PSYC 4803/8080: AI for Cognitive Science: Computational Modeling of Behavioral Data

Instructor: Robert Wilson

Course description

Welcome to PSYC 4803/8080: Computational modeling of behavioral data. In this class you will learn how to build, simulate, and fit computational models to behavioral data. We will focus on three classes of closely related models on economic decision making, perceptual decision making, and reinforcement learning. This is very much a hands-on class and much of your time will be spent coding the models up for yourself in Python or Matlab. In addition, you'll have the opportunity to build your own models and experiments in two mini-projects that take the place of the midterm and final.

Course objectives and learning outcomes

At the end of this course you should be able to:

- Build computational models of behavior in Python or Matlab
- Fit computational models of economic decision making, perceptual decision making, and reinforcement learning to behavioral data
- Understand how to test model and experiment performance by fitting simulated data

Format of the class

This class is an in-person class. All material will be provided online on the class webpage and there will be regular meeting times where you will meet with me or the TAs in groups to discuss the current week's work.

Office hours

I and the TAs will hold office hours every week in person and on zoom.

Coursework and grading

Grading scheme

Grades are based on a mixture of Assignments (80%) and Mini Projects (20%). Students may drop the lowest three assignments.

Grade boundaries will be at

A - 90-100%
B - 80-89%
C - 70-79%
D - 60-69%
F - 0-59%

Depending on aggregate class performance, these boundaries may be revised downwards (e.g. to 87% for an A if the class is harder than expected) but will never be revised upwards.

Assignments

The goal of the Assignments is to have you rediscover cognitive models of decision making for yourself. To this end assignments will involve working with the mathematics that underlies the models and connecting this mathematics to real behavioral and/or neural data. As often as not, you will be using neural data to *refute* models – exposing the limits of what is known and suggesting new modeling directions to explore.

Mini Projects

In place of exams, there will be two mini projects in the middle and at the end of the semester. In these projects you will explore the material in a more open-ended manner – perhaps proposing your own model of decision making or testing an existing model on a new set of decision problems. The goal here is to have you think like a Computational Cognitive Neuroscientist.

Extra credit

Occasionally Assignments will include an extra-credit problem for up to 5% extra credit. Completing these tasks is entirely optional.

Grade disputes

Grade disputes about quizzes, paper grades or exams will be entertained for one week from the day the grade is posted.

If you feel your work has been incorrectly graded please write a short memo explaining your concerns clearly and concisely and submit this memo to the TA. We will then regrade the entire quiz, paper or exam, paying particular attention to the area of concern highlighted in the memo. Please note, however, that mistakes happen in both directions and it is possible that your grade could go down as a result of a regrade.

Academic Integrity

All students are expected to adhere to the Georgia Tech Honor Code in all respects. Violations of the Honor Code are taken extremely seriously and will result in a failing grade in the course and a referral to the Dean of Students for further action. The full Honor Code can be found at http://osi.gatech.edu/content/honor-code.

Accessibility and Accommodations

If you are a student with a disability and need academic accommodations, please see me and contact the Disability Resource Office (404-894-2563). Accommodations must be arranged through that office.