COIT20277 *Introduction to Artificial Intelligence*
Term 2 - 2022

Profile information current as at 27/09/2024 10:15 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 2 - 2022

- Online

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 feedback

Feedback
Link contents to real-world applications.

Recommendation
Initiate a content update to include materials that will cover real-world case studies and examples of artificial intelligence.

Feedback from Analysis by Unit Coordinator

Feedback
Need to focus more on applications of AI rather than theory. Based on the current industry trend consider using Python programming language instead of JAVA.

Recommendation
A unit update will be initiated to cover the basics of AI in the first 2/3 lectures then focus on the AI applications for data analysis, like healthcare, cybersecurity, etc, using Python based coding.

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%	●	●		
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 (Elsevier)
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)
- Apache Netbeans IDE 11.3
- AdoptOpenJDK 11 LTS with Hotspot from https://adoptopenjdk.net/
- R and RStudio

Referencing Style

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

Teaching Contacts

Sujan Chowdhury Unit Coordinator
s.chowdhury2@cqu.edu.au

Schedule

Week 1 - 11 Jul 2022		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Concepts of Artificial Intelligence		
Week 2 - 18 Jul 2022		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Genetic Algorithm		
Week 3 - 25 Jul 2022		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Evolutionary Algorithms		
Week 4 - 01 Aug 2022		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Artificial Neural Network		**Assessment item 1** Due: Week 4 Friday (5 Aug 2022) 11:59 pm AEST

Week 5 - 08 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Artificial Neural Network 2		

Vacation Week - 15 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Break Week		

Week 6 - 22 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Artificial Neural Network 3		

Week 7 - 29 Aug 2022

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Systems Concepts and Paradigms		

Week 8 - 05 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Systems Concepts and Paradigms 2		**Assessment item 2** Due: Week 8 Friday (9 Sept 2022) 11:59 pm AEST

Week 9 - 12 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Decision Making		

Week 10 - 19 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy Controller		

Week 11 - 26 Sep 2022

Module/Topic	Chapter	Events and Submissions/Topic
Fuzzy System Implementations		

Week 12 - 03 Oct 2022

Module/Topic	Chapter	Events and Submissions/Topic
Performance Metrics		**Assessment item 3** Due: Week 12 Friday (7 Oct 2022) 11:59 pm AEST

Review/Exam Week - 10 Oct 2022

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 17 Oct 2022

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Welcome to Term 2 2022! Unit Contact details are found on the unit page on Moodle (under "Information", top left corner). Feel free to contact me if you have any questions which are not suitable to be asked through the unit forums. Have an enjoyable term!

Unit Coordinator - (T2, 2022 COIT20277 - Introduction to Artificial Intelligence)
Dr. Sujan Chowdhury CQUniversity Australia, Brisbane Campus,
Level 20, 160 Ann St, Brisbane 4000 | E s.chowdhury2@cqu.edu.au

Assessment Tasks

1 Assessment item 1

Assessment Type
Written Assessment

Task Description

In this assessment, you are required to write a solution using Genetic Algorithms for a given problem. The

implementation should be in Java. The purpose of the assessment is to assess your ability to think about a given

problem and the solution model that you are building to solve the problem.

The assignment specification and marking criteria can be accessed on the unit Moodle site.

Assessment Due Date
Week 4 Friday (5 Aug 2022) 11:59 pm AEST

Penalty will be applied after the due date of submission

Return Date to Students
Week 6 Wednesday (24 Aug 2022)

Online via Moodle

Weighting
30%

Assessment Criteria
The assignment will be assessed based on the instructions given in the assessment criteria and the quality of code
implementation.

1. Analysis of the solution design for the given problem applying principles of Genetic Algorithms
2. The strategy of implementation presented using UML Diagram
3. Use the appropriate parameters given in the assessment specification and fitness function specified
4. Put appropriate comments in the code and follow good programming techniques/practices
5. Unit testing of the code to ensure the correctness of the model and algorithm

The detailed marking criteria can be accessed on the unit Moodle.

Referencing Style

- [Harvard (author-date)](#)

Submission
Online

Submission Instructions
You must submit your assignment via the online submission system from the unit Moodle site.

Graduate Attributes

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

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

2 Assessment item 2

Assessment Type
Written Assessment

Task Description
You will be asked to develop a solution for a given problem using artificial neural network algorithms. A training and
testing dataset will be provided to train the model and evaluate the performance of the implemented solution. The

implementation should be in JAVA.

The assignment specification and marking criteria can be accessed on the unit Moodle site.

Assessment Due Date
Week 8 Friday (9 Sept 2022) 11:59 pm AEST

Penalty will be applied after the due date of submission

Return Date to Students
Week 10 Wednesday (21 Sept 2022)

Online via Moodle

Weighting
25%

Assessment Criteria
The assignment will be assessed based on the instructions given in the assessment criteria and the quality of code implementation.

1. Analysis of the solution design for the given problem applying principles of Neural Network
2. Explain the design methodology
3. Use the train and test dataset
4. Use the correct technique
5. Use of good programming techniques/practices
6. Unit testing of the code to ensure the correctness of the model and algorithm

The detailed marking criteria can be accessed on the unit Moodle.

Referencing Style

- [Harvard (author-date)](#)

Submission
Online

Submission Instructions
You must submit your assignment via the online submission system from the unit Moodle site.

Graduate Attributes

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

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.

3 Assessment item 3

Assessment Type
Written Assessment

Task Description
In this assessment, you need to implement a Java Application for a given problem using fuzzy systems. Input details and expected output will be provided for the given problem to model, design, and build your application using the fuzzy systems.
The assignment specification and marking criteria can be accessed on the unit Moodle site.

Assessment Due Date
Week 12 Friday (7 Oct 2022) 11:59 pm AEST

Penalty will be applied after the due date of submission

Return Date to Students
Exam Week Wednesday (19 Oct 2022)

Online via Moodle

Weighting
45%

Assessment Criteria
The assignment will be assessed based on the instructions given in the assessment criteria and the quality of code implementation.

1. Analysis of the solution design for the given problem applying principles of Fuzzy System Concepts
2. Strategy of implementation
3. Use the correct method and necessary modules
4. Use of good programming techniques/practices
5. Unit testing of the code to ensure the correctness of the model and algorithm

The detailed marking criteria can be accessed on the unit Moodle.

Referencing Style

- [Harvard (author-date)](Harvard)

Submission
Online

Submission Instructions
You must submit your assignment via the online submission system from the unit Moodle site.

Graduate Attributes

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

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.

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