Learnersourcing: Improving Learning with Large-Scale Interaction Data

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CSAIL

Motivation

Millions of learners watch videos from online learning platforms

YouTube coursera edX KHAN ACADEMY

Challenge

Most video interfaces are not designed to support learning.

lack of interactivity

not adapting to learners   not adapting to content

Solution: Data-Driven Approach

- Use interaction data to understand & improve learning
- Learnersourcing: crowdsourcing with *learners* as a crowd

Learners' natural learning activities dynamically improve future learners' experience.

Passive Learnersourcing
Track learners' natural video watching activities

Active Learnersourcing
Ask learners to engage in learning activities

LectureScape: Lecture Video Player
Powered by Collective Watching Data

Automatic side-by-side view

Friction while scrubbing

Display Timeline: what the learner sees
phantom cursor

Control Timeline: where the actual cursor is (physical displacement)

Keyword Search

Word Cloud

Lecture Video

Interaction Peaks

Rollercoaster Timeline

Personal Watching Trace

Personal Bookmarks

Interactive Transcript

Highlight Storyboard

Recursion on Strings

How to solve this recursively?
- First, convert the string to just characters, by stripping out punctuation, and converting upper case to lower case
- Then
  - Base case: a string of length 0 or 1 is a palindrome

1:44 / 7:29   Add Bookmark   [4:06-4:25] You watched this segment.

Other learners rewatched this part.

Crowdy: How-to Video Player
with Learnersourced Video Outline

crowdy   About   Help

HTML5 and CSS3 Beginner Tutorial 19 - Div and Span
By: Quentin Watt

Wiki Video Outline   Print

Introduce the idea behind <div> and <span>   Edit Delete
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

Demonstrate how to use a <div> tag   Edit Delete
5. Open a div tag
6. Within the div tag, create an <h2> element
7. Beneath the <h2>, create a paragraph with some text

Demonstrate how to use a <span> tag   Edit Delete
8. Put a span tag around two words in the text
9. Give one of the span tags class="brown_text"
>> 10. Set the other span tag to have class="red_text"
11. View the page in firefox to see the changes

2:45 / 0:08

Sidebar with interactive section summary & steps

Multi-stage learner prompts

Stage 1: Generate
What was the overall goal of the video section you just watched?

e.g., Create event handlers

Note: Other users will see your outline to help them better understand the steps in the video.

Submit   Cancel

Stage 2: Evaluate
Which of the following best describes the video section you just watched?

Choose the best answer (submitted by other users) or add your own.

◯ importance of css, comparison to html
◯ defining css
◯ learn css
◯ I have a better answer:

Submit   Cancel

Stage 3: Proofread
Does the below statement (submitted by other users) accurately summarize the steps?

Tip: Good statements usually begin with a verb.

Statement:
basic steps to creating an HTML template

Steps:
1. Begin HTML page with <html> tag and with </html>
2. Start the <body> tag above content, end with </body>
3. Create head section using <head> tag
4. Use the <title> tag to create page title

◯ Yes, this statement applies
◯ No, these steps don't require summarization
◯ No, I want to revise the statement:
basic steps to creating an HTMl

Submit   Cancel

[Learner3879, Video327, "play", 35.6]
[Learner3879, Video327, "pause", 47.2]

Learners watch videos.

System analyzes interaction traces for hot spots.

UI provides social navigation & recommendation.

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.

UI presents a video outline.

Introduce the idea behind <div> and <span>   Edit Delete
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3. Span and div elements were designed to be used with CSS
4. Div and span elements don't really make visual changes

X ....
V ....
X ....
X ....

Data-Driven Interaction Techniques for Improving Navigation of Educational Videos.
Juho Kim, Philip J. Guo, Carrie J. Cai, Shang-Wen Li, Krzysztof Z. Gajos, Robert C. Miller. UIST 2014.

Learnersourcing Subgoal Labels for How-to Videos.
Sarah Weir, Juho Kim, Krzysztof Z. Gajos, Robert C. Miller. CSCW 2015