

Exploration Seminar 3

Human Computation

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Human Computation

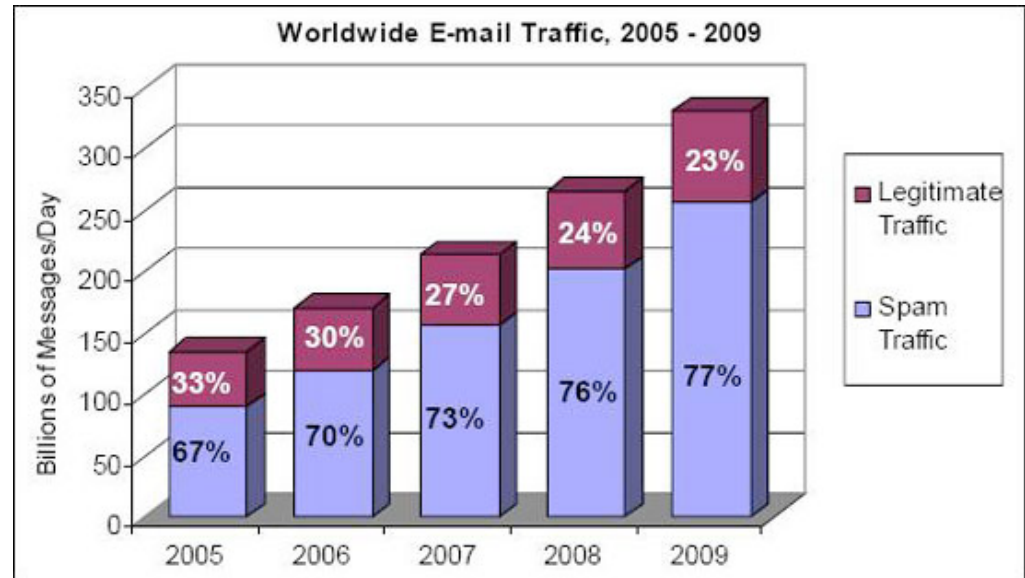
- Outsourcing certain kinds of computation to people
- An attempt to balance the costs of computation with the costs of human labor
- A solution to otherwise unsolvable problems

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



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

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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

The diagram shows a scanned line of text: "This aged portion of society were distinguished from". Below it, the OCR output is shown: "niis aged pntkm at society were distinguished frow." Red arrows point from the explanatory text above to specific characters in the scanned text and their corresponding OCR outputs. The OCR output has red underlines under "niis", "pntkm", "at", and "frow.".

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

A screenshot of a reCAPTCHA challenge. The text "morning" is highlighted in the original image. Below it, the CAPTCHA shows the words "morning" and "overlooks" in a distorted font. At the bottom, there is a text input field with the prompt "Type the two words:" and the reCAPTCHA logo.

Security Check

Enter **both** words below, separated by a **space**.
Can't read this? [Try another.](#)
[Try an audio captcha](#)



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

The ESP Game

2:05
Time Left

The ESP Game

0090
score

Taboo Words

- USO
- BANNER
- PEOPLE

Your Guesses

- CROWD
- STAR
- STARS
- BLUE
- WHITE
- BLACK

Type your next guess:

Your partner has entered a guess

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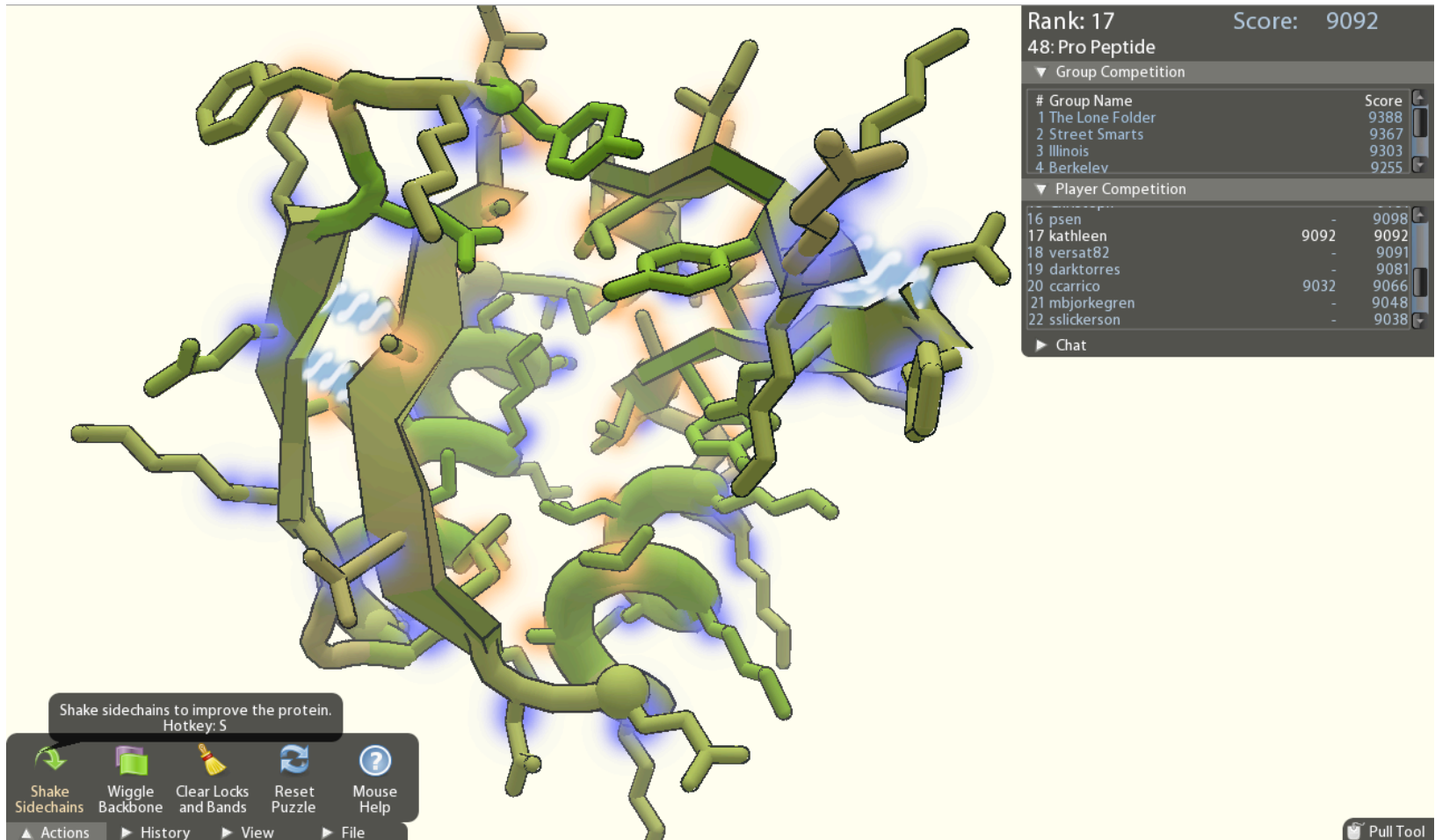
GWAP

- 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



The screenshot displays the FoldIt game interface. The central area shows a 3D protein structure rendered in green and blue, with some parts highlighted in orange. The structure is complex and folded. In the bottom-left corner, there is a toolbar with several icons and labels: "Shake Sidechains", "Wiggle Backbone", "Clear Locks and Bands", "Reset Puzzle", and "Mouse Help". A tooltip above the "Shake Sidechains" icon reads: "Shake sidechains to improve the protein. Hotkey: S". Below the toolbar are navigation buttons: "Actions", "History", "View", and "File". In the bottom-right corner, there is a "Pull Tool" icon.

Rank: 17 Score: 9092
48: Pro Peptide

▼ Group Competition

#	Group Name	Score
1	The Lone Folder	9388
2	Street Smarts	9367
3	Illinois	9303
4	Berkeley	9255

▼ Player Competition

16	pseu	-	9098
17	kathleen	9092	9092
18	versat82	-	9091
19	darktorres	-	9081
20	ccarrico	9032	9066
21	mbjorkegren	-	9048
22	sslickerson	-	9038

► Chat

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