COIT20277 *Introduction to Artificial Intelligence*
Term 1 - 2021

Profile information current as at 20/04/2024 11:59 am

All details in this unit profile for COIT20277 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview

Artificial intelligence is closely related to the field called soft computing which provides a foundation for the conception, design, and deployment of intelligent systems directed towards intelligence and autonomy. This unit introduces you to the fundamental concepts of artificial intelligence in the three prominent areas of fuzzy systems, artificial neural networks, and evolutionary computation. You will be introduced to topics of genetic algorithms, evolutionary programming, and genetic programming. You will also be introduced to the most commonly used neural network paradigms. You will learn the concepts of fuzzy sets and fuzzy logic, and approximate reasoning, as part of fuzzy systems. The theoretical concepts will be reinforced with hands-on experience during computer lab tutorials.

Details

Career Level: *Postgraduate*
Unit Level: *Level 9*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites

Pre-requisite: COIT20245 Introduction to Programming
Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the Assessment Policy and Procedure (Higher Education Coursework).

Offerings For Term 1 - 2021

- Brisbane
- Melbourne
- Online
- Sydney

Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website

This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Postgraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

Regional Campuses
Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

Metropolitan Campuses
Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Written Assessment**
Weighting: 30%
2. **Written Assessment**
Weighting: 25%
3. **Written Assessment**
Weighting: 45%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the CQUniversity Policy site.
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from Student evaluation

Feedback

Students appreciated the fact that this unit introduced the three areas of computational intelligence - evolutionary, neural, and fuzzy.

Recommendation

Maintain the current topic and contents.

Feedback from Student evaluation

Feedback

Provide more explanations in tutorials for the example source code given.

Recommendation

Inform teaching team to provide walk through of some of the example solutions.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Model internal representation, performance criteria, and computational components identifying elements of authentic problems to apply neural, fuzzy or evolutionary computation
2. Create effective and efficient computational intelligence solutions to authentic problems
3. Evaluate the solution to a computational intelligence problem, analysing the merits and demerits of the chosen approach
4. Investigate the potential to enhance the model using one or more computational intelligence techniques.

The Australian Computer Society (ACS) recognises the Skills Framework for the Information Age (SFIA). SFIA provides a consistent definition of ICT skills. SFIA is adopted by organisations, governments, and individuals in many countries and is increasingly used when developing job descriptions and role profiles.
ACS members can use the tool MySFIA to build a skills profile at
https://www.acs.org.au/professionalrecognition/mysfia-b2c.html.
This unit contributes to the following workplace skills as defined by SFIA. The SFIA code is included:

- Data modelling and design (DTAN)
- Software design (SWDN)
- Programming/Software Development (PROG)
- Testing (TEST)
- Application Support (ASUP)

Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level · Introductory Level · Intermediate Level · Graduate Level · Professional Level · Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Written Assessment - 30%	•	•		

Assessment Tasks	Learning Outcomes			
	1	2	3	4
2 - Written Assessment - 25%		•	•	•
3 - Written Assessment - 45%	•		•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
1 - Knowledge	○	○	○	○
2 - Communication	○	○	○	○
3 - Cognitive, technical and creative skills	○	○	○	○
4 - Research				○
5 - Self-management	○	○	○	○
6 - Ethical and Professional Responsibility				
7 - Leadership				
8 - Aboriginal and Torres Strait Islander Cultures				

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes							
	1	2	3	4	5	6	7	8
1 - Written Assessment - 30%	○	○	○		○			
2 - Written Assessment - 25%	○	○	○		○			
3 - Written Assessment - 45%	○	○	○	○	○			

Textbooks and Resources

Textbooks

COIT20277

Prescribed

Computational Intelligence: Concepts to Implementations
(2007)
Authors: Russell C. Eberhart, Yuhui Shi
Morgan Kaufmann Publishers
Burlington , MA , USA
ISBN: 978-1-55860-759-0
Binding: Hardcover

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- R Studio and R
- Java SE 11
- NetBeans IDE 11

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Nahina Islam Unit Coordinator
n.islam@cqu.edu.au

Schedule

Week 1 - 08 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Evolutionary Computation Concepts and Paradigms	Chapter 2 and Part of Chapter 3	

Week 2 - 15 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Evolutionary Algorithms: Representation	Chapter 3, and Chapter 3 and 4 from Introduction to Evolutionary Computing by A. E. Eiben and J. E. Smith	

Week 3 - 22 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Fitness Selection and Population management	5 Introduction to Evolutionary Computing by A. E. Eiben and J. E. Smith	

Week 4 - 29 Mar 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Neural Networks: Components and Terminology	Chapter 5	
Week 5 - 05 Apr 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Neural Networks: Adaptation and Learning	Chapter 5	**Written Assessment** Due: Week 5 Friday (9 Apr 2021) 11:55 pm AEST
Vacation Week - 12 Apr 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Week 6 - 19 Apr 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Neural Networks: Adaptation and Implementation	5 and 6	
Week 7 - 26 Apr 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Fuzzy Systems: Fuzzy Sets and Fuzzy Logic	Chapter 7	
Week 8 - 03 May 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Fuzzy Systems: Approximate Reasoning	Chapter 7	**Written Assessment** Due: Week 8 Friday (7 May 2021) 11:55 pm AEST
Week 9 - 10 May 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Fuzzy Decision Making	Chapter 15 *Fuzzy sets and fuzzy logic* (Vol. 4) Klir, G. and Yuan, B., 1995.	
Week 10 - 17 May 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Fuzzy Systems: Fuzzy Controller	7	
Week 11 - 24 May 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Fuzzy Systems: Implementations	Chapter 8	
Week 12 - 31 May 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Performance Metrics	Chapter 10	**Written Assessment** Due: Week 12 Friday (4 June 2021) 11:55 pm AEST
Review/Exam Week - 07 Jun 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Exam Week - 14 Jun 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**

Term Specific Information

Unit Coordinator: Dr. Nahina Islam
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Assessment Tasks

1 Written Assessment

Assessment Type
Written Assessment

Task Description
In this assignment you will demonstrate your ability to apply evolutionary computing concepts to hypothetical problem, and develop a software application. This assessment task is to design, code, debug, and test using the topics covered in Weeks 1-3. Further details are in the Assignment 1 Specification document available from the Unit website.

Assessment Due Date
Week 5 Friday (9 Apr 2021) 11:55 pm AEST
Submit via the Moodle Link

Return Date to Students
Week 7 Friday (30 Apr 2021)

Weighting
30%

Assessment Criteria

1. Appropriate application of evolutionary computation concepts to the given problem
2. Correct modelling of problem solution following evolutionary computation concepts
3. Effective Source code development applying correct algorithmic steps
4. Effective use of good programming practice/techniques
5. Rigorous testing to evaluate the correctness of the model and algorithm
6. Demonstration of potential practical applications in a written report

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit only one zip file (.zip) containing the source code files (.java) and document file (.doc or .docx).

Learning Outcomes Assessed

- Model internal representation, performance criteria, and computational components identifying elements of authentic problems to apply neural, fuzzy or evolutionary computation
- Create effective and efficient computational intelligence solutions to authentic problems

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management

2 Written Assessment

Assessment Type
Written Assessment

Task Description
In this assignment you will demonstrate your ability to model a neural network to solve a hypothetical problem, and develop a software application implementing your model. This assessment task is to design, code, debug, and test using the topics covered in Weeks 4-7. Further details are available in the Assignment 2 Specification document available from the Unit website.

Assessment Due Date
Week 8 Friday (7 May 2021) 11:55 pm AEST
Submit via the Moodle Link

Return Date to Students
Week 10 Friday (21 May 2021)

Weighting
25%

Assessment Criteria

1. Correct modelling of problem solution following artificial neural network concepts
2. Effective Source code development applying correct algorithmic steps
3. Effective use of good programming practice/techniques
4. Rigorous testing to evaluate the correctness of the model and algorithm
5. Demonstration of potential practical applications in a written report

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit a zip file (.zip) containing the source code files (.java) and the report document file (.doc or .docx).

Learning Outcomes Assessed

- Create effective and efficient computational intelligence solutions to authentic problems
- Evaluate the solution to a computational intelligence problem, analysing the merits and demerits of the chosen approach
- Investigate the potential to enhance the model using one or more computational intelligence techniques.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management

3 Written Assessment

Assessment Type
Written Assessment

Task Description
In this assignment you will demonstrate your problem solving and programming skills to apply fuzzy system concepts to a hypothetical problem, and develop a software application. This assessment task is to design, code, debug, and test using the topics covered in Weeks 8-11. Further details are in the Assignment 3 Specification document available from the Unit website.

Assessment Due Date
Week 12 Friday (4 June 2021) 11:55 pm AEST

Return Date to Students
Exam Week Friday (18 June 2021)

Weighting
45%

Assessment Criteria

1. Correct modelling of problem solution following fuzzy system concepts
2. Effective Source code development for correct implementation of the model
3. Effective use of good programming practice/techniques
4. Rigorous testing to evaluate the correctness of the model and algorithm
5. Suggestions to enhance the model combining one more computational intelligence technique to improve speed/accuracy
6. Write a report on applicability of the enhanced model in real world applications that will also promote social innovation

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit a zip file (.zip) containing the source code files (.java) and the report document file (.doc or .docx).

Learning Outcomes Assessed

- Model internal representation, performance criteria, and computational components identifying elements of authentic problems to apply neural, fuzzy or evolutionary computation
- Evaluate the solution to a computational intelligence problem, analysing the merits and demerits of the chosen approach
- Investigate the potential to enhance the model using one or more computational intelligence techniques.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research
- Self-management

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the **Student Academic Integrity Policy and Procedure**. This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?
A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?
A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?
For academic advice and guidance, the Academic Learning Centre (ALC) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?

Be Honest
If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

Seek Help
If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

Produce Original Work
Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem