HO CHI MINH NATIONAL UNIVERSITY

UNIVERSITY OF SCIENCE

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**Introduction to Artificial Intelligent**

**A blue and white logo

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**Project 01**

**HIDE AND SEEK**

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**CONTENTS**

# Assignment Planner

# Environment Requirement

*Python version:* 3.10+ with Pygame graphical module.  
Consider installing Pygame using *pip install pygame* if it is not available.

*Usage:* Run the application by executing *python main.py* in the console/terminal.  
*Notice:* The command may vary across platforms, the above command it tested on a Windows operating system.

# Idea and Theory

# Maps Design

To some extent, generating maps for testing the seeker has lots of things in common with letting the player find the way to solve a maze. Creating multiple paths around and placing obstacles at the correct position would require the seeker to run around the map several times.

# Problem

## Preparation

## Level 1

## Level 2

## Level 3

## Level 4

Though we did not implement level 4, we have some ideas about this.

One opinion is that, letting the hiders identify the corners, they should move the obstacles to fill up the entrance and hide inside. Therefore, it blocks the seeker from finding itself.

Another idea is to allow hiders to move the obstacles on their way, running away from the seeker if being chased, and block the path to have the seeker find another path to reach it.

However, blocking the path in the first idea may not seem like a valid choice for a non-reinforcement approach; the hiders need to study the map well enough to figure out where the dead end is located.

# User Interface and Game Play

A screenshot of a game

Description automatically generatedWhen running the program, a screen will pop up to allow the user to choose the desired level to run.

A screenshot of a computer

Description automatically generatedA screenshot of a computer

Description automatically generatedAfter choosing a level to run, the screen changes, and a button is shown to let the user pick a map to run. When clicked, all available maps are provided for the user to choose and it will appear accordingly.

A screenshot of a computer game

Description automatically generatedA screenshot of a computer game

Description automatically generatedOnly then will a begin button pop up, allowing the user to run the game.

There can be two results: the seeker will find all hiders, or the seeker will give up (hiders can make the seeker chased endlessly or there is no path to reach them). And the begin button will be changed to "Restart", letting the user load the map again for another run.

# Testing and Commenting

## A screenshot of a video game Description automatically generatedA screenshot of a game Description automatically generatedLevel 1: Single – hider

Size: 18x22 Size: 38x31

A maze with a green square and a red square

Description automatically generatedA screenshot of a game

Description automatically generatedScore: -24 Score: -268

Size: 31x31 Size: 101x101

Score: -146 Score: -3038

Our implementation requires the seeker to visit all squares in the map before giving up; therefore, in maps that are very large, it takes a very long time to reach the location of the hider.

A screenshot of a game

Description automatically generated

Cases when there is no path to reach the hider, the seeker will run around the maps to search for the aisle and eventually gives up after visited all possible squares.

The score of the map: -21 and seeker gave up.

We have added in a 199x199 map, but due to the complexity of running and displaying it (too small), we will not list it in this evaluation.

## A screenshot of a video game Description automatically generatedLevel 2: Multi – hiders

A maze with a few squares

Description automatically generated with medium confidenceA maze with green squares

Description automatically generatedThe seeker gave up after find the 4 hiders on the rightmost side, and find no path to reach the last one.  
The final score: 41

Size: 31x31 Size: 50x50

Score: -228 Score: -1220

As the seeker also needs to visit all the squares, all the hiders will eventually be found.

Though the walls form a maze, the seeker movements may miss some squares in the corners, resulting in much more steps being required to visit those squares of the leftovers.

## A screenshot of a computer Description automatically generatedA screenshot of a game Description automatically generatedLevel 3: Multi – movable – hiders

Score: -238 Score: -163

A screenshot of a game

Description automatically generatedA maze with a few squares

Description automatically generated with medium confidenceBy allowing hiders to move, their first steps will make them move to the squares that have the most observable cells around them. Seeing the seeker, they will move in the opposite direction in order to run away from him. Testing the hide and seek game on a map with no wall shows all possibilities for the seeker's chasing strategy and the hider's method of moving away.

Score: -315 Score: -1176

These maps are exactly the same as the ones in level 2, but now that the hiders can run, the game is much more fun seeing them chase around the map, resulting in worse scores.

# Demo Video

<https://drive.google.com/file/d/1FfvFUIVgkkNwVr5YCtRrc7gdDps8ibAp/view?usp=sharing>

# Refs

<https://www.pygame.org/docs/ref/pygame.html>