CS 188: Artificial Intelligence
Spring 2009

Lecture 1: Introduction
1/20/09

John DeNero -- UC Berkeley
Most slides over the course adapted from
either Dan Klein, Stuart Russell, or Andrew Moore

Course Info

- **Course Staff:**
  - Instructor: John DeNero
  - GSIs: Nimar Arora, Dan Gillick & Nick Hay

- **Course Website:**
  - http://inst.cs.berkeley.edu/~cs188/
  - Syllabus, assignments, course info, faq, etc.

- **Announcements & Forums:**
  - bspace.berkeley.edu (linked from course website)
  - Post your questions to the forum

More Course Info

- **Book:** Russell & Norvig, AI: A Modern Approach, 2nd Ed.

- **Prerequisites:**
  - (CS 61A or B) and (Math 55 or CS 70)

- **Work and Grading:**
  - 5 projects & 4 written assignments (50%)
    - Programming: Python, groups of 1-2
    - Written: solve together, write-up alone
    - 5 late days for projects only
  - Midterm (20%) -- Evening of March 19
  - Final (30%)
  - Fixed grading scale
  - Participation
  - Academic integrity policy

How Much of AI is Math?

- A lot, but not right away
- Understanding probabilities will help you a great deal
- Four weeks from now, there will be many more equations

Today

- What is artificial intelligence?
- What is this course?
- Our first AI program

Sci-Fi AI?
Sci-Fi AI Compared to Real AI

Cyberdyne Systems
T-800 Series
Model 101

VS

Ali Rahimi and
Shen-Hui Lee's
web cam

[VIDEO]

Vision (Perception)

- Object and character recognition
- Scene segmentation
- Image classification

Robotics

- Robotics
  - Part mech. eng.
  - Part AI
  - Reality much harder than simulations!
- Technologies
  - Vehicles
  - Rescue
  - Soccer!
  - Lots of automation…
- In this class:
  - We ignore mechanical aspects
  - Methods for planning
  - Methods for control

[VIDEO]

Natural Language

- Speech technologies
  - Automatic speech recognition (ASR)
  - Dialog systems, speaker identification, meeting analysis, etc.
- Language processing technologies
  - Machine translation
  - Question answering
  - Linguistic analysis

Our research covers a range of topics in natural language processing.

Logic

- Logical systems
  - Theorem provers
  - NASA fault diagnosis
  - Question answering
- Methods
  - Deduction systems
  - Constraint satisfaction
  - Satisfiability solvers
  (huge advances here!)

Game Playing

- May, '97: Deep Blue vs. Kasparov
  - First match won against world-champion
  - "Intelligent, creative" play
  - 200 million board positions per second!
  - Humans understood 99.9% of Deep Blue's moves
  - Can do about the same now with a big PC cluster
- Open question:
  - How can humans compete with computers at all???
- 1996: Kasparov Beats Deep Blue
  - "I could feel --- I could smell --- a new kind of intelligence across the table."
- 1997: Deep Blue Beats Kasparov
  - "Deep Blue hasn't proven anything."
**Decision Making**

- Scheduling, e.g. airline routing, military
- Route planning, e.g. mapquest
- Medical diagnosis
- Automated help desks
- Fraud detection
- Spam classifiers
- Web search engines
- etc.

**Rational Decisions**

We’ll use the term **rational** in a particular way:

- Rational: maximally achieving pre-defined goals
- Rational only concerns what decisions are made (not the thought process behind them)
- Goals are expressed in terms of the utility of outcomes
- Being rational means maximizing your expected utility

A better title for this course would be: **Computational Rationality**

**What About the Brain?**

- Brains (human minds) are very good at making rational decisions (but not perfect)
- Brains are to intelligence as wings are to flight
- Brains aren’t as modular as software
- Lessons learned: prediction and simulation are key to decision making

**Designing Rational Agents**

- An agent is an entity that perceives and acts.
- A rational agent selects actions that maximize its utility function.
- Characteristics of the percepts, environment, and action space dictate techniques for selecting rational actions.
- This course is about:
  - General AI techniques for a variety of problem types
  - Learning to recognize when and how a new problem can be solved with an existing technique

**Pacman as an Agent**

[Image of Pacman game]

**Reflex Agents**

- Consider the past and present, but not future predictions, to select an action.
- Encode preferences as a function of the percepts and action

[Agent trials]
Announcements

• Important this week:
  • Python tutorial is online now (due next Wednesday)
  • Lab hours this Thursday from 1pm-3pm in Soda 275
  • Get your account forms in front after class

• Also important:
  • Sections start on Monday; you may change sections.
    The 5-6 pm section is nice and small (just added).
  • The Waiting list is almost empty. I don’t control
    enrollment. Contact Michael-David Sasson
    (msasson@cs) with questions; he makes decisions.

See You Thursday

Comic courtesy of Dan Gillick