COIT20277 *Introduction to Artificial Intelligence*
Term 1 - 2023

Profile information current as at 11/04/2024 07:39 am

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 - 2023

- 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

There are no required textbooks.

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- NetBean IDE
- Java 17 (Open JDK)

Referencing Style

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

Teaching Contacts

MD Mamunur Rashid Unit Coordinator
m.rashid@cqu.edu.au
Sujan Chowdhury Unit Coordinator
s.chowdhury2@cqu.edu.au

Schedule

Week 1 - 06 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Concepts of Artificial Intelligence		

Week 2 - 13 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Genetic Algorithm		

Week 3 - 20 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Evolutionary Algorithms		

Week 4 - 27 Mar 2023

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

Week 5 - 03 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic

Artificial Neural Network 2

Assessment 1 Submission

• Week 5
• Date & Time: Friday (Apr 07, 2023) 10:59 pm AEST

Assessment 1 Due: Week 5 Friday (7 Apr 2023) 10:59 pm AEST

Vacation Week - 10 Apr 2023

Module/Topic | Chapter | Events and Submissions/Topic

Break Week

Week 6 - 17 Apr 2023

Module/Topic | Chapter | Events and Submissions/Topic

Artificial Neural Network 3

Week 7 - 24 Apr 2023

Module/Topic | Chapter | Events and Submissions/Topic

Fuzzy Systems Concepts and Paradigms

Week 8 - 01 May 2023

Module/Topic | Chapter | Events and Submissions/Topic

Fuzzy Systems Concepts and Paradigms 2

Assessment 2 Submission

• Week 8
• Date & Time: Friday (May 05, 2023) 10:59 pm AEST

Assessment 2 Due: Week 8 Friday (5 May 2023) 10:59 pm AEST

Week 9 - 08 May 2023

Module/Topic | Chapter | Events and Submissions/Topic

Fuzzy Decision Making

Week 10 - 15 May 2023

Module/Topic | Chapter | Events and Submissions/Topic

Fuzzy Controller

Week 11 - 22 May 2023

Module/Topic | Chapter | Events and Submissions/Topic

Fuzzy System Implementations

Week 12 - 29 May 2023

Module/Topic | Chapter | Events and Submissions/Topic

Assessment 3 Submission

Performance Metrics

• Week 12
• Date & Time: Friday (Jun 02, 2023) 10:59 pm AEST

Assessment 3 Due: Week 12 Friday (2 June 2023) 10:59 pm AEST

Review/Exam Week - 05 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic
No Exam		

Exam Week - 12 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic
No Exam		

Term Specific Information

Dear Students,
Happy New Year and welcome to Term 1, 2023! I am excited to have you in my class for COIT20277 - Introduction to Artificial Intelligence. This course will cover the fundamental concepts and techniques used in artificial intelligence, including machine learning, genetic algorithm, and fuzzy logic. We will also be exploring the ethical and societal implications of AI and its potential impact on the future of work and society.
You will be working with a variety of tools and techniques throughout this course, and you will have the opportunity to apply what you learn to real-world problems and projects. This course will give you a solid foundation in AI and its applications, which will be useful for a wide range of careers and fields.
I encourage you to actively participate in class discussions and group projects and to ask questions when you have them. Remember to stay organized and keep up with the coursework to ensure successful completion of the course.
Good luck and let's get started on this exciting journey in the world of AI.
You can find the unit contact details on the unit page on Moodle under the "Information" tab in the top left corner. If you have any questions that are not suitable to be asked through the unit forums, please feel free to contact me. My contact details are:
Dr. Sujan Chowdhury
CQUniversity Australia, Brisbane Campus
Level 20, 160 Ann St, Brisbane 4000
E-mail: s.chowdhury2@cqu.edu.au
Mobile: 0426937599
I wish you all an enjoyable term, and I look forward to working with you.
Best regards,
Dr. Sujan Chowdhury
Unit Coordinator - (T1, 2023 COIT20277 - Introduction to Artificial Intelligence)

Assessment Tasks

1 Assessment 1

Assessment Type
Written Assessment

Task Description

Dear Students,

In this assessment, you will be required to use your knowledge of Genetic Algorithms to develop a solution for a given problem. The implementation must be done in Java. The purpose of this assessment is to evaluate your ability to analyze a problem and design a solution model using the advantage of a Genetic algorithm to solve it. You will learn the basics of Genetic algorithm from Weeks 1-3 and step-by-step how to implement it.

The assignment specification and marking criteria can be found on the unit Moodle site. Please make sure to read through the assignment specification and marking criteria carefully before beginning your work.

Keep in mind that the implementation of Genetic Algorithms is a complex process and requires a lot of thinking and understanding of the problem. So, make sure to start working on the assessment as early as possible to give yourself enough time to think and work on the problem.

If you have any questions regarding the assignment, please don't hesitate to reach out to me or any other instructor.

Best of luck with the assessment,

[Sujan Chowdhury]

Assessment Due Date

Week 5 Friday (7 Apr 2023) 10:59 pm AEST

Return Date to Students

Week 7 Friday (28 Apr 2023)

Weighting

30%

Assessment Criteria

1. Analysis of the solution design for the given problem:
   The student's ability to analyze the given problem and design a solution model that applies the principles of Genetic Algorithms will be evaluated.
2. The strategy of implementation is presented using the UML Diagram:
   The student's ability to present the implementation strategy using a UML diagram will be evaluated.
3. Use of appropriate parameters and fitness function:
   The student's ability to use the appropriate parameters given in the assessment specification and implement the specified fitness function will be evaluated.
4. Code quality and commenting:
   The student's ability to write clean, well-organized, and commented code, as well as to follow good programming techniques and practices will be evaluated.
5. Use of Crossover and Mutation:
   The student's ability to understand the basic genetic algorithm principles and implement them using java.

The detailed marking criteria can be accessed on the unit Moodle. Please make sure to read through the marking criteria carefully before submitting your work.

Referencing Style

- Harvard (author-date)

Submission

Online

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 Assessment 2

Assessment Type
Written Assessment

Task Description
For this assessment, you will be required to use artificial neural network algorithms to develop a solution for a given problem. A training and testing dataset will be provided to you to train the model and evaluate the performance of the implemented solution. The implementation must be done in JAVA. You will learn the basics of artificial neural networks from Weeks 4-6 and step-by-step how to implement them.
The assignment specification and marking criteria can be found on the unit Moodle site. It is important that you read through the assignment specification and marking criteria carefully before beginning your work. Make sure you understand the problem and the requirements clearly.
You will need to use the provided training and testing dataset to train the model and evaluate the performance of the implemented solution. You will also need to implement the neural network algorithms and make sure that it is working correctly.
In order to successfully complete this task, you will need to have a good understanding of the artificial neural network algorithms and their implementation in JAVA. Make sure to start working on the task as early as possible to give yourself enough time to think and work on the problem.
If you have any questions regarding the task, please don't hesitate to reach out to me or any other instructor for guidance.
Good luck and happy coding!
[Sujan Chowdhury]

Assessment Due Date
Week 8 Friday (5 May 2023) 10:59 pm AEST

Return Date to Students
Week 10 Friday (19 May 2023)

Weighting
25%

Assessment Criteria
1. Analysis of the solution design for the given problem:
   The student's ability to analyze the given problem and design a solution model that applies the principles of Neural Networks will be evaluated.
2. Design methodology:
   The student's ability to explain the design methodology and the techniques used to develop the solution will be evaluated.
3. Use of the train and test dataset:
   The student's ability to use the provided train and test dataset to train the model and evaluate the performance of the implemented solution will be evaluated.
4. Use of correct technique:
   The student's ability to use the correct neural network technique and implementation strategy for weight adjustment will be evaluated.
5. Code quality and commenting:
   The student's ability to write clean, well-organized, and commented code, as well as to follow good programming techniques and practices will be evaluated.
The detailed marking criteria can be accessed on the unit Moodle. Please make sure to read through

the marking criteria carefully before submitting your work.

Referencing Style

- Harvard (author-date)

Submission
Online

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 Assessment 3

Assessment Type
Written Assessment

Task Description
For this assessment, you will be required to develop a Java application for a given problem using fuzzy systems. Input details and expected output will be provided to help you model, design, and build your application. The implementation must be done in Java.
The assignment specification and marking criteria can be found on the unit Moodle site. It is important that you read through the assignment specification and marking criteria carefully before beginning your work. Make sure you understand the problem and the requirements clearly.
You will need to use the provided input details and expected output to model, design, and build your application using fuzzy systems. Make sure that the application is working as expected and it is meeting the requirements.
In order to successfully complete this task, you will need to have a good understanding of fuzzy systems and their implementation in Java. Make sure to start working on the task as early as possible to give yourself enough time to think and work on the problem.
If you have any questions regarding the task, please don't hesitate to reach out to me or any other instructor for guidance.
Good luck and happy coding!
[Sujan Chowdhury]

Assessment Due Date
Week 12 Friday (2 June 2023) 10:59 pm AEST

Return Date to Students
Exam Week Friday (16 June 2023)

Weighting
45%

Assessment Criteria
1. Analysis of the solution design for the given problem:
   The student's ability to analyze the given problem and design a solution model that applies the principles of Fuzzy System Concepts will be evaluated.
2. The strategy of implementation:
   The student's ability to present the implementation strategy and the techniques used to develop the solution will be evaluated.
3. Use of correct method and necessary modules:
   The student's ability to use the correct method and necessary modules for the implementation of the Fuzzy System will be evaluated.

4. Code quality and commenting:
   The student's ability to write clean, well-organized, and commented code, as well as to follow good programming techniques and practices will be evaluated.
5. Use of fuzzification:
   The student's ability to understand the fuzzification and choose the correct linguistic variables will be evaluated.

The detailed marking criteria can be accessed on the unit Moodle. Please make sure to read through the marking criteria carefully before submitting your work.

Referencing Style

- Harvard (author-date)

Submission
Online

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