COMP6420

Artificial Intelligence for Text and Vision

Session 2, In person-scheduled-weekday, North Ryde 2024

School of Computing

Contents

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General Information

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Credit points
10

Prerequisites
COMP6200

Corequisites

Co-badged status
COMP3420

Unit description
Availability of digital data in increasingly larger volumes, both as text and images, has enabled machine learning to provide effective solutions to applications that require intelligent processing of text and images. This unit explores the use of Artificial Intelligence techniques, in particular deep learning techniques, for tasks related to the processing of text and computer vision. Application areas include text search, sentiment analysis, information extraction, and image recognition.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

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

ULO1: Identify the range of text processing and computer vision applications that benefit from the use of Artificial Intelligence.

ULO2: Explain the fundamental Artificial Intelligence techniques in text processing and computer vision.

ULO3: Design systems that use deep learning techniques for tasks related to text processing and computer vision.

ULO4: Implement text processing and computer vision applications using a programming language.

General Assessment Information

The assessment of this unit consists of three assignments and a final exam. You will submit the solutions to the three assignments via iLearn by the due date. The final examination is a closed book examination, and will be taken in person during the exam period.

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. *For example, if the assignment is worth 8 marks (of the entire unit) and your submission is late by 19 hours (or 23 hours 59 minutes 59 seconds), 0.4 marks (5% of 8 marks) will be deducted. If your submission is late by 24 hours (or 47 hours 59 minutes 59 seconds), 0.8 marks (10% of 8 marks) will be deducted, and so on.* The submission time for all uploaded assessments is **11:55 pm**. A 1-hour grace period will be provided to students who experience a technical concern. For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for Special Consideration.

Assessments where Late Submissions will be accepted

- Assignment 1 - YES, Standard Late Penalty applies
- Assignment 2 - YES, Standard Late Penalty applies
- Assignment 3 - YES, Standard Late Penalty applies
- Exam - NO, unless Special Consideration is Granted

Supplementary Exam

If you receive Special Consideration for the final exam, a supplementary exam will be scheduled after the normal exam period, following the release of marks. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Requirements to Pass this Unit

To pass this unit, you must achieve a total mark equal or greater than 50%. This unit does not have hurdle assessments.

Special Consideration

The Special Consideration Policy aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment 1	15%	No	Week 3: Friday 11:55pm
Assignment 2	20%	No	Week 7: Friday 11:55pm
Assignment 3	35%	No	Week 9 (10%) and 12 (15%), Friday 11:55pm
Final Exam	30%	No	Exam Period

Assignment 1

Assessment Type [1]: Programming Task
Indicative Time on Task [2]: 10 hours
Due: **Week 3: Friday 11:55pm**
Weighting: **15%**

Implement a simple text processing or computer vision application that uses pre-packaged tools.

On successful completion you will be able to:
- Identify the range of text processing and computer vision applications that benefit from the use of Artificial Intelligence.
- Explain the fundamental Artificial Intelligence techniques in text processing and computer vision.
- Design systems that use deep learning techniques for tasks related to text processing and computer vision.
- Implement text processing and computer vision applications using a programming language.

Assignment 2

Assessment Type [1]: Programming Task
Indicative Time on Task [2]: 20 hours
Due: **Week 7: Friday 11:55pm**
Weighting: **20%**

Implement a text processing or computer vision application that uses simple deep learning techniques.

On successful completion you will be able to:

- Identify the range of text processing and computer vision applications that benefit from the use of Artificial Intelligence.
- Explain the fundamental Artificial Intelligence techniques in text processing and computer vision.
- Design systems that use deep learning techniques for tasks related to text processing and computer vision.
- Implement text processing and computer vision applications using a programming language.

Assignment 3

Assessment Type [1]: Programming Task
Indicative Time on Task [2]: 30 hours
Due: **Week 9 (10%) and 12 (15%), Friday 11:55pm**
Weighting: **35%**

Implement a text or computer vision application that uses complex deep learning techniques and realistic data which may require preprocessing or cleaning.

On successful completion you will be able to:

- Identify the range of text processing and computer vision applications that benefit from the use of Artificial Intelligence.
- Explain the fundamental Artificial Intelligence techniques in text processing and computer vision.
- Design systems that use deep learning techniques for tasks related to text processing and computer vision.
- Implement text processing and computer vision applications using a programming language.

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 10 hours
Due: **Exam Period**
Weighting: **30%**

The final exam will focus on the theoretical aspects of the unit. There will be few questions about implementation issues.

On successful completion you will be able to:

- Identify the range of text processing and computer vision applications that benefit from the use of Artificial Intelligence.
- Explain the fundamental Artificial Intelligence techniques in text processing and computer vision.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

During most of the weeks, there will be 2 hours of lectures and 2 hours ot Practicals. All the required software will be installed in the computers of the PC labs allocated for the Practicals but you are free to bring your own device and install the software.

Lectures and practicals start on Week 1.

Delivery Modes

All lectures and Practicals are delivered in campus. The lectures will also be recorded and recordings of the lecture will be available via iLearn. There will not be recordings of the Practical sessions.

Methods of Communication

We will communicate with you via your university email or through announcements in iLearn. Queries to convenors can be made via the Contact tool in iLearn or sent to diego.molla-aliod@mq.edu.au from your **university email** address.

Reading

Every week there will be a list of required and recommended readings. The list will be maintained in iLearn.

Most of the contents of the unit will be based on the following books:

- Steven Bird, Ewan Klein, Edward Loper. Natural Language Processing -- Analyzing Text with Python and the Natural Language Toolkit. Available online.
- François Chollet (2021). Deep Learning with Python, 2nd Edition. Manning Publications. Available in the library.
- Dan Jurafsky and James H. Martin (2023), Speech and Language Processing (3rd ed. draft). Available online.
- Valliappa Lakshmanan, Martin Görner, Ryan Gillard (2021), Practical Machine Learning for Computer Vision. O'Reilly. Available in the library.
- Mohammed Elgendy (2020), Deep Learning for Vision Systems. O'Reilly. Available in the library.

Software

The main software for this unit is Anaconda for Python 3.11 with the following packages:

1. numpy
2. scipy
3. pandas
4. nltk
5. scikit-learn
6. scikit-image
7. gensim
8. tensorflow
9. opencv
10. pillow

Unit Web Page

Note that the majority of the unit materials is publicly available while some material requires you to log in to iLearn to access it.

The unit will make extensive use of discussion boards hosted within iLearn. Please post questions there, they will be monitored by the staff on the unit.

Week 1 classes

Lectures and practical classes will start on week 1.

Unit Schedule

The following schedule is tentative and is only an indication of the actual contents. The final schedule will be available in iLearn.

Week	Topic	Assignment Due
1	Introduction; Python; Simple image processing	
2	Deep learning for image classification	
3	Convolutional networks	Assignment 1
4	Advanced convolutional networks	
5	Object detection and image segmentation	
6	Practical computer vision	
7	Simple text processing	Assignment 2
8	Text search	
	RECESS	
9	Machine learning for text classification	Assignment 3 - Part 1
10	Deep learning for text classification	
11	Transformers	
12	Large language models	Assignment 3 - Part 2
13	Exam review	

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure

- Assessment Procedure
- Complaints Resolution Procedure for Students and Members of the Public
- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

The Writing Centre

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader
- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides

- Ask a Librarian

Student Services and Support

Macquarie University offers a range of Student Support Services including:

- IT Support

- Accessibility and disability support with study

- Mental health support

- Safety support to respond to bullying, harassment, sexual harassment and sexual assault

- Social support including information about finances, tenancy and legal issues

- Student Advocacy provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the Service Connect Portal, or contact Service Connect.

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/ offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

The assessment weight has changed. This offering, assessment weight of the exam has been reduced from 50% to 30% of the unit assessment, and the assessment weights of the assignments have been increased.

Unit information based on version 2024.03 of the Handbook