UNSW
School of Computer Science & Engineering

COMP9444 Neural Networks
COMP9844 Extended Neural Networks

Course Introduction

This page is now fully updated for 2008s2.
The sections which are not yet updated are those for which
there are obvious gaps in tables, or where links do not yet work.

Session 2, 2008

If you are looking at a print-out of this document, and wish to access the links, this course outline may be found on-line at:
http://www.cse.unsw.edu.au/~cs9444/intro2008s2.html

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Course Staff and Contact Information

Staff member	A/Prof. Bill Wilson Coordinator	A/Prof. Achim Hoffmann Lecturer
E-mail		
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Consults	K17-405 Tue 3-4pm	K17-406 Tue 3-4pm
Pre-exam Consultations	Fri 7 Nov 2-4pm Mon 10 Oct 10am-12noon	Fri 7 Nov 2-4pm Mon 10 Oct 10am-12noon
Appearance		

Each lecturer runs consultations only in weeks when he is lecturing or when one of his assignments is running (and there will be revision-period consultations - times to be announced when the examination timetable is known.)
If you can't make it to our scheduled consultations - e.g. because they clash with another of your classes - then please contact us by phone or email for an appointment.
Consultation times may have to be changed in certain circumstances.
It is best **not** to send e-mail queries to the `cs9444` account; mailing to the relevant lecturer is likely to be more reliable, because the spam density on the `cs9444` account is over 99%. *Note that other CSE courses may have different*

requirements for contacting staff.

Units of credit

COMP9444/9844 earns you 6 Units of Credit. This signifies 25% of a full-time study load for one semester, and involves 12 weeks × 3 hours/week of lectures, plus 4 assignments.

Parallel Teaching Information

This course allows both senior undergraduates and postgraduates to enrol. Only COMP9444/9844 students attend these classes.
COMP9444 is regular Neural Networks, and has both PGs and UGs in it.
COMP9844 is Extended Neural Networks, and has both PGs and UGs in it.

Plagiarism Information

Copying assignments is unacceptable. Assignments will be checked. The penalties for copying range from receiving no marks for the assignment, through receiving a mark of 00 FL for the course, to expulsion from UNSW (for repeat offenders). Allowing someone to copy your work counts as academic misconduct, and makes you liable to a penalty, even if you can prove that it is your work.

Fuller details on plagiarism issues are available below. You should definitely read the full version if:

- you are new to studying in Australia; and/or
- you are new to studying in CSE; and/or
- you are in any way uncertain about plagiarism

COMP9844 Extended Neural Networks

COMP9844 Extended Neural Networks is also a 6 Unit of Credit Course, and so it constitutes 25% of a full-time study load for one semester. COMP9844 provides extra challenges for those who wish them. COMP9844 students attend COMP9444 lectures, and also a "bonus" lecture that covers the extension material. The extensions may include extra components to assignments.

Extended courses are intended for students with a mark of at least 70 in the prerequisite course. COMP9444/9844 has a complicated prerequisite structure, partly to deal with the fact that some students may take it in their first semester of study at UNSW. Such students may choose COMP9844 but should monitor their performance in their first 6 weeks of structure and consider carefully whether to switch to COMP9444 towards the end of this period. If you have taken one of the prerequisite courses (e.g. COMP9024, COMP2011, COMP2911) then you may not enrol in COMP9844 unless you scored at least 70 in that course.

Because COMP9844 and COMP9444 are closely related, it is possible to transfer between them past the **week 1 deadline for adding a course**. However, it is still necessary to have your final enrolment sorted out by the **end of week 6** of session. Further, following changes to mandatory Federal Government reporting procedures for universities, it becomes significantly more hassle to switch after the HECS Census Date (31 March in first session), so it is best to have your enrolment sorted by then.

Extended Neural Networks will cover the syllabus of COMP9444 together with additional topics, to be presented in the additional lecture hour. See the lecture schedule for the planned content. This may be varied, as COMP9844 is being offered for the first time in 2008s2. Information on assessment in COM9844 is below.

If the enrolment in COMP9844 is very small, the extra lecture may be replaced by a reading course. Lecture notes will be available on the web as usual, and COMP9844 students will be able to come and discuss the lecture material in the lecture slot on Tuesday afternoon (or perhaps another time, by arrangement).

Course Schedule

The order and content shown below may vary - what is shown below is an indication only. Lecture notes for each week will be available when a link appears in the column, below, labelled **Notes**.

COMP9444 Lectures						
Wk	**Date**	**Lecturer**	**Topic**	**Notes**	**Remarks/Planned assignment dates**	**Feedback Quiz**
1	29 Jul	Achim	Introduction and brain physiology	pdf		
2	5 Aug	Achim	Perceptrons and Backpropagation	pdf (updated 17:55pm 5/8/08 (on page 10 'sgn function' added.)	Backprop out	
3	12 Aug	Achim	Multi-Layer Perceptrons, Learning Theory	pdf (to be discussed also on 19/8/08)		

4	19 Aug	Achim	Learning Theory	see notes from last week.		
5	26 Aug	Achim	Support Vector Machines	pdf	Backprop due SVM out	
6	2 Sep	Achim	Committee Machines	pdf pics1 pics2		
7	9 Sep	Bill	Recurrent networks 1	pdf (140Kb)		quiz
8	16 Sep	Bill	Recurrent networks 2	As for week 7	SVM due Recurrent networks out	quiz
9	23 Sep	Bill	Self-organising Systems	pdf (1.41Mb)		quiz
	30 Sep	Mid-session Break				
10	7 Oct	Bill	Tensor-product Networks	pdf (802 Kb)	Recurrent nets due Kohonen nets out	quiz
11	14 Oct	Bill	Neurodynamics - Hopfield nets Brain-State-in-a-Box (BSB)	pdf (990K)		quiz
12	21 Oct	Both	Revision: Sample exam	Questions Part A Questions Part B Solutions B	Kohonen due	

Extra COMP9844 Lectures					
Week	**Date**	**Lecturer**	**Tentative Topic**	**Notes**	**Remarks/Planned assignment dates**
2	5 Aug	Achim	Convergence proof for Perceptron	See textbook pp 137ff	
4	12 Aug	Achim	Backpropagation - Weight Decay	pdf (to be discussed on 2 September)	
4	19 Aug	Achim	Descriptional complexity of networks 1	pdf to be discussed also on 12 August 2008	
5	26 Aug	Achim	Descriptional complexity of networks 2	pdf	
6	2 Sep	Achim	Advanced SVM techniques	pdf	
7	9 Sep	Bill	Dynamic nets	pdf notes (456Kb) Fahlman paper (160Kb)	
8	16 Sep	Bill	Radial basis function nets	pdf (1.4Mb)	
9	23 Sep	Bill	Competitive learning	pdf (970Kb)	
mid-session break					
10	7 Oct	Bill	Simulated annealing	pdf (572Kb)	
11	14 Oct	Bill	Boltzmann machine	pdf (404Kb) Hinton on Restricted Boltzmann machines (YouTube)	
12	21 Oct	Just Bill	Revision	Questions - pdf (69K) + Solutions - pdf (460K)	

Course Resource List

Details are below for many of these - follow the links:

- Text Book
- Lecture Notes
- Revision Notes on Linear Algebra
- Self-feedback Quizzes
- Exercise Sets
- List of relevant journals & conferences
- tlearn software
- your fellow students - get to know them and talk to them - because they, like you, are committed to learning about Neural Networks, they can help you to learn, and, by doing so, they will help clarify concepts for themselves. Just remember to stay on the right side of the plagiarism rules, when discussing assignments.
- the COMP9444/9844 class forum - which potentially has contributions from both staff and students

- lecturer consultation sessions
- the UNSW Library has other Neural Networks resources - go and find them!
- the web (obviously)

Self-Feedback Quizzes

See the links labelled "quiz" at the end of rows in the course schedule. These quizzes are voluntary self-assessments. They carry no marks. They are provided to help you work out how well you are going in COMP9444/9844.

Solutions are linked to each quiz.

We suggest that, around the end of each week, you set aside some time to review the COMP9444 lecture material for the week, then try the quiz. Then look at the answers, and mark yourself. If you do not score as well as you aimed to score, then obviously you need to revise more extensively.

You can also get feedback from assignments (which are assessable), and from exercises - see below.

Exercises

These are more problem-oriented, and involve longer answers than the quizzes. Again, they are not assessable. You can most easily find them in the menu at the left of the class home page, but here is another link to the exercises. Solutions are provided to exercise sets.

Course Evaluation and Development

COMP9444 is evaluated by survey each time it is taught. The survey includes stock questions asked of all comparable courses, so that it is possible to compare the delivery of COMP9444 with other relevant UNSW courses, and also a space for free-format comments. You cannot be identified from your survey response, unless you include identifying information in your free-format comments.

The completed survey forms are analysed statistically by "CATEI" software. CATEI is run by UNSW Central, and as a matter of UNSW policy, the results, including the free-format comments, are made available to staff involved in the course *after* grades have been reported.

The comments and statistics reported are used to improve the course, and *all* UNSW lecturers are required to summarise the survey results for their Head of School, and report on what improvements the plan for their course when it is run next.

In the survey conducted in session 2 of 2007, the summary criterion "Overall, I was satisfied with the quality of this course" received the following responses:

Strongly Agree	Agree	Disagree	Strongly Disagree
26%	65%	9%	0%

The response rate was 23/29.

In looking at the free-format comments, no strong patterns emerged. Three students commented positively on the assignments, and one negatively. Three other students liked the "balance" of the course - between depth and breadth, or between coding and theoretical work.

The detailed statistics also indicated that students would appreciate more feedback: although the COMP9444 average rating was the same as the School of CSE average rating for feedback (and significantly better than the Faculty of Engineering average rating), this rating was lower than for other questions. Consequently, we are trying to provide more feedback this year, e.g. by means of the feedback quizzes.

Another development is the COMP9844 Extended Neural Networks option - available this year for the first time.

Related Courses

Pre-requisite:

For undergraduates: (Data Structures and Algorithms *or* COMP2011 Data Organisation *or* COMP2911 Engineering Design in Computing 2) **and**
12 UoC of COMP3### or COMP4###

For postgraduates: (Enrolment in a postgraduate program in the School of CSE or the School of EET *or* COMP9024) **and**
12 UoC of COMP9### or ELEC9### or TELE9###

Mathematical assumed knowledge: We also assume you have completed basic university mathematics courses, such as the UNSW courses MATH1131 and MATH1231, and so know about concepts of vectors and matrices (including inner products and orthogonality). It is possible to learn (or revise) these concepts as you do COMP9444; obviously this will take more time than if you already know them.

Course aims

To introduce students to a range of topics in the field of artificial neural networks, and to provide them with hands-on familiarity with three of these areas.

Topics are chosen from: Network architectures: perceptrons, Hopfield and Kohonen nets, ART models, back-propagation trained feed-forward networks, recurrent nets, weightless nets. Computational complexity analysis of training neural network architectures. Probabilistic analysis of generalisation capabilities of feed-forward networks. Hardware based neural nets. Introduction to fuzzy logic, neurotrained nets; designing successful applications of neural networks; tensor product networks; and recent developments in neural networks.

Learning outcomes

The numbers in [] below refer to UNSW Graduate Attributes which are addressed by the item in question. In addition to the graduate attributes indicated below, the experience of working in this class addresses graduate attributes 5, 7, 8, and 9. See http://www.cse.unsw.edu.au/~billw/gradatts.html for explanation of numbered graduate attributes.

After completing COMP9444, students should

- understand aspects of the social, intellectual, and neurobiological context of neural networks research; [2, 10, 11]
- have an understanding of a variety of neural networks techniques, including: [3]
  - error backpropagation learning
  - support vector machines
  - committee machines
  - recurrent networks
  - tensor product networks
  - self-organising maps
  - Hopfield networks
- be able to analyse a problem for NN solution in terms of these methods; [3]
- have an awareness of the computational theory underlying NNs; [3]
- have a working knowledge of a typical neural network simulation package: tlearn, and be able to use it to perform a range of computational tasks; [4, 6, 12]
- have experience in programming NN applications from scratch. [6]

Students will complete 3-4 programming-style assignments. [3, 4, 6]

Extra learning outcomes for COMP9844

Have a deeper and broader understanding of neural network techniques, derived from learning the material described in the extra lectures (see course schedule).

Teaching Strategies

1. **Lectures** provide a detailed description of the material covered by the course, in an environment that provides a chance to ask questions and listen to the answers to other students' questions. Because the lecturer can see the students' reactions, the lecturer can gauge their level of understanding, and expand on technical material that seems to need further explanation;
2. **Textbooks and reference books** provide supplementary material, and/or a slightly different point of view on the technical material;
3. **Exercise sets** allow you to test and extend your understanding of the lecture materials by tackling problems based on those materials. Some of the questions in the exercise sets might be similar to questions later used in the final examination;
4. **Quizzes** provide feedback on your progress. They are voluntary, and self-administered, at a time convenient to you.
5. **Programming assignments** provide: a chance to test and strengthen your understanding of some of the lecture material by coding it; If you can code a NN algorithm from scratch, then you almost certainly understand it well.
6. The **sample examination** gives students a chance to test themselves on the material of the course in a format similar to that of the final examination;
7. **Consultation sessions** give students an opportunity to ask the lecturers, one-on-one, specific questions about any of the course material that they might be uncertain about;
8. **Other students** - your classmates - are there to help you, too. Because they have just gone through the same learning processes as you, on the material of COMP9444, they are in a way best placed to know what the difficulties are, and explain them. By explaining them, they too will benefit, by reinforcing their own learning. The only limit on this is in relation to the assignments: you can get ideas for the assignments from other students, but you must write the assignment yourself (see plagiarism).
9. The **final examination**: nobody we know enjoys examinations (either sitting them or marking them) but they do provide a focus and a deadline to make sure you revise the material covered in the course. Revision can be an important part of learning.

Assessment Information

The assessment for this subject will consist of:

- 3 hour final exam worth 70%
- 4 programming assignments, together worth 30% (see below)

These marks will be combined using a harmonic mean formula - see below for details - **not** by adding the two marks together.

COMP9844 students: must attempt all 4 assignments. COMP9844 students who attempt 3 assignments or fewer are penalised by subtracting 30% from their assignment total. In addition, COMP9844 students are responsible for knowing the contents of lectures in the extra COMP9844 lectures, and may be examined on all topics.
COMP9444 students: must attempt at least 3 assignments. COMP9444 students who attempt 2 assignments or fewer are penalised by subtracting 30% from their assignment total.

The assignment total is based on the sum of the marks for your *best three* assignments.

The assignment total is then scaled to give a mark out of 100, called `asstotal`. The final exam total is also scaled to give a mark out of 100, called `exam`. The assignment total and the final exam total will be combined using a **harmonic mean formula**, weighting the final exam as 70% (0.7) and the assignment total as 30% (0.3):

```
final mark = min(100, Δ + asstotal*exam/(asstotal*0.7 + exam*0.3))
```

Here `asstotal*exam/(asstotal*0.7 + exam*0.3)` is the weighted harmonic mean of `asstotal` and `exam`, and Δ is the average difference, across the whole class, between the weighted arithmetic mean and the weighted harmonic mean of `asstotal` and `exam`. (The weighted arithmetic mean is 0.7*`exam` + 0.3*`asstotal`. The weighted harmonic mean is always less than or equal to the weighted arithmetic mean, so Δ ≥ 0).

The weighted harmonic mean penalises uneven performances: getting 100% (30/30) for the assignments and 30% (21/70) for the exam would allow a pass if marks were simply added together, (i.e. if the weighted arithmetic mean were used) but under the harmonic mean formula, it results in a final mark of 38%. The effect of the Δ term is to ensure that, on average, the class is not penalised by the use of the harmonic mean. Those with very different assignment totals and exam totals will still do worse, but those with moderate differences will not do worse, and those with even performances will do better than if a weighted arithmetic mean had been used.

More on harmonic means.

Be aware that assignment marks in COMP9444/9844 are likely to be high. In the past, some students have thought that this means that they do not need to study much for the exam. This is *not* wise. Take a look at the 2007s2 mark distribution statistics. You will see that, for example, while at least 68% of students scored in the HD range in each assignment, only 21% scored in the HD range in the exam (i.e. exam mark ≥ 85).

Assessment for COMP9844

COMP9844 assessment will have the same structure as for COMP9444 (3 hour exam worth 70% + assignments worth 10% each, as described above). However, assessment components for COMP9844 may (probably will) differ from those for COMP9444. For example, the COMP9844 assessment may have extra components compared with the corresponding COMP9444 assessment item. There will be enough in common between the assessment items for COMP9444 and those for COMP9844 that it will be possible to mark both on a consistent and equitable scale.

Students enrolled in COMP9844 must make a reasonable attempt at any extra assignment material, and must attend 80% of the extension lectures, or present (a) medical certificate(s), or they will be denied assessment in COMP9844. This rule will be administered in a humane way, and is intended to stop people from enrolling in COMP9844, but doing none of the extension work, thus ending with a grade in "Extended Neural Networks" rather than "Neural Networks" without any extra effort.

Relationship between objectives and assessment

The programming assignments provide a practical introduction to Neural Network programming using a number of types of neural networks.

The final exam tests students on the learning objectives that are not covered in the assignments (see above for list). However, in practice the assignments have a formative role in assessment as well: we have observed that students who do not complete the assignments satisfactorily normally fail the exam.

Supplementary Assessment

See the supplementary assessment policy part of the "yellow form" that you were shown when you obtained your CSE computer account. For the supplementary exam date, see the Supplementary Assessment Dates part of the "yellow form".
Why is it called a yellow form?

A grade of WD or WC usually means that you need to sit the supplementary exam. (Sometimes it might mean some other form of supplementary assessment.) You will receive a *provisional* result as soon as the examination has been marked and your mark computed. This provisional result becomes official when UNSW releases your result on myUNSW. You will be e-mailed when the provisional result is available, and you can access your provisional result by running the command:

on a CSE Linux computer. This will show you all available COMP9444 marks (e.g. assignment marks), including your provisional result when it becomes available.

If you **are** awarded a supplementary exam, it may only be sat on the date notified. It is very important that you make yourself available during this time, as although you are unlikely to *need* a supp exam, it would be sad to fail COMP9444 because you were on your ski holiday in Switzerland (or whatever) on the day of the supp exam.

Lectures

The lecture times are: Up to date for 2008s2

Session 2, 2008	Day	Time	Location
COMP9444/9844	Tuesday	18:00-21:00	Quad G053
COMP9844 only	Tuesday	13:00-14:00	Quad 1049

Lecture Attendance

If you do not attend a lecture, then it is your responsibility to discover any announcements and/or supplemental information that's given. Lectures introduce you to the concepts covered by this subject, provide motivating examples to help you understand them, and demonstrate skills and processes. You may not understand the material completely simply by listening in lectures. You should also:

- review the lecture material after the lecture;
- discuss the material with fellow students if possible;
- read up on the topics covered in each lecture;
- complete relevant assignments and exercises, if any;
- consider exploring the topic on-line by writing and running your own programs;
- attend a consultation session (or phone or email) if you still don't understand the material

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Assignments

Assignments give you the opportunity to practice what you have learnt. Assignments are a very important part of this subject, therefore it is essential that you attempt them yourself. There will be four assignments, on:

1. Error Backpropagation Learning ("backprop")
   The first assignment provides a practical introduction to neural network programming using the backpropagation paradigm and the C programming language.
2. Support Vector Machines
   The second assignment provides some familiarity with support vector machines.
3. Recurrent Networks
   The third assignment allows students to test their understanding of simple recurrent networks, as applied in this case to a toy problem in financial prediction. The tlearn neural network simulation package is used. Students write a report on their experience with tlearn, as well as handing in their tlearn files.
4. Kohonen Networks
   The final assignment gives students a chance to code the SOM algorithm from scratch, and experiment with applying it to learning about clusters in data. Students may choose the programming language that they use in this assignment, within reason. In the past, students have used C, C++, Java, python, and matlab.

When available, the assignment specifications will be linked above.

Assignments are to be completed in your own time. You must submit your assignments for marking via the Unix `give` command and/or by handing in a print-out at a lecture (more details will be made available to you as part of the assignment specification). To maximise the learning benefits from doing assignments, it is essential that you start work on assignments early. Do not leave your assignments to the last minute.

Late submission penalty

Late submission of assignments: Assignments submitted late are subject to the following penalty: the maximum mark obtainable reduces by 10% per day late, up to a maximum of 50%. Thus if the assignment is marked out of 10, and students A and B hand in assignments worth 9 and 7, both two days late, then the maximum mark obtainable is 8, so A gets min(9, 8) = 8 and B gets min(7,8) = 7. Assignments handed in over a month late, or after (if) a solution has been released, will normally receive no marks.

Resources

Text Book

Haykin, S., *Neural Networks: A comprehensive foundation*, Prentice-Hall, 2nd ed., 1999. Up to date for 2008s2

Recommended Reference Books

On the role of neural networks and connectionism as framework for developing AI systems:

Hoffmann, A.G. Paradigms of Artificial Intelligence - A methodological and computational analysis, Springer-Verlag, 1998.

Further Links and References

ALVINN Autonomous Land Vehicle in a Neural Network

TD-Gammon Neural Network Backgammon Player

Tutorial on Support Vector Machines, by Christopher Burges

Wikipedia AdaBoost

K.J. Lang and M.J. Witbrock, 1988. *Learning to tell two spirals apart*, in Proceedings of the 1988 Connectionist Summer School, published by Morgan Kaufman.

Relevant Journals and Conferences

Here are the names of some of the more prominent Neural Network journals and conferences:

- J: Neural Networks
- J: IEEE Transactions on Neural Networks
- J: Neural Computation
- J: Connection Science
- C: NIPS (Neural Information Processing Systems)
- C: ICONIP (International Conference On Neural Information Processing
- C: for conferences organised by the International Neural Network Society, see here, under Announcements.

Some material on neural networks appears in more general journals and conferences. Places to look for the cognitive science end of NNs include:

- J: Behavioral and Brain Sciences
- J: Artificial Intelligence
- J: Cognitive Science

Software Availability

tlearn

- tlearn user manual (pdf, about 40 pages, 719KB) and Unix manual for tlearn (Postscript, 7 pages, 47K);
- Center for Research in Language Resources page, from which you can download Mac Classic (:-() and Windows GUI versions of tlearn, as well as source code for a Unix version (but see next dot-point). If you can't find the *source* to xtlearn here, try Bill's squirreled away copy of the xtlearn source.
- xtlearn is available for CSE's pc.i86.linux machines, at `~cs9444/bin/xtlearn`). Note that the interface to `xtlearn` is a bit different from the Mac interface, on which the documentation is based. The Mac version has a built-in text editor, whereas in the Unix (X-windows) version, you need to use your own favourite text editor to create the `.cf`, `.data`, `.teach`, etc. files. Students have complained that it freezes under certain circumstances if the "Num Lock" key is on (pressed). The fix is: press the "Num Lock" key again to turn it off `:-)`.
- A command-line version of tlearn is also available for pc.i86.linux machines, at `~cs9444/bin/tlearn`. It might be useful for batch-style simulations - e.g. where you wanted to run, say, 1000 simulations of a particular model and then, presumably, automatically analyse the output. Again, you would use your own favorite text editor to create the `.cf`, `.data`, `.teach`, etc. files.
- Info on Cross-Entropy as an error measure in `tlearn`. See also the Training Options menu item in `tlearn`.
- Naturally, if you use a version of tlearn different from the standard CSE Linux one to develop an assignment, remember to do your final run on a CSE Linux machine, using the standard CSE Linux version of tlearn.

Matlab

- Haykin's Matlab code
- Other Matlab code

Tensor Product Networks

- C code for Tensor Product Net operations (simplified version of STAR-1 system)

Contacting Staff in CSE

We don't mind if you use external email accounts for communicating with CSE for academic purposes but:

- you should make sure that you regularly read email from CSE. Either
  - log in to your CSE account and read program-related email there, *or*
  - use the "mlalias" command on a CSE Unix workstation to forward all email to your CSE mail account on to your preferred email address: e.g.

    ```
    mlalias -C abcd123 -a mad_freddy99@hotmail.com
    ```

    where you replace `abcd123` by your CSE Unix login, and `mad_freddy99@hotmail.com` by your preferred email address.
- you **must** include a student ID as part of any message you send to CSE staff from your external email account (messages not containing such an ID may not be answered, particularly if we cannot identify you);
- in some cases we would be obliged by privacy legislation to reply to your CSE or UNSW e-mail account;

How We contact You

We assume that all students read email from CSE regularly (e.g. daily); failing to read email will not be accepted as an excuse for not doing something you were supposed to in any of your courses.

We post most general news items on the class home page.

Academic honesty and plagiarism

As noted, above, copying assignments is unacceptable. Assignments will be checked. The penalties for copying range from receiving no marks for the assignment, through receiving a mark of 00 FL for the course, to expulsion from UNSW (for repeat offenders). Allowing someone to copy your work counts as academic misconduct, and makes you liable to a penalty, even if you can *prove* that it is your work.

Further details of the School plagiarism policy can be found in the yellow form. (You acknowledged receipt of these rules when you obtained your CSE computer account, and the link above is for your convenience so that you can review the rules now.)

We are aware that a lot of learning takes place in student conversations, and don't wish to discourage those. However, it is important, for both those helping others and those being helped, not to provide/accept any programming language code in writing, as this is apt to be used exactly as is, and lead to plagiarism penalties for both the supplier and the copier of the codes. Write something on a piece of paper, by all means, but tear it up/take it away when the discussion is over.

You may not develop your assignment jointly with other students unless this is explicitly permitted in the assignment specification.

If you are new to studying in Australia, be aware that attitudes to plagiarism, and/or definitions of plagiarism, at UNSW may be different from those in your home country. Make sure you are clear about the rules here at UNSW. In brief, and for the purposes of COMP9444, plagiarism includes copying or obtaining all, or a substantial part, of the material for your assignment, whether programming language code, or written or graphical report material, without written acknowledgement in your assignment from:

1. a location on the internet;
2. a book, article or other written document (whether published or unpublished) whether electronic or on paper or other medium;
3. another student, whether in your class or another class;
4. a non-student (e.g. from someone who writes assignments for money)

Note that if you copy code or other material from another student or non-student with acknowledgement, you will not be penalised for plagiarism, but you are unlikely to get any marks for the copied material. If you use code found in a publication (on the internet or otherwise) then the marks you get for this will be at the marker's discretion, and will reflect the marker's perception of the amount of work you put into finding and/or adapting the code, and the degree to which you understand the code.

Note also that there is a big difference between being able to understand someone else's code, and writing that code yourself from scratch. A computer programmer has to be able to write code from scratch. The assignments provide opportunities for you to develop the skills necessary to write your own neural-network-related code. Use these opportunities!

Further information

- Students enrolled in COMP9444 are expected to attend all classes
- The use of School of Computer Science and Engineering computing laboratories is subject to rules described in the Yellow Form, which you acknowledge (electronic) receipt of when you receive your computing account. The Yellow Form also outlines what to do in case illness or misadventure that affects your assessment, and supplementary examinations procedures within the School of Computer Science and Engineering.
- Information on UNSW Occupational Health and Safety policies and expectations
- Equity and Diversity issues

Bill Wilson
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