

CS 151: ARTIFICIAL INTELLIGENCE

Professor America Chambers

Getting to know you



- Name
- Major, College
- What you did this summer
- Interesting fact about yourself

Course Topics



- Part I: Problem solving
 - Search
 - Adversarial Games
 - Constraint satisfaction
- Part II: Reasoning with uncertainty
 - Logic and probability
 - Bayesian networks
 - Reasoning over time (hidden Markov models)
- Part III: Learning
 - Supervised learning
 - Clustering
- Throughout: Applications
 - Natural language processing, speech recognition, etc.

Course Information



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

Today



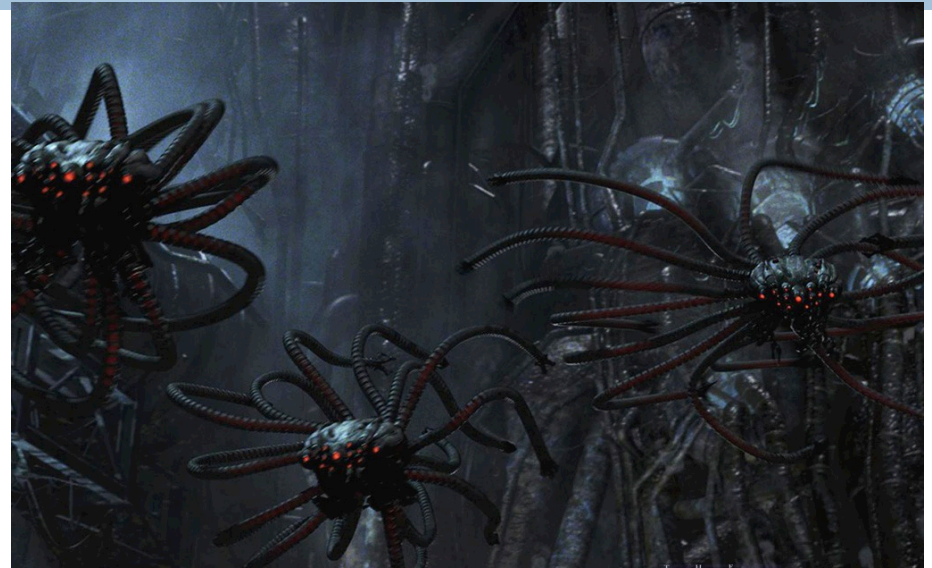
- Reading

- 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
- Getting started with Python...

AI in popular media



Poster by
AAAI

**Association for the Advancement
of Artificial Intelligence**

AI Landscape

Poster development supported in part by



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

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 \(OMCS\)](http://OpenMindCommonSense.com)

Subfields of AI:

Knowledge representation and common sense

The screenshot displays the MCCARTHY Cyc KB Browser interface. The browser window title is "MCCARTHY Cyc KB Browser - Microsoft Internet Explorer". The address bar shows the URL: <http://openyc251.homelinux.org:3603/cgi?cb-start>. The page header includes "Update Tools Nav Opt" and "Login: Guest Machine: mccarthy". A search bar contains the text "vehicle" with "Complete" and "Show" buttons.

The main content area is titled "Collection : **RoadVehicle**". It lists several metadata items:

- GAF Arg : 1
- Mt : [BaseKB](#)
- isa : [PublicConstant-DefinitionalGAFsOK](#) [PublicConstant-CommentOK](#) [PublicConstant](#)
- Mt : [TransportationVocabularyMt](#)
- isa : [ExistingObjectType](#) [ProductType](#)
- gens : [WheeledVehicle](#) [TransportationDevice-Vehicle](#) [LandTransportationDevice](#) [TransportationContainerProduct](#)
- Mt : [ProductGVocabularyMt](#)
- disjointWith : [TrainEngine](#)
- Mt : [TransportationVocabularyMt](#)
- 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 : [EnglishParaphraseMt](#)

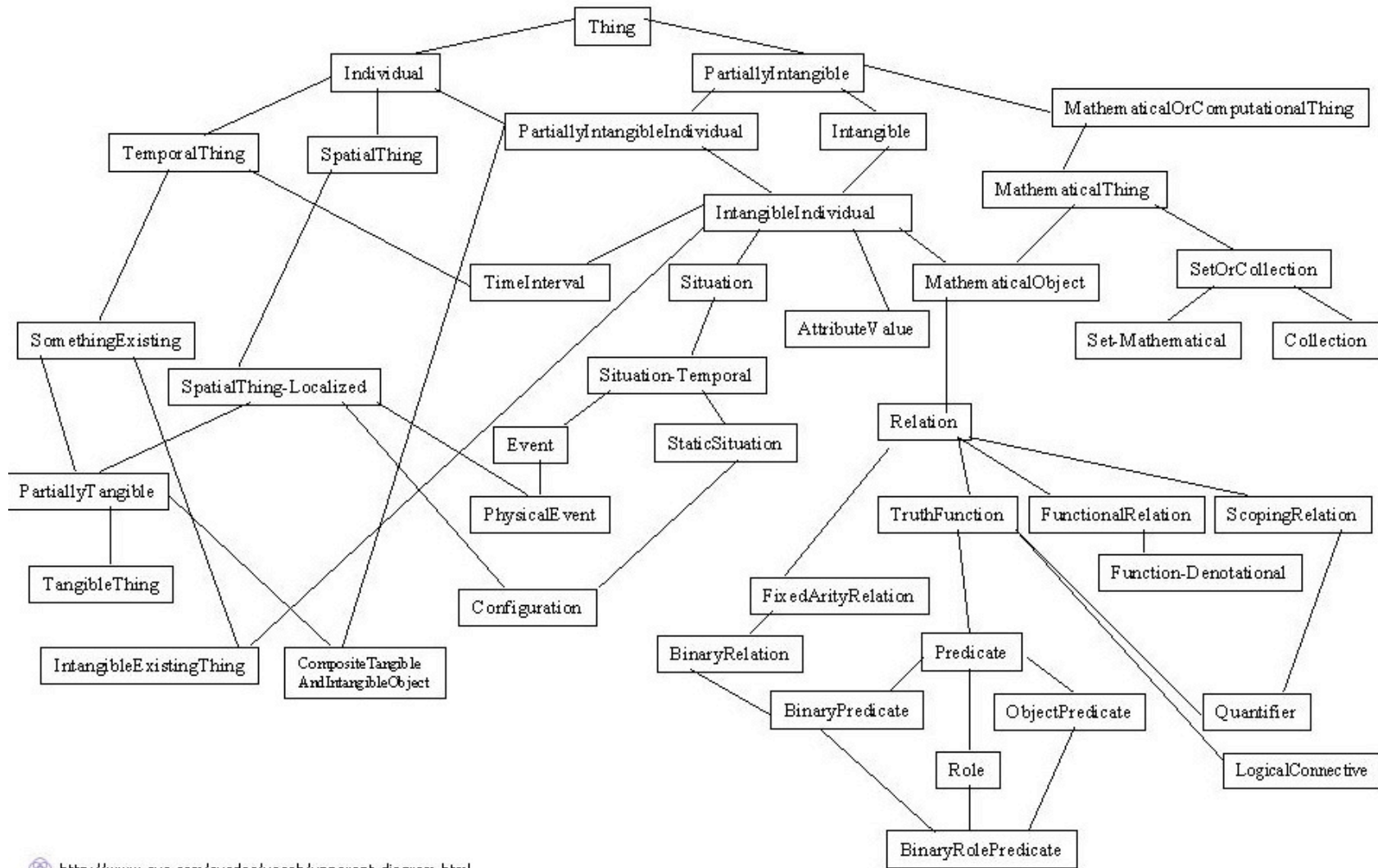
The left sidebar contains navigation and filtering options:

- RoadVehicle**
- Index
- Viewpoint Filters :
 - [\[Create Similar\]](#) [\[Rename\]](#) [\[Merge\]](#) [\[Kill\]](#)
 - [\[Force TMS\]](#) [\[Lexify\]](#) [\[EL Formulas\]](#)
- Documentation
- Definitional Info
- Lexical Info (8)
- Applicable Relations
- All Asserted Knowledge (33)
- All KB Assertions (33)
- All GAFs (32)
- Arg 1 (15)
 - isa (5)
 - [BaseKB](#) (3)
 - [TransportationVocabularyMt](#) (2)
 - gens (4)
 - disjointWith
 - comment
 - genPhrase (2)
 - keClarifyingCollection
 - externalConcept

The status bar at the bottom shows "Update Comm: Storing Only Agenda: Sleep KB: 534 System: 1.2277". The taskbar at the very bottom includes the Start button and several open applications: "TODO.txt - Notepad", "freshmeat.net: Proje...", "OpenCyc - Microsoft ...", "MCCARTHY Cyc KB ...", and "TURING Cyc KB Brow...". The system clock shows "4:52 PM".

Subfields of AI:

Knowledge representation and common sense



Subfields of AI:

Automated Reasoning and Planning

- Game playing
- Planning
- Route finding



Claremont, CA to disneyland - Google Maps - Mozilla Firefox

http://maps.google.com/

christine.alvarado@gmail.com | Saved Locations | Help | My Account | Sign out

Google Maps

Claremont, CA to disneyland

Search the map Find businesses Get directions

Maps

Get reverse directions

From: Claremont, CA 91711

Drive: 27.8 mi (about 35 mins)

1. Head west on W Bonita Ave toward N Indian Hill Blvd 131 ft
2. Turn left at N Indian Hill Blvd 1.0 mi
3. Turn right to merge onto I-10 W via the San Bernardino Fwy/I-10 W ramp to Los Angeles 4.7 mi
4. Take the CA-57 S exit to Santa Ana, keep following signs 1.1 mi
5. Merge onto CA-57 S 18.0 mi
6. Take the Ball Rd exit 3 0.3 mi
7. Turn right at E Ball Rd 2.1 mi
8. Turn left at S Harbor Blvd 0.5 mi

To: Disneyland

Add destination... New!

These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.

Map data ©2007 NAVTEQ™

©2007 Google. Map data ©2007 NAVTEQ™

Find: automated Find Next Find Previous Highlight Match case

Transferring data from mk2.google.com...

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

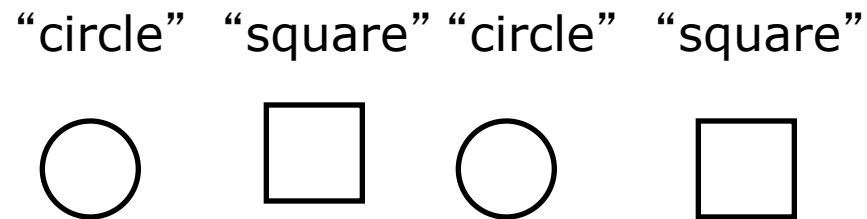
Subfields of AI: Robotics



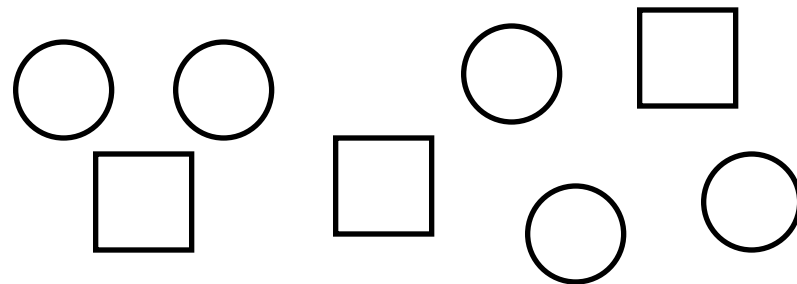
Subfields of AI:

Machine Learning

- What does it mean for a computer to learn?
- Supervised (labeled data)



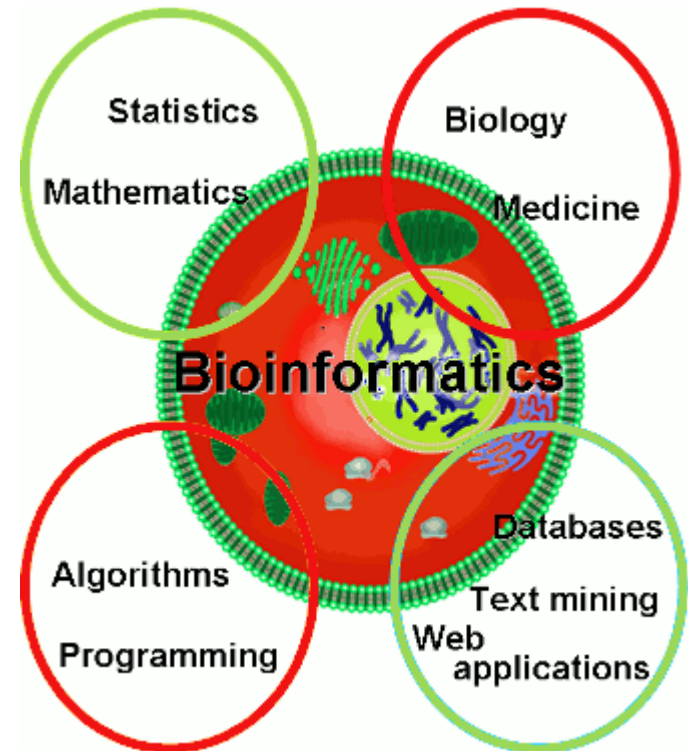
- Unsupervised (unlabeled data)



Group these
objects into two
categories

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?"