CS 431: ARTIFICIAL INTELLIGENCE

Prof. Chambers

What is Artificial Intelligence?

Philosophical/Psychological Answer

- What properties are necessary for something to be considered intelligent?
- What is consciousness?
- Are humans intelligent? Conscious?

Pragmatic Answer

- What problems does the field of AI concern itself with?

Think like a human Cognitive Modeling	**Think rationally** Logic-based Systems
Act like a human Turing Test	**Act rationally** Rational Agents


Poster by
AAAI
Association for the Advancement of Artificial Intelligence
AI Magazine
Poster development supported in part by
Microsoft Research
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Optimizing Paths
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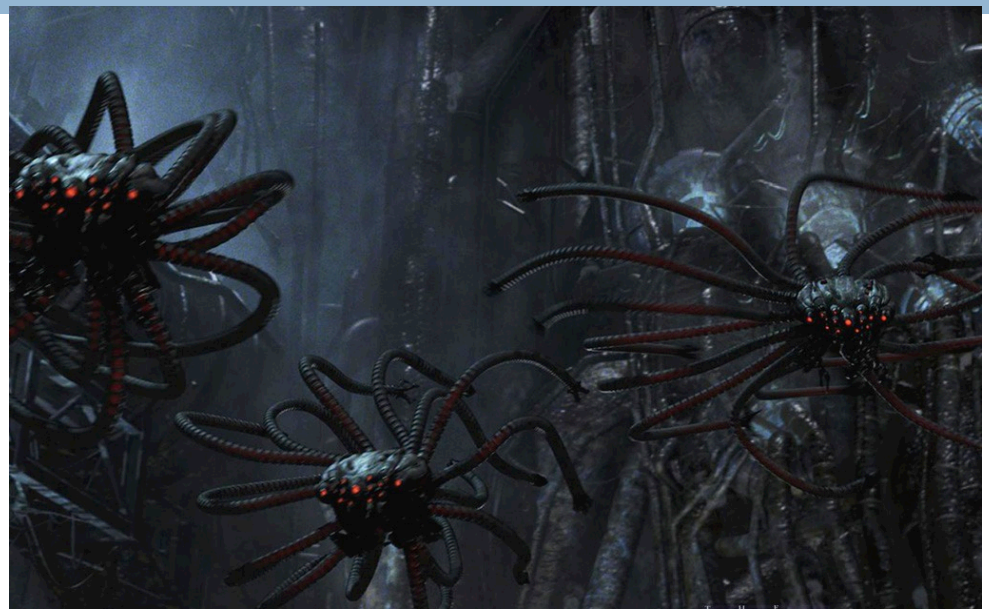
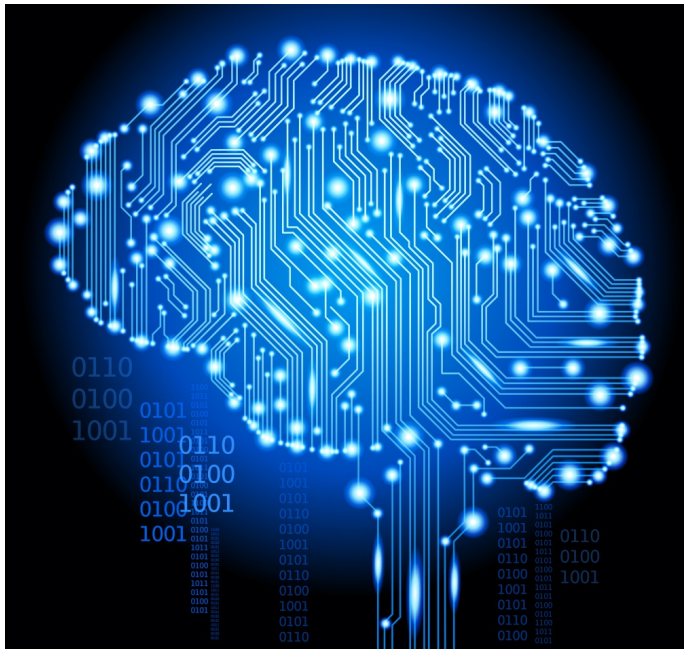
User Modeling
Machine Translation
Vehicle Navigation
Ecocomputing
See the AI timeline and more at
www.aaai.org/AILandscape
The AI Landscape
David Leake, Indiana University, Poster Development Committee Chair
Poster Design: Giacomo Marchesi, www.GiacomoMarchesi.com

Pop Culture Answer

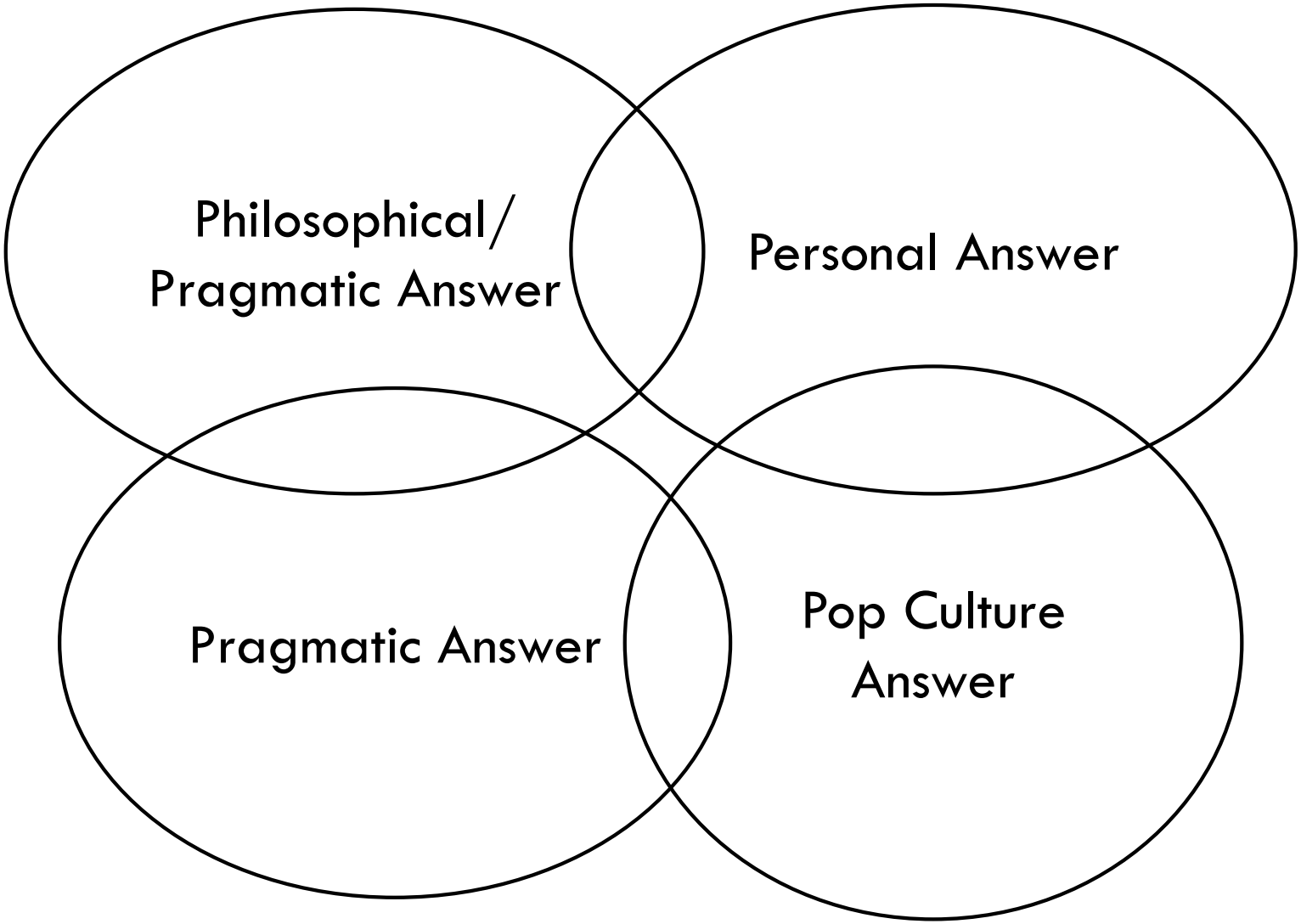


Personal Answer

- What image of AI is hidden in your mind and your imagination that drove you to take this class?



What is Artificial Intelligence?



What this class is **not** about

- We will **not** discuss the philosophical/psychological aspects of intelligence and consciousness
- We will **not** discuss the popular conceptions of AI (e.g. time travel, killer AI)
- We will **not** attempt to build a computer system that has some form of self-consciousness

What this class is about

We **will** study algorithms for solving computational problems, doing prediction, and learning from data

Subfields of AI

Natural Language Processing (NLP)

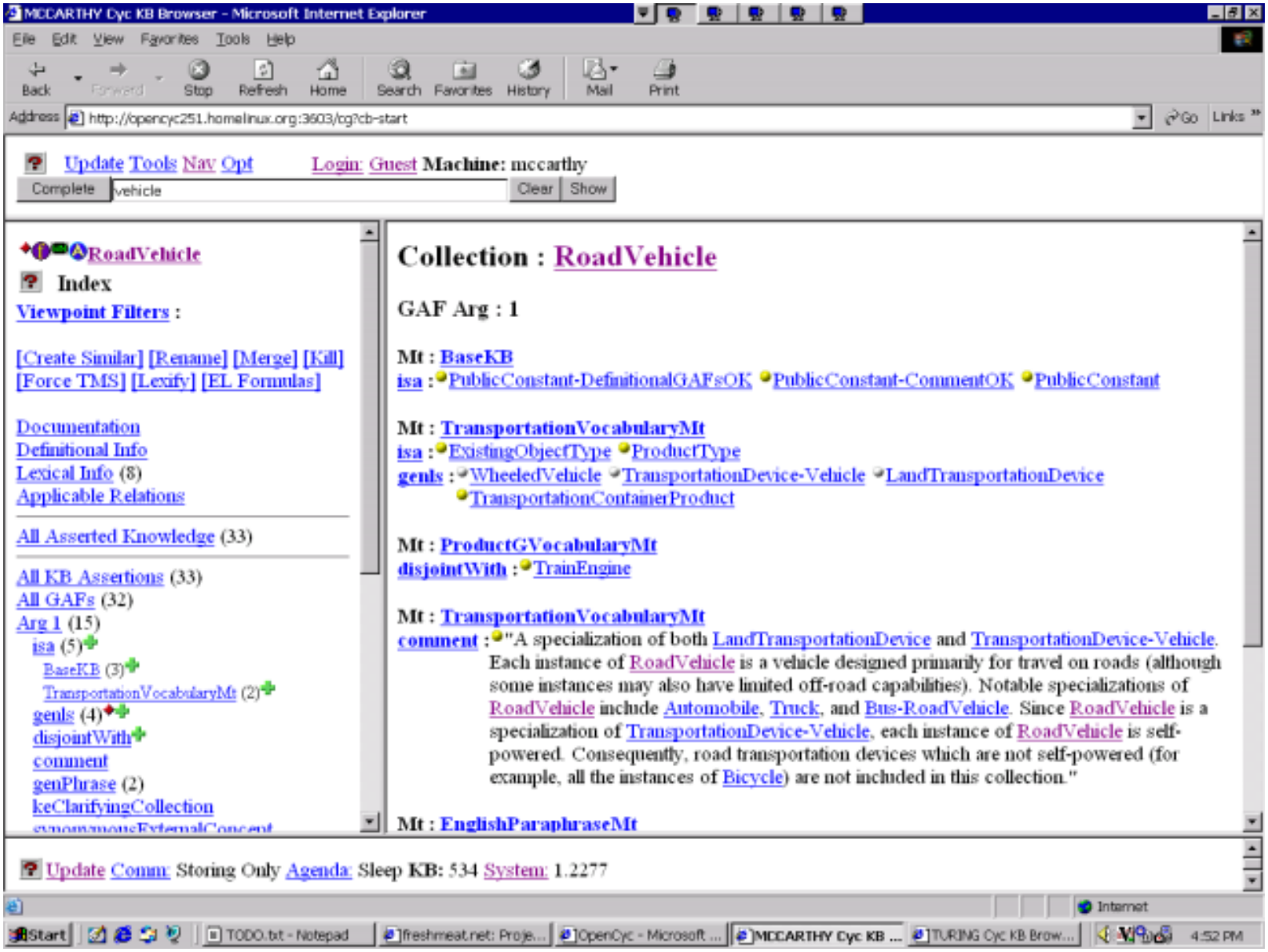
- Understanding
  - Speech recognition
  - Entity and co-reference resolution
- Generation
  - Automatic summarization
  - Natural language generation
  - Speech and gesture generation
- Other
  - Machine translation
  - Question answering
  - Sentiment analysis

Knowledge representation and common sense

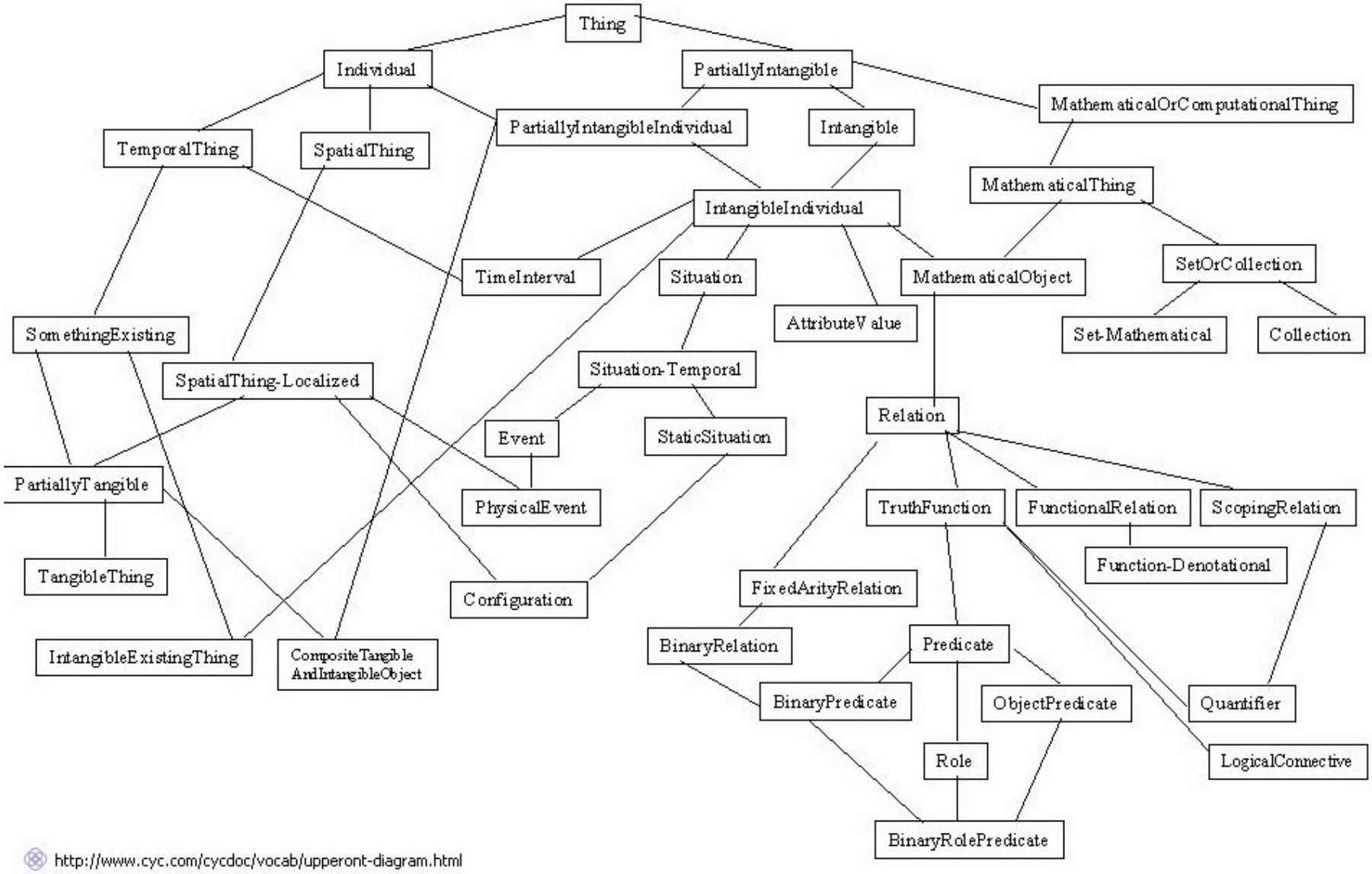
- What would happen if I dropped my computer on the ground? How do you think I would react?

- How do you get common sense into a computer?
- Opencyc.org
- OpenMindCommonSense (OMCS)

Knowledge representation and common sense



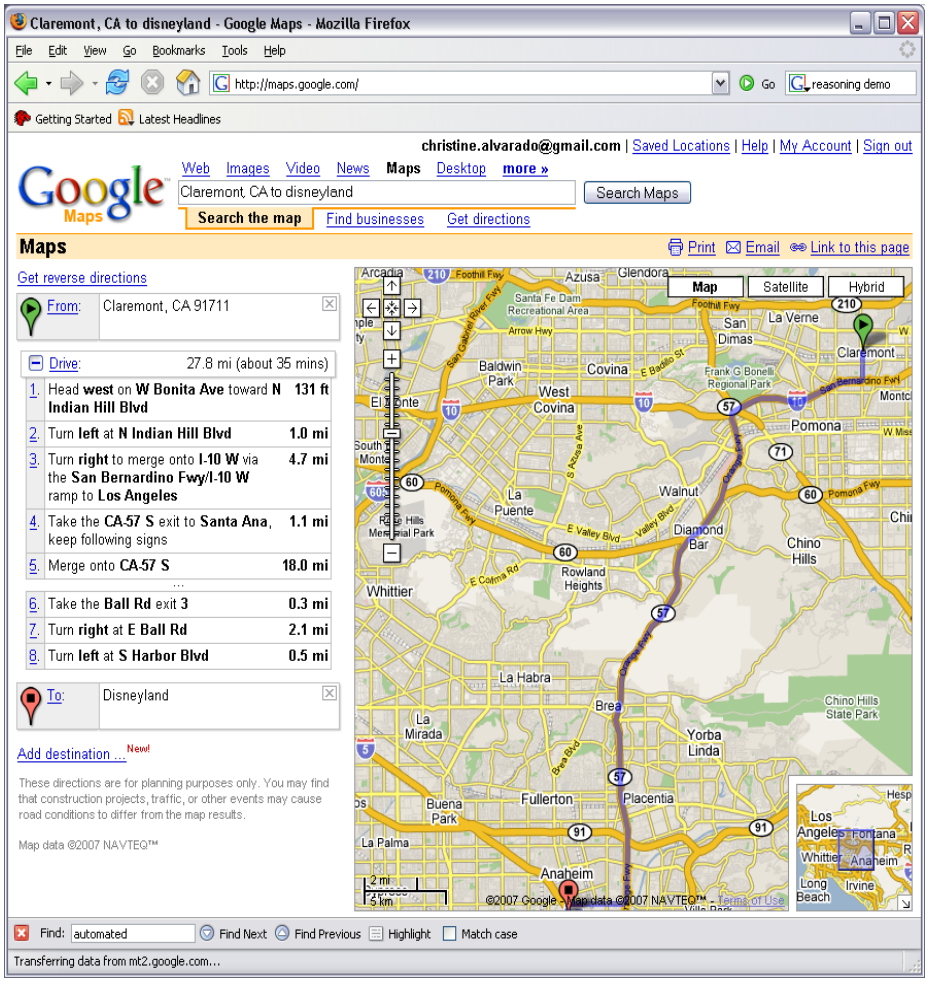
Knowledge representation and common sense



http://www.cyc.com/cycdoc/vocab/upperont-diagram.html

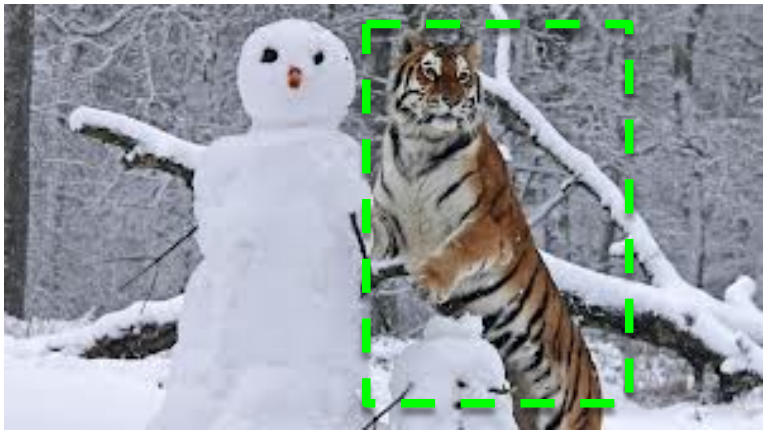
Automated Reasoning and Planning

- Game playing
- Planning
- Route finding



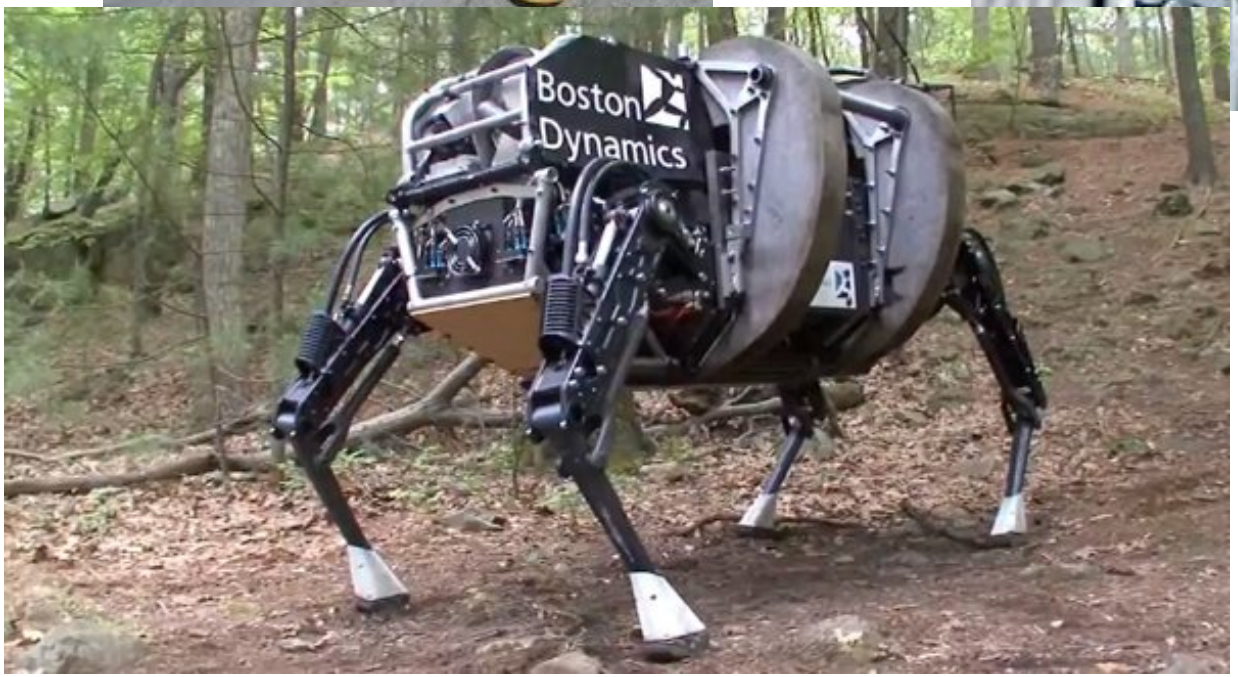
Perception (vision, graphics)

- Image classification
  - Does the image contain an instance of X?
  - Where is the person's head? What is the person doing?



- Scene segmentation
- Object and face recognition

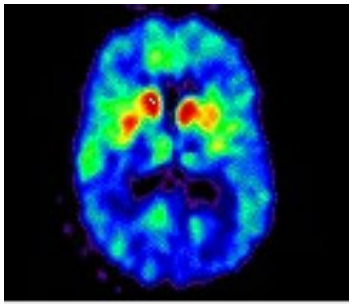
Robotics



Machine Learning

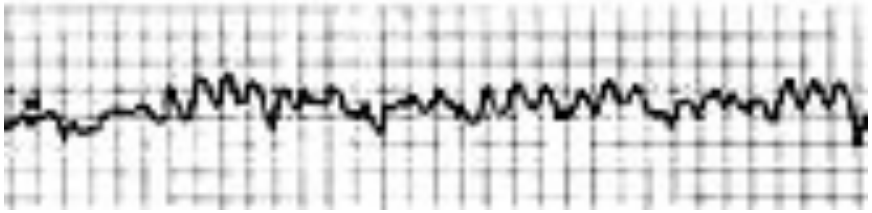
- A better name would be "Pattern Recognition"
  - Supervised learning – labeled data
  - Unsupervised learning – unlabeled data
  - Reinforcement learning – learning with rewards

How much land was burned?



Patient have Parkinsons?

Learn a model of western music?



Is this person having a heart attack?

A (short) history of AI

- 1940-1950: Early days
  - 1943: McCullogh&Pitts, boolean circuit of brain
  - 1950: Turing's "Computing machinery and intelligence"
- 1950-1970: "Look, Ma, no hands!"
  - 1950s: Early AI programs including Samuel's checkers program, Newell & Simon's Logic theorist, Gelernter's Geometry Engine
  - 1956: Dartmouth meeting, "Artificial Intelligence" adopted
  - 1965: Robinson's complete algorithm for logical reasoning
- 1970-1990: Knowledge-based approaches
  - 1969-79: Early development of knowledge-based systems
  - 1980-88: Expert systems industry booms
  - 1988-93: Expert systems industry busts, "AI winter"
- 1990: Statistical approaches
  - Resurgence of probability, focus on uncertainty
  - General increase in technical depth
  - Agents and learning systems…"AI spring?"

Taken from Berkeley CS188 slides

Reminders

- Reading
  - Skim Chapter 1
  - Get started on next week's reading
- Get yourself ready for the semester
  - Make a link to the course webpage
  - Re-read the syllabus