

# Human Computation

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# What computers do badly

- Open-ended, unstructured tasks
- Creativity
  - Writing stories
  - Composing music
  - Making art
- Conversation



UMA5



# Loebner Prize (chatbots)

*hhl How are you?*

Please rephrase this as a proper question. (Instead of "Jim likes peaches?", use "Does Jim like peaches?")

*Hi how are you? Did you understand the question this time?*

I can't say. What is your name?

*My name is Phil, what's yours?*

So my name is Chip. How are you doing today?

*I'm doing well today it is very exciting to be here, how do you feel?*

That's good news. Can you tell me why, Phil?

*Are you still working on the question?*

Let me reflect on that for a moment.

That's an interesting opinion. What is your profession, Phil?

*I am a university professor.*

Thanks for sharing that with me. Doesn't becoming a professor require a lot of schooling?

*Yes and a lot of luck and hard work*

Thanks for answering me. Do you think I'm a bot or a human?

*I'm still deciding. Do you think you are a human?*

I'm happy you think that.

*What kind of things make you happy?*

I wouldn't know. Do you have any pets?

*No no pets, but my children want a dog*

Did you used to have pets?

*What is your line of work?*

You think so? I wouldn't know. What was your dragon li's name?

*I don't have a dragon. What is your profession?*

I wouldn't know. Do you play any musical instruments?

# Computer chess



Computers examine millions of moves, humans examine a handful.

*Photo: Adam Nadel/Associated Press (<http://www.wired.com/playbook/2012/09/deep-blue-computer-bug/>)*

# So...

- Computers are getting better
- Creative/intuitive tasks easier
- If you want to study these things, great!
  - We need help

## BUT

- Computers are not there yet
- Is this a good thing or a bad thing?
- How can we use this?



# A real situation


- I am a spammer
- I want to send millions of spam emails
- I want to seem legitimate
  - Last week: phishing
- Several web services offer “legit” free email accounts
- I’ll create many of these accounts



# The problem

- Spammers want many email addresses
  - Use computers to automate signing up
- Email providers (Google, Microsoft, Yahoo) want real people, not spam accounts
- How to prevent computers from signing up?

**THANK YOU!!**

 **nhy nhy** [show details](#) Aug 4 (9 days ago) [Reply](#)

I am an Account Manager, A client of mine died in 2005 in a horrible boat mishap and he has a lodgment fund to claims US\$14.7M. And no other person knows about this account. I am contacting you because both of you have the same last name. If you are interested forward to me your full names, cell, Phone/fax, profession, age and country so I can contact you for further clarifications.  
Thank You,  
Mr.Kelly Khumalo

# Possible solutions

- What are most computers bad at?
  - Image recognition
  - Context recognition
  - Natural language processing
  - Character recognition

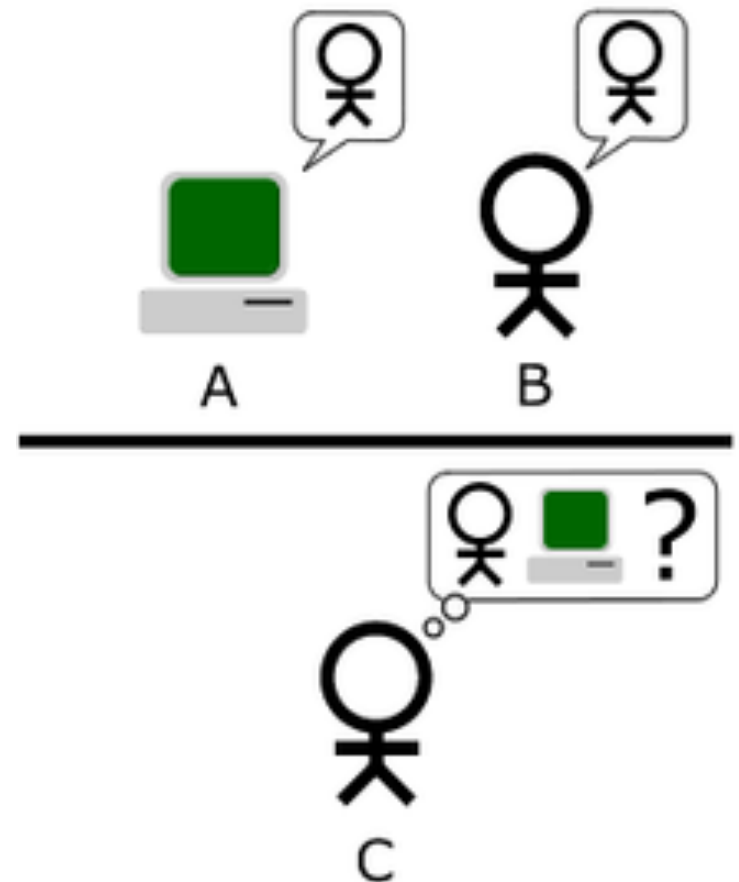
# Character recognition

How it works:

1. Clear background noise
  2. Chop text into blocks, each one a character
  3. Classify the character in each region
- Computers aren't very good at this yet

# (Side note: Turing test)

- Created by Alan Turing
  - Helped break Enigma in WWII
  - "Father of computer science"
- An interrogator determines which individual is the computer



# CAPTCHA

- “Completely Automated Public Turing test to tell Computers and Humans Apart”
  - Reverse Turing Test
  - Distort a random string randomly
- Term from Carnegie Mellon University in 2000
- You can pass, a computer can't

*distat*  
proportioned

*ncientyd*

leaf

the

*anBCP*

# How long do things take?

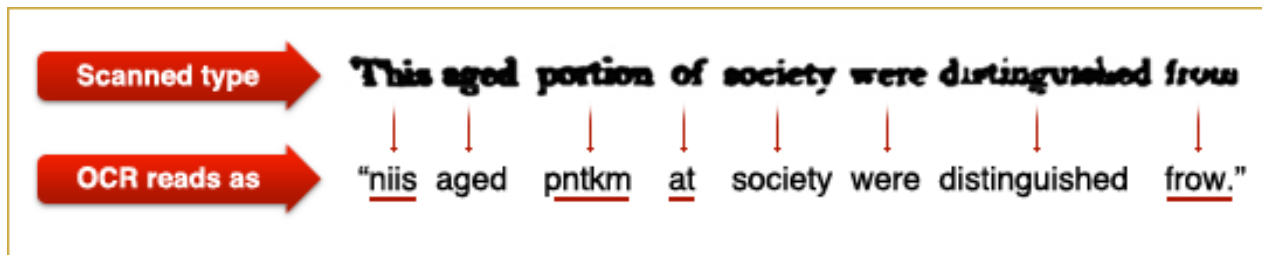
- Empire State building
  - 7 million human hours
- Panama Canal
  - 20 million human hours
- Solitaire in the US
  - 9 billion human hours (2003)
- Humans are good at wasting time
- What if we could harness wasted human power?

# reCAPTCHA

- Luis von Ahn (CMU)
  - When people identify a CAPTCHA, they do useful work
  - Don't waste that work
- Computers can't recognize some text with modern technology
- Use humans to do that work



# How it works



steamboat train, from New  
this **morning** ran off the track  
New-London. Four cars plunged



# Human Computation

- Outsourcing some computations to people
- Balance cost of computation with cost of labor
- Helps solve otherwise unsolvable problems
- (Even spammers are learning: CAPTCHA sweat shops)

# Another idea: Games

- People like to play online games
- What if we could come up with a useful game?
- Luis von Ahn: “games with a purpose”

# ESP Game

- Multiplayer
- Labeling images
- Taboo words for more variety
- Verify over many trials
- Acquired by Google to improve image search quality

score 200

ESP Game  
Concentrate...

time 1:59

What do you see?

taboo words  
keyboard

guesses  
glass  
ice  
blue

submit pass

# GWAP

(Games With A Purpose)

- **ESP Game**
  - Image labeling
- **Tag-a-tune**
  - Identify/label music
- **Verbosity**
  - Acquire common-sense knowledge
- **Squigl**
  - Trace an object within an image

# FoldIt

- Game developed at UW in part by Zoran Popović
- Solve protein-folding problems from chemistry and biology
- Point system encourages minimizing free energy of a protein
- In multiple cases, folded proteins from the game beat biochemist predictions

# Phylo

- Using humans to align multiple DNA sequences
  - To find similarities in evolutionary biology
- Problem: computers can't ensure a globally optimum solution to sequence alignment
- From the McGill University Computer Science department

# Amazon Mechanical Turk

- People in need of human power come up with tasks
- People can complete these tasks for a specified price (ex. \$0.05)
- Affordable results for researchers
- "Artificial artificial intelligence"



# How to recruit?

- Monetary reward
- Competition
- Interesting subject
- Fun environment
- Share your own knowledge