

FIT3094
AI for gaming

Unit Guide

Semester 1, 2011

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

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FIT3094 AI for gaming - Semester 1, 2011

This unit will introduce Artificial Intelligence (AI) techniques that can be used in games development. General capabilities of AI technology, behaviours/circumstances that need to be simulated/learned/reproduced by the smart non-player characters/environments in smart games, AI techniques (such as evolutionary and neural computations) used in the development of smart games will be discussed at length. This unit will build upon previous programming skills, and provide a strong grounding for further study in this area, especially related to games engine development. The unit will examine intelligent game creation using C++.

Mode of Delivery

Caulfield (Day)

Contact Hours

2 hrs lectures/wk, 2 hrs laboratories/wk

Workload

Every week you will need to attend:

- a two hour lecture
- a two hour laboratory session

You will also need to spend 2-3 hours of personal study per one hour of contact time in order to satisfy the reading and assignment expectations.

Unit Relationships

Prerequisites

FIT2049

Chief Examiner

Alan Dorin

Campus Lecturer

Caulfield

Alan Dorin

Contact hours: 4-5pm, Thursday by arrangement during labs & lectures or email

Tutors

Caulfield

Alan Dorin

Learning Objectives

At the completion of this unit students will have:

- an ability to select and use various Artificial Intelligence techniques to build intelligent games;
- an understanding of the general capabilities of Artificial Intelligence (AI) technologies;
- an understanding of the possible opportunities where intelligence can be applied in the game development world;
- an ability to apply AI techniques in building games that challenge the players by learning/adapting to their style over time and thereby developing new strategies to take the games into the next level;
- an ability to evaluate the suitability of AI techniques in the development of various games;
- enthusiasm for the endless possibilities that AI technologies can enrich the game development world;
- motivation to develop further skills in AI techniques for games development;
- appreciation and open-mindedness that better collaborations between the game development industry and the academic AI research will open wider opportunities in the enhancements of smart games;
- skills in developing smart games using AI techniques;
- ability to design, develop and debug game applications written in C++;
- create interactive (2D and 3D) smart game environment that displays the AI techniques learnt in the unit;
- ability to engage in technical discussions on AI technologies for games.

Graduate Attributes

Monash prepares its graduates to be:

1. responsible and effective global citizens who:

- a. engage in an internationalised world
- b. exhibit cross-cultural competence
- c. demonstrate ethical values

critical and creative scholars who:

- a. produce innovative solutions to problems
- b. apply research skills to a range of challenges
- c. communicate perceptively and effectively

Assessment Summary

Examination (2 hours): 60%; In-semester assessment: 40%

Assessment Task

Value

Due Date

Non-Player Character Game Controller	20%	Week 7, 15 April 2011, 6pm
Coordinated Non-Player Character Game Controller	20%	Week 12, 27 May 2011, 6pm
Examination 1	60%	To be advised

Teaching Approach

- **Lecture and tutorials or problem classes**

This teaching and learning approach provides facilitated learning, practical exploration and peer learning.

- **Laboratory-based classes**

This teaching approach is practical learning.

Feedback

Our feedback to You

Types of feedback you can expect to receive in this unit are:

- Informal feedback on progress in labs/tutes
- Graded assignments with comments

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through SETU, Student Evaluation of Teacher and Unit. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, and on student evaluations, see:

<http://www.monash.edu.au/about/monash-directions/directions.html>

<http://www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html>

Previous Student Evaluations of this unit

If you wish to view how previous students rated this unit, please go to

<https://emuapps.monash.edu.au/unitevaluations/index.jsp>

Required Resources

On-campus students may use the software which is installed in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook.

You will need access to:

- Current C++ compiler (e.g. GNU)
- Current OpenGL and GLUT libraries
- Unix-based operating system (e.g. Linux, BSD, MacOS X)

Unit Schedule

Week	Date*	Activities	Assessment
0	21/02/11		No formal assessment or activities are undertaken in week 0
1	28/02/11	Introduction to Artificial Intelligence (AI)	
2	07/03/11	Introduction to Artificial Life (AL)	
3	14/03/11	History of AI and AL	
4	21/03/11	The interactive game loop, Finite State Machines	
5	28/03/11	Neural Networks	
6	04/04/11	Mid-course revision	
7	11/04/11	Vectors and Steering Behaviour, Introduction to Search Algorithms	Assignment 1 due Week 7, 15 April 2011, 6pm
8	18/04/11	Cooperative strategies for agent behaviour	
Mid semester break			
9	02/05/11	Growing plants and forests intelligently and realistically	
10	09/05/11	A* Search algorithm	
11	16/05/11	Artificial Evolution	
12	23/05/11	Virtual Ecosystems	Assignment 2 due Week 12, 27 May 2011, 6pm
	30/05/11	SWOT VAC	No formal assessment is undertaken in SWOT VAC

*Please note that these dates may only apply to Australian campuses of Monash University. Off-shore students need to check the dates with their unit leader.

Assessment Policy

To pass a unit which includes an examination as part of the assessment a student must obtain:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, and the total mark for the unit is greater than 50% then a mark of no greater than 49-N will be recorded for the unit

Assessment Tasks

Participation

- **Assessment task 1**

Title:

Non-Player Character Game Controller

Description:

Write an intelligent game controller for a non-player character. A detailed document describing what is required will be distributed to students via the online materials.

Weighting:

20%

Criteria for assessment:

Please consult the detailed document.

Due date:

Week 7, 15 April 2011, 6pm

- **Assessment task 2**

Title:

Coordinated Non-Player Character Game Controller

Description:

Write software to generate emergent group behaviour of non-player characters. A detailed document describing what is required will be distributed to students via the online materials.

Weighting:

20%

Criteria for assessment:

Please consult the detailed document.

Due date:

Week 12, 27 May 2011, 6pm

Examinations

- **Examination 1**

Weighting:

60%

Length:

2 hours

Type (open/closed book):

Closed book

Electronic devices allowed in the exam:

None

Assignment submission

Assignment coversheets are available via "Student Forms" on the Faculty website:

<http://www.infotech.monash.edu.au/resources/student/forms/>

You MUST submit a completed coversheet with all assignments, ensuring that the plagiarism declaration section is signed.

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.

You must negotiate any extensions formally with your campus unit leader via the in-semester special consideration process:

<http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html>.

Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:

<http://policy.monash.edu.au/policy-bank/academic/education/index.html>

Key educational policies include:

- Plagiarism
(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-policy.html>)
- Assessment
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html>)
- Special Consideration
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.html>)
- Grading Scale
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html>)
- Discipline: Student Policy
(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html>)
- Academic Calendar and Semesters (<http://www.monash.edu.au/students/key-dates/>);
- Orientation and Transition (<http://www.infotech.monash.edu.au/resources/student/orientation/>);
and
- Academic and Administrative Complaints and Grievances Policy
(<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy.html>)

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at www.monash.edu.au/students The Monash University Library provides a range of services and resources that enable you to save time and be more effective in your learning and research. Go to <http://www.lib.monash.edu.au> or the library tab in my.monash portal for more information. Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis

- Website: <http://adm.monash.edu/sss/equity-diversity/disability-liaison/index.html>;
- Telephone: 03 9905 5704 to book an appointment with a DLO;
- Email: dlu@monash.edu

- Drop In: Equity and Diversity Centre, Level 1 Gallery Building (Building 55), Monash University, Clayton Campus.

Reading List

No prescribed text is required. Recommended reading lists will appear each week with the lecture notes.

Some useful web resources

www.ai-depot.com
www.generation5.org
www.ai-junkie.com
www.gamedev.net