CG 168: Human and machine learning  
Spring 2006

Instructor: Tom Griffiths, Department of Cognitive and Linguistic Sciences

Course description:
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? This seminar explores parallels between human cognition and contemporary research in computer science, emphasizing common problems. In addition to the above, topics include simplicity, randomness, coincidences, and causality.

Course objective:
The objective of this course is to provide an in-depth analysis of some of the commonalities between cognitive science and computer science, encouraging students from both disciplines to discover some of the common ground between the disciplines. This common ground concerns some deep issues, and is a rich source of new research.

Who should take this class:
The class is designed for advanced students in cognitive science or computer science who are interested in exploring the parallels between the disciplines. For those with a background in cognitive science, it is an opportunity to learn more about machine learning. For those with a background in computer science, it is an opportunity to see how some of the key ideas in machine learning are relevant to understanding the mind, and to be introduced to some challenging unsolved problems. Formal prerequisites are a comfort with basic mathematical ideas and probability theory, as might be obtained from any course in statistics, applied math, or mathematical computer science. Students with greater experience in cognitive science or computer science (such as CG 42 or 128, or CS 141 or 195) will get the most out of the course.

Format:
There will be one 140 minute session per week, consisting of structured discussion of the topics raised in the papers.

Readings:
There is no textbook for the class. Readings will consist of approximately two journal articles or book chapters per class (< 100 pages/week).

Breakdown of assessment:

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<thead>
<tr>
<th>Contribution</th>
<th>Percentage of final grade</th>
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<tr>
<td>Final project or paper</td>
<td>50%</td>
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<tr>
<td>Discussion questions (3 questions each for 10 classes)</td>
<td>30%</td>
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<td>In-class presentation and participation</td>
<td>20%</td>
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Schedule of classes and readings

January 26: Human and machine learning

February 2: The strange statistics of power laws


February 9: It’s a small world


February 16: Google and the mind


February 23: Books, newspapers, e-mail, and human memory


March 2: Predicting the future


March 9: Active learning


March 16: Simplicity


March 23: Complexity


April 6: Randomness


April 13: Coincidences


Griffiths, T. L., & Tenenbaum, J. B. (submitted). *From mere coincidences to meaningful discoveries*.

April 20: Intentions, imitation, and animacy


April 27: Project presentations