CLPS 1211 Human and Machine Learning
Spring 2014

Meeting Times: TBD
Meeting Location: TBD
Instructor: Joseph Austerweil
   Office: Metcalf (190 Thayer St), Room 332
   Phone: x3-9758
   Office Hours: TBD
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Course Content: How is human memory like a search engine? Is human knowledge like the internet? What can artificial intelligence and machine learning tell us about the mind? How can studying the mind help solve problems in machine learning? This seminar explores parallels between human cognition and contemporary research in computer science, emphasizing common problems. In addition to the topics mentioned above, the seminar will also cover simplicity, object recognition, categorization, and causality.

Textbook & Readings: There is no required textbook. Instead, we will read journal articles and book chapters, which are available as PDFs online on Canvas through e-reserves.

Prerequisites: Proficiency with computational modeling is a prerequisite. If there are any concerns, please discuss them with the instructor. Here is a (non-exhaustive) list of courses that would satisfy this prerequisite: Computational Cognitive Science (CLPS 1291), either Computational Vision Course (CSCI143 or CLPS 1520), Introduction to Artificial Intelligence (CSCI1410), Introduction to Machine Learning (CSCI1420), Introduction to Computational Linguistics (CSCI 1460), Computational Probability and Statistics (AMPA 1690), and Computational Cognitive Neuroscience (CLPS 1492).

Course Requirements:

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<thead>
<tr>
<th>Requirement</th>
<th>Percentage of final grade</th>
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<tbody>
<tr>
<td>Discussion posts</td>
<td>20% (2%/post)</td>
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<tr>
<td>In-class discussion</td>
<td>5%</td>
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<tr>
<td>In-class presentations</td>
<td>15% (7.5% each)</td>
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<tr>
<td>Project proposal</td>
<td>10%</td>
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<td>Final project presentation</td>
<td>10%</td>
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<tr>
<td>Final project paper</td>
<td>40%</td>
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You are expected to submit a short (50-200 word) reaction to the reading for the week on the discussion board (Discussion posts). These are due by 5pm on
Tuesday of each week. The first one is due on X and the last one is due on Y. You are only required to do 10 of these (and so your lowest two grades will be dropped).

The final project for the class will be an independent research project presenting a simple experiment, testing a new model, or analyzing an existing model. Students will work with me individually to develop their own project. Halfway through the course, you will submit a 1-2 page project proposal that explains what the critical question that the project is examining, a short background on previous work on the question, and the methods for examining the question. The project will culminate in a 8-10 page paper and a class presentation.

Additionally, you will be expected to give three class presentations over the course of the semester. Two of the presentations will be to lead discussion on the reading for the class. You will also present your final project to the class.

Disability concerns:
Brown University is committed to full inclusion of all students. Please inform me if you have a disability or other condition that might require accommodations or modification of any of these course procedures. You may speak with me after class or during office hours. For more information contact Student and Employee Accessibility Services at 401-863-9588 or SEAS@brown.edu.

Schedule of classes and readings:
(Note: this course is a seminar exploring current topics in human and machine learning. Thus, the readings on some topics listed below might be substituted with more recent work on the topic.)

Week 1: Introduction

Week 2: Rational analysis


Week 3: Basic Bayes and Prediction


Week 4: Biases


Week 5: Bayesian generalization, and learning to recognize object words


Week 6: Graphical models and hierarchical Bayesian models


Week 7: Rational process models and inference in machine learning


Week 8: Probabilistic interpretations of neural networks


Week 9: Causal learning


Weeks 10 and 11: Nonparametric Bayesian models


Week 12: Memory, information retrieval, and foraging


**Week 13: Similarity, simplicity and randomness**


**Week 14: Student presentations**