Continuous Real-Time (Interactive) Crowdsourcing Pt. 2
Scribe - Realtime Captioning by Non-Experts

[Scribe - System Overview]

Speech Source: we have a crystal that has a two-fold axis...

Flash Media Server:

Caption Stream:

Crowd Corrections:

Output:

we have a crystal that has a two-fold axis

Merging Server:

Merged Captions

[ Lasecki et al. ]
Scribe - Realtime Captioning by Non-Experts

[ Lasecki et al. ]
Scribe - Realtime Captioning by Non-Experts

Merging Incomplete Captions

```
C1: the brown fox jumped
C2: quick fox lazy dog
C3: fox jumped over the lazy
```

Combiner

Final Caption

```
the quick brown fox jumped over the lazy dog
```
Legion:AR - Realtime Activity Recognition

[ Lasecki et al. ]
**Chorus - Conversational Assistant**

(read the chat history above before contributing – you are participating as the 'crowd' user)

[ Lasecki et al. ]
Chorus - Conversational Assistant

[Lasecki et al.]
Chorus - Conversational Assistant

[ Lasecki et al. ]
VizWiz

Instructions are likely on the other side of the box.

Box is mostly out of frame to the right.

Preheat to 400, remove from box, cover edges with foil and put on tray, cook 70 minutes.

[ Bigham et al. ]
Chorus:View - Conversational Q&A

[ Lasecki et al. ]
Hybrid Intelligence
Why Hybrid Intelligence?

Robot navigation
Why Hybrid Intelligence?

Robot navigation
Recap: Behind the Scenes
Recap: Behind the Scenes
Crowd Agent Model

![Diagram of Crowd Agent Model](image)

- Crowd Agent
- Task Mediator
  - $W_1$
  - $y_1(t)$ Task
  - $W_2$
  - $y_2(t)$ Task
  - $...$
  - $W_n$
  - $y_n(t)$ Task
  - Worker Input
- Response Mediator
  - Worker Input
- Reward Scheme
- Context Maintenance
- Communication Channels
- $y(t)$ Feedback
- $u(t)$ Input
- Environment / Actors
Legion:AR - Realtime Activity Recognition
“AAI” needs AI

Figure 3: Decision-theoretic Computations needed to control an iterative-improvement workflow.

Figure 4: Decision-theoretic Computations needed to control the Soylent word processor.
Uses of AI in crowd systems

... in workflow design/management

- Decide which workflow
- Decide on parameters
- Decide on a UI (or UI adaptations needed)
- Decide how to execute (execution control)
Beyond Real Time

...using hybrid intelligence
Brace for Color Change
Bolt: Instantaneous Crowdsourcing

Lundgard et al., CHI 2018
look-ahead approach

game environment

current state
look-ahead approach

system generates possible future states

game environment

current state
look-ahead approach

distributes to
crowd workers

system generates
possible future states

game environment

current state

Walter S. Lasecki  |  University of Michigan
look-ahead approach

distributes to crowd workers

system generates possible future states

game environment

current state

game state transition

next state
look-ahead approach

distributes to crowd workers

system aggregates + returns corresponding response (2ms)

system generates possible future states

game environment

current state

next state

game state transition
possible future states

[ Lundgard et al., CHI 2018 ]

crowd workers

cached responses

game round 1
possible future states

[ Lundgard et al., CHI 2018 ]

crowd workers

cached responses

game round 1
possible future states

crowd workers

cached responses

aggregate multiple responses to a single state

[ Lundgard et al., CHI 2018 ]
possible future states

[ Lundgard et al., CHI 2018 ]

crowd workers

cached responses

game round 2
possible future states

crowd workers

cached responses

[ Lundgard et al., CHI 2018 ]
possible future states

[ Lundgard et al., CHI 2018 ]
possible future states

[ Lundgard et al., CHI 2018 ]

crowd workers

cached responses

collect and aggregate as needed during each round

game round 3
possible future states

crowd workers

cached responses

[ Lundgard et al., CHI 2018 ]
possible future states

crowd workers

cached responses

[ Lundgard et al., CHI 2018 ]

collect and aggregate as needed during each round
Brace for

Color Change
So what can we do with crowds?

- Create intelligent systems beyond AI
- Train ML systems
- Go beyond the bounds of individual human performance/ability levels
These systems can...

- Work 24/7
- Provide rapid responses
- Maintain context (power interactive systems)
- Grow/learn as crowds (workers) themselves do
Readings (reminder)

Extra-credit reading for 498 students

- Real-Time Captioning by Groups of Non-Experts by Lasecki et al.

Required reading for 598 students [Response paper due by next Tuesday]

- Real-Time Captioning by Groups of Non-Experts by Lasecki et al.
- Chorus: A Crowd-Powered Conversational Assistant by Lasecki et al.

Paper should include:

- a paragraph about each of the readings that explains the problem space and the argument presented in the paper
- one page synthesis of all the readings that connects them in a coherent way (there’s no right answer here -- you can tell *your* story!)