CS10
The Beauty and Joy of Computing

Lecture #21
Artificial Intelligence

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WATSON IN A HOSPITAL!

IBM's Watson is being used by researchers in Canada to "provide early warnings when babies in a NICU may acquire a hospital-borne infection".

www.technologyreview.com/computing/37373/

Lecture Overview

- **Definition**
- **What intelligent things do people do?**
- **Videos of awesome examples of AI**
- **Turing Test**

AI Definition by John McCarthy

- "Getting a computer to do things which, when done by people, are said to involve intelligence"

- Finesses the idea of whether a computer has consciousness, whether they have rights, etc
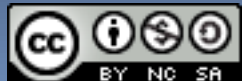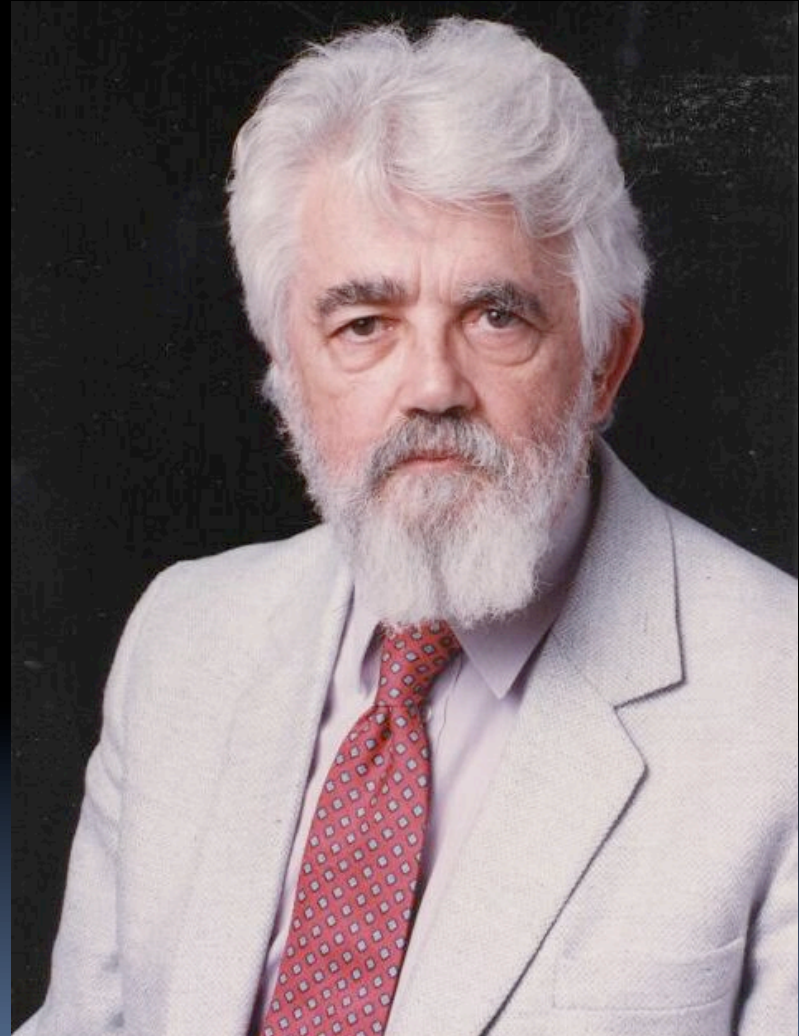
What intelligent things do people do?

- Planning
- (Machine) Learning
- Natural Language Processing
- Motion and manipulation
- Perception
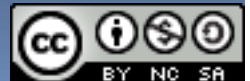- Creativity
- General Intelligence
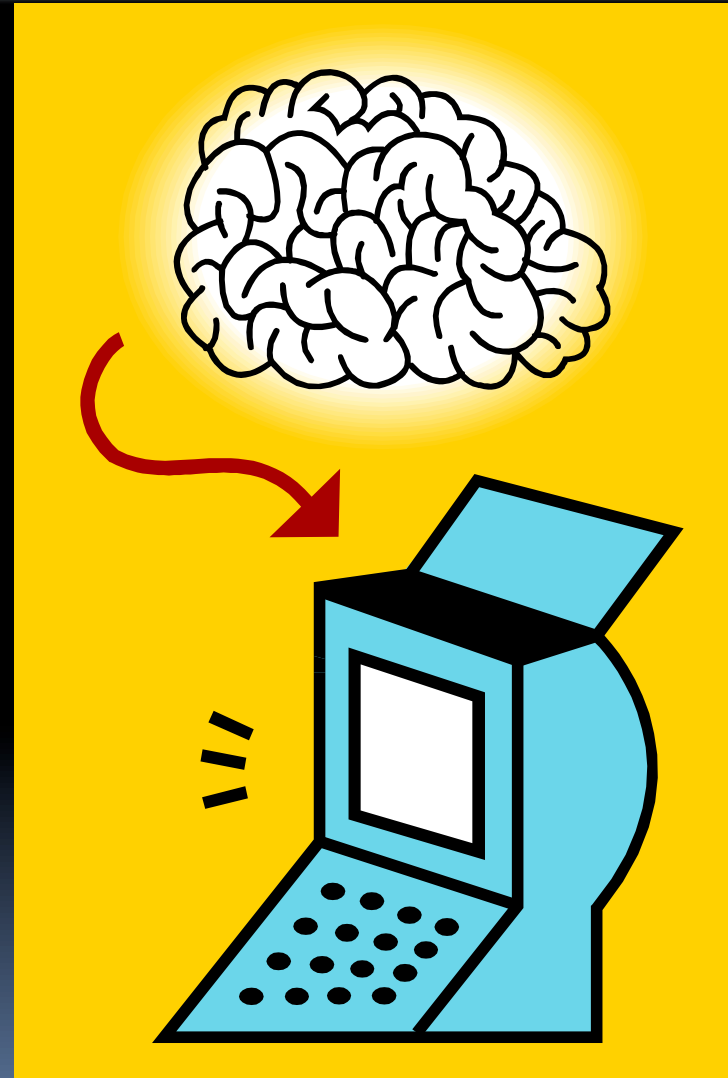
Planning (from Video Games lecture)

- **Range of intelligence**
  - Low: simple heuristics
  - Medium: pathfinding
  - High: Learns from player
- **Dynamic difficulty**
  - Must hold interest
  - "Simple to learn, difficult to master is the holy grail of game design."
  - Cheating AI (e.g.,racing)
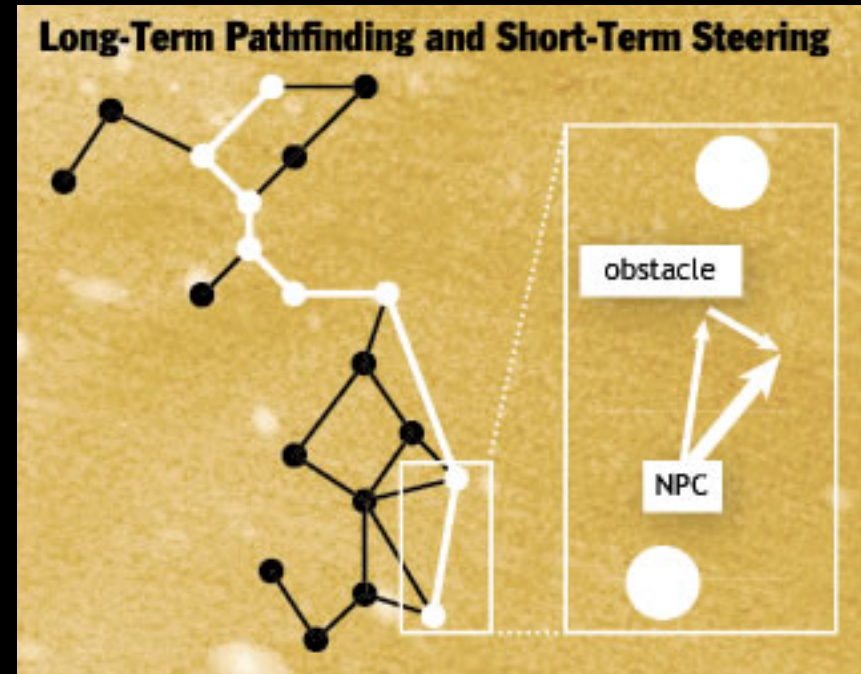
Long-Term Pathfinding and Short-Term Steering

obstacle

NPC

Peer Instruction

The WORLD'S BEST AI StarCraft player is from:

a) Google

b) IBM (folks who did Watson)

c) Stanford

d) Berkeley

e) MIT

Machine Learning

- **"A program learns if, after an experience, it performs better"**

- **Algorithm Types**
  - Supervised learning
    - Give a system input & output training data, and it produces a classifier
  - Unsupervised learning
    - Goal: determine how data is organized, or clustered
  - Reinforcement learning
    - No training data, real-time corrections adjust behavior

Peer Instruction

The BEST interaction I've had with phone-based natural language AI systems was:

a) Awesome

b) Good

c) Fair

d) Poor

e) Terrible

Natural Language Processing

- **Form of HCI**

- **Known as "AI-complete" problem**
  - Requires extensive knowledge of world

- **Statistical NLP**
  - Imagine a supervised learning system trained on all text of Web
  - It could easily correct your text (and guess what you'd say) by seeing what's common

Gift shop

Items such as caps, t-shirts, sweatshirts and other miscellanea such as buttons and mouse pads have been designed. In addition, merchandise for almost all of the projects is available.

Hi. I'm your automated online assistant. How may I help you?

[   ] Ask

CD or DVD

There is a series of CDs/DVDs with selected Wikipedia content being produced by Wikipedians and SOS Children.

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WP 1.0

(GFDL). Images and other files are available under different terms, as detailed on
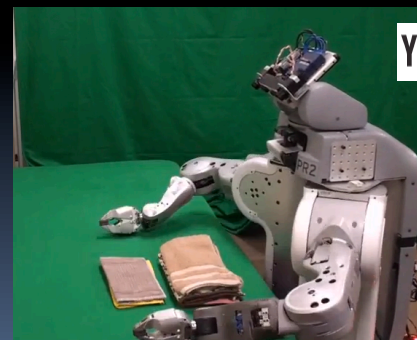
Robotics

- **For many, the coolest and scariest part of AI**

- **Also involves HCI**

- **Combines fields of AI**
  - Speech recognition
  - Synthetic voice
  - Machine vision
  - Planning

- **IPRE believes every one should have their own personal robot!**
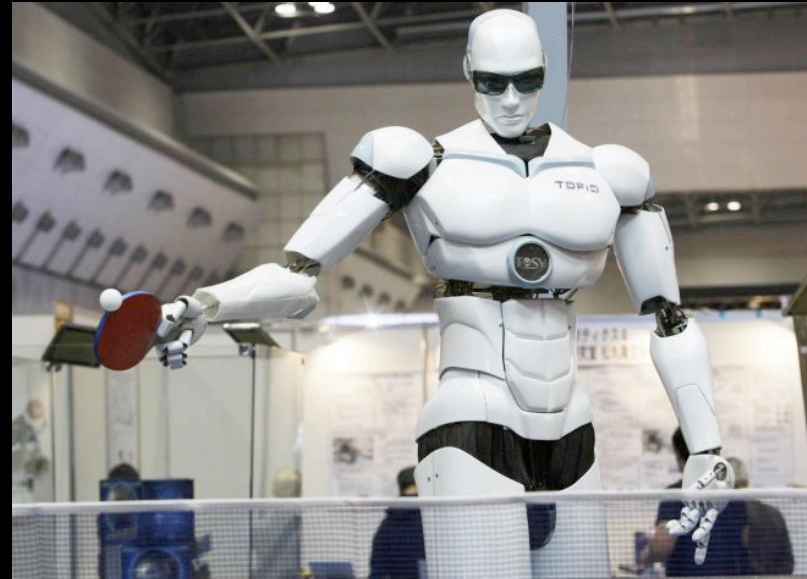
TOPIO, the ping-pong playing robot

UC Berkeley's towel-folder

ASIMO Humanoid robot from Honda

Turing Test for Intelligence

- In 1950, Turing defined a test of whether a machine could "think"

- "A human judge engages in a natural language conversation with one human and one machine, each of which tries to appear human. If judge can't tell, machine passes the Turing test"

- John Searle argued against the test via the Chinese room experiment, in which someone carries on a conversation by looking up phrases in a book. Does that person understand Chinese?

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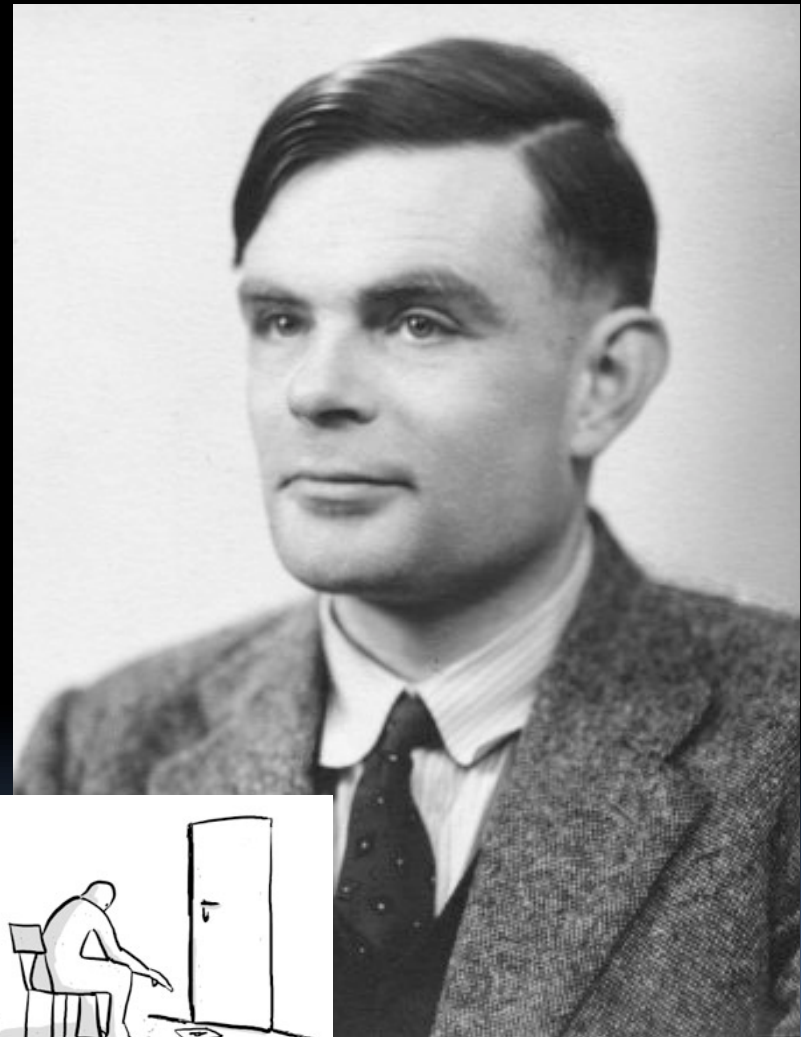
Summary

- **Common Sense knowledge important**

- **Despite early hype, AI has shown recent success**

- **AI systems excel in things computers are good at**
  - big data (using web to parse language)
  - constrained worlds (chess, math)

- **It's getting better at…**
  - Speech recognition (albeit slowly)
  - Real-time robotics

- **CS188 : Artificial Intelligence**
  - One of the most popular courses on campus!