MONASH University

**FIT3080
Artificial intelligence**

Unit Guide

Semester 2, 2009

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FIT3080 Artificial intelligence - Semester 2, 2009

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Introduction

This subject gives students an introduction to the field of Artificial Intelligence, covering the basic techniques and mechanisms for AI programming and the construction of intelligent agents, with a focus on reasoning and actions.

Unit synopsis

This unit includes history and philosophy of artificial intelligence; intelligent agents; problem solving and search (problem representation, heuristic search, iterative improvement, game playing); knowledge representation and reasoning (extension of material on propositional and first-order logic for artificial intelligence applications, situation calculus, planning, frames and semantic networks); expert systems overview (production systems, certainty factors); reasoning under uncertainty (belief networks compared to other approaches such as fuzzy logic); machine learning (decision trees, neural networks, genetic algorithms).

Learning outcomes

At the completion of this unit students will have knowledge and understanding of:

1. the historical and conceptual development of AI;
2. the goals of AI and the main paradigms for achieving them, including logical inference, search, nonmonotonic logics, neural network methods and Bayesian inference;
3. the social and economic roles of AI;
4. heuristic AI for problem solving;
5. basic knowledge representation and reasoning mechanisms;
6. automated planning and decision-making systems;
7. probabilistic inference for reasoning under uncertainty;
8. machine learning techniques and their uses;
9. foundational issues for AI, including the frame problem and the Turing test;
10. AI programming techniques;

At the completion of this unit students will have developed attitudes that enable them to:

1. appreciate the potential and limits of the main approaches to AI;
2. be ready to reason critically about claims of the effectiveness of AI programs.

At the completion of this unit students will have the skills to:

1. analyse problems and determine where AI techniques are applicable;
2. implement AI problem-solving techniques in Lisp;
3. compare AI techniques in terms of complexity, soundness and completeness.

Contact hours

One x 2 hr lecture/week, one x 1 hr laboratory/week for 6 weeks

Workload

The expected weekly workload is 2 hours lecture, 2 to 3 hours programming, 7 or 8 hours reading and study.

Unit relationships

Prerequisites

FIT2004 or CSE2304

Prohibitions

CSC2091, CSC3091, CSE2309, CSE3309, DGS3691, GCO3815, GCO7835, RDT3691

Relationships

FIT3080 is an elective unit in BCS, BSE, BCS/BA, BCS/LLB, BSc/BCS, and in a computer science major sequence in BSc. It is preparatory for a variety of subjects at Honours level.

You may not study this unit and CSC2091, CSC3091, CSE2309, CSE3309, DGS3691, GCO3815, GCO7835, RDT3691 in your degree.

Teaching and learning method

2 lectures per week on AI theory, techniques and applications. Lisp tutorials and programming assignments will reinforce what is learned in lectures and readings.

Timetable information

For information on timetabling for on-campus classes please refer to MUTTS, http://mutts.monash.edu.au/MUTTS/

Tutorial allocation

On-campus students should register for tutorials/laboratories using the Allocate+ system:
http://allocate.cc.monash.edu.au/

Unit Schedule

Week	Topic	Key dates
1	Introduction;	
2	Lisp	
3	Search	
4	Search and Games	Assignment 1 due
5	Lisp II	
6	Logic	
7	Defeasible Reasoning	Assignment 2 due
8	Planning	
9	Bayesian Networks	
10	Machine Learning	
Mid semester break		
11	ANNs and Evolutionary Learning	
12	Bayesian Learning	Assignment 3 due
13	Philosophy of AI	

Unit Resources

Prescribed text(s) and readings

Prescribed Reading

R. Russell and P. Norvig (2003). Artificial Intelligence: A Modern Approach, 2nd edition. Prentice Hall.

P. Graham (1996), ANSI Common Lisp. Prentice Hall.

Text books are available from the <u>Monash University Book Shops</u>. Availability from other suppliers cannot be assured. The Bookshop orders texts in specifically for this unit. You are advised to purchase your text book early.

Recommended text(s) and readings

Supplementary Reading

A Hodges (1992), Alan Turing: The Enigma. London: Vintage.

P McCorduck (1979), Machines Who Think. Freeman.

J Haugland (1985), Artificial Intelligence: The Very Idea. MIT.

M Boden (Ed.) (1990), The Philosophy of AI. Oxford.

Required software and/or hardware

CLISP. Available on Linux lab machines and for free download from GNU.

Equipment and consumables required or provided

Linux lab machine.

Study resources

Study resources we will provide for your study are:

- Weekly detailed lecture notes outlining the learning objectives, discussion of the content, required readings and exercises;
- Exercises with sample solutions provided one to two weeks later;
- Assignment specifications and sample solutions;
- A sample examination and suggested solution;
- Discussion groups;
- This Unit Guide outlining the administrative information for the unit;
- The unit web site on Moodle, where resources outlined above will be made available.

Assessment

Overview

Assignments: 40%; Examination (3 hours): 60%.

Faculty 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 44% then a mark of no greater than 44-N will be recorded for the unit.

Three assignments worth a total of 40% and a final exam worth 60%.

The three assignments are programming assignments in Lisp, weighted 10%, 15% and 15% and tentatively due at the end of weeks: 4, 7 and 12.

The final exahm is 3hrs, closed-book during the exam period. Faculty policy dictates that to pass this unit, a student must obtain :

- 40% or more in the unit's examination and
- 40% or more in the unit's 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 assessment then a mark of no greater than 44-N will be recorded for the unit.

Assignment tasks

Assignment coversheets

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.

Assignment submission and return procedures, and assessment criteria will be specified with each assignment.

- **Assignment task 1**

  Title:
         Assignment 1
  Description:
         Lisp assignment
  Weighting:

      10%
   Due date:
      14 August

- **Assignment task 2**

   Title:
      Assignment 2
   Description:
      Search and/or game playing program.
   Weighting:
      15%
   Due date:
      11 September

- **Assignment task 3**

   Title:
      Assignment 3
   Description:
      Learning and decision-making program.
   Weighting:
      15%
   Due date:
      16 October

Examination

- **Weighting:** 60%
  Length: 3 hours
  Type (open/closed book): Closed book
  Remarks:

  Sample exams will be made available.

See Appendix for End of semester special consideration / deferred exams process.

Due dates and extensions

Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are not regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Students requesting an extension for any assessment during semester (eg. Assignments, tests or presentations) are required to submit a Special Consideration application form (in-semester exam/assessment task), along with original copies of supporting documentation, directly to their lecturer within two working days before the assessment submission deadline. Lecturers will provide specific outcomes directly to students via email within 2 working days. The lecturer reserves the right to refuse late applications.

A copy of the email or other written communication of an extension must be attached to the assignment submission.

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Refer to the Faculty Special consideration webpage or further details and to access application forms:
http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html

Late assignment

Late assignments receive penalties up to two weeks, after whichlate submission is not allowed. A "hidden" penalty is that late assignments may be marked and returned late.The complete list is (for "working days late"; weekends don't count)

1. mark penalty for 1 days late: 1 pt
2. mark penalty for 2 days late: 2 pt
3. mark penalty for 3 days late: 3 pt
4. mark penalty for 4 days late: 4 pt
5. mark penalty for 5 days late: 8 pt
6. mark penalty for 6 days late: 10 pt
7. mark penalty for 7 days late: 12 pt
8. mark penalty for 8 days late: 14 pt
9. mark penalty for 9 days late: 16 pt
10. mark penalty for 10 days late: 20 pt

Return dates

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

Appendix

Please visit the following URL: http://www.infotech.monash.edu.au/units/appendix.html for further information about:

- Continuous improvement
- Unit evaluations
- Communication, participation and feedback
- Library access
- Monash University Studies Online (MUSO)
- Plagiarism, cheating and collusion
- Register of counselling about plagiarism
- Non-discriminatory language
- Students with disability
- End of semester special consideration / deferred exams