UNSW SYDNEY

Faculty of Engineering

School of Computer Science and Engineering

ZZEN9444

Neural Networks, Deep Learning

Hexamester 5, 2022

Course Outline

Description

This course aims to introduce students to the main topics and methods in the field of neural networks (NN) and deep learning (DL), ranging from traditional neural network models to the latest research and applications.

Units of Credit

The course is worth 6 units of credit.

Pre-requisites and Assumed Knowledge

Basic understanding of the following is assumed for this course:

- Linear Algebra
- Probability
- Calculus and Chain Rule

Learning Outcomes

On successful completion of the course, you should be able to:

1. Demonstrate an understanding of aspects of the social, intellectual, and neuro-biological context of neural networks and deep learning.
2. Demonstrate an understanding of a variety of NN and DL techniques.
3. Analyse a solution to a neural network problem in terms of the relevant NN and DL techniques.
4. Have an awareness of the computational theory underlying the various NN methods.
5. Demonstrate a working knowledge of one or more neural network simulation packages and be able to use them to perform a range of computational tasks.
6. Perform neural network and deep learning applications

Schedule

Date	Week	Topic	Assessment Due
22 Aug	0	Orientation Week	
29 Aug	1	Perceptrons and backpropagation	
5 Sep	2	Backprop variations and hidden unit dynamics	A1: Quiz 1
12 Sep	3	Image processing	A1: Quiz 2
19 Sep	4	Language processing	A1: Quiz 3
26 Sep	5	Reinforcement learning	A2: Implementing Neural Networks: Image processing
3 Oct	6	Autoencoders	A1: Quiz 4
10 Oct	7	Examination Week	A3: Writing Neural Networks: Language processing

Assessment

In order to pass the course, you must:

- achieve a total mark of at least 50;
- meet any additional requirements of the assessment tasks.

The assessment tasks are:

No.	Type	Weight	Due*	Learning Outcomes
1	Quizzes	40% (4 x10%)	Week 2,3,4 Monday, 5pm 5, 12, 19 Sep Week 6, Tuesday, 5pm 4 Oct	1,2,3,4
2	Implementing Neural Networks: Image processing	30%	Week 5, Monday, 5pm 26 Sept	3,4,5
3	Writing Neural Networks: Language processing	30%	Week 7, Tuesday, 5pm 11 Oct	4,5,6

*All dates and times are Sydney (Australia) dates and times

You will be penalised 5% per day of the marks available for an assessment task if you submit it after the due date, unless you have an approved extension through Special Consideration. Assessment 1 consists of four quizzes that cannot be submitted late unless Special Consideration has been applied for and approved in advance.

Teaching Staff

Your teaching staff are:

- Dong Gong, dong.gong@unsw.edu.au (Online Lecturer and Course Convenor)
- Alan Blair, a.blair@unsw.edu.au (Online Lecturer)

Teachers are your main point of contact. Their consultation times will be advised on the course website.

Resources

The website for the course is on Moodle, at: http://moodle.telt.unsw.edu.au. From there, you will also access course content in Ed. All readings and activities will be available there - no additional materials are required.

Technical Requirements

The course is fully online. You will need:

- A fast and reliable computer (or equivalent device), with an up-to-date operating system
- A fast and reliable internet connection
- The latest version of a modern browser (e.g. Internet Explorer, Chrome, Firefox or Safari)

- A reliable way to store your files - either on your computer with a backup routine, or in the cloud (e.g. using Dropbox)

Learning and Teaching Activities

The course contains a variety of resources and activities that are carefully designed to enhance your learning.

Some activities require you to work and think alone, by reading some text, listening to a recording or watching a video. You might be asked to engage with the material and explore interactive elements by clicking to reveal content, to help you better absorb and process the concepts. Some activities require you to produce work of your own. You might be answering a question, writing code to solve a problem, or posting to a forum, for example. Some activities are assessment tasks, which have been carefully designed to measure how well you have achieved the learning outcomes of the course. Typically, you will get feedback on your work, either from yourself (by checking your work with models that are provided), or from an automatic marking process, or from your peers, or from your teacher.

You also have access to a variety of ways to communicate with your peers and with the teaching staff. The general discussion forums are a place for you to ask and answer questions, to interact with your peers, and to be challenged by your teachers. Getting involved in these forums will enhance your learning experience and make it more enjoyable. Your course may include Webinars, which provide an opportunity to hear directly from your Online Lecturers and ask questions in real time. All webinars are recorded so you can access them at any time. Online Lecturers are available for consultations and will post information about how to access consultations on the course website. You can also contact your Online Lecturer by email using the email address in the teaching staff section of this outline.

It is up to you how much work you do. The more time and effort that you can dedicate to the course, the better will be your learning and your results.

Special Consideration

If illness or other circumstances beyond your control interfere with your assessment performance then you can apply for special consideration, to get an extra opportunity to demonstrate your level of performance.

You must make your application online, through the Special Consideration portal on myUNSW. Do not apply to your course teaching staff - they will be notified automatically.

You must apply before the assessment task is due or the exam is held - if you submit the assessment or sit the exam then you are declaring yourself well enough to do so and are unable to subsequently apply for special consideration. If illness or misadventure prevent you from applying in advance, then you must apply

as soon as possible, and provide evidence that you could not apply sooner. If you become unwell on the day of the exam, you must provide evidence dated within 24 hours of the exam, with your application.

Your application will be considered centrally, by a case review team, and they will notify you of the outcome. If your application is successful, then your course teaching staff will arrange an alternative assessment for you.

You can read more about special consideration at: https://student.unsw.edu.au/special-consideration.

Academic Integrity

UNSW values academic integrity and has strict rules against cheating. In particular, it has strict rules against trying to get credit that you don't deserve. Thus, you should not plagiarise - i.e. present someone else's work as if it's your own. This could be the work of an academic, or a peer, or a contract writer, and it includes work of all kinds - exact words, general ideas, designs, drawings, software, and so on. Nor should you recycle your own work - i.e. submit it for credit in multiple courses. UNSW also has strict rules against helping others to cheat - e.g. by giving someone your work to copy, or doing someone's work for them, and so on.

For further information about academic integrity and plagiarism at UNSW go to:
https://student.unsw.edu.au/plagiarism

For information about acknowledging your sources and referencing go to:
https://student.unsw.edu.au/referencing. If you are not sure what referencing style to use in this course, you should ask your Online Lecturer.

Evaluation and Development

Toward the end of the hexamester you will be asked to give feedback about the course, via UNSW's MyExperience survey. Your feedback will be used, along with feedback from other stakeholders, to help improve the course. You can also contact your Course Convenor any time you have suggestions or other feedback.

Quality Assurance

UNSW actively monitors student learning and quality of the student experience in its programs. A random selection of completed assessment tasks may be used for quality assurance, such as determining the extent to which program learning goals are being achieved. The information is required for accreditation purposes, and aggregated findings will be used to inform changes aimed at improving the quality of programs. All material used for such processes will be treated as confidential.