CSC3206 ARTIFICIAL INTELLIGENCE

Snake-Game-Master Assignment Report

Group Name: Salla Kutta

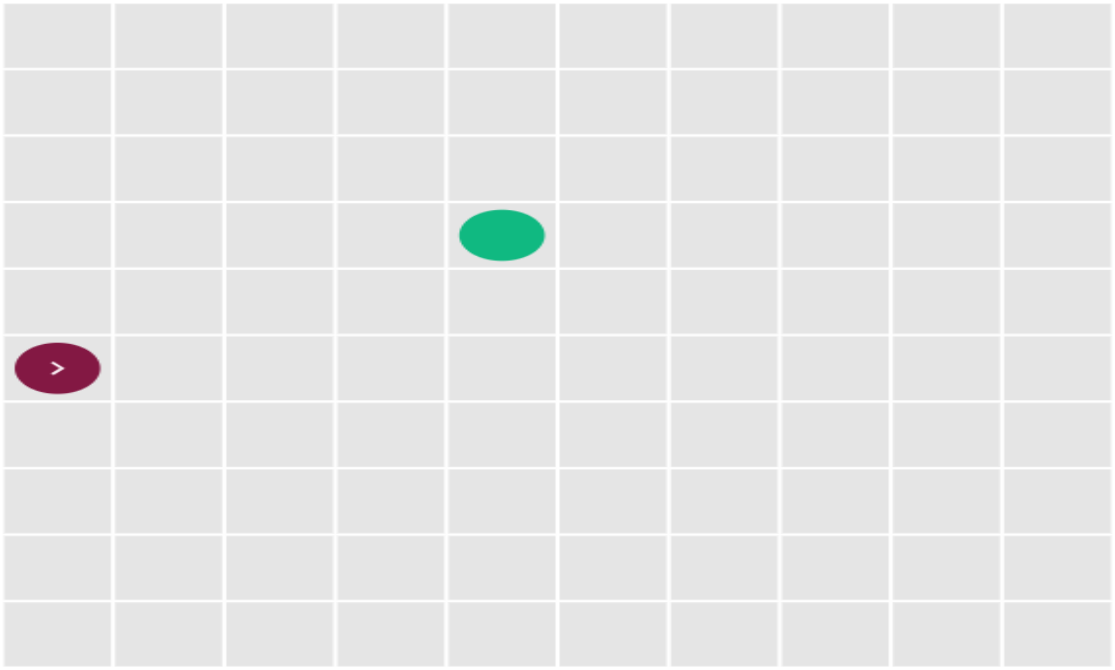
Members:

1)Isaac Lim Nyit Wang (17045378)

2)Keven Tai Yuan Tian (17035023)

3)Shankarnivash Rao (18007930)

a.What is the problem the algorithm needs to solve?



Initialization of the snake game

Problem Description

This project utilizes Python coding to implement a snake game application. An AI player is created that will take part in the snake game. The snake(red circle) will start at a specific place and they are tasked to find the food(green circle). The food is generated at a random position throughout the game.When the snake moves and eats the food the length of the snake will grow.The game will end once the snake crosses itself during the game.

b.Algorithm used in this project

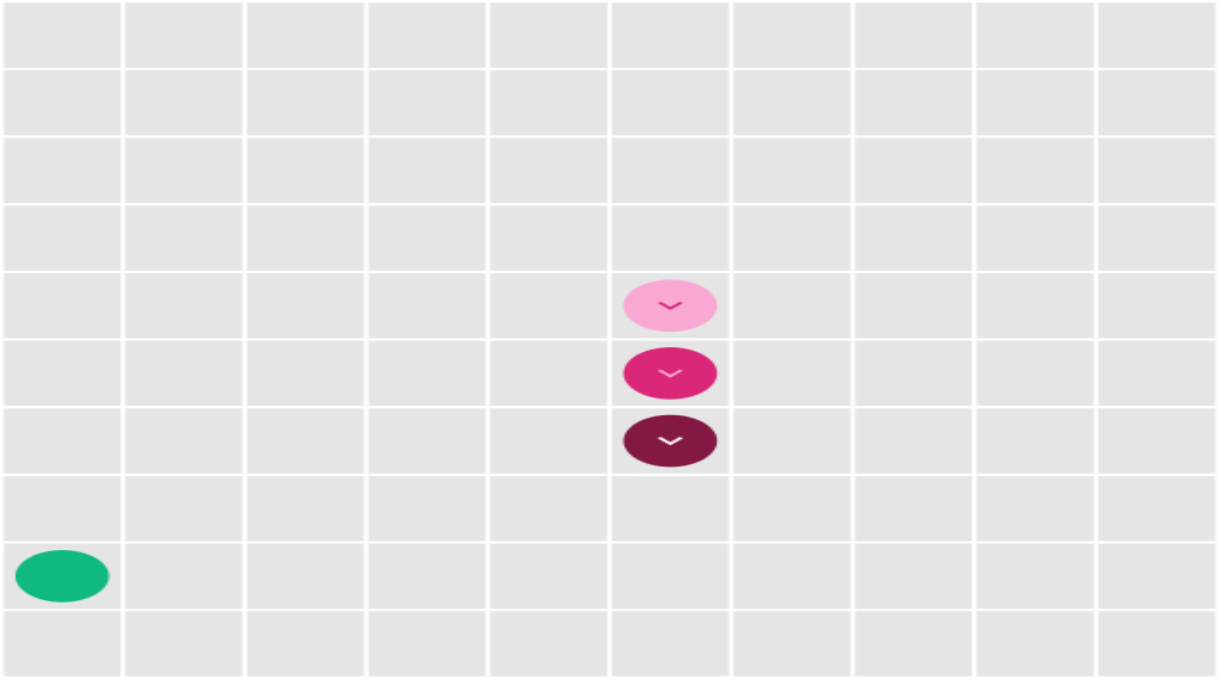
Search algorithm Implementation

In this snake game there will be 2 algorithms to be implemented, one of them is informed search. For informed search we planned to use greedy best first search as our algorithm for the game itself. The algorithm will always select the best possible path to move. As it is the combination of both depth first search and breadth first search which allows us to utilise the best of both worlds algorithm. By using the best first search it allows the snake to move towards the most promising mode and only expand the node which is closest to the goal and

this does not explain the actual heuristic function.

the cost will be estimated by using the heuristic function f(n) = h(n). Of course there are advantages for the greedy best first search where it allows you to switch between best first search and depth first search to utilize the advantages of both algorithms. The disadvantages of using best first search is the chances of getting stuck in a loop same as depth first search. The other search algorithm is uninformed search which we plan to use is uniform cost search. It is used to traverse a tree where there is a different cost for each edge.The goal of the algorithm is also to search for the lowest cumulative cost of the goal node.Since it is implemented by priority queue it will be given to the lowest cumulative cost with maximum priority. The differences between the both algorithms is that UCS expands the least cost node whereas greedy best first search expands the node with least heuristic value.

c.Do the results achieve the aim of solving the problem



Solution of the snake looking for food

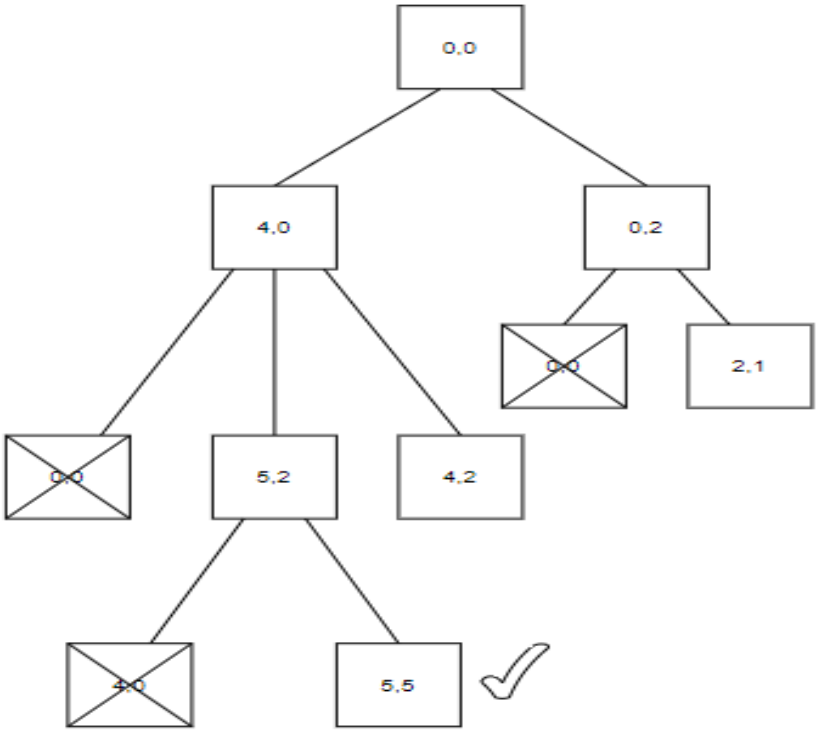
Firstly, we initialized the snake-game along with the player. The player would then be initialised by the _init_ constructor in the player class. The snake-game would then send relevant information that it could find to the player, which includes the size of the grid of the snake game, the beginning and end of the coordinates position. The player is able to take into account the information provided through different specific functions. Once the player has

received the particular information, it will able to request for the next node in order to ensure a smooth transition. As the player moves to the following node, it will receive information regarding its possible next action. The snake-game will continuously request the next node from the player until the player has figured out the solution. When the steps has been figured out, the solution will be directly displayed. While the solution is achieved, the snake-game would request for the uniform-cost search from the player.

d.Benefits of the game

This Snake-game is very beneficial as it allows players to be more practical when making a decision. It allows the players to assess their surroundings and accumulate points by learning about spatial awareness and planning ahead before our next move. This game also involves mental strength which makes it perfect for users or children to learn new skills. They may be more focused when it comes to completing a certain work or assignment which makes it more special. Everytime the length of the snake increases, the mind would be focusing on the next move and how to achieve the most points possible. It may take many attempts to get the longest length but most importantly, every problem has its solution. Hence, snake game is very beneficial to all users.

e. How are the performance of the algorithms



GREEDY BEST FIRST SEARCH

Each node is the information of the snake and how far it will go to get the food(goal). The algorithm is performed by finding the distance and the heuristic function that estimates lowest cost to a node between the head of the snake and the food(goal). To know the distance of the snake and the food in the game we must first know the area of the so that we can calculate the actual distance.Once we have define the heuristic function the snake will find the minimum route to get to its food(goal).The only downside is that it will just keep going even when the snake hits it own body as it only direct the snake for the shortest route to get to its goal.

UNIFORMED COST SEARCH

This algorithm is performed by looking for the minimum cost of each node. It will always compare the paths' minimum costs within the game and optimal cost is always picked if the algorithm is not able to retrieve good results. Once a minimum cost node is found, the highest cost node is normally removed. This algorithm will backtrack to the unexplored nodes if the optimal cost cannot be achieved.

References

Great Learning Team. (2020). *Best First Search Algorithm in AI.* https://www.javatpoint.com/ai-informed-search-algorithms#:~:text=Advantages%3A,than%20BFS%20and%20DFS%20algorithms.

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