Learnersourcing: Improving Video Learning with Large-Scale Interaction Data
Video learning at scale
Video enables learning at scale
Scalable delivery ≠ Scalable learning
In-person learning: Direct learner-instructor interaction

Effective pedagogy
- high engagement
- immediate feedback
- adaptive instruction
Video learning: Mediated learner-instructor interaction

Video interfaces are limiting.
- passive, isolated viewing
- not adapting to learner
- difficult to find info and navigate freely
Challenges in video learning at scale

No information about learners

No information about content
Data-Driven Approach

use data from learners’ interaction to understand and improve learning

second-by-second process tracking  data-driven content & UI updates
Learnersourcing

crowdsourcing with learners as a crowd

inherently motivated
naturally engaged

“Learners’ natural learning activities
dynamically improve content & UI for future learners.”
Learners watch videos. System analyzes interaction traces for hot spots.

Video player adapts to collective learner engagement.

UI supports social navigation & summarization.
Video player adapts to collective learner engagement

Data-driven interaction techniques for improving navigation of educational videos.

Juho Kim, Philip J. Guo, Carrie J. Cai, Shang-Wen (Daniel) Li, Krzysztof Z. Gajos, Robert C. Miller.
UIST 2014.
Learners are prompted to summarize video sections.

UI presents a video outline.

What's the overall goal of the section you just watched?

Learners are prompted to summarize video sections.

System coordinates learner tasks for a final summary.

Introduce the idea behind `<div>` and `<span>`

1. Create a div element using the `<div>` tag
2. Below the div, create a span element using `<span>`
3. Span and div elements were designed to be used with CSS
4. Div and span elements don't really make visual changes unless you use CSS to style them
Video player coordinates learners to generate a video outline.

Learnersourcing Subgoal Labels for How-to Videos.
Sarah Weir, Juho Kim, Krzysztof Z. Gajos, & Robert C. Miller.
CSCW 2015.
Generating section summary in video

- Requires domain experts and knowledge extraction experts to work together. [Catrambone, 2011]
- Insight: the summarization activity is a good learning exercise!

Crowd workflow for complex tasks
- Soylent [UIST 2010], CrowdForge [UIST 2011], PlateMate [UIST 2011], Turkomatic [CSCW 2012], Foundry [UIST 2014]
Interactive, Collaborative, Crowd-powered Video Learning

Which subject are you interested in learning?

Statistics
Web Programming

{ Choose from the how-to videos below }

As you watch the videos, we'll periodically check in and ask what you're learning. It's an experiment to help you learn better from videos.

{ Featured videos }

CSS
Introduction to styling with CSS
By: BeginnerTutsdotcom

CSS
Making Divs Side by Side using CSS
By: I Teach Stuff

jQuery
Introduction to Selectors
By: thenewboston
Crowdy: live deployment

• ~50 web programming + statistics videos

• Apr 2014 ~ Jun 2014, Jan 2015~

• ~1000 participating users (out of ~2,500 visitors)
Two types of learnersourcing

Passive

track what learners are doing

Active

ask learners to engage in activities
Designing learnersourcing activities

Engaging & pedagogically meaningful tasks, while byproducts make useful information

- Summarize, Compare, Inspect [Crowdy]
- “Record your own explanation.” [RIMES]
- “Where is this lecture most confusing? Why?” [Mudslide]
RIMES: Interactive exercises embedded into lecture videos

RIMES: Embedding Interactive Multimedia Exercises in Lecture Videos.

Juho Kim, Elena L. Glassman, Andrés Monroy-Hernández, Meredith Ringel Morris.

CHI 2015.
Gallery of submitted responses

RIMES: Embedding Interactive Multimedia Exercises in Lecture Videos. 
Juho Kim, Elena L. Glassman, Andrés Monroy-Hernández, Meredith Ringel Morris. 
CHI 2015.
Mudslide: Spatially anchored confusion via learnersourcing

Mudslide: A Spatially Anchored Census of Student Confusion for Online Lecture Videos.
Elena L. Glassman, Juho Kim, Andrés Monroy-Hernández, Meredith Ringel Morris.
Best of CHI Honorable Mention. CHI 2015.
Learnersourcing applications for educational videos


Learnersourcing design principles

Learnersourcing vs Crowdsourcing

- pedagogically meaningful task vs. simple and concrete task
- incentive design + minimal distraction vs. quality control
- learning + data collection vs. data collection
- overall contribution visible vs. microscopic, focused task
- cost: learners’ time & effort vs. cost: money
Learnersourcing requires a multi-disciplinary approach

Crowdsourcing techniques
- Quality control, Task design, Large-scale input mgmt

Social computing
- Incentive design, Sense of community among learners

UI design
- Data-driven, Dynamic interaction techniques

Video content analysis
- Computer vision, Natural language processing

Learning science
- Pedagogically useful activity, Theoretical background
Let’s think about...

• Beyond video learning

• How can we capture and understand richer learning interactions?
  – peer learning, creative process

• Completely learnersourced courses