



UC Berkeley  
EECS Lecturer SOE  
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# CS10 The Beauty and Joy of Computing

## Lecture #21 Artificial Intelligence

2011-04-13

### 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/](http://www.technologyreview.com/computing/37373/)

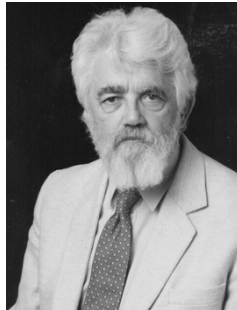
## Lecture Overview

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



## AI Definition by John McCarthy

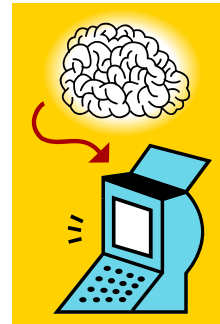
- "Getting a computer to do things which, when done by people, are said to involve intelligence"
- Finesses the idea of whether a computer has consciousness, whether they have rights, etc



[en.wikipedia.org/wiki/Artificial\\_intelligence](http://en.wikipedia.org/wiki/Artificial_intelligence)

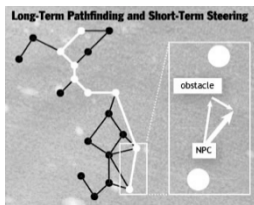
## What intelligent things do people do?

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



## Planning (from Video Games lecture)

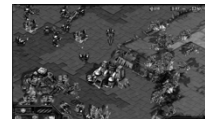
- Range of intelligence
  - Low: simple heuristics
  - Medium: pathfinding
  - High: Learns from player
- Dynamic difficulty
  - Must hold interest
  - "Simple to learn, difficult to master is the holy grail of game design."
  - Cheating AI (e.g., racing)



[www.businessweek.com/innovate/content/aug2008/id20080820\\_123140.htm](http://www.businessweek.com/innovate/content/aug2008/id20080820_123140.htm)  
[en.wikipedia.org/wiki/Dynamic\\_game\\_difficulty\\_balancing](http://en.wikipedia.org/wiki/Dynamic_game_difficulty_balancing)  
[en.wikipedia.org/wiki/Game\\_artificial\\_intelligence](http://en.wikipedia.org/wiki/Game_artificial_intelligence)  
[queue.acm.org/detail.cfm?id=971593](http://queue.acm.org/detail.cfm?id=971593)

## Peer Instruction

The WORLD'S BEST AI StarCraft player is from:




- Google
- IBM (folks who did Watson)
- Stanford
- Berkeley
- MIT

en.wikipedia.org/wiki/Machine\_learning

## 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



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## Peer Instruction

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


- Awesome
- Good
- Fair
- Poor
- Terrible

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en.wikipedia.org/wiki/Natural\_language\_processing

## 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




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en.wikipedia.org/wiki/Robotics

## 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!**

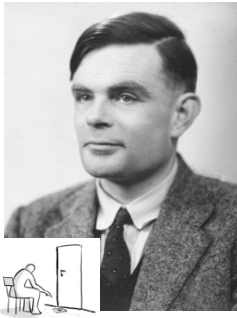


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en.wikipedia.org/wiki/Turing\_test

## 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!



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