

Artificial Intelligence for Video-based Learning at Scale

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ABSTRACT

Video-based learning (VBL) is widespread; however, there are numerous challenges when teaching and learning with video. For instructors, creating effective instructional videos takes considerable time and effort. For students, watching videos can be a passive learning activity. Artificial intelligence (AI) has the potential to improve the VBL experience for students and teachers. This half-day workshop will bring together multi-disciplinary researchers and practitioners to collaboratively envision the future of VBL enhanced by AI. This workshop will be comprised of a group discussion followed by a presentation session. The goal of the workshop is to facilitate the cross-pollination of design ideas and critical assessments of AI approaches to VBL.

Author Keywords

Artificial intelligence; video-based learning; machine learning; natural language processing; computer vision

CSS Concepts

• **Applied computing~Education**; *Interactive learning environments*; *Learning management systems*

INTRODUCTION

Video-based learning (VBL) is a major area of research within the Learning @ Scale community, and has implications to pedagogies, such as Massive Open Online Courses (MOOCs) and flipped classrooms [4,11]. Nonetheless, the effectiveness and efficiency of VBL has been questioned [1,8]. Some instructors are hesitant to use video because it takes a significant amount of time and effort to record and edit instructional videos [2]. For students,

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watching video is often a consumptive and passive activity, limiting learning outcomes [7].

There are many challenges to be tackled in order to better support teaching and learning with video. Copying, pasting, and editing, which can all be easily done with text and word processors, are difficult tasks with most video and VBL systems. How can VBL systems be designed for active learning [3,9]? While instructors may have access to student trace data from VBL systems, data can be hard to make sense of. How can instructional dashboards be designed so instructors can provide their students with timely, personalized feedback in ways that are sensitive to students' interests and abilities [8]?

Artificial intelligence (AI) applications in the research areas of computer vision, information retrieval, and natural language processing will likely power new approaches to VBL [10,12]. For instance, AI could help instructors determine students' understanding of video by analyzing student trace data, and then use this insight to recommend video content that may be useful for students. Also, AI-based text and / or image recognition and classification techniques could assist students in navigating instructional video by detecting changes in topic. AI-based VBL could support instructors in assessing individual student's knowledge gaps based on trace data in order to provide personalized feedback and recommendations tailored to student's abilities, experiences, and interests. Along with this, many concerns are raised when applying AI in the classroom, such as privacy, ethics, and agency vs. automation, which should be investigated [5,6,10]. These are a sample of the research questions that will be explored during this workshop.

Our interest in organizing this workshop stems from our work at the University of British Columbia (UBC) designing systems for learning with video. Through our partnership with Microsoft, we have focused heavily on designing AI-based VBL systems.¹ We have benefited greatly from discussions with members of the Learning @ Scale

¹ <https://videx.ece.ubc.ca/research>

community, and expect this workshop will develop this area of research further.

We see this workshop benefiting the Learning @ Scale community in three ways. First, the workshop will bring together researchers and practitioners applying AI technologies to the design of systems for video-based teaching and learning. We will distribute a call for participation to researchers from computer science, education, information science, psychology, and other fields that share an interest in pedagogies and tools for video-based teaching and learning. Second, the workshop will explore priorities for future work on AI-based VBL. Third, we expect to publish a paper outlining the workshop discussions, describing how the Learning @ Scale community can take steps towards realizing the potential of AI for video-based teaching and learning. We anticipate the insights coming out of the workshop will be useful to many researchers and practitioners beyond the Learning @ Scale community who are working on educational technology.

ORGANIZERS

Kyoungwon Seo

Kyoungwon is a Postdoctoral Research Fellow at UBC. He designs and evaluates AI-based educational technologies to support students' engagement with learning material and social interaction with their peers. Kyoungwon's work explores how AI can support students' learning activities, such as viewing video, searching online, and participating in forum discussions.

Sidney Fels

Sidney is a Professor and Distinguished University Scholar at UBC. He is internationally known for his work on new interfaces for musical expression and interactive arts. He is currently leading the ViDeX project at UBC in partnership with the Microsoft Development Center.

Dongwook Yoon

Dongwook is an Assistant Professor at UBC. He focuses on building rich collaboration systems that offer expressive multimodal interactions (i.e., interactions through multiple communication channels). Dongwook's design approach translates natural human interactions into novel combinations of input modalities that serve as building blocks for fluid, rich, and lightweight interfaces.

Ido Roll

Ido is an Associate Professor at the Technion. He studies how learning environments can support students in becoming better learners and scientists, focusing on their development of information literacies, creativity, and sense making. Ido's work seeks to bridge research and teaching by identifying evidence-based practices that are effective in the context of higher education.

Samuel Dodson

Samuel is a PhD candidate at UBC. He investigates how people find, manage, and use different types of information (e.g., audio, images, text, and video). Samuel explores the tensions and breakdowns in human information interaction, and then provides implications for the design of practices and tools to address these needs.

Matthew Fong

Matthew is a PhD candidate at UBC. His research explores student trace data from VBL systems used within and beyond the classroom. Matthew is also studying the potential of video analytics and instructor dashboards in teaching with video.

PRE-WORKSHOP PLANS

The organizers will recruit workshop participants from both a variety of communities. The workshop materials will be posted on the Learning @ Scale conference website.²

WORKSHOP STRUCTURE

12:00–12:15 (15 minutes) Welcome

The organizers will introduce the agenda and the goals.

12:15–13:00 (45 minutes) Position Paper Presentations

To increase awareness among the attendees, organizers will coordinate a presentation session where each attendee will introduce their research interests and the abstract of their position paper.

13:00–13:15 (15 minutes) Break

13:15–14:15 (60 minutes) Discussing AI-based VBL

Participants will breakout into groups to discuss challenges and opportunities with VBL, and the implications of applying AI in the context of VBL.

14:15–15:00 (45 minutes) Synthesizing

Participants will be asked to synthesize their discussions (e.g., through a mockup, scenario, skit, Wizard-of-Oz, and so on). The organizers will provide a variety of resources and tools to help participants express themselves.

15:00–15:45 (45 minutes) Reporting with Q&A

Breakout groups will report back to the group through presentations on their discussion, and will provide their take-away message(s) on the role(s) of AI in VBL.

15:45–16:00 (15 minutes) Closing

The workshop will conclude with a group discussion about the outcomes of the day, summarizing the challenges and opportunities for designing the future of AI video-based teaching and learning at scale.

POST WORKSHOP PLANS

Following the workshop, the organizers plan to write a special issue paper on the insights gained during the workshop.

² <http://learningatscale.acm.org/las2020/>

CALL FOR PARTICIPATION

We invite position papers for a half-day workshop exploring the potential of artificial intelligence (AI) for video-based learning (VBL) at scale. This workshop offers an interdisciplinary forum for all interested in designing and / or critiquing AI approaches, such as machine learning, natural language processing, computer vision, and big data analytics. Discussions of the potential ethical challenges of AI in education, such as student privacy, bias and discrimination, and labor, are strongly encouraged.

This workshop aims to identify research topics for researchers and practitioners and to build a community around this area.

We welcome two to four page position papers in the CHI Extended Abstracts Format. All papers will be single-blind peer reviewed by the program committee, in order to assess the relevance, quality, and topical diversity of submissions. Participants from all backgrounds are welcome. Accepted submissions will be presented at the workshop. All submissions are due by July 12, 2020 via email to Kyoungwon Seo.³ Notifications of acceptance will be sent no later than July 28, 2020. At least one author of each accepted position paper must attend the workshop, and all participants must register for both the workshop and at least one day of the 2020 Learning @ Scale conference.

We intend to publish a special issue paper summarizing the results of the workshop, and outlining how the Learning @ Scale community can move towards realizing the potential of AI for video-based teaching and learning.

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