CS 431: ARTIFICIAL INTELLIGENCE

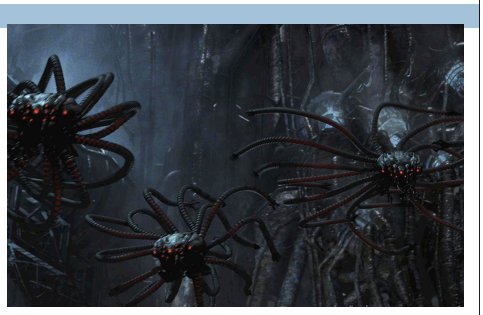
Prof. Chambers

Today

- Go over the course syllabus
- Introduction to Artificial Intelligence (AI)
  - How do we define AI?
  - Subfields of AI
  - A short history of AI
- Reading
  - *Skim* Ch. 1, 2.1-2.2

Most people's conception of AI







A definition of "AI"

- "AI is our attempt to create a 'machine' that thinks (or acts) humanly (or rationally)"

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

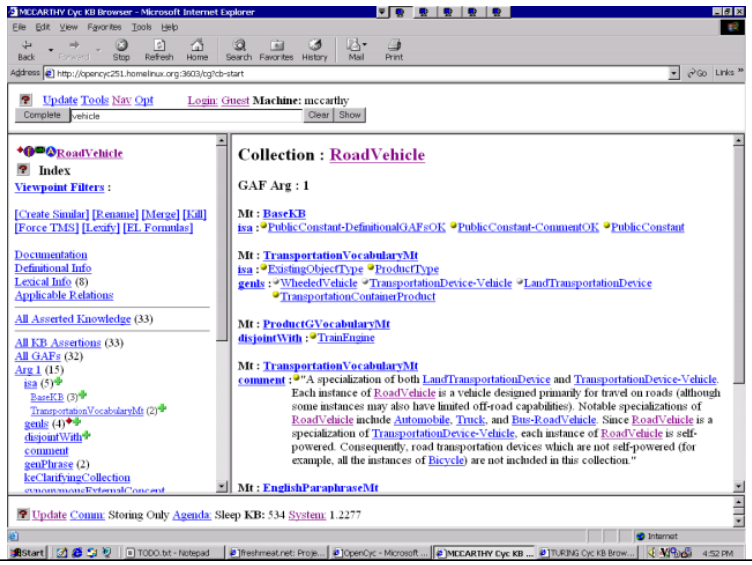
Subfields of AI: Natural Language Processing (NLP)

- 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

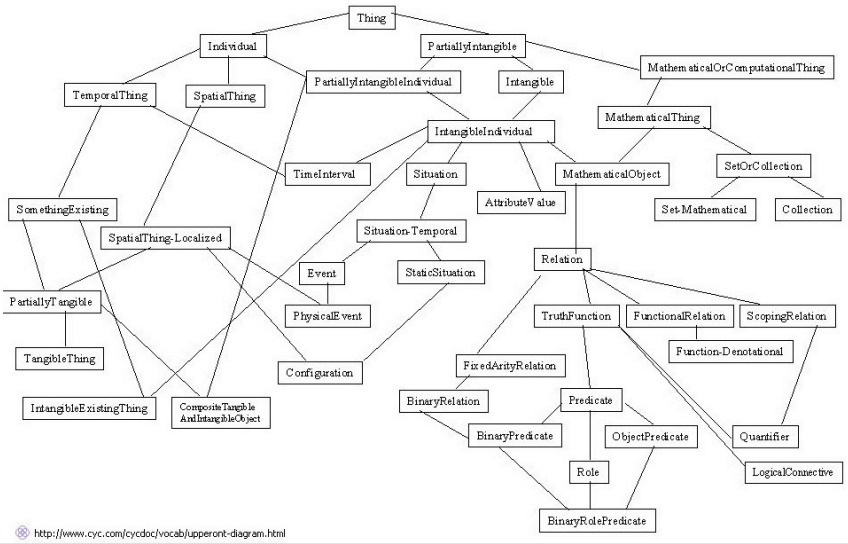
Subfields of AI:
Knowledge representation and common sense

- 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)

Subfields of AI:
Knowledge representation and common sense



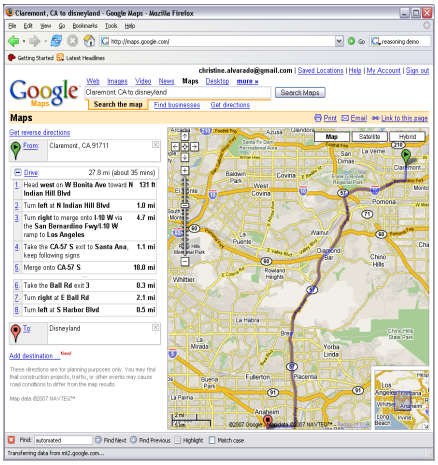
Subfields of AI:
Knowledge representation and common sense



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

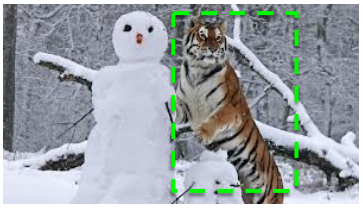
Subfields of AI:
Automated Reasoning and Planning

- Game playing
- Planning
- Route finding



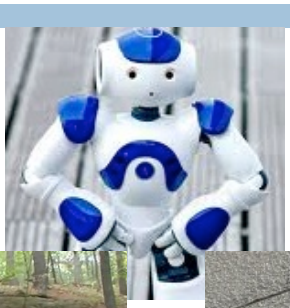
Subfields of AI: Perception (vision, graphics)

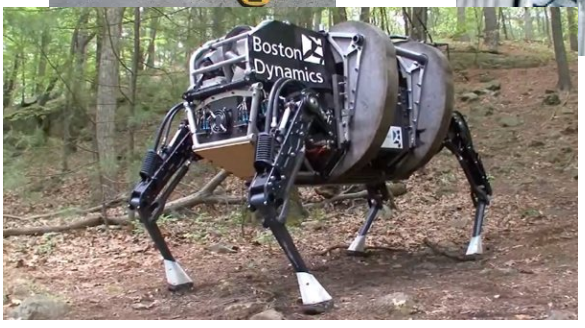
- Image classification
  - Does the image contain an instance of X?
  - Where is the person's head? What is the person doing?

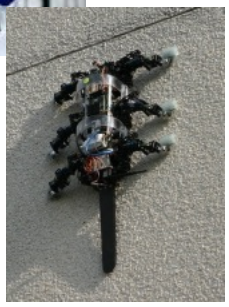


- Scene segmentation
- Object and face recognition

Subfields of AI: Robotics



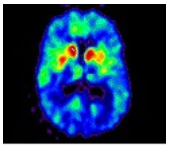




Subfields of AI: Machine Learning

- 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?



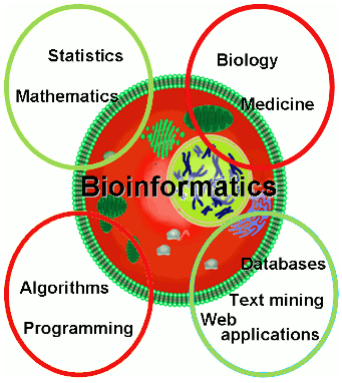
Patient have Parkinsons?

Learn a model of western music?

Is this person having a heart attack?

Applications of AI: Bioinformatics

- Sequence alignment
- Gene finding
- Genome assembly
- Drug design and discovery
- Protein structure prediction



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, 2.1-2.2
  - Friday's reading is already posted
- Get yourself ready for the semester
  - Make a link to the course webpage
  - Re-read the syllabus
- HW1 is due in-class Friday