

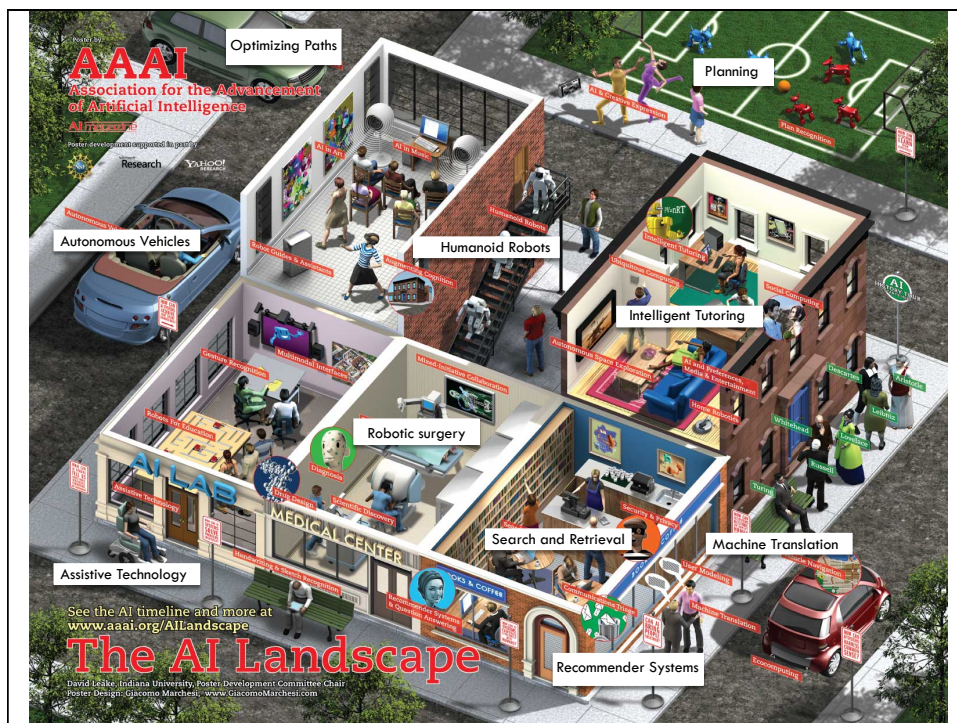
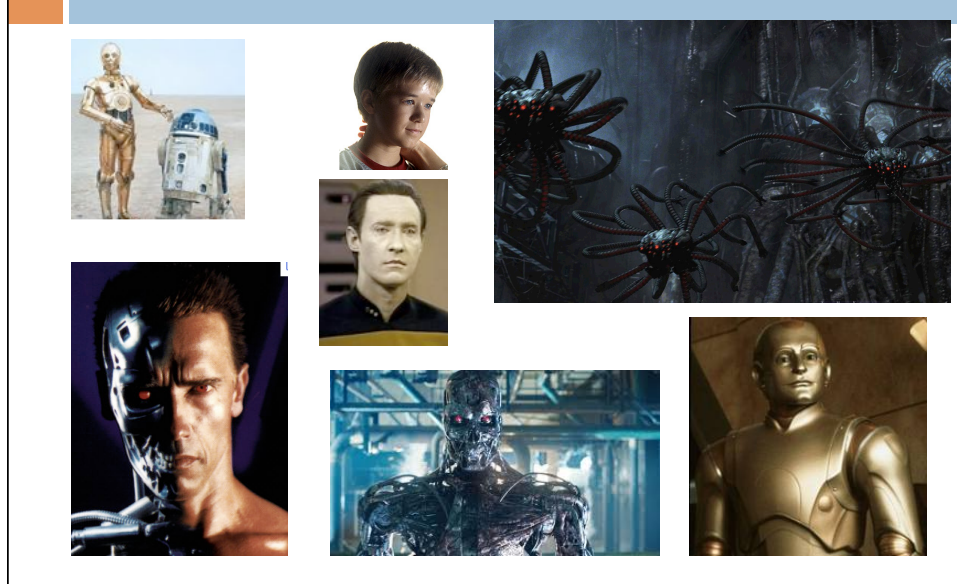
CS 431: ARTIFICIAL INTELLIGENCE

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)”

| | |
|---|--|
| <p>Think like a human Cognitive Modeling</p> | <p>Think rationally Logic-based Systems</p> |
| <p>Act like a human Turing Test</p> | <p>Act rationally Rational Agents</p> |

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

The screenshot displays the MCCARTHY Cyc KB Browser interface in Microsoft Internet Explorer. The browser window title is "MCCARTHY Cyc KB Browser - Microsoft Internet Explorer". The address bar shows the URL: "http://opencyc251.homesite.org:3003/cgi-bin/start". The page content is organized into a sidebar on the left and a main content area on the right.

Sidebar (Left):

- Collection:** RoadVehicle
- Index**
- Viewpoint Filters:**
 - [Create Similar] [Rename] [Merge] [Kill]
 - [Force TMS] [Leafy] [EL Formulae]
- Documentation**
 - Defaultional Info
 - Lexical Info (8)
 - Applicable Relations
- All Asserted Knowledge (33)**
- All KB Assertions (33)**
- All GAFs (32)**
- Arg 1 (15)**
 - isa (5)
 - BaseKB (3)
 - TransportationVocabularyMf (2)
 - genls (4)
 - disjointWith
 - comment
 - genPhrase (2)
 - keChainingCollection

Main Content Area (Right):

Collection: RoadVehicle

GAF Arg: 1

Mt: BaseKB

isa: PublicConstant-DefaultionalGAFsOK, PublicConstant-CommentOK, PublicConstant

Mt: TransportationVocabularyMf

isa: ExistingObjectType, ProhicType

genls: WheeledVehicle, TransportationDevice-Vehicle, LandTransportationDevice, TransportationContainerProduct

Mt: ProductVocabularyMf

disjointWith: TranEngine

Mt: TransportationVocabularyMf

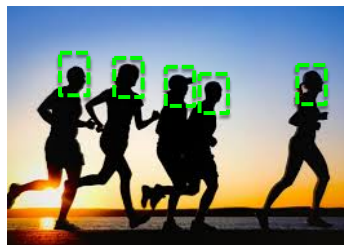
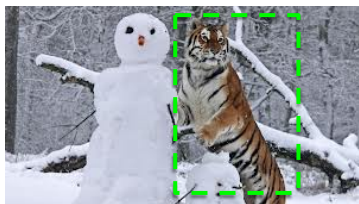
comment: "A specialization of both LandTransportationDevice and TransportationDevice-Vehicle. Each instance of RoadVehicle is a vehicle designed primarily for travel on roads (although some instances may also have limited off-road capabilities). Notable specializations of RoadVehicle include Automobile, Truck, and Bus-RoadVehicle. Since RoadVehicle is a specialization of TransportationDevice-Vehicle, each instance of RoadVehicle is self-powered. Consequently, road transportation devices which are not self-powered (for example, all the instances of Bicycle) are not included in this collection."

Mt: EnglishParaphraseMf

At the bottom of the browser window, the taskbar shows the Start button and several open applications: TOODot - Internet, Freshmail.net - Prop, OpenCyc - Microsoft, MCCARTHY Cyc KB Browser, and TLRING Cyc KB Browser. The system tray shows the time as 4:52 PM.

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

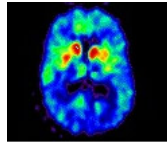


Subfields of AI: Machine Learning

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

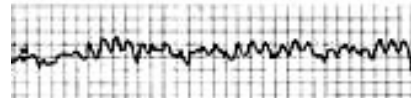


How much land was burned?



Patient have Parkinsons?

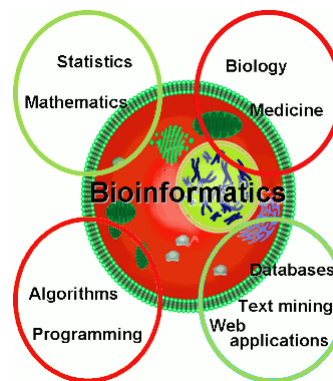
Learn a model of western music?



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: McCulloch&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