



Purdue Fall 2018

CS59000-CSC: Crowdsourcing and Social Computing

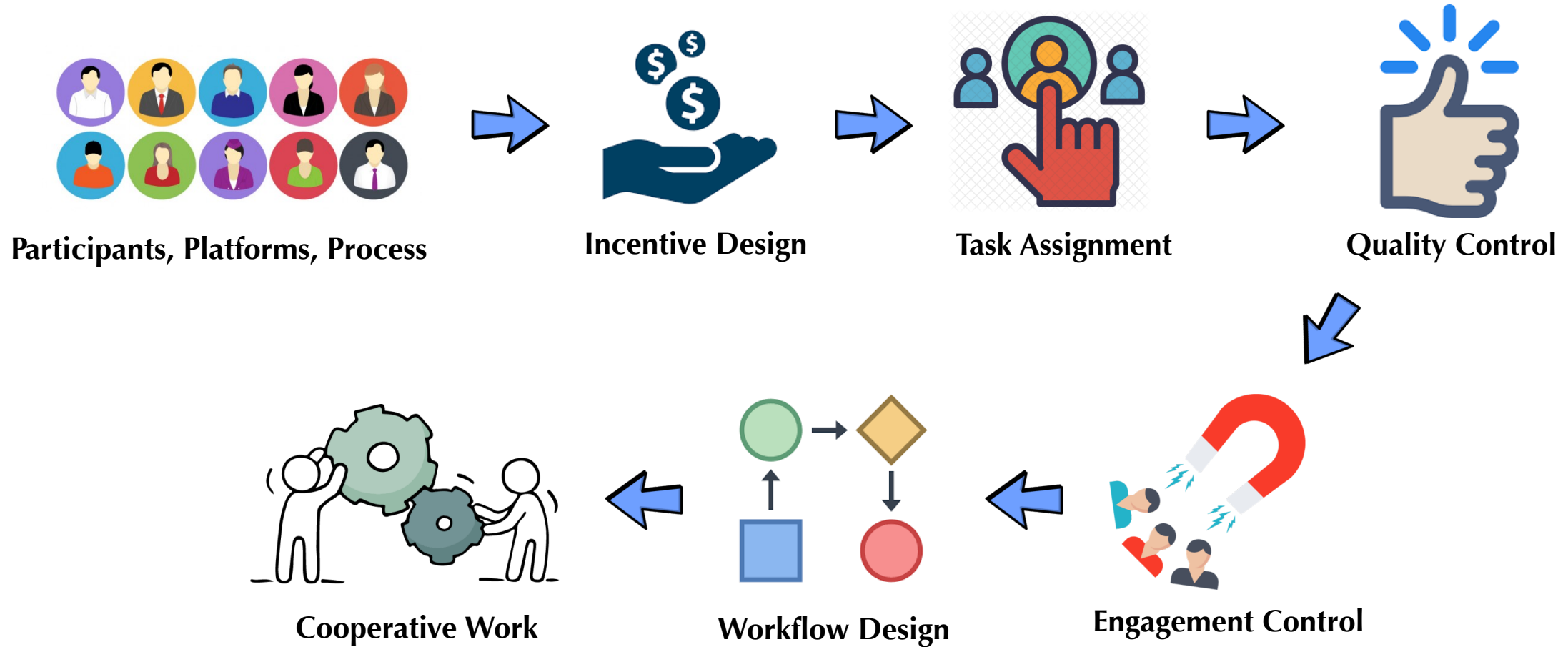
<http://mingyin.org/CS590/Fall2018/index.html>

Class 25: Crowd-Powered Systems

2018.11.19

Ming Yin

What have we learned so far in the course?



Next few classes

Nov 19	Crowd-Powered Systems <i>Lecture</i>	Required Lasecki et al. Real-Time Captioning by Groups of Non-Experts. UIST'12 Kokkalis et al. MyriadHub: Efficiently Scaling Personalized Email Conversations with Valet Crowdsourcing. CHI'17 Optional Vashistha et al. Respeak: A Voice-based, Crowd-powered Speech Transcription System. CHI'17 Nguyen et al. An Interpretable Joint Graphical Model for Fact-Checking from Crowds. AAAI'18
Nov 21	No class (Thanksgiving)	
Nov 26	Crowdsourcing: Future Ideas <i>Lecture</i>	Required Whiting et al. Crowd Guilds: Worker-led Reputation and Feedback on Crowdsourcing Platforms. CSCW'17 Optional Morris et al. Subcontracting Microwork. CHI'17 Vaish et al. Crowd Research: Open and Scalable University Laboratories. UIST'17
Nov 28	Final project presentation (Session 1)	
Dec 3	Final project presentation (Session 2)	

Final Project Timeline

- Final project presentation (Nov 28 & Dec 3)
 - In one week and a half!!
 - Nov 28: 4 presentations; Dec 3: 3 presentations
 - Presentation order
- Final project report (due 11:59pm, Dec 8)
 - This is a HARD deadline. No extension!
 - 10-page maximum, ACM SIG proceedings style
 - Check final project guideline for more details

The Power of Crowds

Classification



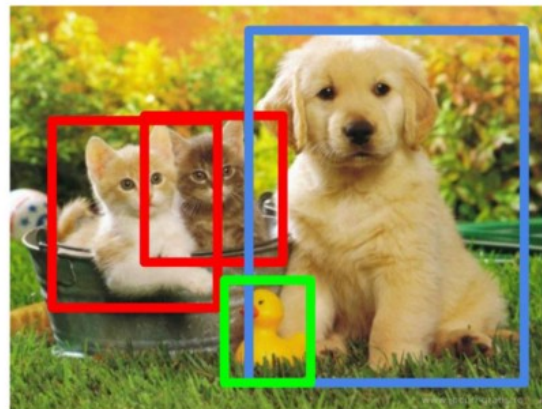
CAT

**Classification
+ Localization**



CAT

Object Detection



CAT, DOG, DUCK

**Instance
Segmentation**



CAT, DOG, DUCK

Simple tasks using *basic human intelligence*

The Power of Crowds

Microsoft Word

C# and Visual Studio Tools for Office

Soylent is a prototype crowdsourced word processing interface. It focuses on three main tasks: shortening the user's writing, proofreading [...]

shorten(text)

Mechanical Turk

Javascript, Java and TurKit

Find
"Identify at least one area that can be shortened without changing the meaning of the paragraph."

Find overlapping areas (patches)

Fix
"Edit the highlighted section to shorten its length without changing the meaning of the paragraph."

Soylent, a prototype...

Randomize order of suggestions

Verify
"Choose at least one rewrite that has significant style errors in it. Choose at least one rewrite that significantly changes the meaning of the sentence."

☐ Soylent ~~is~~, a prototype...
☐ Soylent ~~is a~~ prototype...
☒ Soylent is a ~~prototype~~ test...

return(patches)

Displayed to the user

User selects text



PlateMate

kCal: 869.6
Fat: 41.9g
Protein: 53.1g
Carbs: 69.4g

Stages

HITs

Results

Tag

Identify

Measure

Draw Boxes (2)

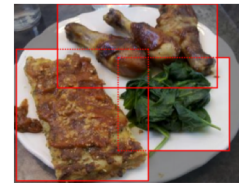
Vote (3)

Describe (3)

Match (2)

Vote (5)

Measure (5)



Baked or Fried Chicken Drumstick

Barbeque Sauce (Low Sodium, Canned)

Cooked Spinach (from Fresh)

Italian Flatbread Focaccia

2.53 drumstick

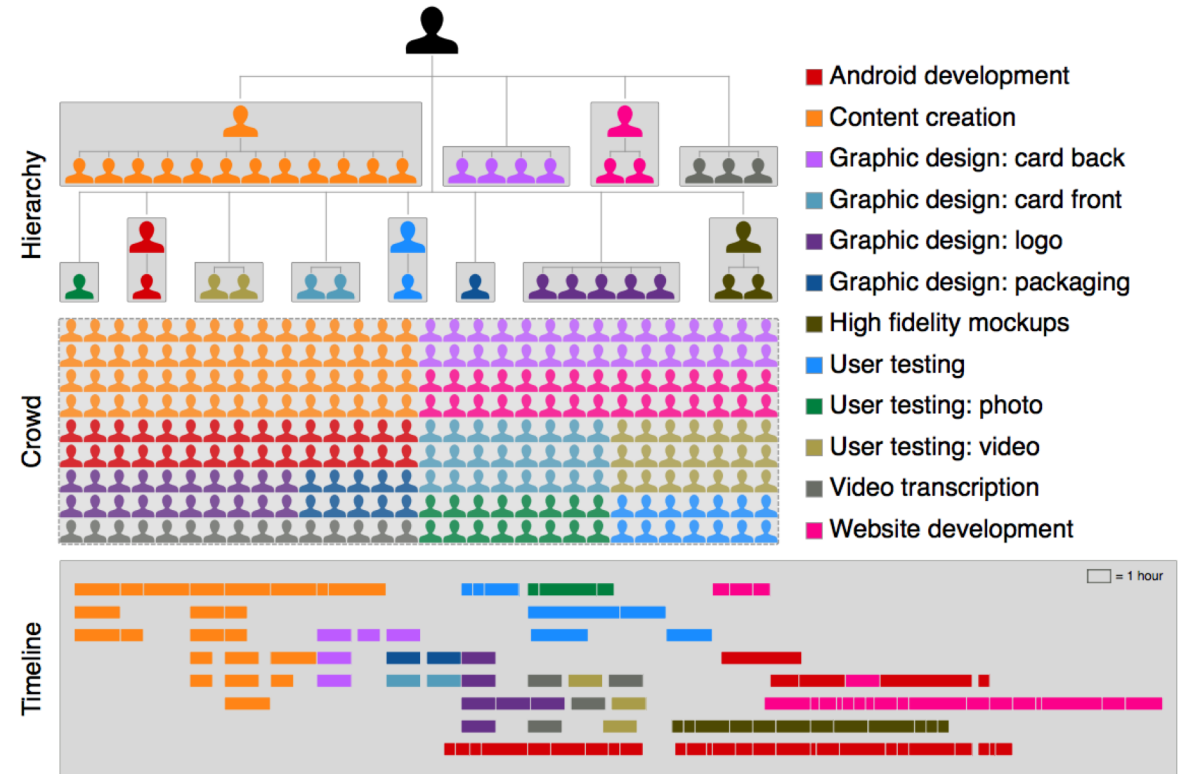
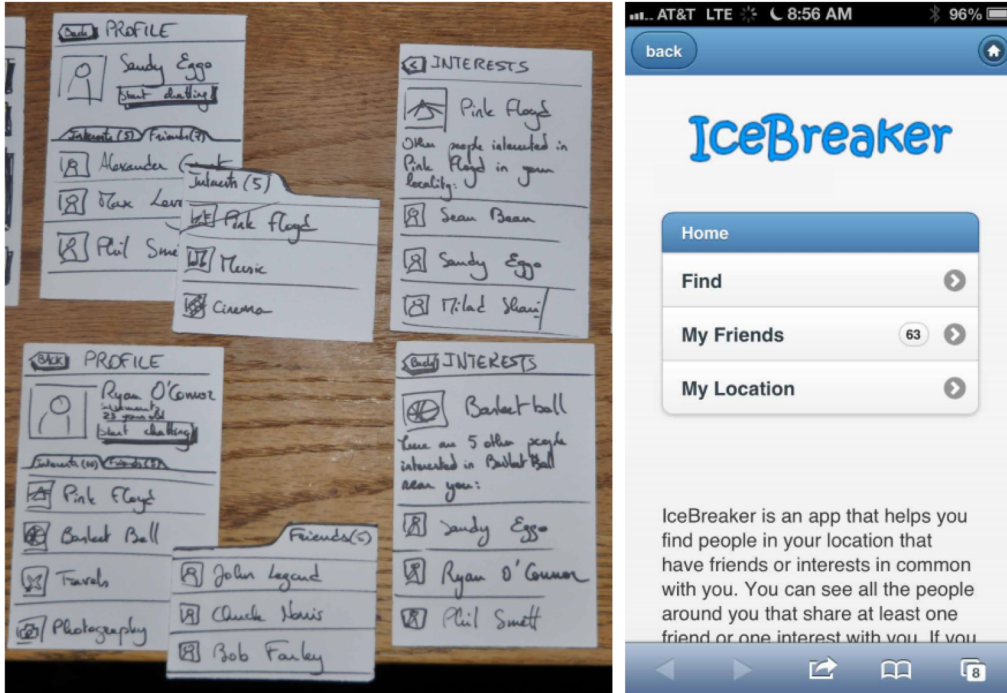
.40 cup

.83 cup, fresh

1.33 slice

Complex (but dividable) tasks leveraging *the division of labor*

The Power of Crowds



Complex (but undividable) tasks harnessing *teamwork*

Some More Advantages of the Crowd

- On-demand: Get help from the crowd whenever you want
- Scalability: Large number of crowd workers
- **Today:** Explore cool end-to-end systems with crowds in the loop that leverage the crowd's on-demand nature and scalability

Scribe

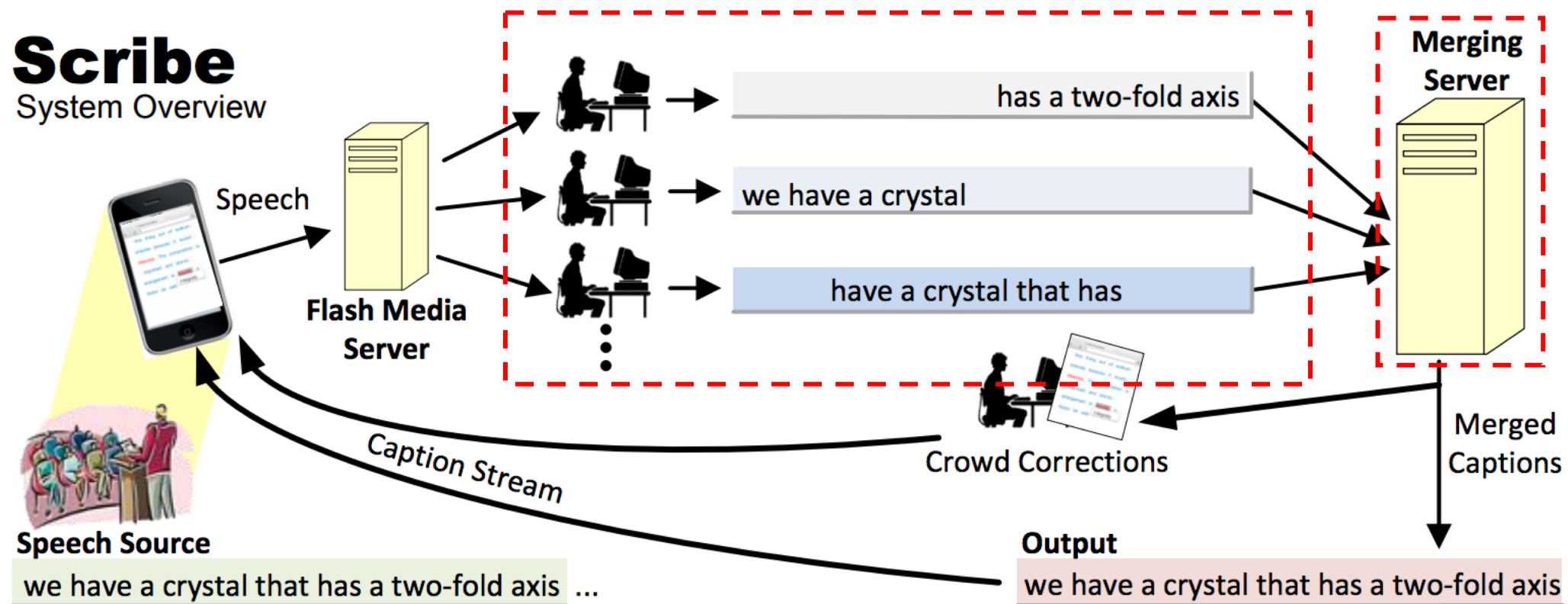
- *Real-time captioning by Groups of Non-Experts*, Lasecki et. al, UIST 2012
- On-demand: “Real-time”
- Scalability: “Groups of Non-Experts”
- Cool application: useful for deaf and hard of hearing people in classrooms, meetings, etc.

Real-Time Captioning: The State of the Art

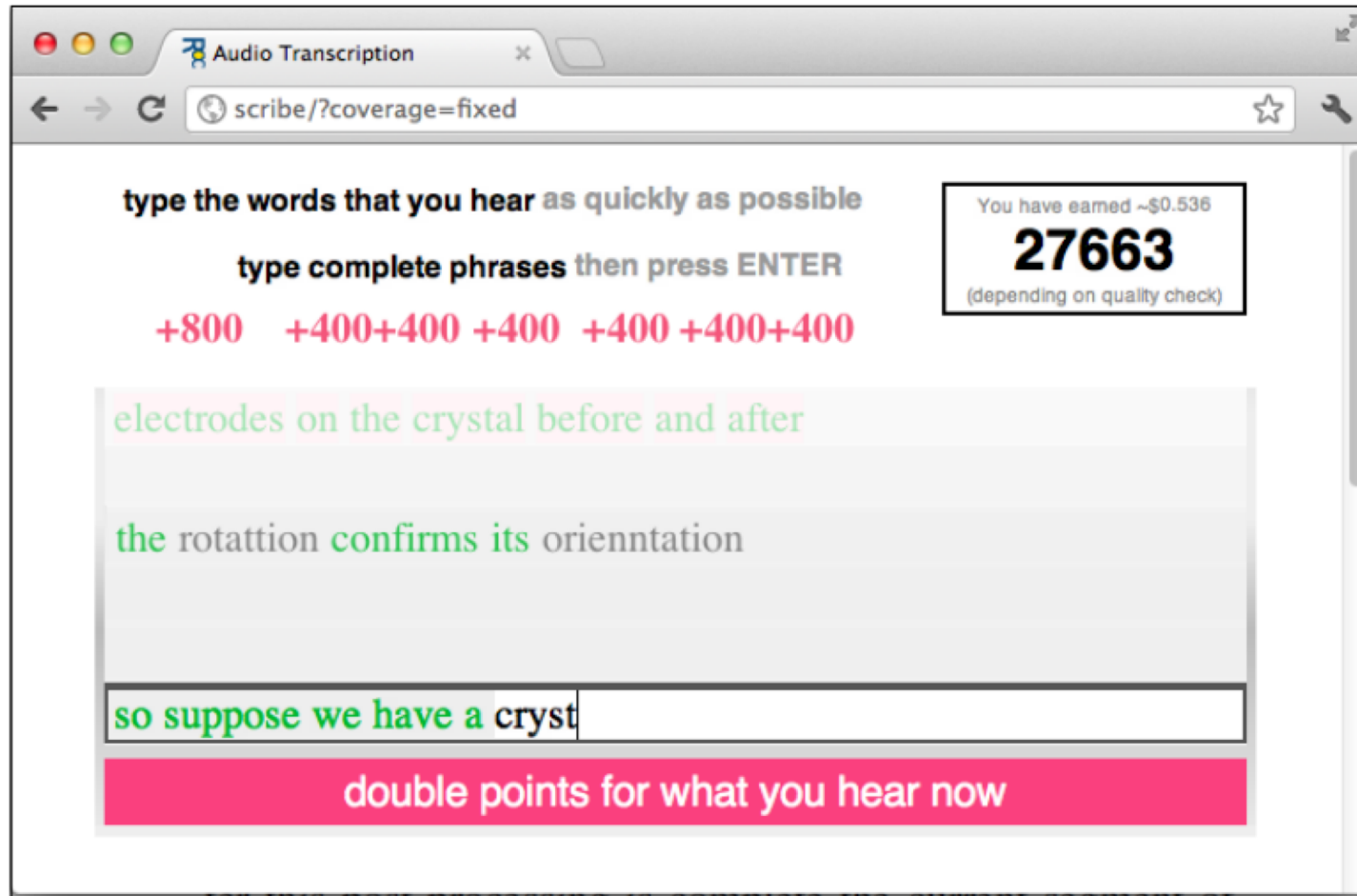
- Communications Access Real-Time Translation (CART)
 - Professional stenographers (2-3 years of training)
 - Most expensive
 - Most reliable: average 141 words per minute
- Non-Verbatim Systems (e.g., C-Print)
 - \$60/hour
 - Slower, and also not verbatim
- Automated Speech Recognition (ASR)
 - Low performance in real-world settings

System Overview

Scribe System Overview



Worker Interface



- Separate contiguous sequences of words by the enter key
- “Lock in” a word after 800 milliseconds it is typed
- Performance based incentives!

Key Idea: Adjusting Saliency

- “Guide” workers to work on different parts of the audio by systematically injecting saliency artificially
 - Through varying the volume of the audio signal

W1: So now suppose that we have a crystal that has a two-fold axis in such a way that the motif is

W2: So now suppose that we have a crystal that has a two-fold axis in such a way that the motif is

W3: So now suppose that we have a crystal that has a two-fold axis in such a way that the motif is

- Better than dividing audio into different segments
 - Contexts help fast transcription
 - Have a sense of “real-time” work

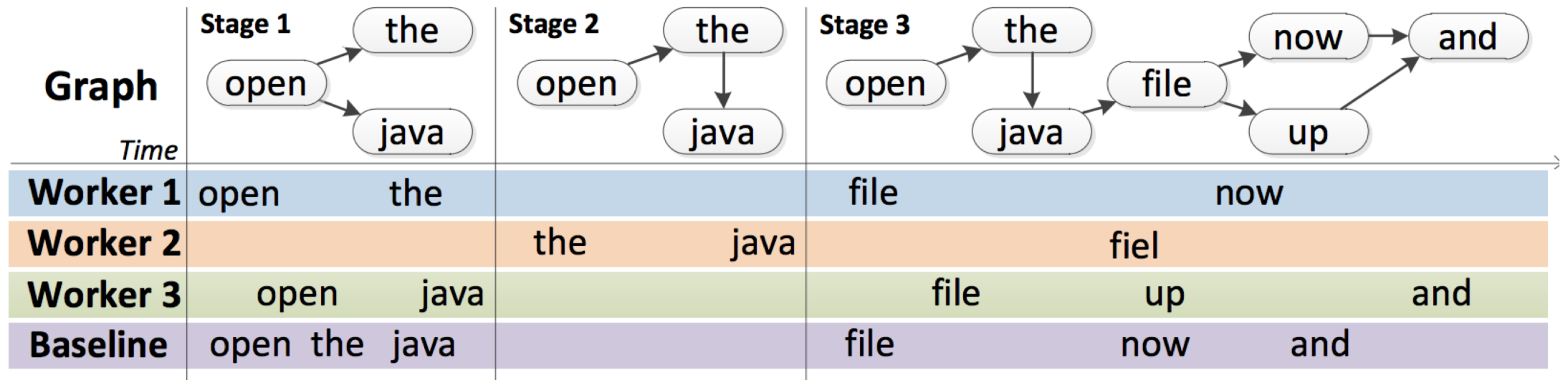
Combining the Inputs

- Multiple Sequence Alignment (MSA):
 - Bioinformatics techniques to align multiple (gene) sequences so as to achieve maximal matching between them
 - Adapting scoring function: incorporating spelling error model

<i>Sequence1</i>	-TCAGGA-TGAAC-----
<i>Sequence2</i>	ATCACGA-TGAACC----
<i>Sequence3</i>	ATCAGGAATGAATCC--
<i>Sequence4</i>	-TCACGATTGAATCGC-
<i>Sequence5</i>	-TCAGGAATGAATCGCM

Online Sequence Alignment

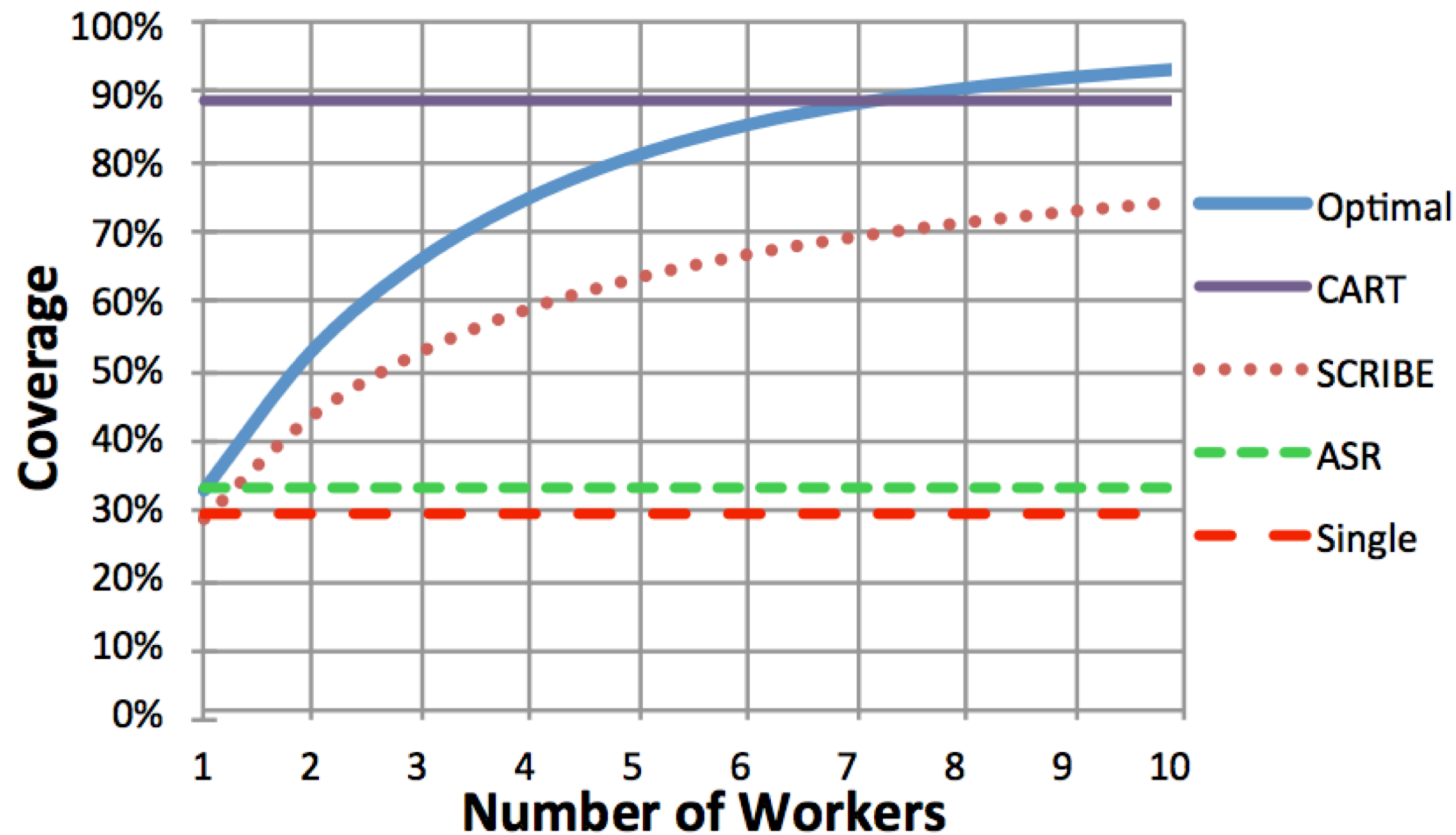
- Maintaining the longest self-consistent path to avoid unnecessary branching.



System Evaluation

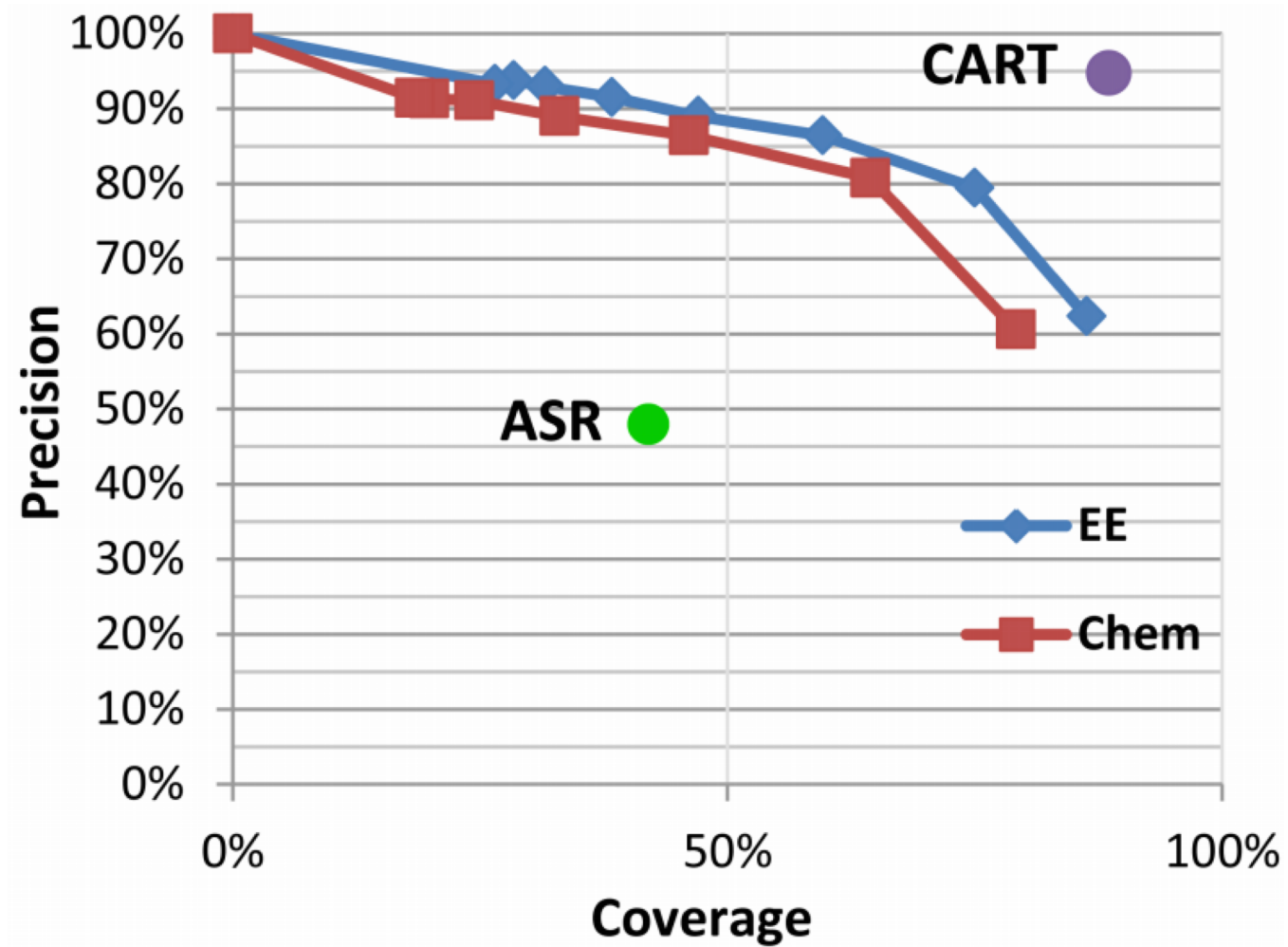
- **Coverage:** the number of words in the ground truth that has been correctly transcribed (by the group) *within 10 seconds* after the words appear
- **Precision:** the fraction of words in the transcription that are in the ground truth *within 10 seconds* after they appear
- A trade-off

System Evaluation



- Scribe outperforms ASR and single worker on coverage
- Average latency of 2.89 seconds (better than CART)!
- Workers also transcribe more words in the salient periods (periods with high volume)

System Evaluation



Discussions

- How do you like this system?
- Any opportunities for improvement?




More Crowd-Powered Systems

- *Respeak: A Voice-based, Crowd-powered Speech Transcription System*, Vashistha et. al, CHI 2017
- Using automatic speech transcription tool to transcribe
- But ask crowd workers to re-speak what they heard in a quite environment
- Value for workers: improved vocabulary, pronunciation and oral skills

Utilizing the Crowd for Email Personalization

- *MyriadHub: Efficiently Scaling Personalized Email Conversations with Valet Crowdsourcing*, Kokkalis et. al, CHI 2017
- Key idea: Leverage crowds as valets to analyze email patterns

Use crowds to extract metadata of emails

Conversation	Fields
Subject: Subject HCI Group Exchange	Interview <input type="text" value="2"/>
 Name (me) request transcript Apr 8 Hi Thomas , very glad to hear from you. Can you please send me your tr... <i>re</i>	Without financial aid <input type="text" value="yes"/>
 Thomas Apr 10 Dear Name , please find my transcript attached. <i>read more</i>	Attends quiz <input type="text" value="no"/>
 Name (me) request skype Apr 12 Hi Thomas . Thanks for your quick response! We will review the material an...	Quiz url <input type="text"/>

Extracting fields and values from emails

Use crowds to generate templates and rules

Filter Applied	Send Template	New Matches	Automatically?
'university_coded' = <i>not blank</i>	request transcript	<i>none</i>	<input checked="" type="checkbox"/> ON
Last sent message = request transcript Status = You need to reply. 'university_coded' = <i>not blank</i> 'skype_handle' = <i>blank</i>	request skype	<i>none</i>	<input type="checkbox"/> OFF
Last sent message = request transcript Status = They need to reply. 'transcripts' = <i>blank</i>	transcript - reminder	5 <input type="button" value="Send"/>	<input type="checkbox"/> OFF
'send skills survey' = 'TRUE'	skills survey	3 <input type="button" value="Send"/>	<input type="checkbox"/> OFF

Other Features

- Visualizations of conversation state (for each receipt)

Name	Your latest message	Status Resend failed 7	Emails	Web	Rails	F
Skype Convo Soon	Skype Convo Soon	You need to read.	15	7	0	ya
Thanks for taking the quiz	Thanks for taking the quiz	You need to reply.	16	0	0	
Thanks for taking the quiz	Thanks for taking the quiz	You need to reply.	14	4	5	
Quiz URL	Quiz URL	They need to reply.	3			
request transcript	request transcript	They need to reply.	1			
Thanks for taking the quiz	Thanks for taking the quiz	They need to reply.	9	4	0	
rejection	rejection	Finished	4			
rejection	rejection	Finished	7	2	0	

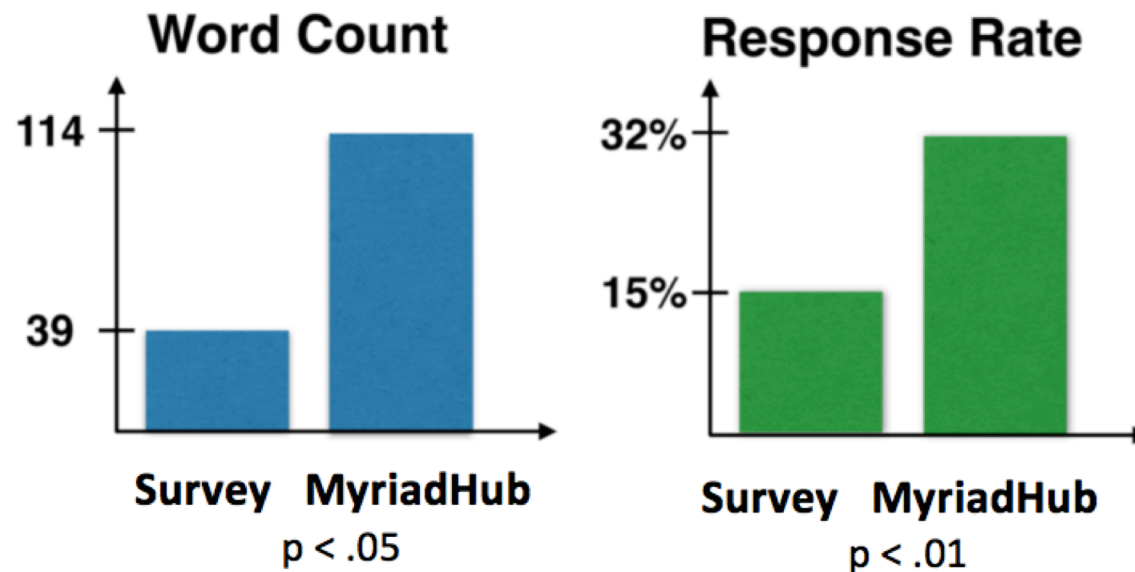
- Integration with existing tools

System Evaluation

- A within-subject field experiment with 12 participants
- Organize a potluck party with 10 invited guests
- Simulated email responses
- Simulated valet crowd workers (only for meta-data extractions)
- Results: 32% saving on time; no mistakes!

System Evaluation

- A between-subject experiment with 172 participants
- Control: redirect participants to fill out a survey
- Experimental: Ask questions directly in the email



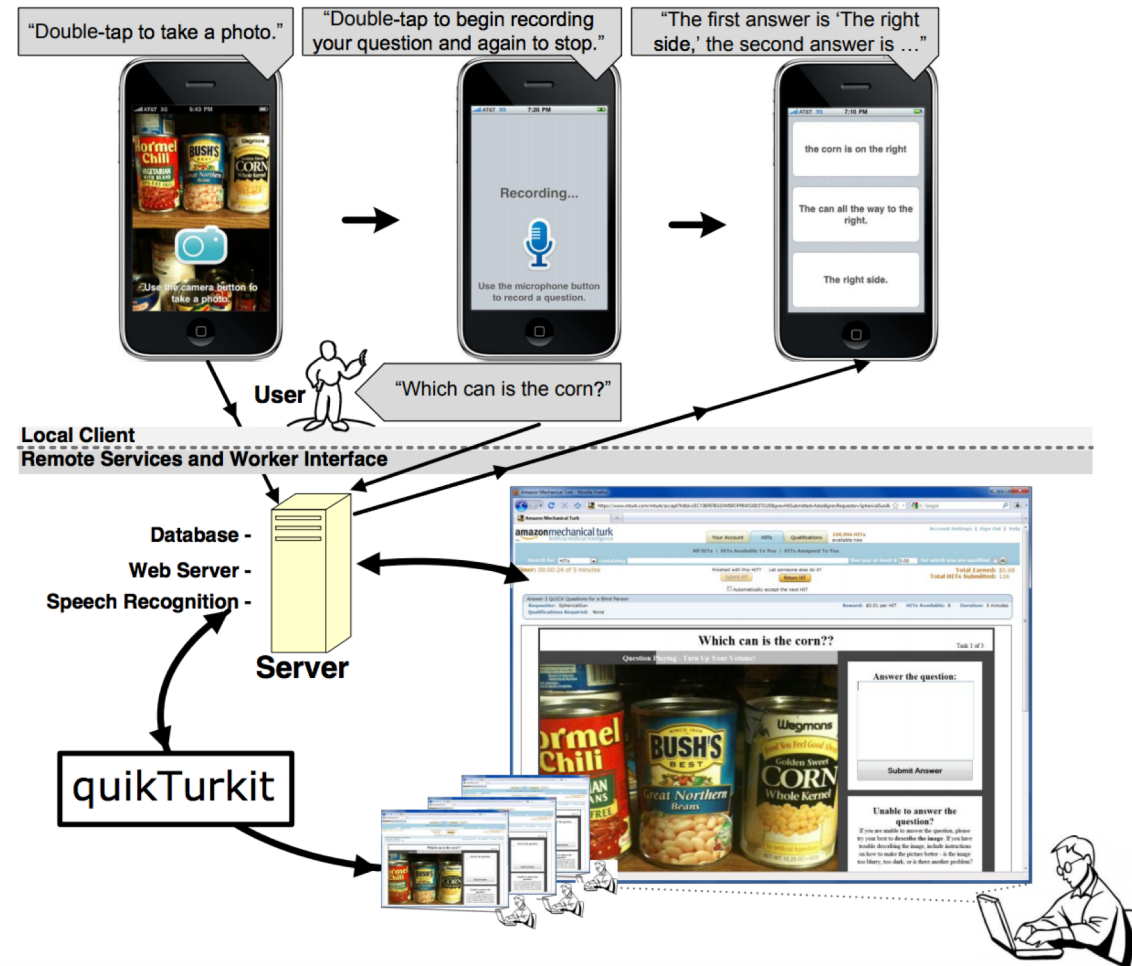
Thoughts?

Discussions

- How do you like this system?
- Any opportunities for improvement?
- If you have a crowd of valet workers, what will you use them for?

More Crowd-Powered Systems

- *VizWiz: Nearly Real-time Answers to Visual Questions*, Bigham et. al, UIST 2010



Next Class

- Nov 21: Happy thanksgiving! (No class)
- Nov 26: The last lecture!
 - Crowdsourcing: Future Ideas
 - Required:
 - Whiting et al. Crowd Guilds: Worker-led Reputation and Feedback on Crowdsourcing Platforms. CSCW'17
 - Optional:
 - Morris et al. Subcontracting Microwork. CHI'17
 - Vaish et al. Crowd Research: Open and Scalable University Laboratories. UIST'17