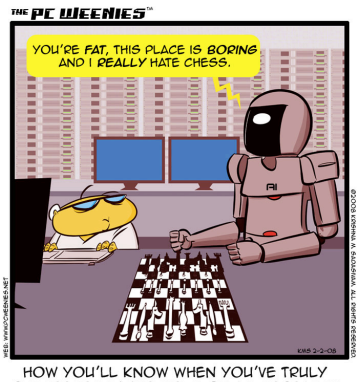


HOW YOU'LL KNOW WHEN YOU'VE TRULY SUCCEEDED IN THE FIELD OF A.I. RESEARCH.

http://www.bbspot.com/comics/PC-Weenies/2008/02/3248.php

Intro to AI

CS30
David Kauchak
Spring 2015

Adapted from notes from:
Sara Owsley Sood

AI is a huge field

What is AI…

AI is a huge field

What is AI…

One definition:

"*Building programs that enable computers to do what humans can do.*"

For example:
read, walk around, drive, play games, solve problems, learn, have conversations…

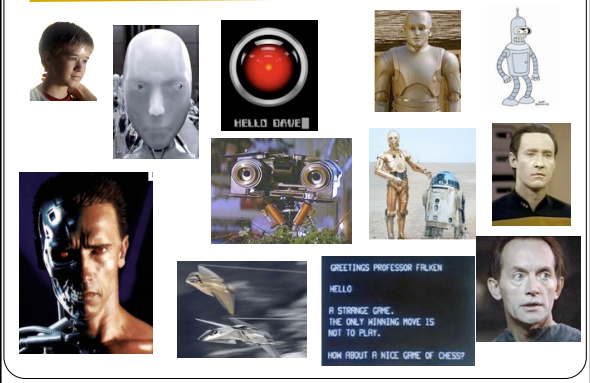
How do we measure success?

"Building programs that enable computers to do what humans can do."

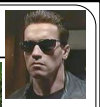
there are many interpretations of this goal…

	human	rational
thinking	**Think like a human** Cognitive Modeling	**Think rationally** Logic-based Systems
vs.		
acting	**Act like a human** Turing Test	**Act rationally** Rational Agents

How is AI viewed in popular media?



What challenges are there?



What challenges are there?

Perception
- perceive the environment via sensors

Computer vision (perception via images/video)
- process visual information
- object identification, face recognition, motion tracking

Natural language processing and generation
- speech recognition, language understanding
- language translation, speech generation, summarization

What challenges are there?

Knowledge representation
- encode known information
- water is wet, the sun is hot, Dave is a person, …

Learning
- learn from environment
- What type of feedback? (supervised vs. unsupervised vs. reinforcement vs …)

Reasoning/problem solving
- achieve goals, solve problems
- planning
- How do you make an omelet? I'm carrying an umbrella and it's raining… will I get wet?

Robotics
- How can computers interact with the physical world?

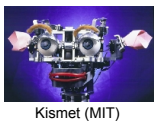
What can we currently do?

What can we currently do?

Understand spoken language?
- speech recognition is really good, if:
  - restricted vocabulary
  - specific speaker with training
- Gotten quite good in the last few years and shows up in lots of places:
  - Mac has built-in dictation software
  - Siri is pretty good (though there's more than speech recognition going on there)
  - Google allows you to search via voice command
- What does the spoken language actually mean (language understanding)?
  - much harder problem!
  - many advances in NLP in small things, but still far away from a general solution

What can we currently do?

Speak?
- Understandable, but you wouldn't confuse it for a person
- Can do accents, intonations, etc.
- Better with restricted vocabulary
- Loquendo
  - http://tts.loquendo.com/ttsdemo/default.asp
- Dealing with facial expression is challenging



Kismet (MIT)

BINA48

What can we currently do?

Drive a car?

What can we currently do?

Drive a car?

- Freeway driving is relatively straightforward
- Off-road a bit harder
  - see DARPA grand challenges (2004, 2005)

- And urban driving is even trickier
  - See DARPA urban challenge (2007)
  - Google's autonomous vehicle

Hint: there's a connection here

What can we currently do?

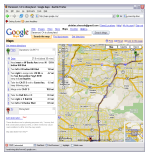
Identify emotion?

- This is hard!
- Some success in text
  - movie reviews
  - blogs
  - twitter
  - dealing with sarcasm is hard
- Some success with faces
  - strongly biased by training data
  - works best when exaggerated

What can we currently do?

Reasoning?

- Success on small sub-problems



- General purpose reasoning is harder
  - Wolfram Alpha
  - OpenCyc

What can we currently do?

Walk?

- Robots have had a variety of locomotion methods
- Walking with legs, is challenging
  - Differing terrains, stairs, running, ramps, etc.
  - Recently, a number of successes
    - Honda's Asimo
      - http://www.youtube.com/watch?v=W1czBcnX1Ww
    - Sony QRIO
      - http://www.youtube.com/watch?v=9vwZ5FQEUFg
    - Boston Dynamic's Big Dog
      - http://www.youtube.com/watch?v=W1czBcnX1Ww



When will I have my robot helper?

What can we currently do?

What can we currently do?



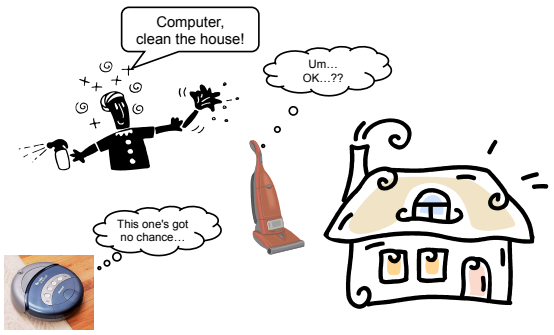
What can we currently do?

Fold a pile of towels?

UC Berkeley towel folding robot:

http://www.youtube.com/watch?v=gy5g33S0Gzo

How do we make a computer "smart?"



Fundamental problem of AI