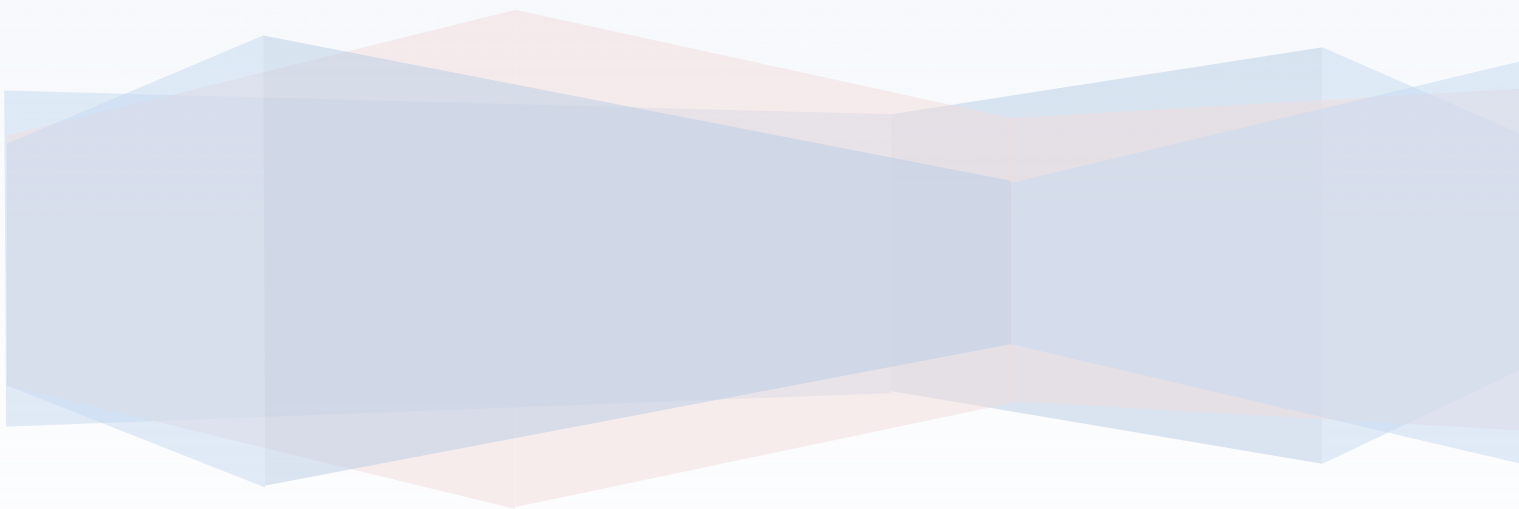


COS30002 Artificial Intelligence for Games

Semester 1, 2023

Learning Summary Report

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Declaration

I declare that this portfolio is my individual work. I have not copied from any other student's work or from any other source except where due acknowledgment is made explicitly in the text, nor has any part of this submission been written for me by another person or software service.

Signature: Dat

Self-Assessment Details

The following checklists provide an overview of my self-assessment for this unit.

	Pass (P)	Credit (C)	Distinction (D)	High Distinction (Low HD) (High HD)	
Self-Assessment (please tick)	✓				

Self-assessment Statement

	Included? (tick)
Learning Summary Report	✓
Complete Pass ("core") task work, approved in Canvas	✓

Minimum Pass Checklist

	Included? (tick)
Additional non-core task work (or equivalent) in a private repository and accessible to staff account.	
Spike Extension Report (for spike extensions) in Canvas	
Custom Project plan (for D and/or low HD), and/or High HD Research Plan document in Canvas (optional)	

Credit Checklist, in addition to Pass Checklist

	Included? (tick)
Custom Project Distinction Plan document, approved in Canvas	
All associated work (code, data etc.) available to staff (private repository), for non-trivial custom program(s) of own design	
Custom Project "D" level documents in Canvas, to document the program(s) (structure chart etc) including links to repository areas	

Distinction Checklist, in addition to Credit Checklist

	Included? (tick)
Custom Project "HD" level documents in Canvas, to document the program(s) (structure chart etc) including links to repository areas	

Low High Distinction Checklist, in addition to Distinction Checklist

	Included? (tick)
High Distinction Plan document, approved in Canvas	
High Distinction Report document, in Canvas, which includes links to repository assets	
All associated work (code, data etc.) available to staff (private repository) for your research work	

High High Distinction (Research) Checklist, in addition to D/Low HD Checklist

Introduction

This report summarises what I learnt in COS30002 AI for games. It includes a self-assessment against the criteria described in the unit outline, a justification of the pieces included, details of the coverage of the unit intended learning outcomes, and a reflection on my learning.

Overview of Pieces Included

1. The Tic Tac Toe AI Battle project demonstrates my familiarity with software development techniques for artificial intelligence games, specifically with the application of min-max algorithms.
2. The "Graphs, Paths & Search" lab and the "Navigation with Graphs" spike allowed me to learn about and apply graph-based path planning techniques, which enhanced the AI's ability to navigate in game environments.
3. Lab "Steering 1- Seek, Arrive, Flee": In this lab, I was able to simulate realistic agent motions found in video games by utilizing a variety of steering behaviors.
4. The spikes "Tactical Analysis with PlanetWars" and "Tactical Steering (Hide!)" demonstrate how I was able to combine several ways to include a range of AI strategies for advanced game production.

Coverage of the Intended Learning Outcomes

This section outlines how the pieces I have included demonstrate the depth of my understanding in relation to each of the unit's intended learning outcomes.

ILO 1: Software Development for Game AI

my comprehension of AI game development methods by using AI Battle Tic Tac Toe's min-max algorithm. This is an excellent illustration of how game developers may use their theoretical knowledge of AI algorithms to create engaging content.

ILO 2: Graphs and Path Planning

In the lab on "Graphs, Paths & Search," I used pathfinding algorithms, looked into the relationship between nodes and edges in a graph, and learned about their importance in the field of game production. This was expanded upon in the Spike "Navigation with Graphs," where I included environmental obstacles and dealt damage to the game's bricks, providing the AI with additional duties and strategies to work with. I also integrated the A* and Dijkstra search algorithms to enhance AI navigation.

In the Spike "Navigation with Graphs," you used graph-based path planning techniques to enhance the enemy's navigational behavior. The hostile class of the adversary. When in 'follow path' mode, Py gives the opponent the ability to follow a path from its current location to a predetermined destination using graph-based pathfinding techniques.

ILO 3: Force-based Agent Movement

In order to simulate real motions, I had the opportunity to experience several steering behaviors in the "Steering 1- Seek, Arrive, Flee" lab. This enhanced the lifelikeness and plausibility of the characters in video game settings.

Since then, these movements have improved with the addition of more force-based agent movement techniques as I've been developing Agent or Enemy classes. By calculating and applying steering forces based on the agent's current mode (e.g., assault, wander, or follow path), I was able to construct agents that navigate their environment more intelligently. The calculate() method of the Agent or Enemy class finds the appropriate steering force based on the agent's mode; the update() function then updates the agent's location and orientation using the determined force.

ILO 4: Goals and Planning Actions

My contribution to the Spike 08 "Goal-Oriented Action Planning (GOAP)" expansion was to expand its mechanism by including more tasks and goals for the agents to accomplish. You also

illustrated the adaptability of the goal-oriented approach by including a range of agent types, each with their own special abilities and strategies. In addition, you incorporated environmental obstacles and created a dynamic universe that evolves over time. These additions required the agents to regularly adjust their strategies and decision-making processes.

By putting a goal-oriented behavior system into place and improving it with GOAP, I demonstrated my capacity to create and develop intelligent agents who are able to manage complex decision-making scenarios independently. The fact that you can incorporate a range of goals, behaviors, and adaptability into the system indicates that you have experience creating more intricate and dynamic AI behavior for game creation.

ILO 5: Combine AI Techniques

Throughout the time, I have continuously combined a number of AI algorithms to create sophisticated gaming AI. For example, using the Spike "Tactical Analysis with PlanetWars" and "Tactical Steering (Hide!)," I combined path planning, steering behaviors, and AI techniques to produce complex AI behavior. To make the game environment in Spike 06, "Navigation with Graphs," more complex and dynamic, I incorporated aspects. Among these were blocks that might do harm and the capacity to enter a wander mode while not being guided.

By combining so many strategies, I have created a strong foundation in AI game development and demonstrated my ability to use and mix several AI procedures for more intricate game design. In addition, I enhanced the agent.py and enemy.py scripts with more AI capabilities. The agent.py script governs the player agent's behavior and movement, which includes path following, roaming, and severing from nearby agents. The opponent AI's movements and behaviors—such as its ability to roam, follow paths, detect collisions with shield and health components, and determine damage—are defined by the enemy.py script. These scripts highlight my abilities to design engaging and dynamic AI-controlled virtual characters, showcasing how I've applied AI theory to the real world of game production.

Reflection

The most important things I learnt:

I gained a thorough understanding of artificial intelligence in games throughout the course. Among the most significant lessons were the use of goal-oriented action planning, the application of force-based agent movement, the integration of graph-based path planning approaches, and the production of games using the min-max algorithm. I also discovered how crucial it is to use these AI techniques in order to create games that are more engaging and dynamic. This educational experience surpassed my expectations and provided me with a thorough understanding of the applications and potential of artificial intelligence in game development.

The things that helped me most were:

The lab tasks in particular taught me a lot. Their practical examples and challenges helped me better understand the concepts and use the AI techniques. I was also able to increase my understanding of the material and get any uncertainty I was having cleared up via group discussions and teacher input.

I found the following topics particularly challenging:

Goal-oriented action planning (GOAP) and the integration of multiple AI methodologies were challenging, but once I understood and used them right, they also made me feel really accomplished.

I found the following topics particularly interesting:

I was particularly interested in how force-based agent movement was used in video games. Thanks to your material, I now have a new perspective on how to create realistic, dynamic characters for game settings.

I feel I learnt these topics, concepts, and/or tools really well:

I gained in-depth knowledge of force-based agent movement, graph-based path planning, goal-oriented action planning, and software development approaches for artificial intelligence in games. My understanding has improved as a result of applying these techniques to numerous lab tasks.

I still need to work on the following areas:

I need to improve my ability to combine different AI techniques in order to make games that are more intricate. Though I believe I have a fundamental understanding today, there's always room for improvement.

My progress in this unit was ...:

Despite working and studying overseas for the final two weeks of the semester, I believe I improved consistently throughout this unit. My learning and final grade were greatly impacted by my consistent ability to turn in assignments on time and communicate with my tutor.

This unit will help me in the future:

The skills and knowledge I have acquired in this unit will come in very handy for my upcoming schoolwork and career aspirations. My grasp of AI techniques and how they relate to the creation of games will provide me a competitive edge in the growing gaming industry.

If I did this unit again I would do the following things differently:

Having recently balanced my schooling with an internship as an AI developer, I now understand the importance of effective time management and task prioritization. I would utilize these skills to arrange special projects and research for higher marks, as well as to begin lab work earlier and give myself more time to work through the complexities of the code.

Conclusion

In summary, I believe that I have clearly demonstrate that my portfolio is sufficient to be awarded a Pass grade.