Computer Science 4033/5033: Machine Learning

Instructor: Dr. McGovern

Fall 2008

1 Course Overview

Imagine a house where you get home from school or work tired and hungry and your house has prepared a fabulous dinner for you and starts to play just the right music when you walk in the door. Or, imagine connecting to the net to look up someone with your virtual reality headset. You can’t quite remember the name of the person you are trying to find but your personalized assistant is able to figure it out from the clues: “red hair, freckles, works as a specialist at the health sciences center...”. Or imagine calling the taxi company, having the car arrive at your door, and going off to work without worrying about an accident because the driving is completely automated and is much safer than any human driving.

These examples may seem farfetched right now but they are potential futures. In fact, they are but the tip of the iceberg of potential machine learning applications accessible to the clever learner. The common thread for each example is that the computer system behind the automation will be able to adapt to new situations and can be personalized by a variety of users. By taking this course, you will learn about current techniques that enable machines to learn and adapt their behavior over time and to new situations. In fact, you will get to try one out for yourself! You will take a small step into our future by choosing and completing your own semester-long machine learning project. The human beings will never be taken out of the loop entirely (unless we create true AI!) and you will also gain experience at teamwork and at presenting your work professionally through the project and homework. We will also discuss the ethical implications of truly adaptive machines.
2 General Information

Class time: Tues/Thursday 12-1:15pm

Irregular exam: Poster session on Dec 12 from 2-5pm

Class location: Carson 123

Prerequisites: MATH 4753 or ENGR 3293 or IE 3293 or MATH 4743 or permission of the instructor. Prior programming experience is assumed.

Required materials: 1) The textbook will be drawn from multiple sources and will be available from the copy center asap. In the meantime, there will be pdfs on D2L as well. 2) *Reinforcement Learning*. This book is available for free online at: http://www.cs.ualberta.ca/~sutton/book/the-book.html

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- **Office**: EL 144A
- **Phone**: 325-5427 (email preferred over voicemail)
- **URLs for class**:  
  http://learn.ou.edu  
- **Email**: amcgovern@ou.edu
- **Office hours**: Tuesday 1:30-3 and Thursday 10-11:30. Also by appointment. Additional appointments for office hours are possible and you just need to email me. Also available irregularly via AIM at dramyngovern. Please note open door policy on my door and stop by if the door is open.

3 Evaluation

To help us all move towards the potential futures described above, you will be learning and practicing many aspects of machine learning. What you get out of a course will depend on what you put into it! In order to give you a fair grade at the end of the semester, I will evaluate you on a combination of your project (50%), homework (40%), and class participation (10%). Participating in class is one of the best ways to learn so please ask questions and attend class.
**Undergraduates:** Students taking 4033 will shorter homework assignments and a smaller project. The grade cutoff lines are not required to be the same for the two courses.

**Grade questions:** To maintain fairness in grading, I prefer than any disagreement be brought to me within a week of the item being returned.

**Online Grade Summary:** Desire2Learn has a grade book that I will use to store all of your grades. It is your responsibility to verify that the grades on D2L are correct. If an error is found, bring the document to me and I will correct Desire2Learn.

**Borderline grades:** Borderline final grades will be decided by your class participation which means that being an active participant in class can push you over a grade boundary.

**Final Examination:** The final examination is Thursday December 18 from 1:30-3:30. No final examinations can be given early, except as required by University policy. **Note that there is no final examination but we will be meeting during this time period to finish project presentations.**

**Due dates:** To be fair to everyone and to minimize disruption to class, homeworks and projects are due at the beginning of class, 12 noon on the day listed in the schedule. Assignments will drop 10% of the grade per day that it is late with no assignment being accepted beyond 72 hours after the original due date. In addition, you have one "slack" day to spend however you choose during the semester. This will entitle you to turn in **one** assignment **or** project up to one day late with no penalty. Keep in mind that you only get one of these so use it wisely.

**Projects:** Your final project will be due the last week of classes. Per university policy, you may turn this project in prior to pre-finals week if you have completed the project. Please contact me if you wish to present prior to pre-finals week as well.

## Course Policies

The following set of rules will help keep us all on the same page all semester and help to ensure fair treatment for all students.

**Academic Misconduct:** Academic misconduct hurts everyone but particularly the student who does not learn the material. All work submitted for an individual grade should be the work of that single individual and not her friends. It is fine to ask a fellow
student for help as long as that help does not consist of copying any computer code, or solutions to other assignments. Students working on joint projects may certainly help one another and are expected to share code within the project group. However, they may not share beyond the group.

1. Collaboration is encouraged for homework and projects. For the projects, you will work within your groups. For the homework, you may form study groups so long as each homework is in your own words. Write your study partners' names on your homework when you turn it in.

2. Do not show another student (or group) a copy of your projects or homework before the submission deadline. The penalties for permitting your work to be copied are the same as the penalties for copying someone else's work.

3. Make sure that your computer account is properly protected. Use a good password, and do not give your friends access to your account or your computer system. Do not leave printouts or thumb drives around a laboratory where others might access them.

Upon the first documented occurrence of academic misconduct, I will report it to the Campus Judicial Coordinator. The procedure to be followed is documented in the University of Oklahoma Academic Misconduct Code\(^1\). In the unlikely event that I elect to admonish the student, the appeals process is described in http://www.ou.edu/provost/integrity-rights/.

**Project code:** Your project code and writeups must be written exclusively by you or your group. **Use of any downloaded code or code taken from a book (whether documented or undocumented) is considered academic misconduct and will be treated as such.** Exceptions from this policy (such as a project that builds on an existing open-source project) may be granted but you MUST speak with me first.

**Classroom Conduct:** Disruptions of class will not be permitted. Examples of disruptive behavior include:

- Allowing a cell phone or pager to repeatedly beep audibly.
- Playing music or computer games during class in such a way that they are visible or audible to other class members.
- Exhibiting erratic or irrational behavior.
- Behavior that distracts the class from the subject matter or discussion.

\(^1\text{http://www.ou.edu/studentcode}\)
• Making physical or verbal threats to a faculty member, teaching assistant, or class member.
• Refusal to comply with faculty direction.

In the case of disruptive behavior, I may ask that you leave the classroom and may charge you with a violation of the Student Code of Responsibilities and Conduct.

Class Web Page: Login to the Desire2Learn website using your 4+4 (first four letters of your last name followed by the last four digits of your student number), using your standard OU password. If you have difficulty logging in, call 325-HELP. This software provides a number of useful features, including a list of assignments and announcements, an electronic mailing list, newsgroups, and grade book. All handouts are available from Desire2Learn. You should check the site daily. When I update the site, I will post an announcement telling you what has been added and where it is located. You are responsible for things posted on the site with a 24 hour delay.

Class Email Alias: Urgent announcements will be sent through email. It is your responsibility to:

• Have your university supplied email account properly forwarded to the location where you read email.
• Make sure that your email address in Desire2Learn is correct, and forwards email to the place where you read it. I'll send out a test message during the first week of class. If you do not receive this message, it is your responsibility to get the problem resolved immediately.
• Have your email program set up properly so that replying to your email will work correctly the first time. You can send email to yourself and reply to yourself to test this.

If you need assistance in accomplishing any of these tasks, contact 325-HELP.

Newsgroups and Email: The newsgroup on Desire2Learn should be the primary method of communication, outside of class. This allows everyone in the class to benefit from the answer to your question. If you email me a question of general interest, I may post your question and my answer to the newsgroup. Matters of personal interest should be directed to email instead of to the newsgroup, e.g. informing me of an extended personal illness. Posting guidelines for the newsgroup are available on Desire2Learn.
Religious Holidays: It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required classwork that may fall on religious holidays.

Incompletes: The grade of I is intended for the rare circumstance when a student who has been successful in a class has an unexpected event occur shortly before the end of the class. I will not consider giving a student a grade of I unless the following three conditions have been met. 1. It is within two weeks of the end of the semester. 2. The student has a grade of C or better in the class. 3. The reason that the student cannot complete the class is properly documented and compelling.

Accommodation of Disabilities: The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course are requested to speak with the professor as early in the semester as possible. Students with disabilities must be registered with the Office of Disability Services prior to receiving accommodations in this course. The Office of Disability Services is located in Goddard Health Center, Suite 166, phone 405/325-3852 or TDD only 405/325-4173.