COMPSCI367 Artificial Intelligence

Course Information

Semester 2, 2018

Prerequisites and restrictions

Prerequisites:

COMPSCI 220, 225

Restriction:

COMPSCI 365, 366

Course Description

In this course, you will cover the representation, utilisation, and acquisition of knowledge. These are the cornerstones of AI. You will investigate how to take a real world problem and represent it in a computer, so that the computer can solve that problem. Utilising this knowledge, or acquiring new knowledge, is done by search. The basics of search and its use in planning will be covered. Machine learning will be covered, including the difference between induction and deduction and the similarities between machine learning and optimisation.

Staff involved in the course

Lecturers

- **Yun Sing Koh**, Room 303-485, ykoh@cs.auckland.ac.nz (Course Coordinator)
- **Mike Barley**, Room 303-488, barley@cs.auckland.ac.nz
- **Ian Watson**, Room 303-493, dr.i.watson@gmail.com

Tutors

- Jordan Douglas, room 303-461, jdou557@aucklanduni.ac.nz

Timetable

Lectures

Wed 10:00AM - 11:00AM, 301-G050 (Science Chem, Room G050)
Thurs 10:00AM - 11:00AM, 301-G050 (Science Chem, Room G050)
Fri 10:00AM - 11:00AM, 301-G050 (Science Chem, Room G050)

Tutorials

Fri 2:00PM - 3:00PM, 303-G20 (Sci Maths & Physics, Room G20)

Course Outcomes

A student who successfully completes this course should be able to:

- Students can represent, in a declarative way, what it means for something to be a solution to a given problem.
- Students understand and can implement the main heuristic-search-based approaches to problem solving and their pro's and con's.
- Students can elicit knowledge and represent it in intermediate knowledge representations.
- Students understand data driven and goal driven inference and can program a declarative rule-based system.
- Students can represent knowledge in predicate calculus and prolog formats.
- Students understand machine learning bias and how that allows programs to learn.

Assessments

Requirements for passing

You have to pass both the theory [the exam and test] and the practical [i.e., assignments] components to pass this course. The exam is worth 60% of the total marks, mid-term test is worth 10% of the total marks, and the assignments are worth 30%.

Component	Percentage	Assessment
Practical	30%	Assignments
Theory	10%	Test
	60%	Exam

Assignments

There will be 3 assignments, each worth 10%. The topics of the assignments are:

- Machine Learning: due 10 August 2018
- Search: due 24 September 2018
- Knowledge Engineering: due 12 October 2018

The assignments will be submitted via the ADB (assignment drop box).

Test

The term test is worth 10% of your final mark. The provisional date for the test is Tuesday 21 August, 2018 from 6:15pm -7:15pm (Please note that this is subjected to possible change. You will be notified of any changes through Canvas). The test is closed book, and calculators are not permitted. Results will be emailed to you. If you have a test timetable clash, please contact the course coordinator, Yun Sing Koh, as soon as possible.

Exam

The final exam is worth 60% of your final mark. Please check Student Services Online for the exam time and date. The exam is closed book, and calculators are not permitted. Provisional exam results can be obtained from Student Services Online.

Lecture Schedule (Tentative)

Lecture Topics

Week 1

- 367 Introduction/The History & Philosophy of AI
- Introduction to Machine learning / The learning problem
- Decision tree learning

Week 2

- Naive Bayes classification, Linear regression
- Evaluation of Hypothesis
- Ensembles

Week 3

- Association rule mining
- Clustering

Week 4

- Perceptron learning, neural networks, deep learning
- Online learning

Week 5

- Logic/Prolog

Week 6

- Search & Constraint Satisfaction

Week 7

- Planning

Week 8

- Adversarial Planning & Review

Week 9

- Symbolic Reasoning
- Knowledge Elicitation
- Knowledge Representation

Week 10

- Rule-based Reasoning
- Knowledge Engineering

- Knowledge Level Modelling

Week 11

- Expert Systems with CLIPS
- Ontologies
- Case-based Reasoning

Week 12

- Fuzzy Logic
- The Ethics of AI

Assistance

There are a number of places where you can seek assistance with your learning.

Office Hours

All staff have office hours when they are available to students. You are encouraged to come and discuss any matters arising from the course during those hours. Staff are also frequently available at other times.

- Yun Sing Koh: Open door policy.
- Mike Barley: By arrangement (send email to arrange meetings and/or drop by)
- Ian Watson: By arrangement (send email to arrange meetings and/or drop by)

Lecture Recordings

All lectures are recorded. They may be a delay of 1 or 2 days before the lecture recordings are distributed through Canvas. You can find the lecture recordings on the Lecture Recordings.

Note: Although the lectures are recorded, some learning activities conducted in class do not translate well to the recordings. To maximise your learning opportunities, you are encouraged to attend the class in person.

Discussion Forums

The discussion forums within Canvas are regularly monitored by teaching staff. Please make use of the forums to ask any questions that you think might be of interest to other students. If your question is of a personal nature, or relates to a unique situation that will be of little interest to others, then please contact the teaching staff directly.

Textbook

Artificial Intelligence: A Modern Approach by Stuart J. Russell, Peter Norvig, 3rd Ed.

Machine learning by by Mitchell, Tom M. c1997.

Tutorials

The tutorials will review the topics of the previous week's lectures and cover some material to help with assignments. Please bring along any questions you have about the course theory or assignments.

Help with Canvas

For help with Canvas see:

`https://www.auckland.ac.nz/en/about/learning-and-teaching/CanvasHomepage/canvas-help-support.html`

Handling illness or absence

If you must leave for family emergencies etc., PLEASE talk to the lecturer, or somehow get a message to the department. Very few problems are so urgent that we cannot be told quite quickly.

For problems affecting assignments or tests, see the lecturer, as soon as reasonably possible.

For illness during exams (or other problems that affect exam performance) students MUST contact the University within one week of the last affected examination, to apply for an aegrotat pass (for illness) or compassionate pass (other problems). The one week limit is strictly enforced.

Refer to the University information about Aegrotat and Compassionate Considerations:

`https://www.auckland.ac.nz/en/for/current-students/cs-academic-information/cs-examiation- information/cs-aegrotat-and-compassionate-consideration.html`

Academic Integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting his or her learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the world-wide web. A student's assessed work may be reviewed against electronic source material using computerised detection mechanisms. Upon reasonable request, students may be required to provide an electronic version of their work for computerised review.

For information on the University's Policy on Cheating, please refer to the web page:

`http:// http://www.auckland.ac.nz/uoa/home/about/teaching-learning/honesty`