CSE 150 - Winter 2012
Introduction to Artificial Intelligence: Probabilistic Reasoning and Decision Making

Prof. Lawrence Saul




Administrivia	Syllabus	GradeSource	CAPEs

Subject

This course will introduce students to the statistical models at the heart of modern artificial intelligence. Specific topics to be covered include: probabilistic methods for reasoning and decision-making under uncertainty; inference and learning in Bayesian networks; prediction and planning in Markov decision processes; applications to intelligent systems, speech and natural language processing, information retrieval, and robotics.

Prerequisites

This course is aimed very broadly at undergraduates in mathematics, science, and engineering. Prerequisites are elementary probability, linear algebra, and calculus, as well as basic programming ability in some high-level language such as C, Java, Matlab, R, or Python. (Programming assignments are completed in the language of the student's choice.) Students of all backgrounds are welcome.

Texts

The course will not closely follow a particular text. The following texts, though not required, may be useful as general references:

- K. Korb and A. Nicholson, Bayesian Artificial Intelligence.
- S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach.
- R. Sutton and A. Barto, Reinforcement Learning: An Introduction.

Instructors

- Professor: Lawrence Saul (saul@cs.ucsd.edu)
- Teaching assistants:
  Diane Hu (dhu@cs.ucsd.edu)
  Youngmin Cho (yoc002@cs.ucsd.edu)

Meetings

- Lectures: Tue/Thu 8-9:20 am, Center 113.
- Office hours: Fri 10-11 am, EBU3B Room 3214.
- Discussion (optional): Fri 3-4 pm, WLH 2205; Mon 4-5 pm Center 109.
- Tutoring hours: Fri 4-5 pm, TBA; Mon 5-6 pm, EBU3B B240A.
- Final exam: Thu Mar 22, 8-11 am, Center 113.

Grading

- homework (25%)
- quizzes (40%)
- final exam (35%)

Syllabus

Tue Jan 10	Administrivia and course overview	
Thu Jan 12	Modeling uncertainty, review of probability.	
Tue Jan 17	Examples of probabilistic reasoning.	HW 1 out.
Thu Jan 19	Belief networks: from probabilities to graphs.	
Tue Jan 24	Conditional independence, d-separation.	HW 1 due. HW 2 out.
Thu Jan 26	Inference in polytrees and loopy networks.	
Tue Jan 31	Learning, maximum likelihood estimation.	HW 2 due. HW 3 out.
Thu Feb 02	Naive Bayes and Markov models; latent variable models.	
Tue Feb 07	Review session by TA.	HW 3 due.
Thu Feb 09	EM algorithm.	
Tue Feb 14	**Quiz #1.**	HW 4 out.

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Thu Feb 16	Examples of EM algorithm.	
Tue Feb 21	Hidden Markov models, speech recognition.	HW 4 due. HW 5 out.
Thu Feb 23	Viterbi and forward-backward algorithms. Belief updating.	
Tue Feb 28	Reinforcement learning and Markov decision processes.	HW 5 due.
Thu Mar 01	Policy evaluation, improvement, and iteration.	
Tue Mar 06	**Quiz #2.**	HW 6 out.
Thu Mar 08	Bellman optimality equation, value iteration.	
Tue Mar 13	Extensions of MDPs.	HW 6 due.
Thu Mar 15	Course wrap-up; what we didn't cover.	
Thu Mar 22	**Final exam**	