linear equation problem with multiple variables using genetic algorithm: **[1.5+1.5+3 = 6 Marks]**

$$6v + 10w + 2x - y + 2z = 50$$

where v, w, x, y and z are integers in the range [-10,10] (equation can have more than one solution)

a. Design the Problem Solving Agent formulation & fitness function. The fitness score of a particular state can be determined by calculating the difference between the left-hand side (LHS) and right-hand side (RHS) values of the equation. A higher difference will result in a lower fitness score. Explain with numerical example.

b. Describe the Chromosome/String representation of a parent state for four randomly selected states with their fitness score.

c. Detail the approach toward the selection, crossover and mutation steps for this problem. Show these with only one iteration of numerical example.

Test Submitted Successfully.

For security reasons, please exit your browser.

- Question 1
- Question 2
- **Question 3**
- Question 4

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Qtext:-

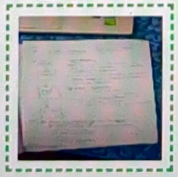
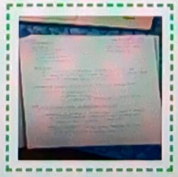
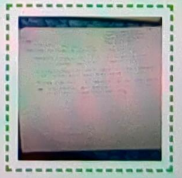
Answer to the below question for the following scenarios. Vague theory will not be awarded marks.
[2+2+2 = 6 Marks]

?The central control hub in a smart home system is an AI agent that serves as a bridge between different smart devices and appliances. It enables centralized control and automation, allowing users to manage and interact with their smart devices seamlessly. For example, in a smart home equipped with smart lights, thermostats, door locks, and security cameras, the AI agent can receive commands from the user or other connected devices and coordinate the actions of these devices accordingly. This simplifies the management and enhances the interaction with the various smart devices within the home.?

(i) Provide the complete problem formulation.

(ii) Provide the PEAS description.

(iii) Identify the various dimensions of the task environment with appropriate justification for each in no more than 30 words

Question 1

Question 2

Question 3

Question 4

View Uploaded Answer Sheets

Qtext:-

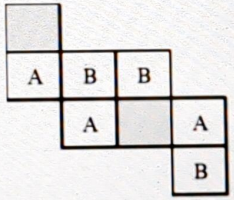
Consider a 2-player game as in below diagram. The sliding-tile game consists of three ?A? tiles, three ?B? tiles, and two empty spaces. [Tile shaded in gray ? Empty Space/Tile]. In this game a player wins if a pattern of player owned similar three tile are placed adjacent to each other. The term adjacency represents coins are in same row or same column. Assume the player with tile ?A? starts the move from this state. In the game, player ?A? and ?B? alternate in their turn.

[3+3+2 = 8 Marks]

The puzzle has two legal moves: which results in the swap of position of the tile with the empty location

Move #1: A tile may move into an **adjacent** empty location.

Move #2: A tile can only hop over one tiles in the **same row** into the empty position.



a. Expand the complete game tree (with neat diagram) from the given current state (0th level) as Start Node up to exactly 3 levels only (1st, 2nd & 3rd Level - ie., one round for each of the player and an extra round for the first player.)

b. Calculate the utility of the **leaves** of the tree with below static evaluation function.

Utility value = [3(MAX's win chance – MIN's win chance)] + [2*(MAX's No.of.adjacent.pairs – MIN's No.of.adjacents.pairs)]*

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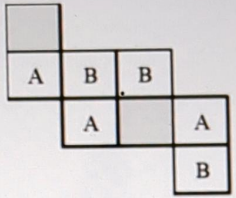

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Note: eg., For the given Initial configuration, *MAX's win chance* is calculated as "In the current initial state 3 MAX coins ie., (A) are adjacent to empty cell and hence its win's chance = 3." and the *MIN's win chance* is calculated as "In the current initial state 1 MIN coins ie., (B) is adjacent to empty cell and hence its win's chance = 1."

c. Apply the MIN MAX algorithm on the game tree constructed in part a) using static evaluation values calculated in the part b) and highlight the best path chosen by players in the game given.