

EPGY Session II: Artificial Intelligence

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1 Lecture: July 16, 2013

1.1 Your website

Course website: www.epgy.sherolchen.com

Computers

- To reduce amount of human work needed
- Cloud computing
 - Share data online
 - Google has a computer without a hard drive because of this

Domain names:

- Maybe \$10 / year to buy one
- `wordpress.com` is free
- Important
 - Allows people to see what you have done
 - Employers always google you to see what pops up these days
- Have an online resume
 - Easy to edit when you need it
 - Takes a while for google to list your new CV when you need it

Stay up to date with the news

- Java has lots of security issues
 - One day you may need to know that
- SDK/API changes all the time for iPhone
 - Software development kit
 - Need to port things from older to newer all the time

Building your resume

- Track what you are doing over the years/ in the past
 - Useful for filling out applications for internships/ etc
- Link your projects! - Important
- Don't choose stupid domain names/ page designs, etc
- Open processing - <http://www.openprocessing.org>
 - like Java
 - Good for rapid processing
 - Convenient to display your projects

TheGreatFirewallOfChina.com

- What websites are blocked in China?
- Twitter
- Facebook

App Development

- Graphics are important!

AI

- Very interdisciplinary
- Finding patterns in big data

Google drive

- Can do most Microsoft word-ish stuff online
- Stuff online is good - easy to update stuff quickly

How websites work

- Click on link
- Browser downloads info from website into your computer
- Browser converts the HTML to code you can read
- Therefore don't click on malicious links to write stuff to your computer

1.2 What is Artificial Intelligence?

1956 - AI term coined

- Dartmouth conference

Strong vs Weak AI

- John Searle
 - Strong: “A physical symbol system can have a mind and mental status”
An intrinsic part of what you created
 - Weak: “A physical symbol system can act intelligently.”
- Does it matter?

Approaches to AI

- Systems that think? act? link humans
- Systems that think? act? rationally
- Textbook: Russell/Norvig, 2
Needs updating!

Human Simulation

- Systems that think like humans
- Cognitive Sciences - study of human and brain behavior
- Cybernetics

- Asimov's positronic brain
 - Control computer for robot
 - Provide it with consciousness recognizable to humans
- Ray Kurzweil: Technological Singularity
 - Can machines get smarter by themselves
 - Can machines get so smart humans can't understand what they do?
- Early neural networks
- How do brains function?

Logical Machines

- Systems that think rationally
- Theorem provers
- Logic-based systems
 - Take the human out of it

Approaches to AI - Turing Test

- "Systems that act like humans"
- The imitation game
 - Computer and Humans talking
 - Is it a computer or human?
 - What background knowledge should a human know?
- Siri
 - Intelligent PA developed by Apple
- Joseph Weizenbaum
 - ELIZA
 - chatbot
 - Human? Intelligent? Psychotherapist?
- Can you fool 70% of people into thinking your program is a human?

- Loebner Test
- Internet dating sites?
Computer girlfriend/boyfriend

Humans are better than computers at reading weirdly scrambled words

- “It you don’t baliefve me rifd zis yorgsehf.”

Rational Agent

- Search
- Machine Learning
- Probabilistic models
- Constraint satisfaction
- Perception/ Sensors
- Robotics

John McCarthy and Lisp (1958)

- Problems with AI
 - Algorithmic complexity
 - Logical Systems and Neural Nets inappropriate
- Reframing of AI - Rational agent model
- Expert Systems and Knowledge (1970s)
- Natural Knowledge

Artificial Flight

- Natural Flight: Birds
- Artificial Flight:
Gliding airplanes
Looked into aerodynamics

- Same idea for AI
- Not necessary to create the human being
Not cognitive science approach
- Work towards desired OUTCOME instead

Recent progress

- Deep learning
- Real tools
- Applications

Big Data

- How to mine big data
- Learn from the right parts of information?
- How do we store purchasing history of Amazon.com

2 Lecture: July 19, 2013

2.1 Question

You have two eggs and a 100 story building! You are told to find the highest floor that you can safely drop the eggs from without them breaking. These eggs could be pretty strong, so it is possible that they will not break even after being dropped from the very highest floor. Come up with a strategy to minimize the number of times you need to drop the eggs to discover the desired floor. One strategy is to drop an egg from the first floor, second floor, third floor, and so on until that egg breaks. This could require up to 100 egg drops though! A better strategy would be to start by dropping an egg from the 51th floor. If that egg breaks, then switching to our old strategy will take at most 50 drops. If the egg doesn't break, then we can keep working our way up the floors. This strategy guarantees at most 50 drops. How much better can you do?

Solution

- $N = 14$
- Go up by N stories in increments until the egg drops
- If we drop between Ny and $N(y + 1)$ floors
 - Count up with other egg from $Ny + 1, Ny + 2, \dots, N(y + 1) - 1$
 - See where the other egg breaks

2.2 Data Structures

Types

- Arrays
- Lists
- Stacks
- Queues
- Maps
- Sets

How Hashing works

- Worst case: everything hashes to the same bucket (complete linked list)
- Hash the value of the thing stored to a bucket

3 Lecture: July 22, 2013

3.1 What is considered AI?

- Calculators / bicycles /Siri
- When a computer does what a human can do?
 - Sort things?
- Bar keeps getting raised
- Just a take on problem solving
- This class: Turing Test
- Is this believably intelligent?

3.2 Abstract Data Structures

- Binary Search Trees
 - Should always be balanced
 - Easier, faster to find stuff