15-780 - Graduate Artificial Intelligence

MW 10:30-11:50 / WeH 5409

This course is targeted at graduate students who need to learn about current-day research, and about how to perform current-day research, in Artificial Intelligence---the discipline of designing intelligent decision-making machines.

Techniques from Probability, Statistics, Economics, Algorithms, Operations Research and Optimal Control are increasingly important tools for improving the intelligence and autonomy of machines, whether those machines are robots surveying Antarctica, schedulers moving billions of dollars of inventory, spacecraft deciding which experiments to perform, or vehicles negotiating for lanes on the freeway. This AI course is a review of a selected set of these tools. The course will cover the ideas underlying these tools, their implementation, and how to use them or extend them in your research.

Instructors:
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Office hours:
Bar-Joseph, Wednesday 12-1:30
Gordon, Monday 12-1:30
Benisch, TBD

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Course structure

The requirements of this course will consist of participating in lectures, five problem sets, midterm and a project.
The grading breakdown is as follows:

Problems sets: 35%
Midterm: 30%
Final project: 25%
Class participation and reading: 10%

Class participation and reading

For most of the class we will follow the book: "Artificial Intelligence: A Modern Approach" by Russell and Norvig (Prentice Hall).
Some lectures will have assigned reading, and it is expected that students read the assigned chapters before class.

Problem sets

We will have five problem sets. Problem sets will consist of both theoretical and programming assignments. On some assignments we will recommend that students program in Matlab. However, you are free to do your assignments in any programming language you like as long as you clear it with the TAs first. We will hold a Matlab tutorial during the first week of classes for those who are not familiar with this language.
While you are permitted to discuss the problem sets with fellow class members, each student must write the solutions and code on her / his own. Problem sets are due at the beginning of class on their due date.

Late homework policy:

In any case of personal problems preventing you from submitting your answers on time, please contact the instructors or TAs as soon as possible (*before* the problem set is due). If you do not have a good enough reason for a late submission you will be penalized according to the following policy:

- Homework is worth full credit at the beginning of class on the due date.
- It is worth 75% credit for the next 24 hours.
- It is worth 50% credit if submitted more than 24 ours but less than 48 hours after due time.
- It is worth zero credit after that.

You must turn in all of the homeworks, even if for zero credit, in order to pass the course.
Turn in all late homework assignments to Monica Hopes.

Midterm

The Midterm will take place during class hours (see schedule). It will cover the material in the first two parts of class. We will be holding review sessions prior to the midterm. More information will be provided later in the class.

Projects:

There are many exciting opportunities for projects in the general area of AI. Projects will either try to extend one the methods discussed in class, apply a method to a new problem or dataset or apply a new / revised algorithm to one of the problems discussed in class. We will provide a number of ideas for projects but students are encouraged to propose their own ideas.

Projects will be carried out in teams of one or two (encouraged) students. You will submit a one page proposal and a one page progress report during the semester (see class schedule for dates). The final project presentation will be in a poster session during the final exam period. You will also be required to submit a project report of no more than six pages during the poster session.