Exploration Seminar 3 Human Computation
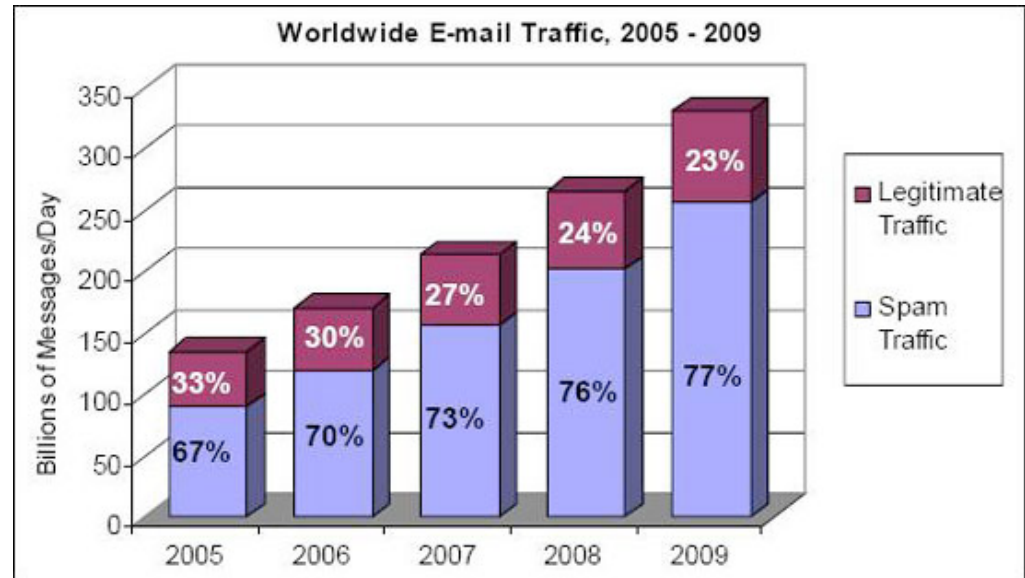
Roy McElmurry

Human Computation

- Outsourcing certain kinds of computation to people

- An attempt to balance the costs of computation with the costs of human labor

- A solution to otherwise unsolvable problems

Spam Email

- As a spammer I would like to send out millions of emails a day

- I want my emails to seem legitimate, so I need a convincing email address

- There are several online email services that provide free accounts

- Maybe I can make a ton of those

Problem

- As a spammer I need many email addresses

- As Gmail, Yahoo or Hotmail, I don't want an email that is not tied to an actual person

- What we need is a way to prevent computers from signing up for these accounts

Worldwide E-mail Traffic, 2005 - 2009

Year	Spam Traffic	Legitimate Traffic
2005	67%	33%
2006	70%	30%
2007	73%	27%
2008	76%	24%
2009	77%	23%

Things Computers Are Bad At

- Image recognition

- Context recognition

- Natural language processing

- Character recognition

Optical Character Recognition

A basic OCR algorithm:

- Chop the text into blocks that are identified as characters

- Classify each block as to its type, font, size, etc.

- Groups the blocks into appropriate structures such as words, sentences, paragraphs

CAPTCHA

- Coined in 2000 by Luis Van Ahn, Manuel Blum, Nicholas J. Hopper, and John Langford

- **C**ompletely **A**utomated **P**ublic **T**uring test to tell **C**omputers and **H**umans **A**part

- A test intended to distinguish between people and computers

Wasted Time

- 9 billion human-hours of solitaire were played in 2003

- The empire state building was built in 7 million human-hours

- The panama canal was built in just 20 million human-hours

reCAPTCHA

- What do we get from CAPTCHA?

- Luis Van Ahn thought that maybe we could use the time wasted filling out CAPTCHAs to do something useful

- Remember that computers cannot recognize some kinds of text with modern OCR techniques

- We can use CAPTCHAs to do this recognition

reCAPTCHA

OCR confuses the T of This with an n character

The o is incorrectly recognized as an a

A good candidate for a CAPTCHA challenge

Scanned type → This aged portion of society were distinguished frow

OCR reads as → "niis aged pntkm at society were distinguished frow."

The Norwich line steamboat train, from New-London for Boston, this morning ran off the track seven miles north of New-London.

morning

morning overlook,

Type the two words:

Security Check
Enter **both** words below, separated by a **space**.
Can't read this? Try another.
Try an audio captcha

contribute of

Text in the box:

◄ Back   Sign Up

Games With A Purpose

- How can we use the gaming community to do something helpful?

- Another one of Luis Van Ahn's ideas is to create games with a purpose

- This is done by creating games with side effects

Taboo Words and Cheating

- Some labels will occur more than others

- Taboo words specify words that cannot be used to describe the image

- This helps generate many different labels

- Answers are checked against a dictionary and verified through many trials

- We can stop cheaters by randomly assigning players random tests where the answers are known

ESP Game
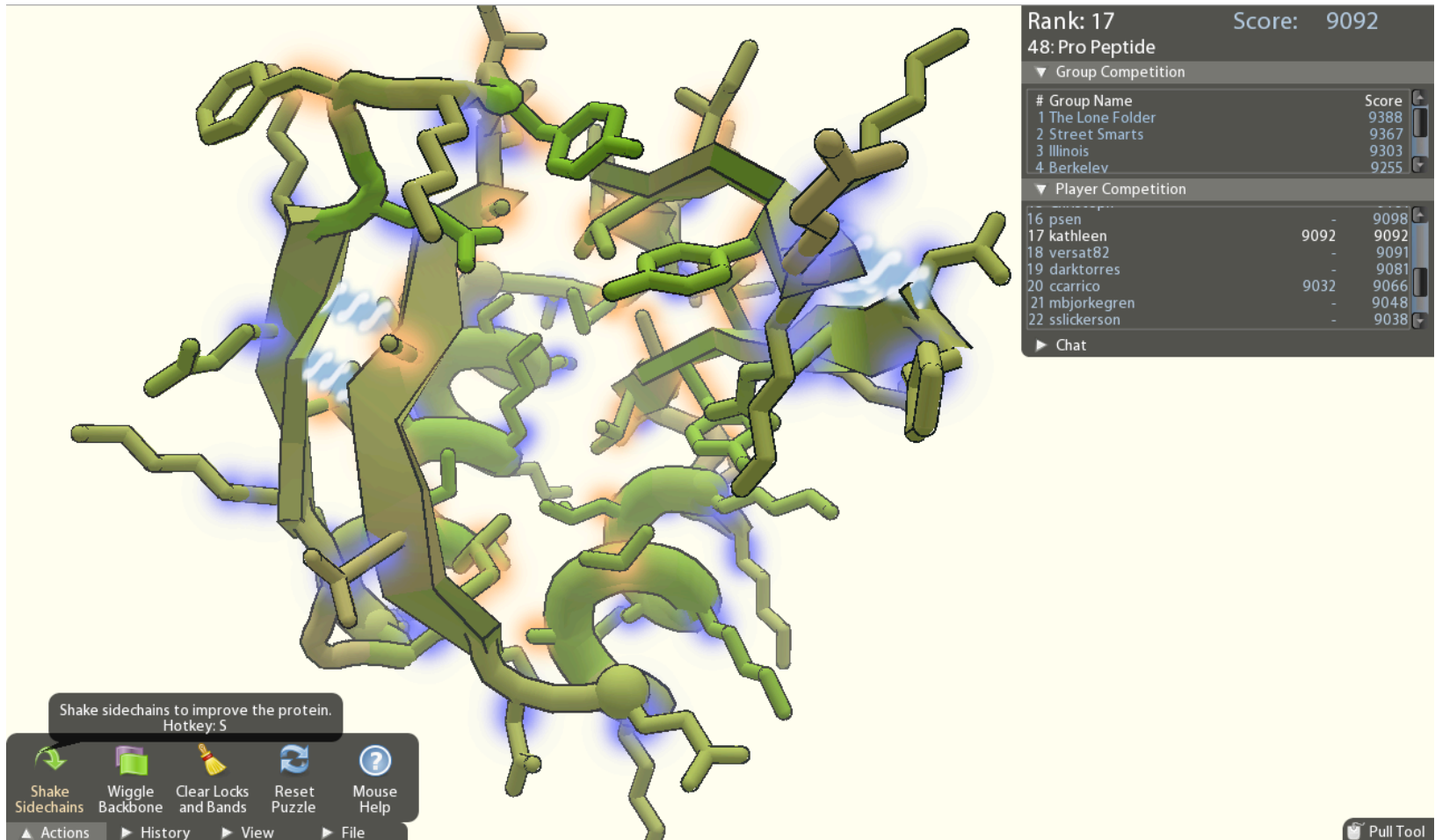
GWAP

- ESP game
  - Labeling images for accessibility users and image search

- Peekaboom
  - Identifies objects within images for improved searching and image recognition training data

- Tag a Tune
  - Identifies and labels musical tunes

FoldIt

- A game developed at UW in part by Zoran Popović

- The game is designed to help solve the complex protein folding problems that arise in many fields

- The point system of FoldIt is in direct correlation with minimizing the free energy of the given protein

FoldIt

Mechanical Turk

- Amazon Mechanical Turk provides easy work to some and affordable results for others

- Researchers can receive results performed by humans via short task-oriented jobs

- Workers can solve these tasks for a specified price

VizWiz

- A project by Jeffrey Bigham

- Combining smart phone capabilities with mechanical turk we can provide essential services to blind people

- VizWiz takes a picture and records a question and sends this task off to be processed by Mechanical Turk

- Results arrive back to the user within about 2 minutes