

2024 / 25

School of Science and Computing

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South East
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Module Descriptor

Artificial Intelligence for Games (Computing and Mathematics)

Artificial Intelligence for Games (A14782)

Short Title: AI for Games
Department: Computing and Mathematics
Credits: 5

Level: Advanced

Description of Module / Aims

This module provides students with theoretical and practical concepts for the implementation and development of artificial intelligence in video games.

Programmes

| stage/semester/status | | |
|-----------------------|--|-----------|
| GAME-0006 | BSc (Hons) in Applied Computing (WD_KACCM_B) | 4 / 8 / E |
| GAME-0006 | BSc (Hons) in Applied Computing (WD_KCOMP_B) | 4 / 8 / E |
| GAME-0006 | BSc (Hons) in Computer Science (WD_KCMSC_B) | 4 / 8 / E |

Indicative Content

- Static and dynamic path finding
- Behaviour trees
- Obstacle avoidance
- Machine learning
- Finite state machines

Learning Outcomes

On successful completion of this module, a student will be able to:

1. Develop artificial intelligence for a 2D or 3D game using C# (or equivalent) and demonstrate how it can improve the game play.
2. Design and implement path finding and obstacle avoidance techniques.
3. Construct and implement a finite state machine.
4. Design and implement behaviour trees and machine learning.
5. Implement and assess common AI principles and algorithms for video games.

Learning and Teaching Methods

- Since this module is focused on developing practical programming skills (i.e., game programming for mobile devices), the four contact hours will be delivered in the computer labs in the form of two 2-hour practicals.
- Due to the very practical nature of the skills to be acquired in this module, these practical sessions will be centred around the idea of learning by doing, whereby students develop proficiency in the specified skill set through guided activities, and whereby lecturers provide short formal presentations of relevant concepts and technologies, as well as practical tips, feedback, and best practices.

Learning Modes

| Learning Type | F/T Hours | P/T Hours |
|----------------------|-----------|-----------|
| Practical | 48 | |
| Independent Learning | 87 | |

Assessment Methods

| | Weighting | Outcomes Assessed |
|-----------------------|-----------|-------------------|
| Continuous Assessment | 100% | |
| Assignment | 25% | 1,2,3 |
| Assignment | 25% | 3,4 |
| Assignment | 50% | 1,5 |

Assessment Criteria

<40%: Inability to understand, explain the workings of or modify, a simple program. Inability to write simple programs using constructs as per learning outcome (3). Inability to use the programming environment to edit, run and debug programs.

40%–49%: Able to understand, explain the workings of or modify a simple program. Able to write simple programs using constructs and data structures as per learning outcome (3). Able to use the programming environment to edit, run and debug programs comfortably. Can produce a prototype of a simple system.

50%–59%: All the above and in addition correctly choose appropriate programming and data structures. Use pre-defined class libraries in programs (e.g. String). Show a high level of competency with programming environment.

60%–69%: In addition, able to apply given solutions to new, similar problems. Starts to reference on-line documentation to examine new constructs, libraries. Starts to see programs in terms of system of components.

70%–100%: All previous to an excellent level. Starts to understand the concept of good solutions.

Supplementary Material(s)

- Buckland, M. *Programming Game AI by example*. Burlington, MA, USA: Jones & Bartlett Learning, 2010.
- Millington, I. and J. Fudge. *Artificial Intelligence for Games*. Boca Raton: CRC Press, 2009.

Requested Resources

- Equipment: MAC PCs
- Room Type: Computer Lab