CS 151: ARTIFICIAL INTELLIGENCE

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Getting to know you

- Name
- Year
- Major, College
- Interesting fact about yourself

Course Topics

- Part I: Problem solving
  - Search
  - Adversarial Games
  - Constraint satisfaction
- Part II: Reasoning with uncertainty
  - Probability
  - Bayesian networks
  - Reasoning over time (hidden Markov models)
- Part III: Machine Learning
  - Supervised Learning
  - Clustering
  - Reinforcement Learning

Course Information

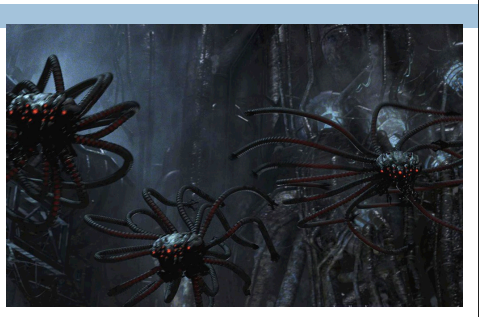
http://www.cs.pomona.edu/classes/cs151/

Today

- Reading
  - Artificial Intelligence: A Modern Approach (AIMA) Chapter 1
- Goals
  - Introduction to Artificial Intelligence (AI)
    - How do we define AI?
    - Subfields of AI
    - A short history of AI

AI in popular media







What is AI in reality?

- "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)

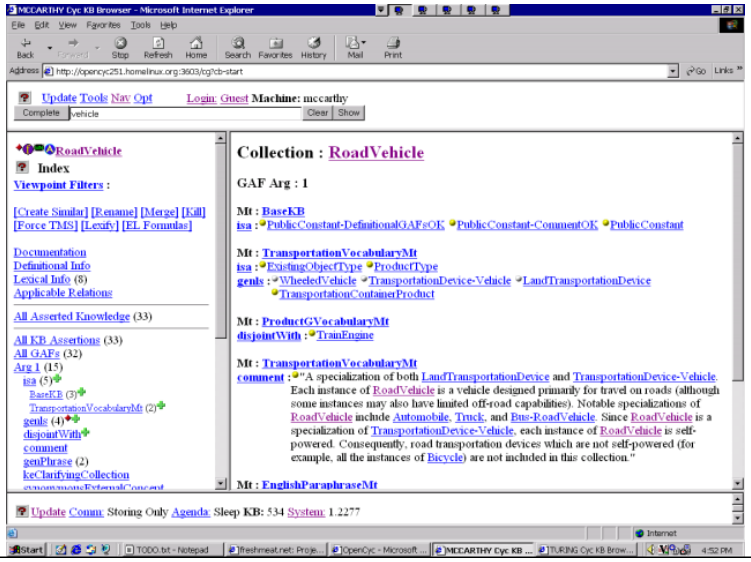
- Understanding
  - Speech recognition
  - Entity and co-reference resolution
- Generation
  - Automatic summarization
  - Natural language generation
  - Speech and gesture generation
- Other
  - Machine translation
  - Question answering
  - Sentiment analysis

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)

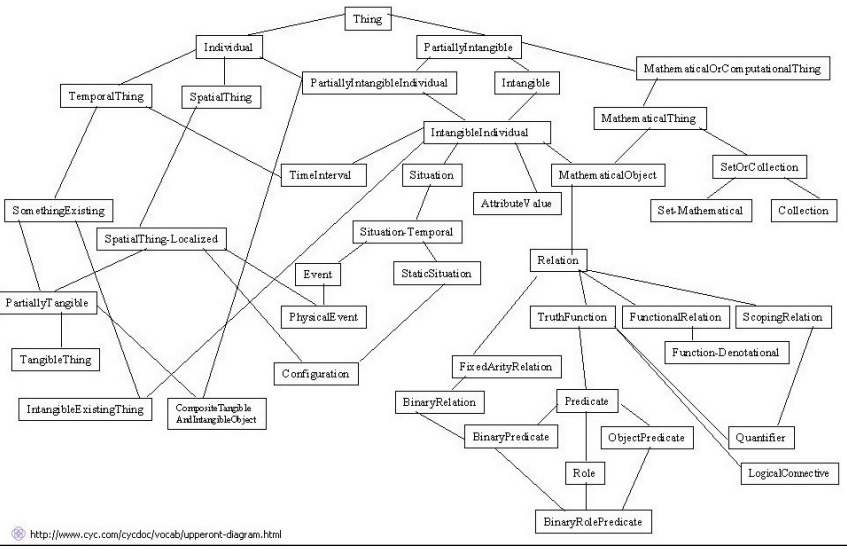
Subfields of AI:

Knowledge representation and common sense



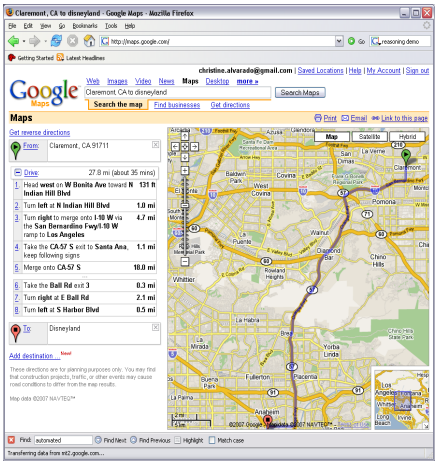
Subfields of AI:

Knowledge representation and common sense



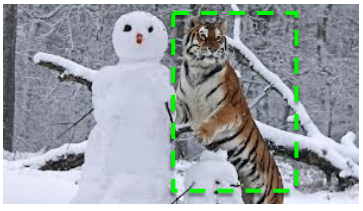
Subfields of AI: Automated Reasoning and Planning

- Game playing
- Planning
- Route finding



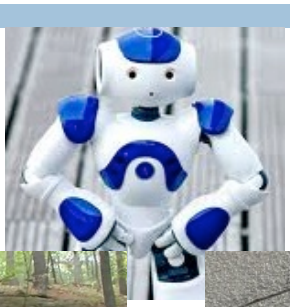
Subfields of AI: Perception (vision, graphics)

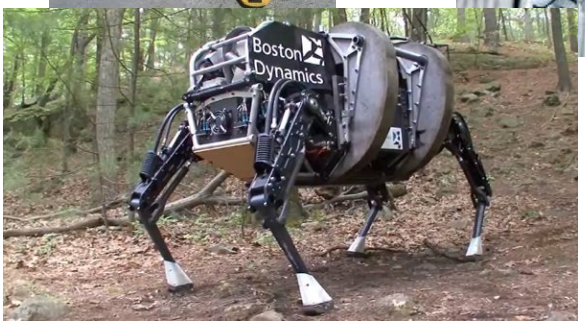
- Image classification
  - Does the image contain an instance of X?
  - Where is the person's head? What is the person doing



- Scene segmentation
- Object and face recognition

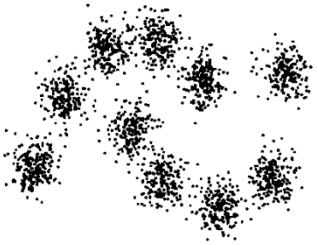
Subfields of AI: Robotics





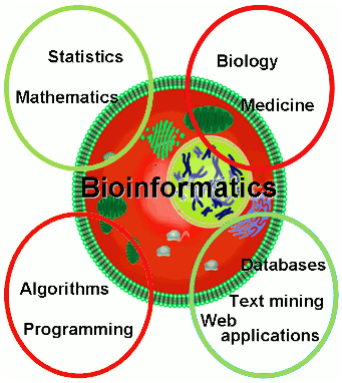
Subfields of AI: Machine Learning

- "Learning" is a bit misleading.
  - Pattern recognition
- Types of Learning
  - Supervised – learning with labels
  - Unsupervised – learning without labels
  - Reinforcement – learning with rewards



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

- The reading is important!
  - AIMA Chapter 1 (can skim this)
- Course information
  - Check out the course website
  - Make sure you have a DCI account
  - Make sure you have a Piazza account
- HW1 is due by midnight Friday