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Lecture Video and Scene-related Knowledge Sharing Common Platform Design and its Prototyping

-A Practical Example of Learner-centric Open Video Content Service-

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Abstract: Open Course Ware (OCW) was first adopted by universities to release text-based lecture notes, and lecture videos are a recent addition. We have designed Web site which can be shared among OCW member universities without their own facility for sharing lecture video and lecture-scene-related-knowledge. We initially propose the 'Social Curator Collaboration Model' which creates an environment that general public user other than course lecturer can participate as learning assistant to reply to other learner's questions or opinions. We also propose Web-API function mash-up architectural design to realize OCW common platform. We have evaluated the functionality of our proposed model by prototyping the infrastructure and challenged it with real OCW lecture video.

Keywords: video sharing, knowledge sharing, open courseware

Introduction

Online video learning is flourishing due to the explosion of high-speed Internet access. 23 Japanese universities have joined JOCW, a consortium of OCW-related organizations in Japan, and begun OCW activities. Most launched OCW-site with text based lecture notes at first, but have begun to publish lecture videos. We have opened a Web site which can be shared among universities without their own facility for distribution of lecture video [1].
Public opinion poll concerning JOCW activities has been conducted in the form of the Internet research annually since 2006. They show more than 80% of the respondents want to use OCW materials for their own learning and 80% of people would like to watch lecture videos and exchange opinion among users regarding lectures [2].
Lecture video distribution and opinion exchange are so expensive to implement that a common OCW platform is essential. Down-to-earth gathering of lecture video viewer's feedback and resulting collective-intelligence on the common platform shall improve learner's better understanding. Lecture video and its scene-related- knowledge sharing in the learner-centric usage scenario rather than simply distributing content shall be realized.
In this paper we initially propose the 'Social Curator Collaboration Model' which allows public users to participate as learning assistants by replying to other learner's questions or comments. To realize the OCW common platform, we introduce a Web-API function mash-up architectural design. In this paper OCW common platform design methodology and experimental Web site prototyping as well as functional evaluation through real OCW lecture video content are described.

1. Learner-centric Common Platform Design for Open Content Sharing

1.1 Challenge in learning via open environment

Unlike closed environments such as formal classrooms, open environments for self-learning have great difficulty in motivating general public users. Thus it is necessary to provide functions such as teaching assistance or opinion exchange. On the other hand OCW consortium members are unable to provide follow-up support because it is an open and free publication of formal university course. An interesting tactic is to create an environment that allows the general public to collaborate and support each other. Existing comment sharing facilities allow users to conduct detailed discussions, however, actively discussed or not are uncertain under the circumstance that who replies and when replies are unknown. In this meaning learner-centric workflow fitted to OCW activities is unclear.

1.2 Usage Scenario

We propose 'Social Curator Collaboration Model' and typical usage scenario is shown in Figure 1. Original lecture video content is uploaded to OCW portal site. General public users freely review any lecture video contents on the site at any time without membership subscription. Subscribed users (hereafter learners) can post lecture-related questions on the bulletin board. A learner who can support other learner (hereafter social curator) is allowed to answer for the questions. Questions and answers are accumulated so that other learners might discover recent Q&A activities. Workflows are realized by both OCW member university's voluntary work and general public's collaborative work.

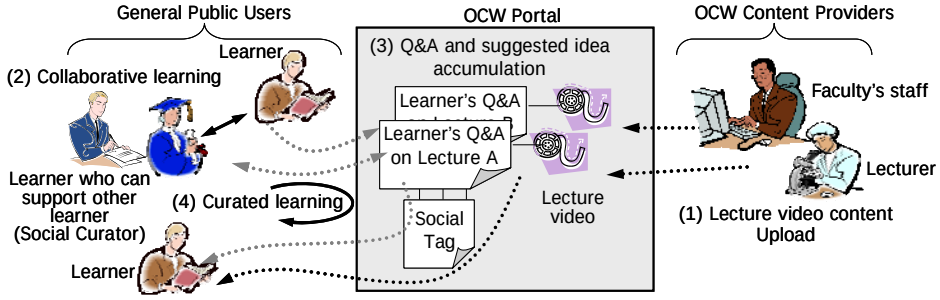


Figure 1 Usage scenario of 'Social Curator Collaboration Model'

1.3 Minimum Requirements

The common platform must satisfy the following requirements:
Lecture video content shall be uploaded and published among general users by lecturer or faculty's staff.
Learners can discover and review their favorite lecture video.
Learners can put and share comments such as Q&A, suggested ideas, or opinions linked to its original lecture video.
Learners are able to find lecture video with Q&A(s).

2. Prototype Implementation

2.1 OCW Common Platform Implementation

MIT and other OCW member universities already have their own YouTube-based facilities. As a video content distribution only infrastructure, YouTube is thought to be one of the best

solutions from the viewpoint of acquiring a specific reputation. In contrast, we focused on the concept of incrementally enhancing the effectiveness lecture videos through the collection and publication of lecture related-comments such as Q&A or suggested idea with less increase of university's faculty stuff's voluntary work.

As described in 1, workflow design for 'Social Curator Collaboration Model' remains unfixed so the infrastructure must be flexible enough to develop in a trial and error manner. Unlike previous research [3], we create our common platform by using the Web-API function mash-up of a video sharing site and a bulletin board, ClipLife [4] and SceneKnowledge [5], respectively, as shown in Figure 2. ClipLife provide resource exhausting video sharing functions such as video content storage, video-format conversion, and video streaming. ClipLife and SceneKnowledge provide Web-API functions so that common platform has been implemented on OCW Web portal sub domain and management workflow and operational rules fitted to educational purposes can be designed in a simple manner. Only very small applets that use HTTP/JSON WEB-API calling procedures are needed to access lecture video content sharing functions including video format conversion and data store for video streaming function provided.

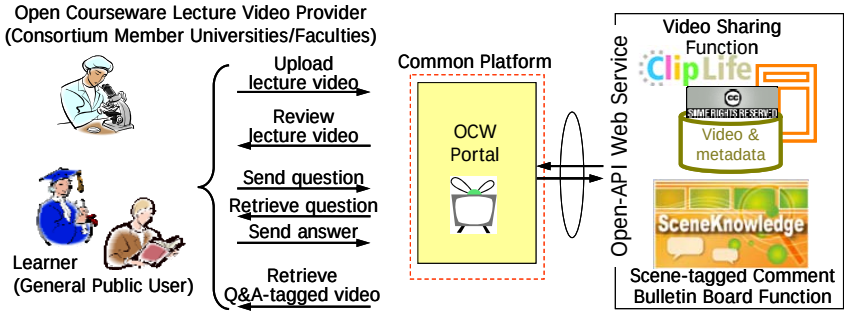


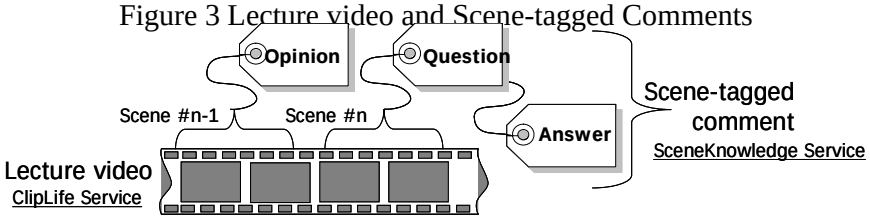
Figure 2 Common Platform Implementation based on Web-API service mash-ups

2.2 Functional Implementation

By using ClipLife video sharing service, member universities can upload up to 500M bytes lecture video of widely available video format at any time without their own video distribution facilities such as storage and video streaming. ClipLife provides a function to set the by-nc-sa (Non-Commercial-Share- Alike) Creative Commons License condition [6] which allows learners to download original lecture video content and view it off-line.

SceneKnowledge bulletin board service handles 'Scene-tagged comment' as shown in Figure 3 and provides a user-friendly Web interface to annotate lecture videos, post scene-tagged comment and share among the pre-defined members. Its Web interface appearance is shown in Figure 4. SceneKnowledge was used to evaluate over the lecture video on the closed user group (i.e. registered students for each course lecture) [7], however, this is the first trial to evaluate its ability to gather lecture-scene-related comments on open environment. Currently, lecturer can choose or change the status of bulletin board publication for each lecture video; if scene-tagged comments are not desired, only the video sharing function is active.

Figure 3 Lecture video and Scene-tagged Comments



2.3 Learner-collaboration Workflow prototyping

Our initial implementation of trial workflows is listed below.

1. List of available bulletin boards linked to lecture videos can be checked.
2. Learners post scene-tagged questions and social curators retrieve scene-tagged comments with ease and reply to each. Status of questions replies can be checked.
3. List of accumulated Q&A and their review frequency can be checked.

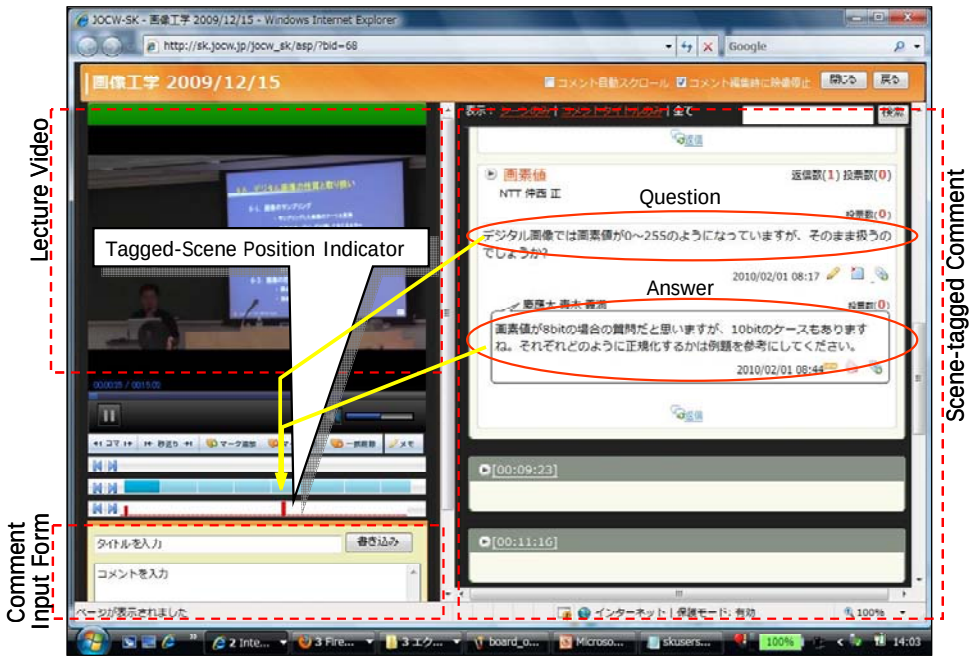


Figure 4 WEB Interface of SceneKnowledge Bulletin Board

The Scene-tagged comments enables users to exchange detailed or specific discussions, however, it is difficult for other users to discover these exchanges. Our solution is to realize typical Q&A routine among learners (denoted as ‘Quick Q&A Turnaround Workflow’). Each time a learner visits the OCW portal site, a list of recent initial scene-tagged comments can be displayed with one click linking to directly review the comment of interest. This function reduces the delay until a response is posted, which will encourage learners to keep asking questions.

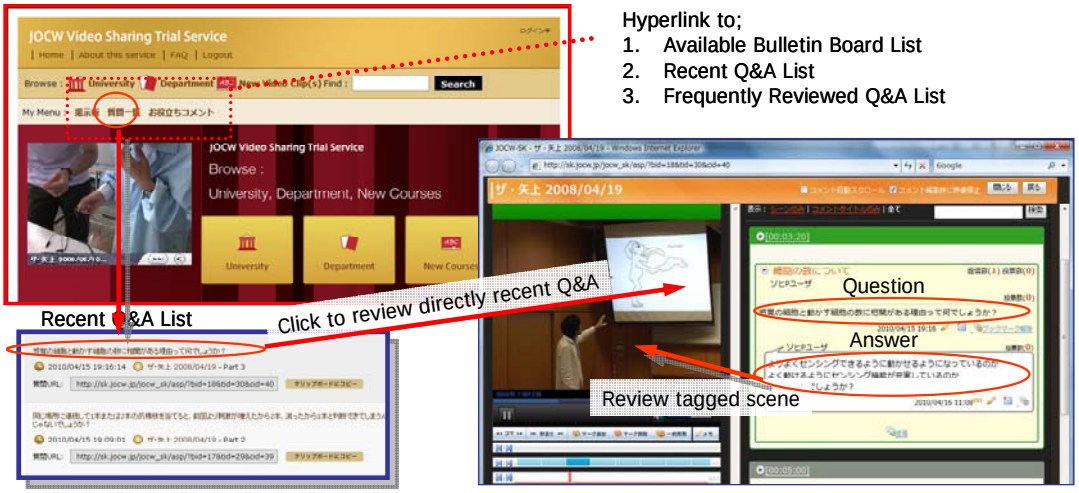
3. Functional Evaluation

3.1 Video sharing facility evaluation

Video sharing workflow has been implemented and a total of 111 lecture videos from Kagawa Nutrition University, Keio University, and Meiji University were uploaded and made available via the Internet. Each video has been encoded at 768kbps Flash Video (H.264 Codec), which is nearly equivalent to the quality of YouTube’s standard definition (SD) mode. Average time required to upload each lecture video is approximately 6.2min, much faster than its production. The bottleneck is the manual editing of lecture videos before uploading. An automated approach to postproduction editing will ease this bottleneck [8].

3.2 Scene-tagged comment sharing facility evaluation

Four persons with SceneKnowledge bulletin board experience evaluated scene-tagged comment sharing facilities. Eight of 39 lecture videos were scene-tagged with comments and shared. Typical access time from 'choosing one of recent Q&A by clicking hyperlink'



to 'start reviewing tagged-Q&A with original lecture video' is 5sec. We functionally confirmed the 'Quick Q&A Turnaround Workflow' as shown in Figure 5.

Figure 5 'Quick Q&A Turnaround Workflow' utilizing Web-API functions

4. Conclusion

In this paper we proposed the design methodologies for an open content sharing portal service which can be shared among OCW member universities without their own facility for lecture video and lecture-scene-related-knowledge sharing.

We initially propose the 'Social Curator Collaboration Model' which allows learners to assist each other and prototyped OCW common platform by a combination of video sharing service and bulletin board scene-tagging service. We implemented 'Quick Q&A Turnaround Workflow' as a typical Q&A routine among learners and evaluated its functionality by challenging it with real OCW lecture video. Proposed Web-API mash-up method was confirmed effective for trial and improvement style workflow design. We will qualitatively evaluate trial workflow under open environment in the near future and refine it utilizing Web-API function mash-up methodologies.

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