COMP250: Artificial Intelligence

1: Module Introduction

COMP250
Artificial Intelligence

FALMOUTH
UNIVERSITY

20 credits
Compulsory for BSc Computing for Games
Dr Edward Powley

Introduction

This module will help you to learn how AI is used in the context of games. You will gain in understanding and experience of the technical dimension of AI and how it might be used in the particular expressive context within game development. You will apply your learning in a practical context where you will design AI for a game in a live brief format, taking as your cue the game concepts developed by development teams across the academy.

Aims

This module aims to help you:

- Gain in understanding of AI technology and techniques and their relation to games
- Acquire knowledge and experience of the expressive uses of AI in games contexts
- Apply AI solutions for specific game contexts

LO	Learning Outcomes	Assessment Criteria
1	Show a basic understanding of creative computing solutions using professional techniques.	Demonstrate an understanding of the technical principles of AI in a games context. Select and deploy appropriate AI techniques within the context of games development to create an expressive and appropriate solution.
2	Show a basic understanding of how to communicate effectively with stakeholders in writing, verbally and through adherence to coding standards.	To communicate in a collaborative context to generate an innovative AI concept. Create AI for an existing game and generate an expressive and appropriate use of AI that communicates with its audience.
3	Show a basic development of the ability to reflect critically on and evaluate working methods and solutions.	Analyse critically the strengths and weaknesses of your code and develop an ability to respond to the critical judgements of others.
4	Show a basic understanding of the ability to conduct research, present knowledge in an academic format and apply that research to practice.	Demonstrate a working knowledge of AI techniques literature and its application to games. Apply that appropriately that knowledge to identify and create AI for an expressive purpose.
6	Show a basic understanding of methods used to help set goals, manage workloads to meet deadlines and to work collaboratively.	Show an understanding of how to plan and manage time. Meet deadlines by planning available time to deliver solution effectively.

Academic Staff	Dr Edward Powley	
	Dr Michael Scott (Moderator)	
Assignments	Portfolio of AI Instances	90%
	Research Journal	10%
Indicative Hours	Sessions	36 hours
	Directed Reading	18 hours
	Portfolio of AI Instances	55 hours
	Integration into Collaborative Game	20 hours
	Research Journal	7 hours
	Self-Directed Study	24 hours
	Self-Directed Studio Practice	40 hours
		200 hours

Each study block represents 600-hours of study. This means that 40 hours of study per week (including contact time) is expected, alongside a further 120-hours of studio practice across the assessment period.

Additional Resources

Session Plans & Materials:
`https://learningspace.falmouth.ac.uk/course/view.php?id=3027`

Assignment Briefs:
`http://github.com/falmouth-games-academy/bsc-assignment-briefs/tree/2018-19/comp250`

Reading List:
`http://resourcelists.falmouth.ac.uk/modules/comp250`

Assignments

COMP250 assignments

- Portfolio tasks (90%)
  - Game component (30%)
  - MicroRTS bot (70%)
- Research wiki (10%)

Research wiki

- As a **group**, populate a wiki on the topic of artificial intelligence for games
- Suggested jumping-off point: "Artificial Intelligence and Games" by Georgios Yannakakis and Julian Togelius
- ... but follow up the references as well!
- Suggested topic assignments are linked on LearningSpace
- **You** are initially responsible for your own assigned topics, but in the end **everyone** is responsible for **everything** on the wiki
- You should edit and improve each others' work

Research wiki

- Deadline is **Friday week 3**!
- Don't procrastinate — you need to be working on this **now**!

What is AI?

What is AI?

- Socrative FALCOMPED
- Discuss for **5 minutes**
- Suggest a **one sentence** definition of artificial intelligence (AI)

What is AI?

- ✗ Simulating human brains or human intelligence
- ✓ Performing tasks by machine (or by software) which would ordinarily require human intelligence
- ✓ Making decisions to achieve goals

What is AI?

- ✗ Programming machines to learn by themselves
- ✓ Machine learning is an important sub-field of AI, but there are many other AI techniques

What is AI?

- ✗ Programming machines to possess general intelligence, self-awareness, consciousness
- ✓ Maybe one day, but for now this is pure sci-fi
- ✓ Programming machines to carry out (or learn to carry out) a specific type of task

Computers vs brains

Discuss:

- For what kinds of tasks are digital computers "better" than human brains?
- For what kinds of tasks are human brains "better" than digital computers?
- For what kinds of tasks are both "good", but approach the task in different ways?

Is it AI?

Discuss: are these examples of AI?

- Calculator
- Computer opponent in a chess program
- Enemy in a video game
- Facebook newsfeed
- Autocorrect in a text messaging app
- Autocompletion in an IDE
- Spellchecker
- Satellite navigation
- Virtual assistant (e.g. Siri, Alexa, Cortana etc.)
- Amazon product recommendations
- Search function in a text editor
- Google search
- C++ compiler
- Robot

AI in games

Applications of AI in games

- Enemies and other NPCs
- Opponents in {board, card, strategy} games
- Automated playtesting
- Directors, hints, adaptive difficulty
- Procedural content generation
- Content production tools
- Procedural narrative
- Agent-based simulations
- ...

Design considerations

- Creating "perfect" AI is an interesting technical challenge, but may be bad game design

```
procedure EnemySoldierAI
    while player.isAlive do
        AimAt(player.head)
        Shoot( )
    end while
end procedure
```

- A common (and difficult) challenge: creating AI which is **imperfect**, but not obviously **stupid**